Salmon Bycatch Monitoring and Sampling Results for the Pacific Region 2024/25 Groundfish Trawl Fishery

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ABSTRACT

Lagasse, C.R., Fraser, K.A., Braithwaite, E., Komick, N. 2026. Salmon Bycatch Monitoring and Sampling Results for the Pacific Region 2024/25 Groundfish Trawl Fishery. Can. Manuscr. Rep. Fish. Aquat. Sci. 3318: vi + 38 p. https://doi.org/10.60825/s7pb-fq56

Beginning fall 2022, new monitoring and retention requirements for salmon bycatch were introduced in the Pacific Region Option A groundfish trawl fishery to improve the accuracy of catch estimates and collect information on Chinook salmon stock composition and coded wire tags (CWT). This report describes results from the enhanced salmon bycatch monitoring program for the 2024/25 groundfish fishery and 2024 calendar year, including salmon bycatch by species, stock composition, CWT indicator stock catches, and age composition of Chinook salmon bycatch. The 2024/25 fishery was the first year under a salmon bycatch management plan that introduced a fleet-wide annual bycatch cap of 9,500 Chinook salmon. There was an estimated total of 7,527 salmon caught in the 2024/25 groundfish fishery including 7,040 Chinook salmon. CWT and genetic stock composition estimates indicate that most bycatch of Canadian origin Chinook salmon was from the Fraser Fall 4(1) stock management unit (78%), which includes CWT exploitation rate indicator stocks from the Chilliwack and Harrison Rivers.

RÉSUMÉ

Lagasse, C.R., Fraser, K.A., Braithwaite, E., Komick, N. 2026. Salmon Bycatch Monitoring and Sampling Results for the Pacific Region 2024/25 Groundfish Trawl Fishery. Can. Manuscr. Rep. Fish. Aquat. Sci. 3318: vi + 38 p. https://doi.org/10.60825/s7pb-fq56

À partir de l'automne 2022, de nouvelles exigences de surveillance et de rétention des prises accessoires de saumon ont été introduites dans la pêche au chalut de fond de la région du Pacifique (Option A) afin d'améliorer la précision des estimations de prises et de recueillir des informations sur la composition des stocks de saumon quinnat et les étiquette de fil codée (CWT). Ce rapport décrit les résultats de la pêche au poisson de fond 2024-2025 et de l'année civile 2024, y compris les prises accessoires de saumon par espèce, la composition des stocks, les prises des stocks indicateurs de CWT et la composition par âge des prises accessoires de saumon quinnat. La pêche 2024-2025 a marqué la première année de mise en œuvre du plan de gestion des prises accessoires de saumon, qui prévoyait un plafond de prises accessoires à l'échelle de la flottille de 9 500 saumons quinnats. On estime que 7 527 saumons ont été capturés lors de la pêche au poisson de fond 2024-2025, dont 7 040 saumons quinnats. Les estimations de la composition génétique et du CWT des stocks indiquent que la plupart des prises accessoires de saumon quinnat d'origine canadienne provenaient de l'unité de gestion des stocks Fraser Fall 4(1) (78%), qui comprend les stocks indicateurs du taux d'exploitation du CWT des rivières Chilliwack et Harrison.

INTRODUCTION

Beginning in September 2022 an enhanced salmon bycatch monitoring program was initiated in the groundfish trawl fishery. The purpose of the program was to provide accurate estimates of Pacific salmon bycatch by species and assess the stock composition and CWT recoveries of Chinook salmon bycatch. Prior results from the enhanced monitoring program were described in Lagasse et al. 2024 and Lagasse et al. 2025, focusing on the 2022/23 and 2023/24 groundfish fisheries, respectively. This report describes salmon bycatch monitoring and sampling results for the 2024/25 groundfish fishery and the 2024 calendar year. We provide information on salmon bycatch by species for the 2024/25 fishery from February 21, 2024 to February 20, 2025. Information on stock composition, CWT indicator stock catches, and age composition of Chinook salmon bycatch is reported for the 2024 calendar year.

The results in this report represent the second full year of mandatory retention requirements and sampling to better understand potential impacts of the groundfish trawl fishery on Chinook salmon stocks of concern. The monitoring requirements and methods used to estimate catch by species and stock composition are similar to those described in Lagasse et al. 2025, with a few updates to monitoring procedures to support implementation of the new salmon bycatch management plan. This plan was introduced for the 2024/25 fishery and included a Chinook salmon bycatch cap of 9,500 Chinook salmon for the trawl fleet along with individual vessel bycatch cap allowances.

METHODS

Groundfish Trawl Catch Monitoring and Sampling

Commercial groundfish trawl catch is monitored and reported using a combination of fisher logs, audits of independent at-sea electronic monitoring (EM), and dockside monitoring program (DMP) validation of landed catch. While hailed out, all vessels must keep accurate records of fishing activities in an electronic fishing log while ensuring that the at-sea EM systems are fully operational. At the end of each fishing trip, all landed catch must be independently validated by the DMP during offload to ensure accurate catch weights for each species. Further details on monitoring requirements for the groundfish trawl fishery are detailed in Appendix 8 of the Groundfish Integrated Fisheries Management Plan (DFO 2024).

Retention and sampling requirements for Pacific salmon bycatch in the Option A groundfish trawl fishery were changed in 2022 to enable accurate estimation of the number of salmon caught by species, and accurate estimation of stock composition for Chinook salmon catch. For the 2024/25 groundfish trawl fishery, minor updates to monitoring procedures were implemented to support in-season tracking of Chinook salmon bycatch as part of the salmon bycatch management plan. Changes to monitoring and retention requirements for salmon were implemented via section 52 scientific licences that were issued to each vessel participating in the Option A groundfish trawl fishery. Requirements for the 2024/25 groundfish trawl fishery are provided in Appendix A and summarized below by catch type with vessels landing catch fresh on ice subject to different requirements than vessels that head, gut, and freeze catch at-sea.

For vessels landing fresh catch, which consist of most Option A trawl licence holders, all Pacific salmon were required to be retained and landed whole for DMP validation of catch numbers and weights by species. From April to June 2024, 25% of trips were randomly selected for collection of Chinook and Coho salmon heads by dockside observers, with the random selection occurring after vessel hail-in. The trip sample rate was increased to 50% from July 2024 to March 2025 to ensure sufficient samples were

collected to representatively estimate stock composition following reduced catches under the salmon bycatch management plan.

For vessels landing frozen catch headed and gutted at sea, also known as receiving tank vessels, scientific licences required the retention of salmon heads only, in recognition of the limited freezer space available for storage of non-marketable fish. Receiving tank vessels were responsible for cutting, bagging, and labelling heads on all trips according to instructions provided by DFO (Appendix A). Salmon smaller than 30cm in length were required to be retained whole to enable accurate species identification, however, only a small portion of catch was expected within this size range. Vessels were required to bag heads separately for each tow, with a maximum of ten heads loosely packed in each bag to facilitate efficient species identification and counting. Chinook salmon heads were required to be bagged separately from other salmon species because they were the dominant species of salmon bycatch and the only species managed under a bycatch cap. At offload, bagged heads were examined and counted by dockside observers for independent validation of catch by species.

Validated salmon catch by species from all vessels was recorded in Vericatch, the trawl fishery's catch and sample logging system, after each trip. Catch of Chinook salmon from each trip was counted towards the individual vessel Chinook bycatch cap allowance and the fleetwide Chinook salmon bycatch cap. After validation, Chinook salmon heads were packaged and labelled by dockside observers, placed in cold storage, and shipped to the DFO-contracted coded wire tag (CWT) lab at J.O. Thomas and Associates Ltd. Every head was identified to species, counted, and examined for the recovery of a CWT using lab dissection techniques. DNA cheek tissue samples were collected from heads that did not have CWTs. Heads from other salmon species were not retained for further sampling during the 2024/25 fishery.

In addition to the enhanced monitoring and sampling protocols, bio-sampling of length, sex, and adipose clip status was conducted for Chinook salmon bycatch from the Strait of Georgia hake fishery from October 2024 to March 2025. This sampling of individual fish aimed to better characterize the size and sex distribution of Chinook salmon catch from a portion of the fishery where Chinook salmon bycatch is most easily accessible to dockside observers. Individual biodata was matched to CWT and stock identification information using the DNA sample ID. All trips from vessels targeting hake in the Strait of Georgia were sampled using these enhanced bio-sampling procedures from October 1, 2024 to March 31, 2025. Otolith samples were also collected from 100 Chinook salmon each for catch originating from the West Coast Vancouver Island and Strait of Georgia regions for stable isotope analysis.

Catch and Effort Estimation

Estimates of numbers of salmon caught by species were compiled from the Official Catch table in the 'Groundfish views of FOS' (GFFOS) database, a restructured version of DFO's Fisheries Operations Systems database. Landed counts recorded by DMP observers were used as the official catch of salmon by species for all trips, including receiving tank vessels that bagged and retained heads only. This procedure was modified from previous years of the enhanced monitoring program, where lab enumeration was used as the best catch estimate for receiving tank vessels, to correspond with the shift to dockside validation of all salmon bycatch as part of the salmon bycatch management plan.

Salmon catch was matched to fishing events (i.e. the trawl tow) to determine location and gear sub-type (midwater or bottom trawl) using fisher log information where available. For salmon heads that could not be matched to a specific tow due to unlabeled samples or catch not reported in fisher logs, catch locations were inferred by PFMA and region based on the locations of all tows within a trip. A small portion of

salmon bycatch was assigned to an unknown category because fishing activity occurred in multiple regions and could not be associated to a specific region.

In March 2024, a receiving tank vessel conducted experiments with a bycatch reduction device to evaluate escape rates for salmon and its effect on catch per unit effort (CPUE) while targeting Walleye pollock (*Gadus chalcogrammus*) around Johnstone Strait and Queen Charlotte Strait. These experiments were conducted under a scientific permit and not counted towards the individual vessel bycatch allowance or the fleetwide bycatch cap, however, we included these results in catch estimates as well as stock composition. Results from this experiment are described in a report by Archipelago Marine Research Inc and not included here.

Stock Composition and CWT Analysis

The collection of CWT and DNA samples allowed estimation of stock composition and catch by stock from Chinook salmon bycatch, and also provided information on bycatch age composition. To representatively sample for stock identification, all Chinook salmon heads were first examined for the presence of CWTs. Any heads that did not contain a CWT had a DNA sample collected from cheek tissue. A sub-sample of DNA was selected for parentage-based tagging (PBT) and genetic stock identification (GSI) analysis, targeting a minimum sample size of 150 within each catch strata or a sample rate greater than 25% dependent on total catches within the strata.

The catch strata for estimation of stock composition and total CWT recoveries consisted of combinations of regions (West Coast Vancouver Island, Strait of Georgia, Queen Charlotte & Johnstone Strait, North Coast, or unknown), catch type (fresh or frozen), and time periods (January – June or July – December, 2024). These factors combined to form 16 possible catch strata during the 2024 calendar year (see Appendix B for all strata). Out of these catch strata, 13 included CWT and DNA samples and were included for estimation of stock composition and catch by stock. For reporting purposes, both catch types were combined in order to meet the “rule of three” privacy requirements when reporting on fisher catch data.

Stock Composition Analysis

Stock composition of Chinook salmon bycatch in each stratum was estimated using both CWT and genetic methods to identify fish to population or Conservation Unit (CU) of origin, which were rolled up to the stock management unit (SMU) level for reporting (see Appendix C for correspondence between SMU, CUs and genetic reporting units). CWT recoveries can determine the stock of origin to high accuracy and resolution for populations that have been tagged. For fish that did not contain a CWT, a sub-sample of DNA tissue samples were analyzed by DFO’s Molecular Genetics Lab to determine stock of origin using PBT or GSI assignment methods from a panel of at least 150 single nucleotide polymorphisms (SNPs) (Beacham et al. 2018).

