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North and Central Coast Salmon Escapement, Catch, Run Size and Exploitation Rate Estimates for each Salmon Conservation Unit for 1954-2017

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDIX TABLES AND FIGURES

APPENDIX A: Methods used to estimate total escapement, the total return to Canada and total run size for North and Central coast salmon stocks.

APPENDIX B: Northern Boundary Sockeye run reconstruction model run timing parameters for Nass and Skeena Sockeye Conservation Units.

APPENDIX F: Area 3-4-5 Chum Salmon Model

APPENDIX G: Age Composition Estimates for Statistical Areas and Conservation Units.

EXECUTIVE SUMMARY

LGL Limited was contracted by the Pacific Salmon Foundation (PSF) in February 2018 to work with Fisheries and Oceans Canada (DFO) stock assessment biologists to update the core datasets, database systems and analysis tools needed to produce annual abundance estimates for all North and Central Coast (NCC) salmon stocks using the best available information from 1954-2017. This project builds on previous work supported by Indian and Northern Affairs Canada (INAC), the State of the Salmon Program (SOS), DFO and the PSF to produce the 1980-2010 estimates of escapement, catch and run size for each BC salmon Conservation Unit (CU; English et al. 2004a; 2006a;b; 2010; 2012) and the extension of the time series for Skeena salmon CUs to cover the years from 1954-2010 (English et al. 2013) and 2011 – 2014 (English et al. 2016), both prepared for the PSF.

A large amount of time and resources are expended each year by DFO, the Pacific Salmon Commission (PSC), First Nations, stewardship groups, the PSF and other NGOs to obtain the catch and escapement data needed to monitor trends for BC salmon stocks and CUs. Some of these data are combined in regional or coast-wide models to derive estimates of run size and exploitation rates for specific salmon indicator stocks (e.g., Northern Boundary Sockeye Run Reconstruction Model, Skeena Sockeye In-river Model, Area 3-5 Pink and Chum Models, coast-wide CWT analysis models for NCC Chinook and Coho exploitation rate indicator stocks). In most instances prior to 2009, the results from these substantial data collection and analysis efforts have not been applied to the challenge of tracking trends in catch and escapement by CU.

The analytical procedures used to compute the abundance estimates for each NCC Statistical Area (SA) and CU range from the relatively simple summation of annual catch and escapement estimates for a SA, to complex run reconstruction techniques using all the available run-timing data for specific Sockeye CUs (English et al. 2015). The foundation for the escapement estimates presented in this report is the NuSEDS database and list of indicator streams identified by DFO and First Nation biologists as the most reliable set of escapement data available for each CU. Regional biologists have identified 681 indicator streams for even-years and 630 indicator streams for odd-years where escapement survey data were of sufficient quality and quantity to be used as an indicator of annual escapement trends for NCC salmon CUs. The majority of these indicator streams (76%) were assigned survey quality ratings of fair (2) or good (3). The streams with the highest quality survey data (ratings of 4 and 5) accounted for 6% of the indicator streams and 18% of the indicator streams were assigned a poor quality rating of 1.

This report provides details on the methods used to convert the escapement estimates for indicator streams into total escapement estimates for each SA and CU as well as a description of the methods used to estimate the exploitation rates needed to compute annual harvest and total run size estimates for each salmon CU for 1954-2017. The appendices to this report provide further details on the methods, data sources, and assumptions used to derive the annual estimates of escapement, catch and exploitation rates for each salmon CU.

INTRODUCTION

The primary purpose for this project was to streamline and further document the process used to do annual updates of the best available estimates for escapement, catch, and exploitation rates for each North and Central Coast (NCC) Statistical Area (SA) and Conservation Unit (CU) to track trends in these salmon stocks and facilitate further analysis.

LGL Limited was contracted by the PSF in February 2018 to work with Fisheries and Oceans Canada (DFO) stock assessment biologists to update the core datasets, database systems and analysis tools needed to track stock status and trends for NCC salmon stocks using the best available information from 1954-2017. Further to these objectives, LGL was contracted by the PSF to move some of the programs to the 'R' environment from Excel and Visual Basic. This was done to better enable all users to test assumptions while recognizing the increasing use of 'R' amongst biologists. This project builds on a previous work supported by Indian and Northern Affairs Canada (INAC), the State of the Salmon Program (SOS), DFO, and the PSF to produce the 1954-2014 estimates of escapement, catch and run size for NCC Salmon. The initial projects for INAC computed escapement, catch and total annual run size estimates for each salmon species by SA for 1980-2003 (English et al. 2004a; 2006a; b). In 2005-06, a comprehensive review of the NCC salmon stock assessment programs was conducted and the indicator streams were identified for each salmon species (English et al. 2006). In 2008-09 the SOS, DFO and the PSF supported additional efforts to compute these estimates for each BC Salmon CU (English et al. 2010). From 2011- 2016, the PSF supported projects to update the NCC Database and Analysis System and the various models used to compute annual exploitation rates for NCC salmon (English et al. 2012); the extension of the time series for Skeena salmon CUs to cover the years from 1954-2010 (English et al. 2013) and include estimates for 2011 – 2014 (English et al. 2016).

A large amount of time and resources are expended each year by DFO, the Pacific Salmon Commission (PSC), First Nations, stewardship groups, the PSF and other NGOs to obtain the catch and escapement data needed to monitor trends for BC salmon stocks and CUs. Some of these data are combined in regional or coast-wide models to derive estimates of run size and exploitation rates for specific salmon indicator stocks (e.g., Northern Boundary Sockeye model, Skeena Sockeye In-river Model, Area 3-5 Pink and Chum Models, coast-wide CWT analysis models for NCC Chinook and Coho exploitation rate indicator stocks). In most instances prior to 2009, the results from these substantial data collection and analysis efforts have not been applied to the challenge of tracking trends in catch and escapement by CU.

METHODS

General Analytical Approach

The analytical procedures used to compute escapement, catch, and run size (ECR) estimates for each SA and CU range from the relatively simple summation of annual catch and escapement estimates to complex run reconstruction techniques. A summary of the major components of the data compilation and analytical sequence is provided below:

a. Identify the streams with reliable and consistent time-series of escapement data for a specific species and run timing group (indicator streams);

b. Record information about the escapement survey methods and relative quality of the escapement estimates for each indicator stream using a 5-point scale along with other metadata related to these escapement estimates;

c. Obtain the latest version of the NuSEDS database to extract the escapement data for each indicator stream and all the non-indicator streams that have been monitored;

d. Link the NuSEDS database, Blair Holtby's October 2011 version of his "CU decoder ring" database and our new set of indicator streams using the unique NuSEDS POPID code which is common to each of these separate databases;

e. Account for missing escapement estimates in the available time series for a specific SA or CU using the methods described in Appendix A and previous reports;

f. Obtain the best estimates of catch by species, week, gear type and SA;

g. Obtain the most recent version of the available run reconstruction analyses for intensively monitored and assessed stocks (e.g., Nass and Skeena Sockeye and Chinook stocks);

h. Estimate Canadian and total exploitation rates for Pink and Chum salmon returning to Area 3, 4 and 5 using Effort-Harvest Rate (EHR) relationships and/or adjustments to Sockeye harvest rates to account for species-stock specific run-timing differences;

i. Obtain total fishing mortality or exploitation rate (ER) estimates for each Chinook and Coho indicator stocks and link these estimates to the appropriate SA and CU for each species;

j. Upload all of the above information into an MS Access database; and

k. Run the analyses using procedures described in this and related reports (Challenger et al. 2018; English et al. 2018) to produce annual estimates of total escapement, Canadian harvest, total harvest, run size, and exploitation rates for each SA and CU.

The foundation for the escapement estimates presented in this and previous NCC Salmon Analysis reports is the NuSEDS database and list of indicator streams identified by NCC biologists as the most reliable set of escapement data available for each CU. Our analyses are linked directly to a downloaded copy of the NuSEDS database so these analyses can be readily updated as new information is loaded into the database.

Two different approaches have been used to convert escapement estimates for a specific CU into a time series of comparable estimates. One approach uses the estimates for the most reliably monitored streams (indicator streams) to determine the trends in the escapement data, corrects for missing estimates for these indicator streams using an algorithm similar to that described in (Little and Rubin 1987) and expands the total for indicator streams to represent all streams in a specific SA or CU (English et al. 2006; Appendix A). The other approach proposed in Holtby (2011) uses criteria related to the number of annual estimates in a specified period to determine the escapement data that should be used to determine trends and employs a relatively complex algorithm (Brown 1974) to fill in the missing values for each stream based on the available data for the other streams in a SA or CU. In previous projects, we compared the methods used to correct for missing estimates and determined that the results were essentially identical when the same set of streams were selected (English et al. 2016). Therefore, we employed the approach initially described by Little and Rubin (1987) because it was easier to implement and more readily understood of the two methods.

The critical step in the escapement estimation process was identifying the streams with the most reliable escapement records. We used the set of indicator streams previously identified by NCC biologists (English et al. 2004a; 2006; 2009; 2012; 2016) as the starting point for this project. Prior to conducting the analyses reported in 2012, NuSEDS data for all NCC streams were linked to our initial set of indicator streams and we worked with DFO biologists to review the escapement time series for every NCC stream for each CU. Together, we determined which indicator streams should be removed and which of the other streams should be added to the indicator stream list. The indicator streams used to produce the results presented in this report are the same as those used for our 2016 report (English et al. 2016). These indicator streams are also the same as those used to produce the results presented in our 2012 report (English et al. 2012), except for Coho Salmon where 40 indicator streams were added in Area 4 and 5 for the results reported in 2016. The quality of the escapement data for each indicator stream was assessed on a 5 point-scale (see below).

In addition to the above change in the indicator streams for Coho salmon, we made the following modifications to the methods used to expand observed escapements to indicator streams to a total escapement estimate for a specific species-SA or CU:

a. For the Expansion Factor 1, English et al. (2012) and previous analyses used decade averages for each indicator stream to determine the expansion factor to account for indicator streams that were not surveyed in a given year. However, this process underestimated the total escapement to indicator streams for those decades where one or more indicator streams for a specific CU or SA-species combination did not have any escapement estimates in that decade.

b. To address the above issue, we modified our analysis program in 2016 to use the average stream specific escapements for the nearest decade with at least one escapement estimate for each indicator stream in a CU or SA-species combination (English et al. 2016). There were very few instances (2 for Coho and 1 for Chinook) where there was no decade when each indicator stream had at least one escapement estimate in the NuSEDS database. For these cases, we used the average escapement estimates for 1980-1999 to compute Expansion Factor 1.

c. For Expansion Factor 2, English et al. (2012) and previous analyses used decades or multiple decade periods (e.g., 0=decadal averages, 1=1980-89 average, 2=1990-99 average, 3=2000-09 average, 4=1980-99 average, 5=1980-2009 average) to expand the adjusted indicator stream escapement to total escapement for all streams in a SA or CU (see English et al. 2012, Appendix Tables A1 and A2).

d. For 1950's, 1960's and 1970's, we used the above rules to determine Expansion Factor 2 except for those decades or multiple decade period where one or more indicator streams did not have any escapement estimates. For these instances, we used the 1980-99 averages to expand the adjusted indicator stream escapement to total escapement for all streams in a SA or CU.

e. The expansion factor associated with observer efficiency (Expansion Factor 3) was adjusted from 5.0 to 3.0 for Area 2E Coho and the Haida Gwaii East Coho CU (CO_23) and from 3.0 to 1.0 for Smith Inlet Coho CU (CO_20) and Upper Nass Coho (CO_36) due to changes in the quality of the escapement estimates for the indicator streams in these areas. Deena and Pallant creeks are the two major indicator streams in Area 2E and both

have more reliable escapement estimates than most Coho streams. The primary indicator stream for the Smith Inlet CU is the Docee Fence after 1990 and the Meziadin fishway is the primary source of the indicator stream escapement Upper Nass CU is Meziadin where the escapement estimates are derived from highly reliable fishway counts.