GSI assignment matches genetic markers (SNPs in this case) from samples to baselines collected from spawning grounds to identify the population of origin for wild or hatchery salmon, while PBT assignment matches sampled fish with their parents from hatchery broodstock, allowing determination of the hatchery of origin and age of sampled fish (Beacham et al. 2018). While GSI provides river or region of origin for most Chinook, including Alaska and the southern US, PBT results are limited to Canadian populations that have PBT programs in place. When available, PBT results provide better accuracy and resolution than GSI and were used instead of GSI to determine stock of origin where available, with the combined application of both methods denoted by PBT-GSI.

To determine stock proportions and catch by stock in each catch strata, separate stock proportions were estimated using CWT versus GSI-PBT methods, and then a combined stock proportion was calculated by weighting these proportions according to their respective partition of the catch. For rare cases where a fish was identified using both CWT and GSI-PBT methods, the CWT assignment was used due to its higher resolution and accuracy. The CWT partition was the proportion of the Chinook bycatch in the strata represented by CWTs, calculated as the number of CWTs recovered divided by the number of heads collected and examined. The GSI-PBT partition was then the remaining proportion of the catch. This partitioning prevented bias in stock composition estimates associated with the higher sample rate for CWTs versus GSI-PBT, ensuring that stocks without CWT indicator programs would be accurately represented when estimating stock proportions.

We assumed 100% accuracy from stock assignments using CWT and PBT methods, and characterized uncertainty in GSI stock proportions by bootstrapping assignment probabilities. For each Chinook salmon identified using GSI, we simulated 1,000 samples from a probability distribution equal to the assignment probabilities for each stock. We then estimated stock proportions from GSI-PBT samples in each strata by calculating the mean proportions of samples assigned to each stock across all simulations. Uncertainty in GSI stock assignment was summarized using 95% confidence intervals (±1.96 SD) of the stock proportions across all simulations. Finally, the mean weighted stock proportions from CWT and GSI-PBT stock assignments with confidence intervals were multiplied by catch in each strata to obtain estimates of catch by stock including uncertainty in GSI assignment.

CWT Analysis

For Chinook salmon bycatch in the trawl fishery, we estimate total CWT recoveries to provide information on mortality of exploitation rate indicator stocks in Canada. The Chinook Technical Committee (CTC) of the Pacific Salmon Commission uses CWTs to perform an annual exploitation rate analysis (CTC 2023), and currently monitors 45 Chinook CWT exploitation rate indicator stocks, including 16 within Canada (see Appendix D for geographic locations, stock acronyms, and full stock names). Notably, this includes Harrison and Chilliwack River indicator stocks, which are both within the Fraser Fall 4(1) SMU and cannot be reliably distinguished using genetic methods. The CTC uses CWT recoveries to estimate exploitation rates in fisheries, however, this analysis is developed for salmon-directed fisheries only.

To estimate total CWT recoveries of Canadian Chinook indicator stocks within each catch stratum, we divide the number of CWTs observed for each stock by the CWT sampling rate in each stratum. The CWT sample rate was the number of Chinook salmon heads collected divided by the total Chinook salmon catch in each stratum.

Age Composition

We provide a summary of Chinook salmon bycatch age composition data using brood year assignments from CWTs and PBT analysis. Due to the Covid pandemic, most Canadian CWT indicator stocks from the 2019 brood year were not tagged, therefore age 5 fish are not represented in the CWT age data. However, these fish likely represent only a small proportion of samples based on current and previous year age compositions (Lagasse et al 2025). We report on age composition by SMU for trawl bycatch in all regions, as well as age composition by region where PBT sample sizes were four or greater.

RESULTS

Salmon Bycatch

There was an estimated total of 7,527 salmon caught in the 2024/25 groundfish fishery, which was less than a third of the previous year's catch of 28,145 (Table 1, also reported by calendar year in Table 2). Total bycatch of Chinook salmon was 7,040 pieces in 2024/25, representing 94% of salmon caught. This total bycatch includes 666 Chinook salmon caught under scientific licence during experiments on a bycatch reduction device that did not count towards the fleetwide Chinook salmon bycatch cap. The majority of Chinook salmon bycatch occurred using mid-water trawl gear, with 84% or 5,940 Chinook salmon caught using mid-water trawl gear (Table 3).

Bycatch of Chinook salmon was lower across all regions and months compared to the previous two years of the enhanced monitoring program (Figure 2). The highest catches occurred in the West Coast Vancouver Island (WCVI) region between May and October (Figure 2 4). Vessels in this region targeted a mixture of species, but Pacific Hake landings were much lower compared to previous years due to reduced abundance of the stock in Canadian waters.

Stock Composition and CWT

Over the 2024 calendar year, 2,042 samples from individual Chinook salmon were collected and successfully analyzed to determine stock of origin, representing 28% of estimated Chinook salmon bycatch. Of these samples, 1,196 were assigned to stock of origin using GSI and 239 could be matched to parental origin using PBT. There were 607 CWTs successfully analyzed and matched to a release group by tag code out of 4,523 Chinook heads that were collected (Table 5). Analyzed samples covered all regions and time periods where Chinook salmon bycatch was observed (Figure 33).

Sampling rates for Chinook salmon bycatch were variable using CWT and PBT-GSI, with most regions and time periods represented with CWT and PBT-GSI sampling rates above 20% (Table 5). Sample rates increased in the second half of the year with sample rates above 20% in all strata and with sample rates above 50% in many strata following the increase in sampling rates for vessels landing fresh catch (Table 5).

Stock Composition

Chinook salmon stock composition was variable among regions and time periods with the proportion of Canadian origin stocks in trawl salmon bycatch ranging from 32 - 88% across strata during the 2024 calendar year (Figure 4, Table 6). The proportion of Canadian origin stocks was highest in the Strait of Georgia region where it was 80 - 88% throughout the year. The estimated bycatch of all Canadian origin stocks was 2,927 across all strata, representing 48% of Chinook salmon bycatch for the 2024 calendar year (Table 7).

Among Canadian origin stocks, the Fraser Fall 4(1) SMU was the largest proportion of bycatch across regions and time periods, with the exception of smaller catches in the North Coast region. Fraser Fall 4(1)s represented 23-96% of the Canadian proportion of Chinook bycatch in the Strait of Georgia (SoG), Queen Charlotte and Johnstone Strait (QC&JSt), and WCVI regions. The mean estimated bycatch of Fraser Fall 4(1) was 2,281 salmon, representing 78% of Canadian origin stocks (Figure 5). Other Canadian stocks representing greater than 1% of Canadian origin catch included the Lower Georgia Strait, Middle Georgia Strait, Fraser Summer 5(2), Fraser Spring 5(2), and Fraser Summer 4(1) SMUs.

CWT Indicator Stocks

Most CWT recoveries were from stocks of US origin, with 540 out of the 732 CWTs belonging to stocks from the US West Coast after expanding for sample rates. Tagging rates are a factor in this result; the US released nearly 256.4 million CWT Chinook between brood years 2018 and 2022, compared to just 22.6 million from Canada (PSC DSWG 2023). Total estimated recoveries of Canadian stocks were dominated by Chilliwack and Harrison CWT indicator stocks, with 121.4 and 139.7 total estimated CWT recoveries, respectively (Table 8). Cowichan River, Big Qualicum River, and Nicola River had total estimated recoveries of 31.1, 11.9 and 7.5 CWTs respectively. There were no CWT recoveries of other Canadian indicator stocks or the Similkameen River stock, which originates from the US just downstream of the Canadian Okanagan River.

Age Composition

Observed PBTs among Chinook salmon in 2024 belonged primarily to the Fraser Fall 4(1) and Middle Georgia Strait SMUs, which respectively represented 161 and 58 out of the total of 239 PBT samples (Table 9). Fraser Fall 4(1)s sampled by PBT and CWT were primarily age 2 and 3, with a higher proportion of age 3 fish in CWT samples than PBT. For Middle Georgia Strait, higher proportions of age 2 fish were observed from both CWT and PBT samples (82% and 88% respectively). There were differences in PBT age composition by stock and region (Table 10), with higher proportions of age 2 caught in the Strait of Georgia compared to Queen Charlotte and Johnstone Strait regions for PBT populations within the Fraser Fall 4(1) SMU.

Length and sex sampling

From October 2024 to March 2025, 851 Chinook salmon caught in the Strait of Georgia region were individually sampled for length, sex, and adipose clip status, in addition to typical sampling for CWTs and DNA. This bycatch occurred almost exclusively in PFMA 14 (Appendix F) when vessels were targeting Pacific hake. Mean fork lengths for these samples were 557 mm for females and 529 mm for males (Figure 8). 397 Chinook salmon were identified as female, 346 were male, while 108 could not be identified to sex. Lengths varied by age and stock, although 443 samples were not matched to stock and only a subset could be aged where PBT or CWT information was available (Table 11).

DISCUSSION

This report provides results from the second full year of the enhanced salmon bycatch monitoring program for the Pacific Region groundfish trawl fishery, based on monitoring procedures and methodologies previously described in Lagasse et al. 2025. Total bycatch of Pacific salmon for the 2024/25 fishery was reduced by more than two thirds compared to the previous year following implementation of a salmon bycatch management plan and reduced landings of Pacific Hake. The total Chinook salmon bycatch of 7,040 was closer to historical levels estimated prior to 2022/23 (Table 1) and below the 2024/25 Chinook salmon bycatch cap of 9,500.

Although total landings decreased significantly, stock composition of catch was similar to the year prior with the majority of Chinook salmon catch consisting of US origin stocks and most Canadian origin Chinook salmon bycatch belonging to the Fraser Fall 4(1) SMU. Estimated bycatch of other Canadian stocks was much lower than Fraser Fall 4(1)s, but included stocks of conservation concern, including Fraser Spring 4(2), Fraser Spring 5(2), and Fraser Summer 5(2) SMUs.

Sources of error in catch and stock composition estimates were previously described (Lagasse et al. 2025) and apply to these results. Stock composition and stock-specific catch information represent estimates

with potential error related to sampling, stock identification, and analysis of stock composition. Chinook salmon stock composition can vary significantly across weeks and months, particularly during summer periods when stocks migrate through marine areas towards their natal streams at different times (Freshwater et al. 2021). Thus, our aggregation of catch into half-year periods for estimating stock composition may not capture this variability.

Enhanced monitoring of salmon bycatch and implementation of the salmon bycatch management plan is ongoing during the 2025/26 groundfish trawl fishery. Funding for the enhanced monitoring program has been provided by the Pacific Salmon Strategy Initiative that sunsets at the end of March 2026.

ACKNOWLEDGEMENTS

The program was developed collaboratively by the trawl salmon bycatch working group that included representatives from DFO Fisheries Management, DFO Science, the groundfish trawl industry, the Canadian Groundfish Research and Conservation Society, Archipelago Marine Research, and JO Thomas and Associates. As with any fisheries monitoring and sampling program, collection of data relies upon the work and dedication of fishers, technicians, and field staff. We are grateful to trawl fishers, dockside monitors from Archipelago Marine Research, and technicians from JO Thomas and Associates for their work to count, collect, and analyze salmon bycatch.