Appendix Table A3 provides a summary of the average values for expansion factors 1, 2, and 3 for each species by SA and Appendix Table A4 provides similar values for each CU.

The relative survey rating scale presented in (Figures 1-5, lower graph) was comprised of three sub-ratings, which included: a) survey quality (Q1); b) survey execution (Q2); and c) survey coverage (Q3) for the indicator streams within each SA or CU. A 5-point scale was used for each of these three sub-ratings, where 1= a poor score and 5= an excellent score.

The ratings for survey quality (Q1) were:

1) **Poor quality** – An estimate of poor reliability due to few surveys, counting deficiencies, etc.
2) **Fair quality** – An estimate of moderate reliability based on two or more visual inspections (i.e., low quality AUC estimate);
3) **Good quality** – An estimate of good reliability based on three or more visual inspections (i.e., medium quality AUC estimate);
4) **Very good quality** – An estimate of high reliability based on mark-recapture data, almost complete fence counts, or high quality AUC estimates; and
5) **Excellent quality** – An estimate of very high reliability from an unbreached fence count.

The ratings for survey execution (Q2) is the degree to which the surveys of indicator streams were conducted and these were calculated based on Expansion Factor 1 used to account for indicator streams not surveyed in a given year. The portion that the surveyed streams represent of the average escapement to all indicator stream was converted to a 5-point scale using the following equation:

$$Q2 = 5.0 / \text{Expansion Factor 1}$$

Therefore, for those years when escapement estimates are available for each indicator stream in a SA or CU (Expansion Factor 1 = 1.0) and Q2 is 5.0.

The ratings for survey coverage (Q3) reflect the portion that indicator streams represent of all streams within a SA or CU (index portion). Expansion Factor 2 is used to convert the escapement estimate for the indicator streams to a total escapement estimate for all streams within a SA or CU. Therefore, the values for Q3 on a 5-point scale was calculated as follows:

$$Q3 = 5.0 / \text{Expansion Factor 2}$$

For those decades when the sum of the average escapement estimates for indicate represent half of the sum of the average escapement estimates for all streams in a SA or CU (Expansion Factor 2 = 2.0) and Q3 is 2.5.

The three sub-ratings are summed together to provide an overall rating of survey quality. A combined rating above 10 would be indicative of reliable escapement estimates. A score of 9-12

could occur when the average quality rating was fair-good, 80-100% of the escapement to indicator streams was monitored, and the index streams represented more than 60-80% of the total escapement for a species to all streams within a SA or CU. The survey execution and index portion components of the overall survey rating can vary by year or decade. The survey quality component was usually constant over all years unless there was a change in the survey method for one or more of the indicator streams for a specific SA/CU/species combination.

Sockeye Salmon

As indicated above, no changes were made to the list of escapement indicator streams for NCC Sockeye salmon but the time series was extended forward to 2016 for CUs within Area 1, 2 and 6-10. The time series of escapement and ER estimates starts in 1982 for Area 3 Sockeye and 1960 for Area 4 and 5 Sockeye and the estimates for Sockeye CUs in Area 3 and 4 have been updated through 2017. The approach of adjusting for missing indicator stream data (Expansion Factor 1), using the nearest decade with at least one escapement estimate for each indicator stream (described above), worked for all Sockeye CUs and SAs.

Exploitation rate estimates for the Nass and Skeena Sockeye stock aggregates are estimated annually using the Northern Boundary Sockeye Run Reconstruction (NBSRR) Model (English et al. 2004b; 2005; Alexander et al. 2010; in prep.). The NBSRR was recently modified to incorporate the DNA estimates of the contribution of Central Coast Sockeye stocks to the Northern Boundary fisheries from 2002-2017. This is the primary reason for the small but notable reductions in the Canadian catch and exploitation rates for Nass and Skeena stocks compared to those reported previously (English et al. 2016).

As in previous analyses, we used available data on the migration timing by CU to derive preliminary estimates of the marine ERs for each CU or group of CUs with the same migration timing. The average CU timing relative to the mean run timing for the Nass Sockeye aggregate was estimated using DNA stock composition data reported in Hall et al. (2010). The average CU timing relative to the mean run timing for the Skeena Sockeye aggregate was derived from Cox-Rogers et al. (2004). The timing distribution for each CU was defined by a normal curve with its peak defined by the relative timing (offset) parameter and duration determined by the standard deviation (SD) parameter (e.g., SD value of 2.0 = 14.0 days and a run duration of 84 days). Reviews of the run-timing parameters for Skeena Sockeye resulted in the decision to reduce the run duration for each Skeena sub-stock group by 20% (e.g., 2.5 SD to 2.0 reduced the run duration from 105 days to 84 days). A summary of the current set of timing offsets and run duration parameters for Nass and Skeena Sockeye CUs is provided in Appendix B along with some examples of the shape of the aggregate run based on these parameters. The run timing parameters for the Skeena Sockeye CUs are the same as those used in the updated version of the Skeena Sockeye In-River (SSIR) model (English et al. 2015; 2018). The SSIR model combines the best available estimates of weekly Sockeye catches in Skeena River First Nation fisheries with daily escapement estimates derived by combining information from the Tyee Test fisheries with relative escapement estimates for each of the Skeena Sockeye sub-stock groups. The in-river harvest rates computed by the SSIR model are combined with the marine harvest estimates from the NBSRR model to estimate the Canadian ER for each Skeena Sockeye sub-stock group.

The methods and assumptions used to derive Canadian and Total ERs for stocks returning to each SA are summarized in Table 1. In the absence of any direct ER estimates for Area 1, 2E,

and 2W the assumption of a constant 20% ER was used. The ERs for Area 5 Sockeye stocks were assumed to be equal to the ER estimates for Lakelse Sockeye which have similar run timing to those of Area 5 Sockeye stocks. ERs for Area 6-10 Sockeye stocks were derived by combining the escapement and catch estimates for each SA, as described below for Pink and Chum salmon returns to these areas.

The Canadian and Alaska ERs were combined with the escapement estimates for Sockeye salmon to produce the estimates of Canadian catch, Alaska catch, and total run size for each SA or CU. The relationship between the Sockeye salmon CUs and the ER estimates for Sockeye returning to each SA is provided in Table 2 along with the total number of streams and the number of indicator streams by survey quality rating for each CU.

Pink Salmon

No changes were made to the list of indicator streams for NCC Pink salmon but the time series was extended forward to 2017 for CUs and SA where at least one of the indictor streams was monitored in that year. The approach of adjusting for missing indicator stream data (Expansion Factor 1), using the nearest decade with at least one escapement estimate for each indicator stream, worked for all Pink CUs and SAs. In previous analyses, the average escapement estimates for each Pink salmon stream were derived from both odd and even years combined. Since Pink salmon returns can be substantially different and distinct between odd and even cycle years, this was corrected for the analyses presented in this report. This change has resulted in changes in the escapement estimates for all Pink Salmon stocks and in cases where odd and even year returns were very different, the changes have been substantial (e.g. Area 8).

A summary of the methods used to estimate the Canadian and Alaska ERs for NCC Pink salmon stocks is provided in Table 1. Canadian HRs for Area 1, 2E, 2W, and 6-10 were derived by combining the escapement and catch estimates for each SA as described in previous reports (English et al. 2004a; 2012; 2016). The methods used to estimate the Canadian HRs for Pink salmon stocks returning to Areas 3, 4, and 5 were similar to those described in English et al (2016), but the entire analytical process used to estimate annual ERs for Area 3-5 Pink and Chum was re-programmed in R. All the data sources, analytical methods and output files are described in Challenger et al. (2018).

The resulting Canadian HR_i and Alaskan ER_i for stock "i" were combined in the following equation to compute the total ER_i for Canadian fisheries:

$$\text{Total Canadian } ER_i = \text{Canadian } HR_i * (1\text{-Alaska } ER_i)$$

The Canadian and Alaskan ERs were combined with the escapement estimates for Pink salmon to produce the estimates of Canadian catch, Alaskan catch, and total run size for each SA or CU. The relationship between the Pink salmon CUs and the ER estimates for Pink salmon returning to each SA is provided in Table 3 along with the total number of streams and the number of indicator streams by survey quality rating for each CU.

For Pink salmon CUs contained within a single SA, the ER estimates were set equal to those for that SA. For Pink salmon CUs that include streams from multiple SAs, the ER estimates were the average of those for the associated SAs (see Table 3). Previous analyses (English et al. 2012; 2016) used the same relationships between CUs and SA and the method used to compute the ERs for CUs that include streams from multiple SAs for Pink salmon.

Chum Salmon

No changes were made to the list of indicator streams for NCC Chum salmon, but the time series was extended forward to 2017 for CUs and SA where at least one of the indictor streams was monitored in that year. The approach of adjusting for missing indicator stream data (Expansion Factor 1), using the nearest decade with at least one escapement estimate for each indicator stream, worked for all Chum CUs and SAs.

A summary of the methods used to estimate the Canadian and Alaska ERs for NCC Chum salmon stocks is provided in Table 1. Canadian HRs for Area 1, 2E, 2W, and 6-10 were derived by combining the escapement and catch estimates for each SA using methods similar to those described in English et al. (2004a; 2012; 2016).

Assessments of the Canadian HRs Area 3, 4 and 5 Chum stocks in the Area 3-5 seine and gillnet fisheries were complicated by the mixture of Chum stocks in these fisheries, lack of any direct measures of Chum harvest rates and the recent implementation of Chum non-retention regulation in specific weeks for some fisheries. Prior to 1982, we assumed that HRs for Area 3, 4 and 5 Chum stocks in Canadian fisheries were equal to the Canadian HRs estimates for Area 3, 4 and 5 Pink salmon stocks, respectively. From 1982-2017, we combined weekly Sockeye HR estimates from the NBSRR model (English et al. 2005; Alexander et al. in prep.) with estimates of Chum run timing and the timing-location of Chum non-retention fisheries into a Chum HR Model to estimate the Canadian HRs for Area 3, 4 and 5 Chum stocks (see Appendix F for more details).

The Chum HR Model for Area 3 stocks included the capability to apply adjustments for Chum non-retention by week and gear type for each of the Area 3 (3A, 3B, 3C, 3D, 3E) and Area 4 (4W, 4X) fisheries where Nass (Area 3) Sockeye are harvested (Figure 1). These weekly adjusted HRs were weighted by the portion of the Area 3 Chum migrating through these fisheries each week to compute the annual HRs for Area 3 Chum. The migration timing for Area 3 Chum was derived from the 1994-2009 daily Nass fishwheel Chum catch data adjusted for weekly variability in fishwheel catch efficiencies and annual variability in the duration of fishwheel operations (Will Duguid, LGL Limited, pers. comm.).

The Chum HR Model for Area 4 stocks was similar to the Area 3 Model but included all the Canadian fisheries that harvested significant numbers of Skeena Sockeye (Sub-area 3A, 3B, 3C, 4W, 4X, 4Y, 4Z, and Area 5;

Figure 2). The Area 4 Chum run timing was derived from the Tyee Test Fishery data and is equivalent to the Chum run timing used in the Skeena Model used to evaluate alternative fishing plans for Skeena Sockeye (Dave Peacock, pers. comm.).