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FIGURES

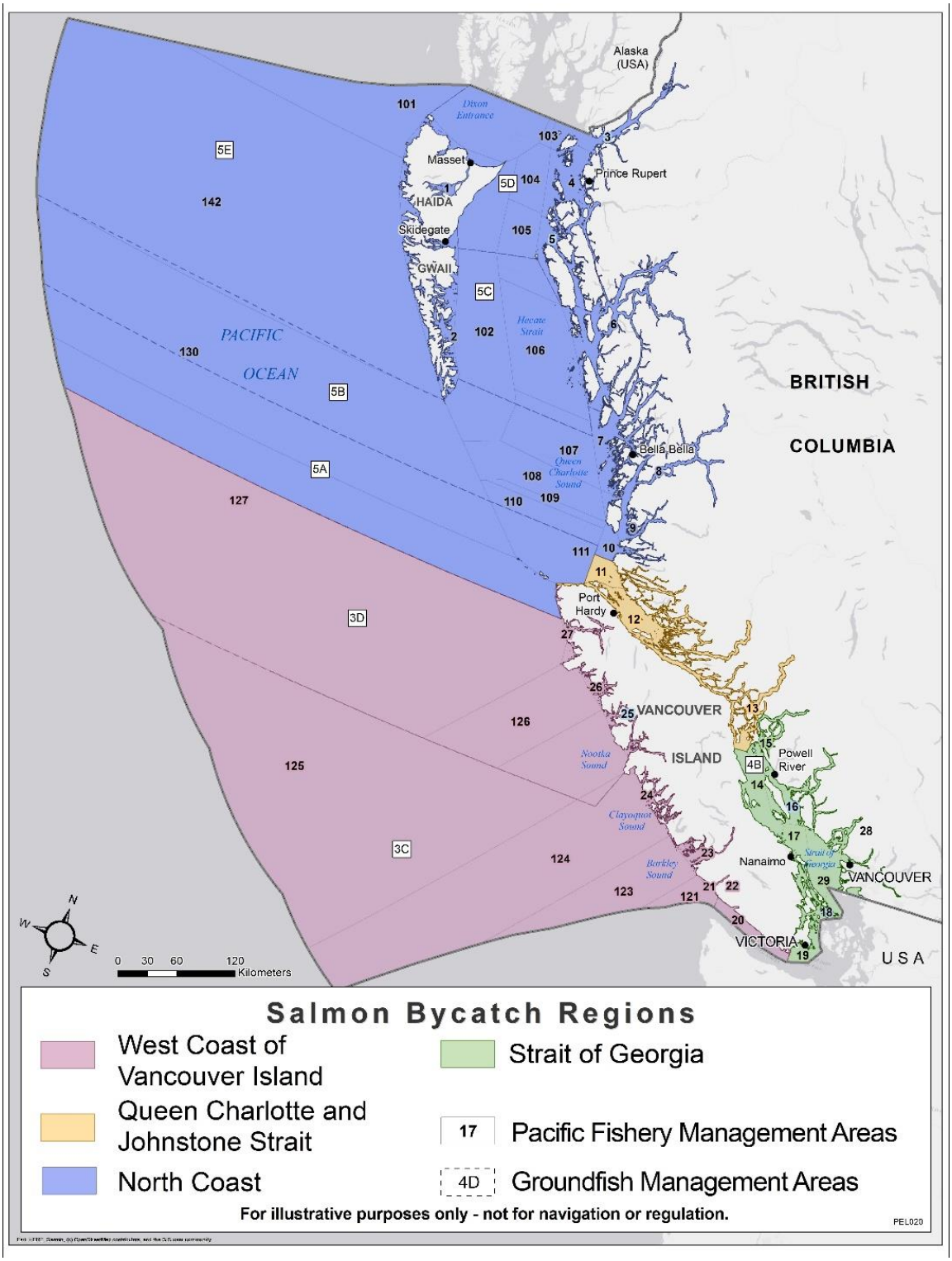

Figure 1 – Map of the British Columbia coast with regions used for stratifying salmon bycatch overlaid on groundfish management areas (dashed lines) and Pacific fishery management areas (PFMAs, solid lines).

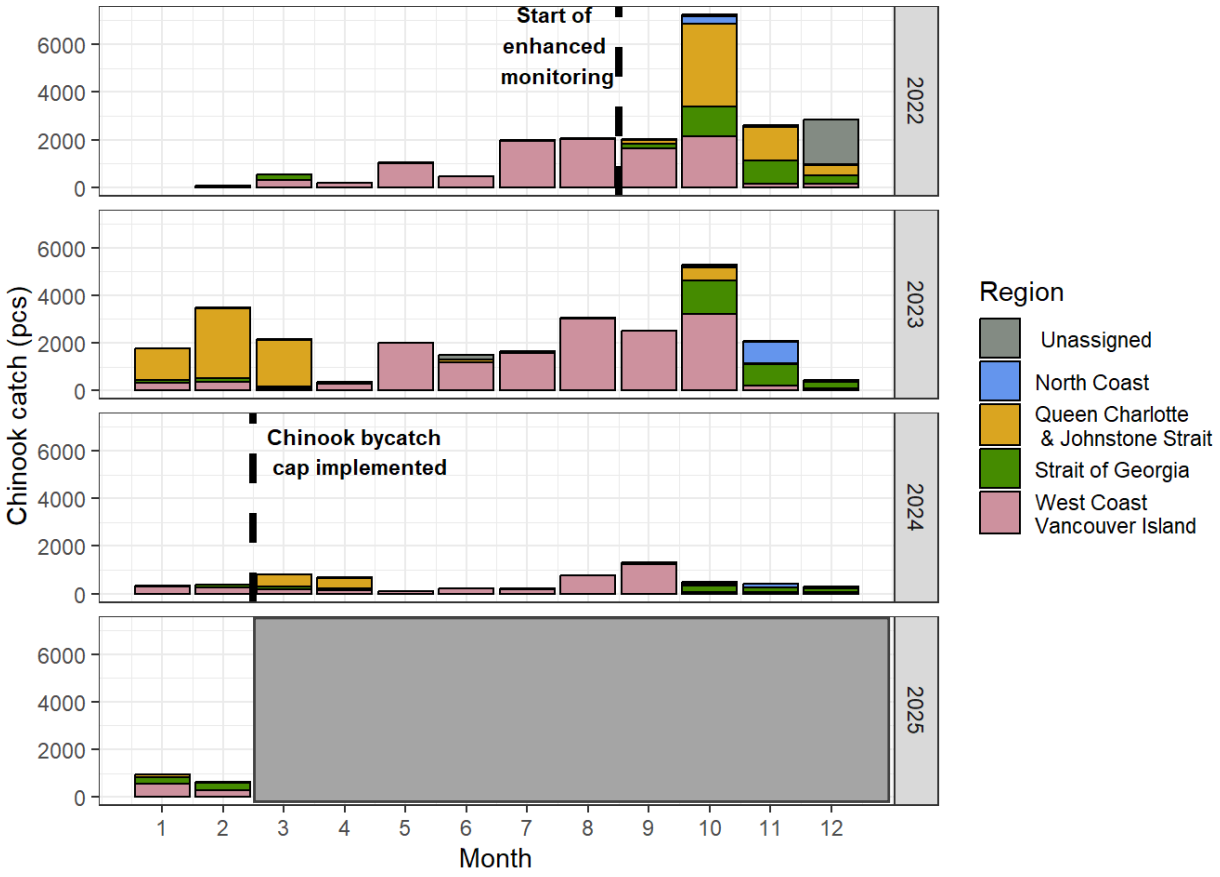

Figure 2 – Chinook salmon bycatch by month and region in the groundfish trawl fishery from 2022 to the end of the 2024/25 fishery on February 21, 2025. The enhanced monitoring program and changes to retention requirements began on September 22, 2022. Chinook salmon bycatch since February 21, 2025 is not yet available or shown.

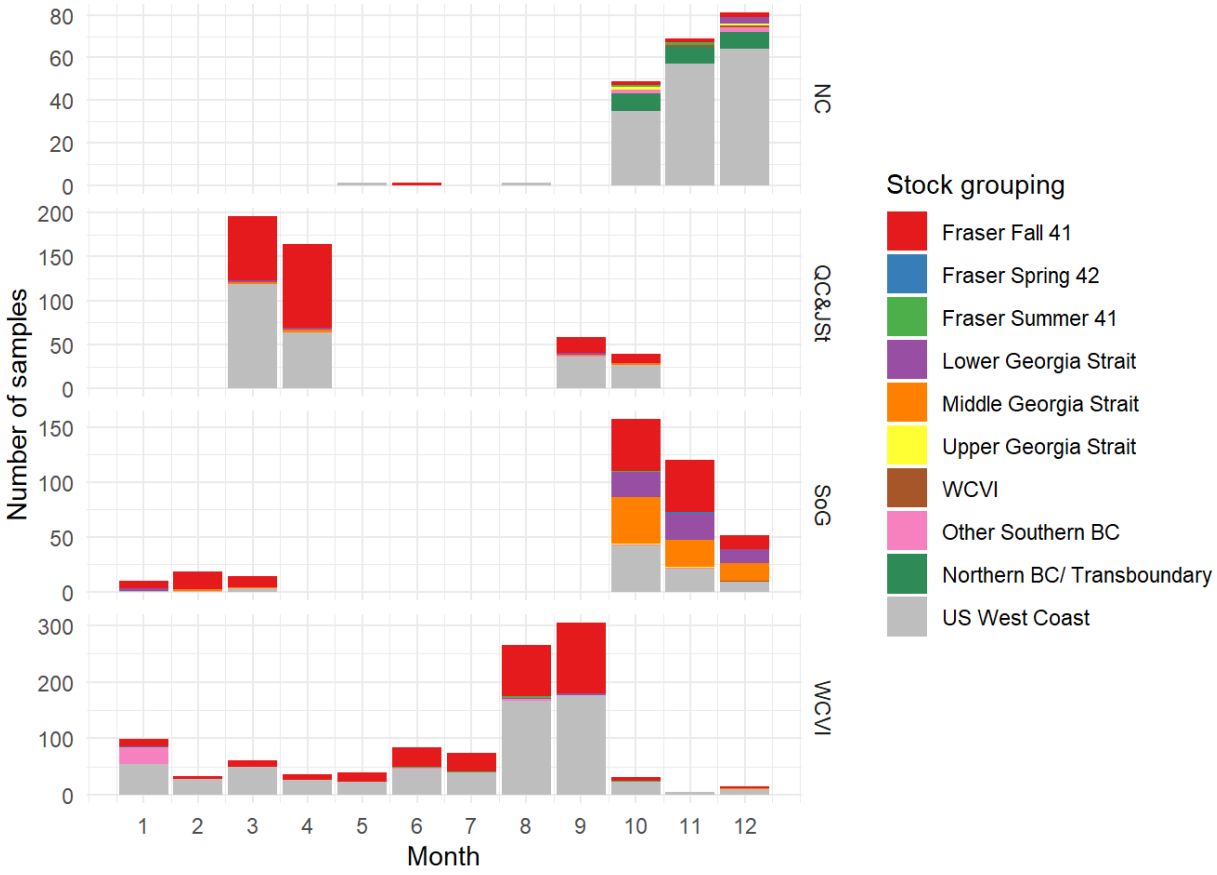

Figure 3 – Stock assignments of Chinook salmon bycatch samples from the trawl fishery in 2024 by catch region and month. Stock assignment from samples used either CWT, or GSI-PBT methods. The stock with the highest assignment probability from GSI analysis is shown in cases where there are multiple potential stocks of origin. The Other Southern BC group includes including Fraser Spring 5(2), Fraser Summer 5(2), Boundary Bay Fall 4(1), and Mainland Inlet SMUs, and the Northern BC/ Transboundary includes Nass, Skeena, Central Coast, Alsek, and Unuk SMUs. Note the different y-axis scales between panels.

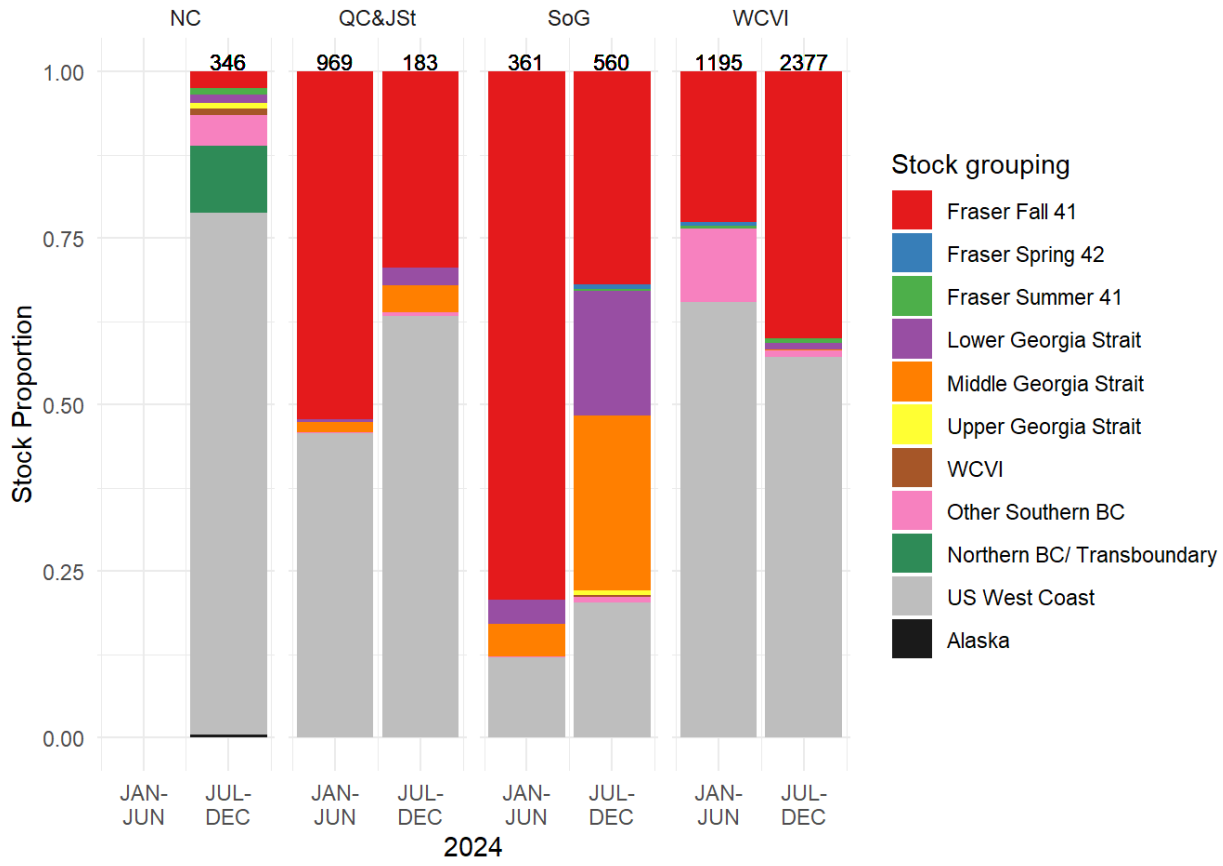

Figure 4 - Stock composition of Chinook salmon trawl bycatch by region and time period (January-June or July-December 2024). Numbers above each bar represent the total catch of Chinook salmon in the stratum. The Other Southern BC group includes including Fraser Spring 5(2), Fraser Summer 5(2), Boundary Bay Fall 4(1), and Mainland Inlet SMUs, and the Northern BC/ Transboundary includes Nass, Skeena, Central Coast, Alsek, and Unuk SMUs.

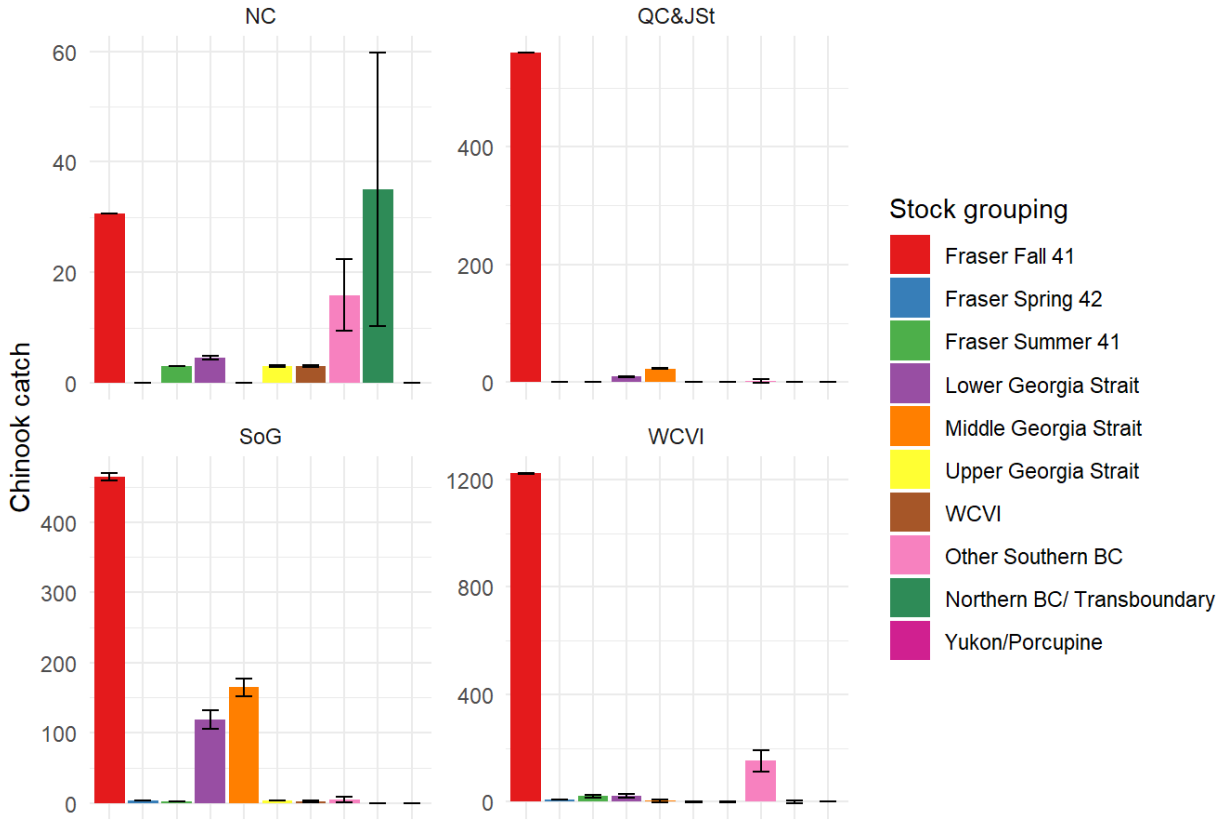

Figure 5 – Estimated Chinook salmon bycatch during the 2024 calendar year for Canadian SMUs by region including error bars representing 95% confidence intervals from GSI assignments. The Other Southern BC group includes Fraser Spring 5(2), Fraser Summer 5(2), Boundary Bay Fall 4(1), and Mainland Inlet SMUs, and the Northern BC/ Transboundary includes Nass, Skeena, Central Coast, Alsek, and Unuk SMUs. Note the different y-axis scales between panels.

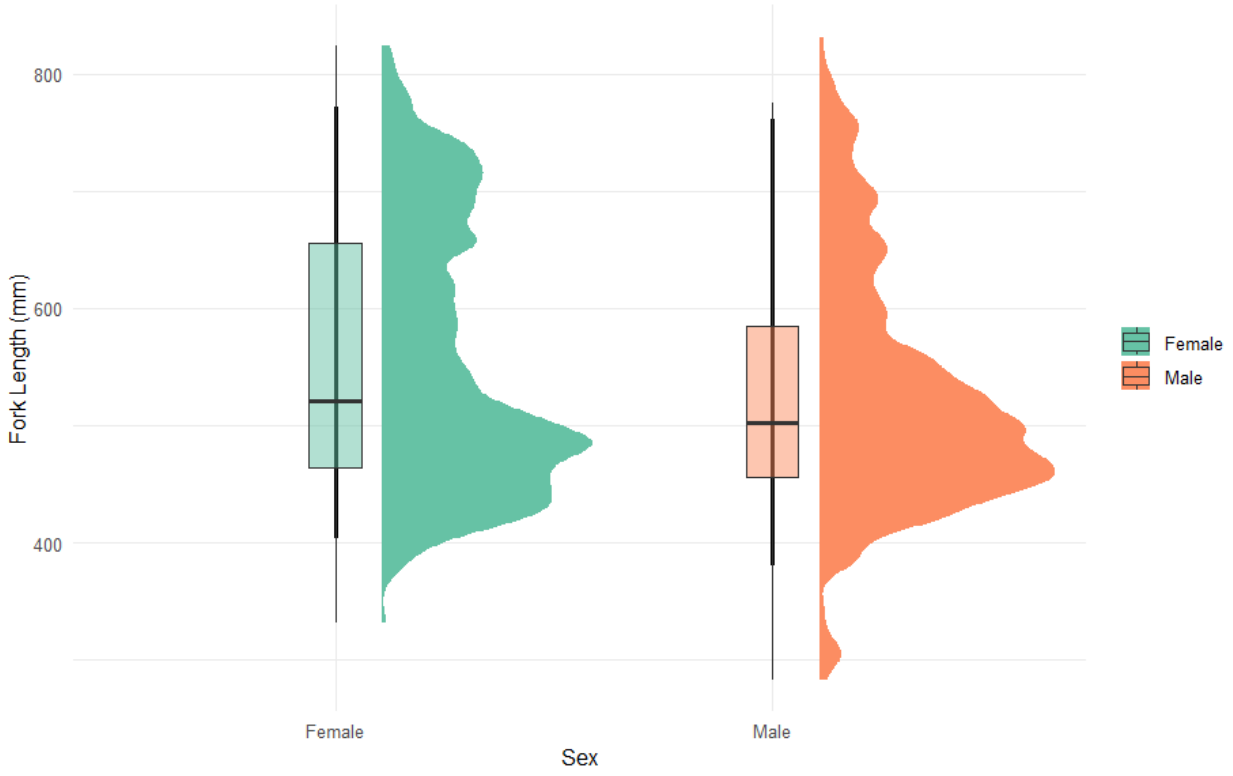

Figure 6 – Density and box plots of fork lengths by sex from Chinook salmon bycatch sampled from the Strait of Georgia region from October 2024 to March 2025. Sample sizes were 397 female and 346 male Chinook salmon. 108 samples of unknown sex are not shown in the plot. Box plot bars represent 25th, 50th and 75th percentiles.

TABLES

Table 1 – Summary of annual coastwide salmon catch (numbers of fish retained and released) by species, and landed catches (kg) in the groundfish trawl fishery reported by groundfish fishing year (February 21 of the starting year to February 20 of the subsequent year). Unidentified salmon catch was reported as Pacific salmon and trout and represents salmonids that could not be identified to species either by fisher or independent monitoring programs. Total landed catch is the landed weight of all species in the groundfish trawl fishery.

Groundfish Fishery	Total salmon (# of fish)	Chinook (# of fish)	Coho (# of fish)	Chum (# of fish)	Pink (# of fish)	Sockeye (# of fish)	Steelhead (# of fish)	Unidentified salmon (# of fish)	Total landed catch (kg)
2008/09	3,470	3,121	56	195	19	0	0	79	103,600,000
2009/10	9,611	8,628	95	191	566	32	0	99	85,280,000
2010/11	7,364	6,973	62	185	44	21	0	79	85,760,000
2011/12	11,193	9,808	242	457	328	22	0	336	90,780,000
2012/13	8,062	7,119	418	253	25	18	0	229	81,190,000
2013/14	4,813	3,034	292	218	700	16	7	553	90,790,000
2014/15	7,668	6,641	234	240	125	23	1	405	79,640,000
2015/16	7,645	6,319	193	794	122	80	4	137	80,470,000
2016/17	3,510	2,469	403	296	21	28	3	293	109,800,000
2017/18	8,265	7,320	113	394	157	39	1	242	124,300,000
2018/19	8,886	8,290	123	284	46	16	0	127	133,200,000
2019/20	7,680	6,776	199	294	80	59	10	272	132,200,000
2020/21	12,354	11,848	27	197	30	2	0	250	127,300,000
2021/22	11,627	9,635	695	708	572	17	0	0	98,350,000
2022/23[a]	28,183	26,273	628	1,099	18	42	0	123	74,710,000
2023/24	28,145	21,696	501	1,952	3,894	30	0	72	61,590,000
2024/25[b]	7,527	7,040[c]	182	263	39	3	0	0	45,750,000

[a] Changes to salmon monitoring requirements including mandatory retention began on September 26, 2022

[b] The 2024/25 fishery was the first year of implementation of the salmon bycatch management plan

[c] Includes 666 Chinook salmon caught under scientific licence for an excluder device experiment not counted towards the bycatch cap

Table 2 – Estimated annual coastwide salmon catch (numbers of fish retained and released) by species in the groundfish trawl fishery reported by calendar year.