The Chum HR Model for Area 5 stocks used all the same Skeena Sockeye harvest rates and fisheries used for Area 4 stocks, along with an assumption that the run timing for Area 5 Chum is one week later than that for Area 4 Chum stocks.

The Alaska ERs for Area 1, 2E, 2W and Central Coast (Area 6-10) Chum stocks were assumed to be zero (Dave Peacock, pers. comm.). The Alaska ERs for Area 3 and 4 Chum salmon stocks were assumed to be equal to the Alaska ERs for Area 3 and 4 Pink salmon, respectively, as described above for 1954-2017. The Alaska ERs for Area 5 Chum salmon stocks were assumed to be equal to the Alaska ER estimates for Area 4 Pink salmon for 1954-2017.

As described for Pink salmon (Challenger et al. 2018), the resulting Canadian HR_i and Alaskan ER_i for stock "i" were combined in the following equation to compute the total ER_i for Canadian fisheries:

$$\text{Total Canadian } ER_i = \text{Canadian } HR_i * (1\text{-Alaska } ER_i)$$

The Canadian and Alaska ERs were combined with the escapement estimates for Chum salmon to produce the estimates of Canadian catch, Alaska catch, and total run size for each SA and CU. The relationship between the Chum CUs and the ER estimates for Chum returning to each SA is provided in Table 4 along with the total number of streams and the number of indicator streams by survey quality rating for each CU.

For Chum salmon CUs contained within a single SA, the ER estimates were set equal to those for that SA. For Chum salmon CUs that include streams from multiple SAs, the ER estimates were the average of those for the associated SAs (see Table 4). Previous analyses (English et al. 2012) used the same relationships between CUs and SA and the method used to compute the ERs for CUs that include streams from multiple SAs for Chum salmon.

Coho Salmon

The extension of the time series for Coho escapement estimates resulted in a few changes to the escapement indicator streams and analysis procedures for Coho salmon are the same as those described in English et al. (2016), but are repeated here and updated where appropriate for 2015-2017:

a. Historical indicator streams (26 streams) were reinstated for Area 5 to provide better estimates for the earlier years in the time-series (1954-1979).

b. Zymoetz River Coho was removed from the list of indicator streams for Area 4 and Lower Skeena due to inconsistent monitoring that provided some very anomalous results for several years.

c. The new approach of adjusting for missing indicator stream data (Expansion Factor 1), using the nearest decade with at least one escapement estimate for each indicator stream, did not work for Area 4 and 5 Coho because there was no decade when each indicator stream had at least one escapement estimate in the NuSEDS database. For these cases, we used the average escapement estimates for 1980-1999 to compute Expansion Factor 1.

d. Annual escapement estimates for Babine River Coho were derived from Holtby (1999) for 1954-1998. The estimates for 1999-2017 were derived by expanding the Babine River fence counts for the portion of the run migrating after the counting period.

The extension of the time series to provide 1954-2014 ER estimates for Coho resulted in fairly substantial changes in data sources and the analytical methods used to derive the ER estimates for both Canadian and Alaskan fisheries (English et al. 2016). These analytical methods have been applied to the available data for 2015-2017 to further extend the time series:

a. The ER estimates for NCC Coho were derived by CWT recovery information for several Coho ER indicator streams (Deena River, Toboggan Creek and Zolzap Creek) with the historical time series of ER estimates for Babine River Coho 1954-88 (Holtby 1999).

b. Area 3 Coho ERs for 1992-2017 were derived by the Nisga'a Joint Technical Committee based on CWT recovery data for Zolzap Creek Coho and escapement estimates for Coho

streams in the Nass Area (Table C-1; Richard Alexander, pers. comm.). The Area 3 Coho ER time series was extended back to 1954 by multiplying the ratio of the Area 3 to Area 4 average ER estimates for 1992-1997 by the annual Area 4 ER estimates for 1954-1991.

c. The Area 4 ER estimates for 1989-2017 were derived by combining CWT recovery data for Toboggan Creek Coho with the total escapement estimates for Area 4 Coho (Table C-2). The Babine ER estimates for 1954-1988 (Table C-3) were derived from run reconstruction analyses for Babine River Coho (Holtby 1999) and Babine ER estimates for 1989-2017 were assumed to be equal to those estimates for Area 4 Coho.

d. Area 2E and 2W ERs for 1997-2014 were from the CWT recovery data for Deena River Coho with missing values for 1999, 2007, 2008, and 2012 filled in using the average of the ER estimates in adjacent years. No reliable Deena River CWT data were available for 2015-2017. The Canadian ERs for 1954-1996 and 2015-2017 were set equal to the average values for 2011-14 which were similar to those for Area 3 Coho. The estimates for Alaska ER for Area 2E and 2W Coho for 1954-1996 and 2015-2017 were derived using the ratio of the average Canadian ERs and average Alaskan ER for 1997-2014 from the Deena River CWT recovery data (Table C-4).

e. Area 6 Canadian ERs for 1997-2010 were from the NCC Coho Model (Dave Peacock, DFO Prince Rupert, pers. comm.). The Canadian ER estimates for 2011-2017 were set equal to those for Babine/Area 4 Coho, as described above. The Canadian ERs for 1954-1996 were derived using the ratio of the average Canadian ERs for Babine/Area 4 Coho for 1980-1996 to the baseline Canadian ER estimate of 25.6% for Area 5/6 Coho from the NCC Coho Model. The Alaskan ERs for Area 6 Coho were set equal to those estimated for Area 4 Coho for all years (Table C-5).

f. Area 6-8 Canadian ERs for 1997-2010 were from the NCC Coho Model (Dave Peacock, pers. comm.). The Canadian ER estimates for 2011-2017 were set to 60% of those for Babine/Area 4 Coho. The Canadian ERs for 1954-1996 were derived using the ratio of the average Canadian ERs for Babine/Area 4 Coho for 1980-1996 to the baseline Canadian ER estimate of 24.7% for Area 6-8 Coho from the NCC Coho Model. The Alaskan ERs for Area 6-8 Coho were set to 60% of those estimated for Area 4 Coho for all years (Table C-5).

g. Area 8 Canadian ERs for 1997-2010 were from the NCC Coho Model (Dave Peacock, pers. comm.). The Canadian ER estimates for 2011-2017 were set to 60% of those for Babine/Area 4 Coho. The Canadian ERs for 1954-1996 were derived using the ratio of the average Canadian ERs for Babine/Area 4 Coho for 1980-1996 to the baseline Canadian ER estimate of 25.5% for Area 8 Coho from the NCC Coho Model. The Alaskan ERs for Area 8 Coho were set to 60% of those estimated for Area 4 Coho for all years (Table C-5).

h. Area 4-9 Canadian ERs for 1997-2010 were from the NCC Coho Model (Dave Peacock, pers. comm.). The Canadian ER estimates for 2011-2017 were set to 40% of those for Babine/Area 4 Coho. The Canadian ERs for 1954-1996 were derived using the ratio of the average Canadian ERs for Babine/Area 4 Coho for 1980-1996 to the baseline Canadian ER estimate of 25.5% for Area 4-9 Coho from the NCC Coho Model. The Alaskan ERs for Area 4-9 Coho were set to 40% of those estimated for Area 4 Coho for all years (Table C-6).

i. Area 9-10 Canadian ERs for 1997-2010 were from the NCC Coho Model (Dave Peacock, pers. comm.). The Canadian ER estimates for 2011-2017 were set to 20% of those for Babine/Area 4 Coho. The Canadian ERs for 1954-1996 were derived using the ratio of the average Canadian ERs for Babine/Area 4 Coho for 1980-1996 to the baseline Canadian ER estimate of 25.0% for Area 4-9 Coho from the NCC Coho Model. The Alaskan ERs for Area 9-10 Coho were set to 20% of those estimated for Area 4 Coho for all years (Table C-6).

The relationship between the Coho CUs and the ER estimates for Coho returning to each SA is provided in Table 5 along with the total number of streams and the number of indicator streams by survey quality rating for each CU.

Chinook Salmon

The results of the 1980-2017 analyses for Area 3 (Nass), Area 4 (Skeena), Areas 6, 8, 9, and 10 were reviewed and new information was added to these analyses. North and Central Coast Chinook run reconstruction analyses were conducted using MS Excel workbooks where the spreadsheets results for each SA were linked to a table that summarized the results in the standard output format used for all other species. These spreadsheet analysis results were uploaded into our MS Access database to facilitate further analyses of each Chinook CU. The relationship between the Chinook CUs and the ER estimates for Chinook returning to each SA is provided in Table 6.

The Area 3 analyses are updated annually by the Nisga'a Joint Technical Committee (NJTC) as required for implementation of the Nisga'a Treaty (Richard Alexander, LGL, pers. comm.). The revised version of the NJTC Nass Chinook tables provides estimates for 1986-2017 (Table D-1). Note that the estimates from 1986 to 1991 were generated prior to the start of the Nisga'a Fisheries Program in 1992 and are considered less reliable (i.e., higher degree of uncertainty associated with escapement and catch estimates) than the estimates produced after 1991. The data sources and methods used to produce the estimates for Nass Chinook are identified in the footnotes for the Nass Chinook summary table (Table D-1) and further documentation can be found in NJTC reports (e.g., Alexander et al. 2015).

Escapement estimates for Skeena Chinook were reviewed and revised based on a reanalysis of Kitsumkalum mark-recapture data and results from analysis of DNA samples from the Tyee Test Fishery (Ivan Winther, DFO Rupert, pers. comm.). These revised estimates were used to update the NCC database for 1984-2017. The revised estimates do not use the indicator escapement estimates, but these are included in the Chinook workbook.

The Skeena Chinook time series started in 1984 with the initiation of a mark-recapture program for estimating the escapement for Kitsumkalum Chinook. Prior to the revised estimates based on DNA, the mark-recapture escapement estimates were combined with those from the Babine fences, and visual surveys of the Bear, Kispiox, and Morice rivers to produce an annual index of the escapement. This index was expanded to represent the entire Skeena using decadal averages of the portion that these indicator streams represented of the total for all Skeena Chinook spawning areas. Estimates of harvest for marine fisheries were derived from CTC tables with the Total Fisheries Mortality estimates for Kitsumkalum Chinook based on expanding CWT return data (Ivan Winther, pers. comm.). Estimates for Skeena River Chinook fisheries were derived from First Nation and recreational catch monitoring programs (Table D-2).

Escapement estimates for the non-enhanced Chinook streams in Area 6 were based on recorded escapements for three indicator streams (Wahoo, Brim, and Khutze) which represent 25% of the average total escapement to the non-enhanced Chinook streams in Area 6. However, no estimates have been produced for Khutze River since 2008. Escapement for 2017 was not available in NuSEDs, but was updated using BC16 records provided by Marilyn Helin (DFO, Prince Rupert). Harvest estimates for Area 6 Chinook were derived using the Canadian marine and total marine ERs for Area 8 Chinook (Table D-3). Prior to the 2014 update (English et al. 2016), catch estimates for Area 6 Chinook were derived from marine ERs for Area 4 Chinook. However, DFO advisors indicated that Area 8 ERs would be more appropriate for Area 6 Chinook (Ivan Winther, pers. comm.).