Calendar year	Total salmon catch	Chinook catch	Coho catch	Chum catch	Pink catch	Sockeye catch	Steelhead catch	Unidentified salmon catch
2008	3,209	2,871	26	191	19	0	0	102
2009	9,646	8,666	121	178	566	32	0	83
2010	7,582	7,097	65	205	44	20	0	151
2011	11,081	9,753	242	456	325	23	0	282
2012	8,299	7,404	378	254	28	18	0	217
2013	4,681	2,898	289	212	701	14	1	567
2014	7,299	6,303	247	244	121	24	7	360
2015	8,171	6,731	211	795	119	81	4	234
2016	3,157	2,211	400	290	28	28	3	200
2017	6,839	5,944	129	394	93	39	1	240
2018	9,218	8,514	119	288	85	16	0	196
2019	7,828	6,945	146	292	96	55	9	294
2020	10,002	9,442	83	178	39	6	1	254
2021	14,270	12,255	697	729	572	17	0	0
2022	24,227	22,333	613	1,101	16	42	0	122
2023	31,941	26,091	511	1,344	3,892	30	0	73
2024	6,539	6,072	175	250	39	3	0	0

Table 3 – Number of tows and salmon catch (numbers of fish retained and released) by species, region, and gear subtype for the 2024/25 groundfish fishery year (February 21, 2024 to February 20, 2025). Catch with unspecified gear subtype represent a small proportion of tow events and are summarized across all regions only. Regions are abbreviated as follows: NC = North Coast, QC&JST = Queen Charlotte & Johnstone Strait, SoG = Strait of Georgia, WCVI = West Coast Vancouver Island, UNK = Unknown. Catch with Region UNK could not be associated to a single geographic Region.

Gear subtype	Region	Number of tows	Total salmon catch	Chinook Catch	Coho catch	Chum catch	Pink catch	Sockeye catch	Unidentified salmon catch
Bottom Trawl	TOTAL	5,212	1,095	979	9	96	11	0	0
	NC	2,613	174	75	6	82	11	0	0
	QC&JSt	0	0	0	0	0	0	0	0
	SoG	735	0	0	0	0	0	0	0
	UNK	102	0	0	0	0	0	0	0
	WCVI	1,762	921	904	3	14	0	0	0
Midwater Trawl	TOTAL	1,682	6,239	5,940	155	117	24	3	0
	NC	287	361	343	0	18	0	0	0
	QC&JSt	73	1,292	1,278	3	8	3	0	0
	SoG	391	1,376	1,360	12	4	0	0	0
	UNK	12	12	0	0	12	0	0	0
	WCVI	919	3,198	2,959	140	75	21	3	0
Unspecified	TOTAL	143	193	121	18	50	4	0	0

Table 4 – Total salmon catch (numbers of fish retained and released) by catch region and time period for the 2024/25 groundfish fishery year (February 21, 2024 to February 20, 2025). Regions are abbreviated as follows: NC = North Coast, QC&JST = Queen Charlotte & Johnstone Strait, SoG = Strait of Georgia, WCVI = West Coast Vancouver Island. Catch with Region UNK could not be associated to a single geographic Region.

Catch Region	Time Period	Total salmon catch	Chinook catch	Coho catch	Chum catch	Pink catch	Sockeye catch	Unidentified salmon catch
NC	JAN-JUN	80	73	0	7	0	0	0
	JUL-DEC	458	346	6	95	11	0	0
QC&JSt	JAN-JUN	1,095	1,095	0	0	0	0	0
	JUL-DEC	197	183	3	8	3	0	0
SoG	JAN-JUN	807	800	7	0	0	0	0
	JUL-DEC	569	560	5	4	0	0	0
WCVI	JAN-JUN	1,611	1,571	18	22	0	0	0
	JUL-DEC	2,663	2,377	143	115	25	3	0
UNK	JAN-JUN	1	1	0	0	0	0	0
	JUL-DEC	46	34	0	12	0	0	0
TOTAL		7,527	7,040	182	263	39	3	0

Table 5 – Summary of Chinook catch (numbers of fish), sample sizes of CWTs and PBT-GSI, and sample rates for CWT and stock composition analysis during the 2024 calendar year. Sample rates shown are divided by region and bi-annual time periods, but aggregated by catch type to meet privacy restrictions. The CWT sample rate is equal to the proportion of Chinook catch that had heads collected and examined for CWTs, while the PBT-GSI sample rate is the number of successfully analyzed PBT-GSI samples within the PBT-GSI proportion of catch.

				CWT Analysis		Stock Composition Analysis	
Catch Region	Time Period	Chinook catch	Chinook sampled	# CWTs observed	CWT Sample Rate	# PBT-GSI analyzed	PBT-GSI Partition Sample Rate
NC	JAN-JUN	46	5	0	11%	2	5%
	JUL-DEC	346	284	50	82%	150	53%
QC&JSt	JAN-JUN	969	969	179	100%	182	23%
	JUL-DEC	183	183	37	100%	60	41%
SoG	JAN-JUN	361	54	2	15%	40	12%
	JUL-DEC	560	544	68	97%	262	53%
WCVI	JAN-JUN	1,195	455	84	38%	269	27%
	JUL-DEC	2,377	1,924	278	81%	421	21%
TOTAL		6,037	4,418	698	66%	1,386	29%

Table 6 – Stock composition of Chinook salmon stock management units during the 2024 calendar year across region, catch type, and half-year time strata. Stock proportions are estimated using weighted proportions from CWT and PBT-GSI samples and values shown represent mean estimates from bootstrapping GSI assignment probabilities. The North Coast grouping includes the Nass, Skeena, and Central Coast stocks, and the Transboundary group includes Unuk, Stikine, and Taku stocks.

Catch region	Time period	% Cana-dian	Fraser Fall 41	Fraser Summer 41	Fraser Spring 42	Fraser Spring 52	Fraser Summer 52	Fall 41 Boun-dary Bay	Fraser Cross	Lower Georgia Strait	Middle Georgia Strait	Upper Georgia Strait	WCVI	North Coast	Trans-boundary
NC	JAN-JUN	48%	47.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	JUL-DEC	32%	2.5%	0.9%	0.0%	3.5%	0.3%	0.0%	0.8%	1.3%	0.0%	0.9%	0.9%	6.6%	3.6%
QC& JSt	JAN-JUN	54%	52.2%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.4%	1.6%	0.0%	0.0%	0.0%	0.0%
	JUL-DEC	37%	29.4%	0.0%	0.0%	0.0%	0.0%	0.5%	0.0%	2.7%	4.0%	0.0%	0.0%	0.0%	0.0%
SoG	JAN-JUN	88%	79.3%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	3.7%	4.9%	0.0%	0.0%	0.0%	0.0%
	JUL-DEC	80%	31.9%	0.3%	0.7%	0.0%	0.3%	0.1%	0.3%	18.7%	26.3%	0.7%	0.3%	0.0%	0.0%
UNK	JAN-JUN	0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	JUL-DEC	48%	5.3%	34.5%	0.0%	0.0%	5.3%	0.0%	0.0%	2.6%	0.1%	0.0%	0.0%	0.0%	0.0%
WCVI	JAN-JUN	35%	22.6%	0.4%	0.6%	5.5%	4.5%	0.3%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	JUL-DEC	43%	40.1%	0.7%	0.0%	0.0%	0.2%	0.5%	0.2%	0.9%	0.1%	0.0%	0.0%	0.0%	0.0%

Table 7 – Estimates of Chinook salmon stock management unit bycatch by region in the groundfish trawl fishery during the 2024 calendar year. Lower and upper 95% confidence intervals are included for total catches by stock using results from bootstrapping GSI assignment probabilities.

Catch region	Chinook catch	Canadian stocks catch	Fraser Fall 41	Fraser Summer 41	Fraser Spring 42	Fraser Spring 52	Fraser Summer 52	Fall 41 Boundary Bay	Fraser-Cross	Lower Georgia Strait	Middle Georgia Strait	Upper Georgia Strait	WCVI	North Coast	Trans-boundary
NC	392	119	31	3	0	12	1	0	3	5	0	3	3	23	12
QC&JSt	1152	593	560	0	0	0	0	2	0	9	22	0	0	0	0
SoG	921	765	465	2	4	0	2	1	2	118	165	4	2	0	0
UNK	35	17	2	12	0	0	2	0	0	1	0	0	0	0	0
WCVI	3572	1,431	1,223	21	7	66	58	16	13	22	3	0	0	1	0
Total (mean)	**6,072**	**2,927**	**2,281**	**38**	**11**	**78**	**63**	**19**	**18**	**155**	**190**	**7**	**5**	**24**	**12**
Lower 95%		2,767	2,272	33	11	54	54	0	14	133.9	171.7	6	2	3	8
Upper 95%		3,080	2,288	43	11	101	71	38	21	175.3	209.1	8	7	46	16

Table 8 – Estimates of CWT recoveries of Canadian exploitation rate indicator stocks in the Groundfish Trawl Fishery during the 2024 calendar year by region and catch type. CWT estimates are calculated by multiplying the observed number of CWTs by the inverse of the sample rate, with sample rates calculated for each combination of region, catch type, and half-year period.

Canadian CWT stock codes are as follows: ATN = Atnarko, BQR = Big Qualicum River; COW = Cowichan River; CHI = Chilliwack River; HAR = Harrison River; NIC = Nicola River; RBT = Robertson Creek; PPS = Puntledge River; QUI = Quinsam River, SHU = Shuswap River. The Similkameen River (SMK) US CWT stock is included as a proxy for Okanagan Chinook.

					Estimated CWT Recoveries By Indicator Stock														
Catch Region	**Time Period**	**CWT Sample Rate**	**# CWTs observed**	**CWT Estimated Number**	**ATN**	**BQR**	**CHI**	**COW**	**HAR**	**KLM**	**KLY**	**MSH**	**NIC**	**PHI**	**PPS**	**QUI**	**SHU**	**RBT**	**SMK**
NC	JAN-JUN		0.0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	JUL-DEC	1.176	50.0	6.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
QC&JSt	JAN-JUN	1	179.0	1.0	0	2	20	4	36	0	0	0	0	0	0	0	0	0	0
	JUL-DEC	1.022	37.0	1.0	0	0	4.9	0	3.9	0	0	0	0	0	0	0	0	0	0
SoG	JAN-JUN	0.15	2.0	6.7	0	0	0	13.4	0	0	0	0	0	0	0	0	0	0	0
	JUL-DEC	0.971	68.0	1.0	0	8.2	13.4	9.3	6.2	0	0	0	0	0	0	0	0	0	0
WCVI	JAN-JUN	1.309	84.0	4.7	0	0	43.1	0	43.1	0	0	0	7.5	0	0	0	0	0	0
	JUL-DEC	1.598	278.0	2.7	0	1.7	40	4.4	50.5	0	0	0	0	0	0	0	0	0	0
Total					**0**	**11.9**	**121.4**	**31.1**	**139.7**	**0**	**0**	**0**	**7.5**	**0**	**0**	**0**	**0**	**0**	**0**

Table 9 – Age composition of Canadian stock management units from PBT and CWT samples from the 2024 calendar year. Salmon age is calculated by subtracting the year a fish was caught from the brood year.