Escapement estimates for Area 8 Chinook were produced by summing the available estimates for the Bella Coola (including Atnarko River) and Dean rivers, and filling missing values for the Dean River for 2012 to 2014. These estimates were compared with the 1990-2013 escapement estimates for Atnarko River Chinook (Vélez-Espino et. al 2014). With the single exception of 1992, the NuSEDS records for Bella Coola Chinook were consistently larger than the Atnarko estimates but showed a similar pattern (Appendix Table D4). For the 2015-2017 update, Chinook escapement estimates for Atnarko and Dean rivers were based on data provided by Kate McGivney (DFO, Bella Coola). None of the escapement estimates provided by DFO were in NuSEDs (either blank or NI in NuSEDs). Estimates of escapement for Bella Coola for 2015-2017 were set to equal Atnarko River. Estimates of harvest for marine fisheries were derived from CTC tables with the Total Fisheries Mortality estimates for Atnarko Chinook based on expanding CWT return data (Ivan Winther, pers. comm.). For this update, CWT return data were only available to 2016, so harvest estimates for 2017 were derived used the exploitation rates estimated for 2016. Harvest estimates for 1985-89 were derived using the average total ER for the 1990-1994 period (43%) and the average distribution of the harvest between Canadian and Alaskan fisheries (Table D-4).

Escapement and harvest estimates for Area 9 Summer and Area 9 Fall (Wannock River) Chinook are provided in Table D-5 and Table D-6, respectively. NuSEDs shows Wannock River Chinook as *Not Inspected* for 2015 and 2016. Data for 2017 were not available in NuSEDs. However, English et al. (2018) provide escapement estimates based on DIDSON and ARIS counts from 2012 to 2017. These values were used to update the Area 9 Fall Chinook table. Escapements for Area 9 Summer streams (Kilbella and Chuckwalla rivers) are shown as *Not Inspected* for 2015 and 2016 in NuSEDs (2017 data were not available). Escapement estimates for 2015-2017 summer runs were estimated by expanding brood stock collections by effort (number of sets relative to sets conducted in 2017) and assuming 50% coverage of the run each year.

Annual exploitation rate estimates for Area 9 Chinook in Canadian and Alaskan fisheries were derived by combining the CWT recovery data for Wannock Chinook with annual estimates of the catch of Wannock Chinook in Central Coast (Areas 7-9) recreational fisheries for 1988-2017. The contribution of Wannock Chinook to recreational fisheries in Area 7+8 and Area 9 (Rivers Inlet) were assumed to be 10% and 20%, respectively, in average escapement years. These catch estimates were adjusted for variation in escapement levels by increasing the contribution of Wannock Chinook to these fisheries in higher than average escapement years and decreasing the contribution in lower than average escapement years. The average escapement level for Wannock Chinook was set to the average for 2010-17 (6,700). These analyses resulted in Canadian ERs that varied from 6-15% and Total ERs varying from 11-58%, with the highest ERs

occurring in recent years. It is likely that the Canadian ERs for Area 9 Summer Chinook are higher than those for Wannock Chinook, however, the CWT recovery data for Area 9 Summer Chinook is very limited compared to that for Wannock Chinook. Consequently, we assumed that marine ERs were similar for both of these Area 9 Chinook stocks.

Escapement and harvest estimates for Area 10 Chinook are provided in Table D-7. No escapement estimates have been reported for Area 10 Chinook indicator streams (Docee and Nekite rivers) since 2011. Harvest estimates for Area 10 Chinook in Canadian fisheries were derived using the following assumptions: 1) First Nations catch was 1% of the adjusted escapement estimate; 2) commercial catch was 2% of the Area 10 Troll Catch and 5% of the Area 10 gillnet catch; and 3) the harvest rate for Area 10 Chinook in the central coast recreational fishery was equal to the harvest rate for Wannock Chinook in the Area 7-9 recreational fisheries. Harvest estimates for Area 10 Chinook in Alaskan fisheries were derived using the exploitation rates for Wannock Chinook in Alaskan fisheries.

Age Composition Data

Estimates of the average annual age composition for each salmon species returning to each SA and CU were derived from the Pacific Region Salmon Age Dataset (Bruce Baxter, DFO, pers. comm.). Additional data on the annual age composition of Sockeye returns to the Nass and Skeena watershed were provided by Richard Alexander and Steve Cox-Rogers, respectively. The average age composition estimates used for each SA and CU are provided in Appendix G.

RESULTS

The escapement trends for each CU and species-SA combination reflect the adjusted annual escapement estimates derived from 681 indicator streams for even years and 630 indicator streams for odd years (Table 7). The quality ratings for each indicator stream are the same as those resulting from previous reviews and these quality rating were based on the methods used to estimate escapement since 1980 (English et al. 2012). The majority of these indicator streams (76%) were assigned survey quality ratings of fair (2) or good (3). The streams with the highest quality survey data (ratings of 4 and 5) accounted for 6% of the indicator streams and 18% of the indicator streams were assigned a poor quality rating of 1. Most of the Pink and Chum streams with poor ratings could have been removed from the indicator stock list without affecting the estimates because they were associated with CUs that had many other streams with higher survey quality ratings. For Sockeye, Coho, and Chinook, there were several CUs for which all the indicator streams were assigned a poor rating for survey quality. For these CUs, escapement trends should be interpreted with caution since the available estimates are only slightly better than no data at all. Tables 2-6 provide the total number of streams, number of indicator streams and survey quality ratings for each CU with at least one indicator stream.

Tables 8-12 provide the annual Canadian and total ERs for each species and SA derived using the various analyses described above. Blanks in these tables indicate years when estimates of total run size could not be derived for a specific SA because escapement or ERs could not be estimated for that year. The time series for Area 3 and 4 Sockeye (Table 8) included those years (1982-2014) with completed run reconstructions using the NBSRR model. Pink salmon estimates for Area 1 and 2W were not available for odd numbered years (Table 9) because no indicator streams were identified for the odd-year returns of Pink salmon in these SAs. Coho salmon ERs were estimated for each year from 1954-2017, as described above. The lack of ER

estimates for Area 1 Coho is because no indicator streams were identified for Coho salmon in Area 1 (Table 11). The start of the time series of estimates for Area 3, 4 and 8 Chinook salmon (Table 12) was determined by the first year when escapement estimates improved substantially for Nass, Kitsumkalum, and Bella Coola (Atnarko) Chinook, respectively. For Area 9 and 10 Chinook, the time series of ER estimates starts in 1980 because this is the first year in the time series of comparable catch estimates for the Area 7-9 recreational fisheries which is the critical time series used to derive the ER estimates for these Chinook stocks.