			CWT age composition				PBT age composition			
Stock Management Unit	**# CWTs**	**# PBTs**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 2**	**Age 3**	**Age 4**	**Age 5**
Central Coast	0	2					50%	50%	0%	0%
Fall 41 Boundary Bay	1	1	0%	100%	0%	0%	0%	100%	0%	0%
Fraser Fall 41	229	161	17%	68%	14%	0%	43%	45%	10%	1%
Fraser Spring 42	2	0	0%	100%	0%	0%				
Fraser Summer 52	1	0	0%	0%	100%	0%				
Lower Georgia Strait	18	8	44%	56%	0%	0%	88%	12%	0%	0%
Middle Georgia Strait	11	58	82%	18%	0%	0%	88%	12%	0%	0%
Upper Georgia Strait	0	3					100%	0%	0%	0%
WCVI	0	1	0%	0%	0%	0%	0%	0%	100%	0%

Table 10 – Age composition of PBT samples from groundfish trawl bycatch for the 2024 calendar year by stock management unit and region. Only region and stock combinations with four or more PBT samples are included.

Stock Management Unit	Region	# PBT	Age 2	Age 3	Age 4	Age 5
Fraser Fall 41	QC&JSt	38	21%	63%	16%	0%
Fraser Fall 41	SoG	46	46%	50%	2%	2%
Fraser Fall 41	WCVI	74	53%	34%	12%	1%
Lower Georgia Strait	SoG	7	86%	14%	0%	0%
Middle Georgia Strait	SoG	55	91%	9%	0%	0%

Table 11 – Mean fork length by stock management unit and brood year for samples of Chinook salmon bycatch from the Strait of Georgia region from October 2024 to March 2025. Length information was matched to stock management unit using DNA sample IDs. Samples with Unknown stock management unit were not matched to a DNA sample or did not undergo genetic stock identification. Brood year was determined from PBT or CWT information. Only stock-brood year combinations with more than 3 samples were included.

Stock Management Unit	Brood Year	# samples	Mean Fork Length (mm)
Fraser Fall 41	2021	18	670.6
	2022	22	524.5
	Unknown	58	620.9
Lower Georgia Strait	2022	7	443.1
Lower Georgia Strait	Unknown	51	483.0
Middle Georgia Strait	2021	4	568.0
Middle Georgia Strait	2022	54	468.0
Middle Georgia Strait	Unknown	22	503.3
Unknown	Unknown	443	557.9

Appendix A - 2024/25 Option A Groundfish Trawl Salmon Bycatch Requirements

Introduction

February 21, 2024

Monitoring and sampling requirements for Pacific salmon bycatch were first introduced in 2022 to provide more accurate information on salmon catch by species and stock composition of Chinook salmon catch. Requirements are being updated for the 2024/25 groundfish year to support implementation of a Chinook salmon bycatch cap and individual vessel accountabilities.

Separate requirements have been developed for Receiving Tank Vessels (RTVs) that freeze catch at sea and vessels that land fresh catch.

Vessels Freezing Catch at Sea

Changes to support the Chinook salmon bycatch cap and dockside validation are:

- Chinook heads must be kept separate from heads of other salmon species.
- Small salmon less than 30 cm (12 inches) must be kept whole.
- Each tow bag must contain a tow bag label and no more than 10 specimens of:
    - Chinook heads only,
    - Salmon heads from other species (no Chinook heads), or
    - Small whole salmon only (all species).
- Bags of salmon heads from species other than Chinook must have an external label attached to identify them as distinct from bags of Chinook heads.
- All bags must be packed loosely and frozen flat to allow them to be counted in a frozen state at offload by the dockside observer.

Vessel Requirements: The following requirements **apply to all trips.**

1. For **Chinook salmon greater than 30 cm (12 inches)** length from each tow:
    a. Remove and retain the heads using a cut following the outline of the operculum and remove the gills **according to DFO Groundfish Trawl RTV Salmon Bycatch Packing Instructions**.
    b. Package all Chinook salmon heads separately from other species into tow bags with a maximum of 10 heads per bag. Do not mix Chinook heads from separate tows or with other salmon species or whole fish. Pack heads loosely and frozen flat to facilitate piece counts during dockside validation.
    c. Using TOW bag labels in sequence, record the vessel name, packing date and time, and tow # using pencil on a TOW bag label.
    d. **Put a completed TOW bag label into each bag** of Chinook heads and seal with a zip tie.

2. For **all other salmon species (excluding Chinook) greater than 30 cm (12 inches)** length from each tow:
    a. Remove and retain the heads using a cut following the outline of the operculum and remove the gills **according to DFO Option A Trawl RTV Salmon Bycatch Packing Instructions**.
    b. Package all heads from other salmon species together in tow bags with a maximum of 10 heads per bag. Do not mix heads from separate tows or with Chinook heads or whole

fish. Pack heads loosely and frozen flat to facilitate piece counts during dockside validation.

   c. Using TOW bag labels in sequence, record the vessel name, packing date and time, and tow # using pencil on a TOW bag label.
   d. **Put a completed TOW bag label into <u>each</u> bag** of salmon heads.
   e. Using a zip tie, **attach an external coloured label indicating the bag contains salmon heads that are not Chinook,** and seal the bag.

3. For **all salmon less than approximately 12 inches (30cm)** in length from each tow:
   a. Retain the whole fish and package into separate tow bags with a maximum of 10 per bag. Do not mix small salmon from separate tows or with any salmon heads.
   b. Using TOW bag labels in sequence, record the vessel name, packing date and time, and tow # **using pencil** on a TOW bag label.
   c. Put a completed TOW bag label into **<u>each</u>** bag of small salmon and seal with a zip tie.

4. In the at-sea observer logbook, for each tow record the total estimated weights and retained pieces of salmon by species, with utilization "retained". Where species cannot be determined, record as "salmonids (106)".
5. Freeze all tow bags until delivery, with specimens packed loosely and frozen flat to the extent possible.
6. Record the total number of salmon retained for each trip in the comments of the hail-in within the Trawler application.
7. Transfer all tow bags to the dockside monitor during the offload.

Supplies will be provided by the dockside monitor and include:

- Detailed RTV salmon bycatch packing instructions,
- Tow bags for packing specimens,
- Tow bag labels to be completed and sealed inside bags,
- External labels to be attached to non-Chinook salmon bags,
- Pencils and zip ties

Throughout the season, more supplies will be available from the dockside monitor. Please verify sufficient supply as part of your pre-departure checklist.

<u>AMR Dockside Monitor Procedures</u>

Detailed dockside observer staff procedures and requirements are specified by Archipelago Marine Research in the **<u>Option A Groundfish Trawl Salmon Monitoring and Sample Collection Program Requirements</u>**.

General requirements are described below and **apply to all landings**:

1. Receive all tow bags from the vessel.
2. General inspection of bag packaging procedures to provide feedback to vessel to improve for future trips
   a. Are bags packed loosely and flat?
   b. Do tow bags include tow labels with information recorded?
   c. Has the vessel packed Chinook heads separately from other species heads and from small salmon (< 30 cm / 12" length)?
   d. Has the vessel identified the bags with heads from other species with external coloured labels?

3. Ask the vessel crew if they need a resupply of any items they are running low on.

Validation procedures:

4. Separate the bags with Chinook salmon heads from bags containing other species heads and whole fish. Bags containing other species heads should contain a label affixed to the zip tie to distinguish them.
5. Count the number of heads from all Chinook salmon tow bags. If Chinook bags are opened in order to count the Chinook, they must be repacked, including the tow bag label. Chinook salmon heads should remain frozen to the extent possible to preserve DNA.
6. Count and speciate all heads of other salmon to get a trip count of salmon by species. These heads may need to be thawed to verify species identification, with procedures completed during or after offload depending on conditions. If there are any Chinook heads included in a bag, keep them by repacking them into the original bag with the tow label and count them with Chinook salmon. If there is no tow label, they still must be repacked as a Chinook bag.
7. Count and speciate all small whole fish) from bags. Include these counts with the number of heads counted to get a total salmon count by species. If there are any Chinook salmon included in the small whole salmon bag, keep them by repacking them into the original bag with the tow label and count them with Chinook salmon. If there is no tow label, they still must be repacked as a Chinook bag.
8. Send all heads or whole small fish of non-Chinook salmon to offal.

Bio-sample collection and packaging procedures:

9. Pack tow bags with Chinook salmon heads or whole fish into larger trip bags for consolidation and shipping to JO Thomas.
10. Close all trip bags and, using trip bag labels in sequence, attach a completed (**in pencil**) TRIP bag label **to each bag** using zip ties.
11. Take a digital photo of the first TRIP bag label used and the last TRIP bag label used to associate the TRIP label series used to the hail number.
12. Create a record of each TRIP bag in the "tagged fish" form of the Trawler dockside monitor application noting the hail number and TRIP bag label number.

Trip reporting and shipment procedures:

13. Fill in salmon DMP forms using pencil.
14. The number of salmon by species should be entered in the pieces field in the Trawler application for dockside monitors. The weight should be entered as "1" for any salmon species that is counted.
15. Coordinate cold storage and direct shipment of trip bags to the JO Thomas lab in Vancouver or to DFO's Pacific Biological Station in Nanaimo.

Vessels Landing Fresh Catch

Vessel Requirements

For all trips:

1. Retain all salmon bycatch.
2. In the at-sea observer logbook, for each tow record the total estimated weights and retained pieces of all salmon by species. If species cannot be determined, record as "salmonids (106)".
3. All salmon retained must be landed at the conclusion of each trip.

AMR Dockside Monitor Procedures

Dockside Monitors will be responsible for counting and weighing the salmon bycatch for all trips, and the collection of Chinook salmon heads from 25% of the landings. The dockside monitoring data

management system will be used to randomly select vessels and notify dockside monitors which landings require salmon head sampling.

For all landings:

1. In the trawler platform, record the **pieces** and weights of all salmon by species. Pieces is a mandatory field for salmon catch at offload.

For landings randomly selected for Chinook salmon head sampling:

1. Remove the heads from all Chinook salmon using a cut following the line of the operculum and remove the gills. Small salmon < 30cm (12") should be retained as whole fish.
2. Package Chinook salmon heads and small salmon into bags. Do not mix specimens from separate landings.
3. Using TRIP bag labels in sequence, record essential information for the landing on TRIP bag labels **using pencil**.
4. Take a digital photo of the first TRIP bag label used and the last TRIP bag label used to associate the TRIP label series used to the hail number.
5. Close all trip bags and attach a TRIP bag label **to each bag** of heads using zip ties.
6. Fill in salmon DMP forms using pencil.
7. Create a record of each bag of salmon heads in the "tagged fish" form of the Trawler dockside monitor application noting the hail number and TRIP bag label number.
8. Coordinate storage or direct shipment of trip bags to the CWT lab in Vancouver or to DFO's Pacific Biological Station in Nanaimo.
9. After heads have been removed, send all Chinook salmon bodies and other salmon species to offal.

For landings not selected for salmon head sampling, send all salmon to offal.

Appendix B - Regions and Catch Strata for Reporting and Analysis

Table B1 – Strata variables used for grouping Chinook salmon bycatch for CWT analysis, and stock composition estimation. The catch types were aggregated together for reporting to meet privacy requirements.

Variable	Region	Catch Type	Period
Definition	Location of catch by tow (where available) or trip	Vessel type and method of sampling	Calendar half-year
Values	WCVI QC&JS SoG NC	Fresh Frozen	Jan-Jun 2024 Jul-Dec 2024

Table B2 – Correspondence between Regions and PFMAs and groundfish management areas. Regions were used to define strata for reporting, CWT analysis, and stock composition estimation.

Region	Abbreviation	Pacific Fishery Management Areas (PFMAs)	Groundfish Management Areas
West Coast Vancouver Island	WCVI	20 to 27, 121 to 126, 127-1 and 127-2	3C and 3D
Strait of Georgia	SoG	14 to 19, 28, 29	Portions of 4B
Queen Charlotte Strait & Johnstone Strait	QC&JSt	11, 12	Portions of 4B and 5A
North Coast	NC	3 to 10, 101 to 11, 127-3 and 127-4, 130, 142	5A, 5B, 5C, 5D, 5E
Unassigned	UNK	Unknown or multiple PFMAs	Unknown or multiple areas

Appendix C - SMU-CU-Reporting Units Tables

Table C1 – PBT-GSI reporting units and corresponding CU and SMU assignments used for stock composition estimates in this report.

Reporting Unit	CU #	Conservation Unit (CU) name	Stock Management Unit (SMU)
AKK	AKK	ALASKA_KOYUKUK RIVER	Alaska
AKT	AKT	ALASKA_TANANA RIVER	Alaska
AKYR-L	AKYR-L	ALASKA_LOWER YUKON RIVER	Alaska
AKYR-M	AKYR-M	ALASKA_MID YUKON RIVER	Alaska
AKYR-U	AKYR-U	ALASKA_UPPER YUKON RIVER	Alaska
SEAK	SEAK	SOUTH EAST ALASKA	Alaska
Alsek	67	ALSEK	Alsek
DOCEE	36	DOCEE	Central Coast
RI	37	RIVERS INLET	Central Coast
WANN	38	WANNOCK	Central Coast
BCR-BENT	39	BELLA COOLA-BENTINCK	Central Coast
DEAN	40	DEAN RIVER	Central Coast
NCC-lake	41	NORTH AND CENTRAL COAST-LATE TIMING	Central Coast
NCC-stream	42	NORTH AND CENTRAL COAST-EARLY TIMING	Central Coast
BB	2	BOUNDARY BAY_FA_0.3	Fall 41 Boundary Bay
LFR-fall	3	LOWER FRASER RIVER_FA_0.3	Fraser Fall 41
STh-BESS	16	SOUTH THOMPSON-BESSETTE CREEK_SU_1.2	Fraser Spring 42
LTh	17	LOWER THOMPSON_SP_1.2	Fraser Spring 42
MFR-spring	10	MIDDLE FRASER RIVER_SP_1.3	Fraser Spring 52
UFR-spring	12	UPPER FRASER RIVER_SP_1.3	Fraser Spring 52
NTh-spr	18	NORTH THOMPSON_SP_1.3	Fraser Spring 52
LFR-spring	4	LOWER FRASER RIVER_SP_1.3	Fraser Spring 52
LFR-UPITT	5	LOWER FRASER RIVER-UPPER PITT_SU_1.3	Fraser Spring 52
FRCanyon	8	MIDDLE FRASER-FRASER CANYON_SP_1.3	Fraser Spring 52
STh-0.3	13	SOUTH THOMPSON_SU_0.3	Fraser Summer 41
STh-SHUR	15	SHUSWAP RIVER_SU_0.3	Fraser Summer 41
Maria	7	MARIA SLOUGH_SU_0.3	Fraser Summer 41
MFR-summer	11	MIDDLE FRASER RIVER_SU_1.3	Fraser Summer 52
STh-1.3	14	SOUTH THOMPSON_SU_1.3	Fraser Summer 52
NTh-sum	19	NORTH THOMPSON_SU_1.3	Fraser Summer 52
LFR-summer	6	LOWER FRASER RIVER_SU_1.3	Fraser Summer 52

Portage	9	MIDDLE FRASER RIVER-PORTAGE_FA_1.3	Fraser Summer 52
LFR-suppl	9006	FRASER-CROSS-CU SUPPLEMENTATION EXCLUSION<<BIN>>	Fraser-Cross
HGN	43	HAIDA GWAII-NORTH	Haida Gwaii
CWCH-KOK	22	EAST VANCOUVER ISLAND-COWICHAN AND KOKSILAH_FA_0.X	Lower Georgia Strait
EVI-fall	25	EAST VANCOUVER ISLAND-NANAIMO AND CHEMAINUS_FA_0.X	Lower Georgia Strait
SMn-SFj	28	SOUTHERN MAINLAND-SOUTHERN FJORDS_FA_0.X	Mainland Inlet
HOMATH	34	HOMATHKO_SU_X.X	Mainland Inlet
KLINA	35	KLINAKLINI_SU_1.3	Mainland Inlet
SMn-GStr	20	SOUTHERN MAINLAND-GEORGIA STRAIT_FA_0.X	Mainland Inlet
QP-fall	27	EAST VANCOUVER ISLAND-QUALICUM AND PUNTLEDGE_FA_0.X	Middle Georgia Strait
EVIGStr-sum	83	EAST VANCOUVER ISLAND-GEORGIA STRAIT_SU_0.3	Middle Georgia Strait
LNR-P	57	PORTLAND SOUND-OBSERVATORY INLET-LOWER NASS	Nass
UNR	58	UPPER NASS	Nass
SFork	77	SALMON FORK	Porcupine
Porcu	78	PORCUPINE	Porcupine
Russia	Russia	RUSSIA	Russia
SKEst	45	SKEENA ESTUARY	Skeena
ECST	46	ECSTALL	Skeena
LSK	48	LOWER SKEENA	Skeena
KALUM-E	49	KALUM_EARLY TIMING	Skeena
KALUM-L	50	KALUM_LATE TIMING	Skeena
MSK-LGLKS	53	MIDDLE SKEENA-LARGE LAKES	Skeena
MSK-M_S	54	MIDDLE SKEENA-MAINSTEM TRIBUTARIES	Skeena
MSK-UprBulk	55	UPPER BULKLEY RIVER	Skeena
USK	56	UPPER SKEENA	Skeena
ZYM	80	ZYMOETZ	Skeena
SIC	81	SICINTINE	Skeena
LSTK-early	60	STIKINE_EARLY TIMING	Stikine
LSTK-late	61	STIKINE_LATE TIMING	Stikine
TAKU-early	63	TAKU_EARLY TIMING	Taku
TAKU-mid	64	TAKU_MID TIMING	Taku
TAKU-late	65	TAKU_LATE TIMING	Taku
UNUK	59	UNUK	Unuk
NEVI	29	EAST VANCOUVER ISLAND-NORTH_FA_0.X	Upper Georgia Strait
CACO	CACO	COASTAL CALIFORNIA	US West Coast
CACV-F	CACV-F	CALIFORNIA CENTRAL VALLEY_FALL	US West Coast
CACV-Sp	CACV-Sp	CALIFORNIA CENTRAL VALLEY_SPRING	US West Coast
CAKT	CAKT	CALIFORNIA KLAMATH TRINITY	US West Coast

COWA	COWA	COASTAL WASHINGTON	US West Coast
JDF	JDF	JUAN DE FUCA	US West Coast
LCR	LCR	LOWER COLUMBIA RIVER	US West Coast
MCR-Sp	MCR-Sp	MID COLUMBIA RIVER_SP	US West Coast
NCOR	NCOR	NORTH & CENTRAL OREGON	US West Coast
NPS	NPS	NORTH PUGET SOUND	US West Coast
SOR	SOR	SOUTH OREGON COASTAL	US West Coast
SPS	SPS	SOUTH PUGET SOUND	US West Coast
SR-F	SR-F	SNAKE RIVER_FA	US West Coast
SR-SpSu	SR-SpSu	SNAKE RIVER_SP_SU	US West Coast
UCR-Sp	UCR-Sp	UPPER COLUMBIA RIVER_SP	US West Coast
UWR	UWR	UPPER WILLAMETTE RIVER	US West Coast
OK-UCR-SuF	1-UCR-SuF	OKANAGAN_1.X_UPPER COLUMBIA RIVER_SU_FA	US West Coast
SWVI	31	WEST VANCOUVER ISLAND-SOUTH_FA_0.X	WCVI
NoKy	32	WEST VANCOUVER ISLAND-NOOTKA AND KYUQUOT_FA_0.X	WCVI
NWVI	33	WEST VANCOUVER ISLAND-NORTH_FA_0.X	WCVI
Teslin	68	YUKON RIVER-TESLIN HEADWATERS	Yukon
UpperYR	69	UPPER YUKON RIVER	Yukon
Norden	71	NORDENSKIOLD	Yukon
Pelly	72	PELLY	Yukon
MidYR	73	MIDDLE YUKON RIVER AND TRIBUTARIES	Yukon
Stew	74	STEWART	Yukon
White	75	WHITE AND TRIBUTARIES	Yukon
NYR	76	NORTHERN YUKON RIVER AND TRIBUTARIES	Yukon

Table C2 – CWT exploitation rate indicator stock codes and corresponding Chinook salmon CUs and SMUs used for stock composition estimates. Canadian CWTs that did not belong to an indicator stock are not included in this table, but were matched to CU and SMU through a table provided by the Enhancement Planning and Assessment Database (EPAD). EPAD is maintained by the Salmonid Enhancement Program and is DFO's centralized repository for enhancement data in the Pacific Region.

Stock code	Stock name	Conservation Unit (CU)	Stock Management Unit (SMU)
SHU	Lower Shuswap	Shuswap River_SU_0.3	Fraser Summer 41
MSH	Middle Shuswap	Shuswap River_SU_0.3	Fraser Summer 41
HAR	Harrison River	Lower Fraser River_FA_0.3	Fraser Fall 41
RBT	Robertson Creek	West Vancouver Island-South_FA_0.x	WCVI
KLM	Kitsumkalum	Kalum_late timing	Skeena
PHI	Phillips River Fall	Southern Mainland-Southern Fjords_FA_0.x	Mainland Inlet
ATN	Atnarko	Bella Coola-Bentinck	Central Coast
BQR	Big Qualicum River	East Vancouver Island-Qualicum and Puntledge_FA_0.x	Middle Georgia Strait
KLY	Kitsumkalum	Kalum_late timing	Skeena
QUI	Quinsam River	East Vancouver Island-North_FA_0.x	Upper Georgia Strait
PPS	Puntledge River	East Vancouver Island-Georgia Strait_SU_0.3	Middle Georgia Strait
NIC	Nicola River	Lower Thompson_SP_1.2	Fraser Spring 42
COW	Cowichan River	East Vancouver Island-Cowichan and Koksilah_FA_0.x	Lower Georgia Strait
CHI	Chilliwack River	Fraser-Harrison Fall Transplant_FA_0.3	Fraser Fall 41

Appendix D - CWT Exploitation Rate Indicator Stocks used in Exploitation Rate Analysis

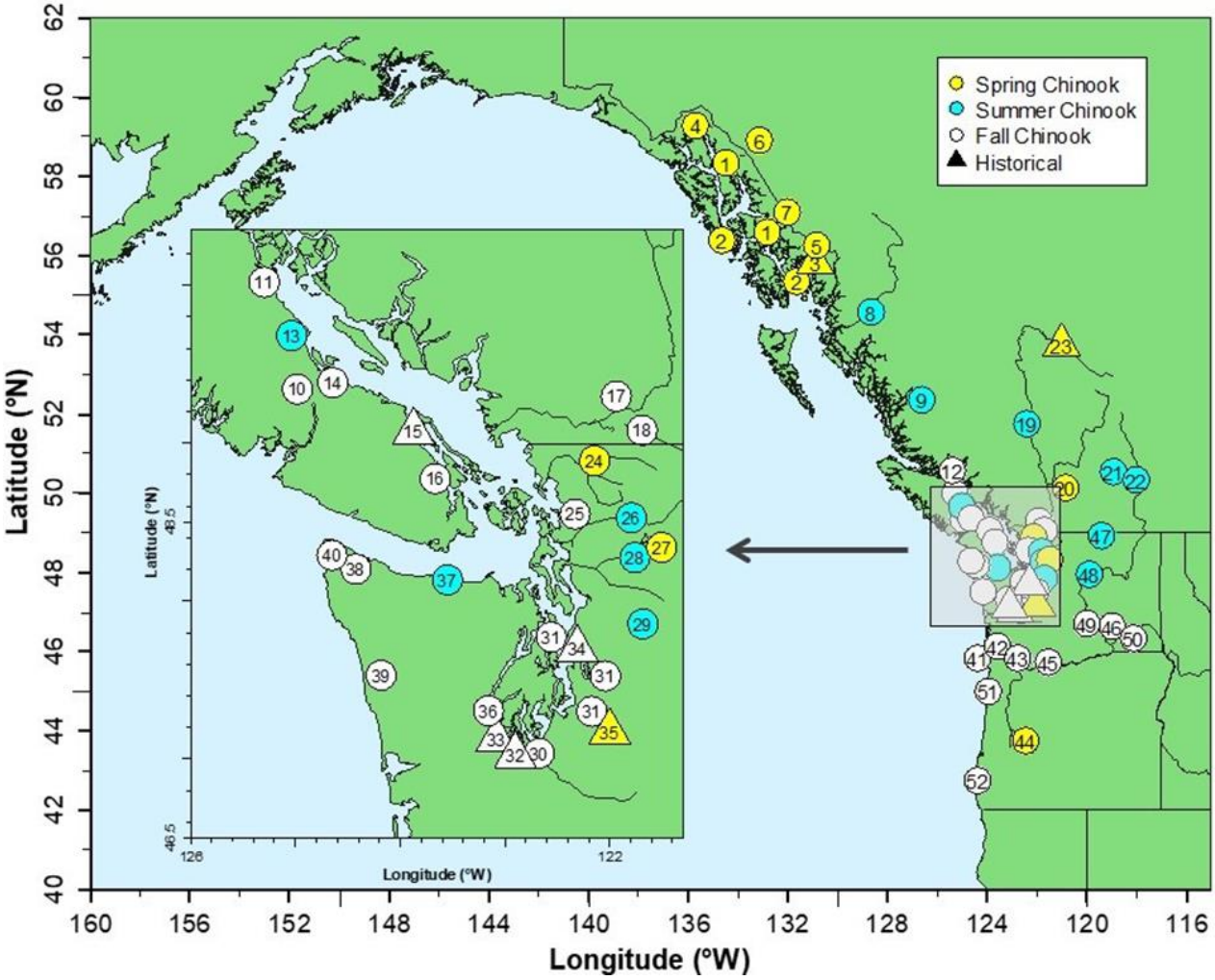

Figure D1—Geographical locations of historic and current Chinook salmon coded wire tag (CWT) exploitation rate indicator stocks. See Table D1 for the full stock names associated with each number. The southern B.C. and Puget Sound area, where concentration of the CWT indicators is greatest, is shown in the expanded view. Adapted from CTC 2023, Page 3

Table D1—Summary of current and historic (last tagged brood year in brackets) coded wire tag (CWT) exploitation rate indicator stocks, location, run type, and smolt age. Adapted from CTC 2023, Pages 4-5.

Stock/Area	Exploitation Rate Indicator Stock	Hatchery	Run Type	Smolt Age	Map No.	Status
Southeast Alaska	Northern Southeast Alaska (NSA)	Crystal Lake (ACI), Macaulay (AMC)	Spring	Age 1	1	Current
	Southern Southeast Alaska (SSA)	Herring Cove (AHC), Little Port Walter (ALP), Deer Mountain (ADM), Neets Bay (ANB)	Spring	Age 1	2	Current
Transboundary Rivers	Chickamin (CHM)	Wild	Spring	Age 1	3	Historical (2005)
	Chilkat (CHK)	Wild	Spring	Age 1	4	Current
	Unuk (UNU)	Wild	Spring	Age 1	5	Current
	Taku (TAK)	Wild	Spring	Age 1	6	Current
	Stikine (STI)	Wild	Spring	Age 1	7	Current
North/Central B.C.	Kitsumkalum (KLM)	Deep Creek	Summer	Age 1	8	Current
	Atnarko (ATN)	Snootli	Summer	Age 0	9	Current
WCVI	Robertson Creek (RBT)	Robertson Creek	Fall	Age 0	10	Current
Strait of Georgia	Quinsam (QUI)	Quinsam	Fall	Age 0	11	Current
	Phillips (PHI)	Gillard Pass	Summer/Fall	Age 0	12	Current
	Puntledge (PPS)	Puntledge	Summer	Age 0	13	Current
	Big Qualicum (BQR)	Big Qualicum	Fall	Age 0	14	Current
	Nanaimo (NAN)	Nanaimo	Fall	Age 0	15	Historical (2004)
	Cowichan (COW)[1]	Cowichan	Fall	Age 0	16	Current
Fraser River	Harrison (HAR)	Chehalis	Fall	Age 0	17	Current
	Chilliwack (CHI)[1]	Chilliwack	Fall	Age 0	18	Current
	Chilko (CKO)	Spius Creek, Chehalis	Summer	Age 1	19	In development
	Nicola (NIC)	Spius Creek	Spring	Age 1	20	Current
	Lower Shuswap (SHU)[1]	Shuswap Falls	Summer	Age 0	21	Current
	Middle Shuswap (MSH)	Shuswap Falls	Summer	Age 0	22	Current
	Dome (DOM)	Penny Creek	Spring	Age 1	23	Historical (2002)
North Puget Sound	Nooksack Spring Fingerling (NSF)	Kendall Creek	Spring	Age 0	24	Current
	Nooksack Spring Yearling (NKS)	Kendall Creek	Spring	Age 1		Historical (1996)
	Samish Fall Fingerling (SAM)[2]	Samish	Summer/Fall	Age 0	25	Current
	Skagit Summer Fingerling (SSF)	Marblemount	Summer	Age 0	26	Current
	Skagit Spring Fingerling (SKF)	Marblemount	Spring	Age 0	27	Current
	Skagit Spring Yearling (SKS)[2]	Marblemount	Spring	Age 1		Historical (2010)

Stock/Area	Exploitation Rate Indicator Stock	Hatchery	Run Type	Smolt Age	Map No.	Status
Central Puget Sound	Stillaguamish Fall Fingerling (STL)[3]	Stillaguamish Tribal	Summer/Fall	Age 0	28	Current
	Skykomish Summer Fingerling (SKY)[2,3]	Wallace	Summer/Fall	Age 0	29	Current
South Puget Sound	Nisqually Fall Fingerling (NIS)[2]	Clear Creek	Summer/Fall	Age 0	30	Current
	South Puget Sound Fall Fingerling (SPS)[2]	Soos/Grovers/Issaquah creeks	Summer/Fall	Age 0	31	Current
	South Puget Sound Fall Yearling (SPY)	Tumwater Falls	Summer/Fall	Age 1	32	Historical (2013)
	Squaxin Net Pens Fall (SQP)	Squaxin Net Pen			33	Historical (1997)
	University of Washington Accelerated (UWA)	University of Washington			34	Historical (1988)
	White River Spring Yearling (WRY)[4]	White River	Spring	Age 1	35	Historical (2015)
Hood Canal	George Adams Fall Fingerling (GAD)[2]	George Adams	Summer/Fall	Age 0	36	Current
Juan de Fuca	Elwha Fall Fingerling (ELW)	Lower Elwha	Summer/Fall	Age 0	37	Current
North Washington Coast	Hoko Fall Fingerling (HOK)	Hoko Makah National Hatchery	Fall	Age 0	38	Current
	Queets Fall Fingerling (QUE)	Wild, Salmon River (WA)	Fall	Age 0	39	Current
	Tsoo-Yess Fall Fingerling (SOO)[5]	Makah National Fish Hatchery	Fall	Age 0	40	Current
Lower Columbia River	Columbia Lower River Hatchery (LRH)[2]	Big Creek	Fall Tule	Age 0	41	Current
	Cowlitz Tule (WA) (CWF)	Cowlitz	Fall Tule	Age 0	42	Current
	Lewis River Wild (LRW)	Wild	Fall Bright	Age 0	43	Current
	Willamette Spring (WSH)[1]	Willamette Hatcheries	Spring	Age 1	44	Current
	Spring Creek Tule (WA) (SPR)[2]	Spring Creek National Hatchery	Fall Tule	Age 0	45	Current
Upper Columbia River	Hanford Wild (HAN)	Wild	Fall Bright	Age 0	46	Current
	Similkameen Summer Yearling (SMK)	Similkameen and Omak Pond	Summer	Age 1	47	Current
	Columbia Summers (WA) (SUM)	Wells	Summer	Age 0/1	48	Current
	Columbia Upriver Brights (URB)[2]	Priest Rapids	Fall Bright	Age 0	49	Current
Snake River	Lyons Ferry Fingerling (LYF)[6]	Lyons Ferry	Fall Bright	Age 0	50	Current
	Lyons Ferry Yearling (LYY)[2]	Lyons Ferry	Fall Bright	Age 1		Current
North Oregon Coast	Salmon (SRH)	Salmon	Fall	Age 0	51	Current
Mid Oregon Coast	Elk River (ELK)	Elk River	Fall	Age 0	52	Current

Appendix E – Salmon bycatch by groundfish management area for the 2024/25 groundfish fishery

Table E1 – **Total salmon catch (numbers of fish retained and released) by species and groundfish management area for the 2024/25 groundfish fishery year (February 21, 2024 to February 20, 2025). Catch in the UNK category could not be associated to a single area.**

Groundfish Management Area	Total salmon catch	Chinook catch	Coho catch	Chum catch	Pink catch	Sockeye catch	Unidentified salmon catch
3C	2887	2689	122	60	13	3	0
3D	631	599	10	22	0	0	0
4B	3039	2971	43	14	11	0	0
5A	309	281	0	27	1	0	0
5B	67	14	1	52	0	0	0
5C	3	3	0	0	0	0	0
5D	307	291	0	15	1	0	0
5E	12	9	0	3	0	0	0
UN	272	183	6	70	13	0	0
TOTAL 2024/25	**7527**	**7040**	**182**	**263**	**39**	**3**	**0**

Appendix F - Salmon bycatch by Pacific fishery management area for the 2024 calendar year

Table F1 – Estimated annual salmon catch (pieces retained and released) by Pacific Fishery Management Area (PFMA) in the groundfish trawl fishery during the 2024 calendar year. PFMAs where catch values come from less than 3 vessels were excluded due to privacy restrictions. Catch assigned to PFMA UNK represent catch enumerated at landing that could not be assigned to a specific PFMA.

PFMA	Total salmon catch	Chinook	Coho	Chum	Pink	Sockeye	Unidentified salmon
0	416	277	26	100	13	0	0
3	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0
14	818	809	5	4	0	0	0
16	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0
20	558	520	28	2	8	0	0
23	0	0	0	0	0	0	0
29	91	91	0	0	0	0	0
101	288	273	0	14	1	0	0
102	3	3	0	0	0	0	0
103	2	2	0	0	0	0	0
104	17	16	0	1	0	0	0
105	0	0	0	0	0	0	0
106	2	2	0	0	0	0	0
107	5	3	0	2	0	0	0
108	13	7	0	6	0	0	0
109	0	0	0	0	0	0	0
110	38	2	0	36	0	0	0
111	36	10	0	25	1	0	0
121	1,131	1,032	80	6	10	3	0
123	778	763	11	1	3	0	0
124	646	597	17	32	0	0	0
125	313	305	1	7	0	0	0
126	60	58	0	2	0	0	0
127	132	124	4	4	0	0	0
130	16	16	0	0	0	0	0
142	2	2	0	0	0	0	0
% excluded due to privacy restrictions	17.95%	19.10%	1.71%	3.20%	7.69%	0.00%	0.00%
Total catch	6,539	6,072	175	250	39	3	0
Total catch included	5,365	4,912	172	242	36	3	0