The results from the escapement and harvest rate analyses described above were organized into a series of workbooks that facilitated the preparation of two primary types of figures showing: 1) escapement, catch and harvest rate trends (Figures 2-6, upper graph); and 2) the relative data quality and completeness of the escapement monitoring efforts for the selected SA or CU (Figures 2-6, lower graph).

The escapement, catch, and run size estimates for each species (Chinook, Coho, Sockeye, Pink odd, Pink even, and Chum) were organized into a single file to facilitate the preparation of summary tables and figures for any selected SA, CU, or Areas 1-10 combined. Figures 2-6 are samples of the stock abundance, harvest, and exploitation rate trends for selected CUs for each species within each region. These particular figures were selected to provide examples of the variability in survey quality, survey execution, abundance and exploitation rates observed among the species and CUs. While the quality and quantity of data used to generate these plots was often substantially different between CUs, these types of figures provide a quick means for examining trends in abundance, catch and exploitation over the past 29-35 years for Chinook, 33-61 years for Sockeye and the past 61 years for Pink, Chum and Coho salmon.

Nass Chinook provide an example of the result of substantial improvement to escapement estimation procedures (

Figure 2). Previous summaries for Nass Chinook have included run size estimates back to 1980; however, the level of uncertainty in the pre-1992 estimates was so large that regional managers and stock assessment biologists agreed that the Nass Chinook time series should start in 1992. Prior to 1992, escapement estimates for Nass Chinook were derived from visual surveys of variable numbers of spawning areas. From 1992 to present, these estimates were derived from intensive mark-recapture programs (thus, the high survey quality rating for this period). Nass Chinook provides an example of relatively stable abundance (total run size usually in the 30,000-60,000 range) and total ERs averaging 52% since 1992. The difference between the total ERs and Canadian ERs indicates that a small portion of this stock (averaging <3%) was harvested in US fisheries.

Area 4 Coho (Figure 3) provide an example of a stock with lower quality survey ratings, generally good coverage and much higher variability in annual abundance than Nass Chinook. The substantial reduction in the Canadian ERs from 1996 to 1998 reflects the fishery closure resulting from the 1997 "Coho crisis". The portion of the run harvested in Alaskan fisheries has remained fairly stable over the years and, with the decline in Canadian harvests, Alaskan fisheries have accounted for the majority of the catch of Skeena Coho since 1997.

Owikeno Lake (Area 9) Sockeye provide an example of a stock in which abundance levels declined dramatically over a short period and have not recovered despite the complete closure of the fishery (Figure 4). Escapement estimates for this stock were derived from DFO's clear stream index (CSI) counts. Recent DIDSON/ARIS sonar counts suggest that the CSI counts

represent on 16% of the total escapement of Sockeye to the Owikeno watershed. All harvests of this stock occurred in Canadian waters (i.e., Canadian ER = Total ER).

Chum salmon escapement estimates for the Hecate Strait Lowland CU (Figure 5) were derived from visual surveys of up to 41 indicator streams. The average survey quality rating is only fair (rating=2), but the frequency of surveys and coverage has been sufficient to produce an annual survey rating close to 10 on the 15 point scale until recent years (Figure 5, lower graph).

The last example is for Hecate Strait Fjords even-year Pink salmon returns (Figure 6). This figure shows the very large returns Pink salmon for this CU from 1986-92 (10-16 M), the substantial decline to less than 1 M in 2006-10 and signs of some recovery in 2014. As a result of the even-odd cycles for Pink salmon, there are fewer years on these graphs than those for other species, but there are two Pink salmon graphs (one for even-years and one for odd-years) for most SAs. In some SAs, consistently small returns or poor survey coverage limit the Pink salmon graphs to one of the two cycles (e.g., North and West Haida Gwaii CUs).

DISCUSSION

A large amount of time and resources are expended each year by DFO, PSC, First Nations, stewardship groups, PSF and other NGOs to obtain the catch and escapement data needed to monitor trends for BC salmon stocks and CUs. Some of these data are combined in regional or coast-wide models to derive estimates of run size and exploitation rates for specific salmon indicator stocks (e.g., Northern Boundary Sockeye model; PSC Chinook and NCC Coho models).

In this project, we have worked with regional fisheries biologists to identify or compute the most reliable time series of escapement and exploitation rate estimates and to link these time series to the CUs for each species. While there have been some improvements to the DFO catch and escapement databases over the past 3 years, there are still several important issues that need to be addressed. The NuSEDS database is supposed to contain the most reliable escapement estimate for each monitored salmon spawning area. However, some of the escapement time series that are the foundation for the regional analysis models are not included in the NuSEDS database. For example: the NuSEDS database does not include the escapement estimates that are routinely used to assess the status and trends for several major stocks, including: Nass River Sockeye, Chinook, Coho, and Babine Sockeye. Similarly, a single source for the complete set of catch and fishing effort data for BC salmon fisheries does not exist. Alternative estimates of commercial catches for the same fishery can be found in the sales slip and FOS databases, and these estimates can be substantially different. Recreational catch estimates have been systematically organized for some fisheries and completely lacking for others. Harvest estimates are available for most First Nation fisheries, but most of these estimates are not contained in any database.

Reliable estimates of the annual age composition for return salmon is available for only a few NCC stocks (e.g., Nass, Babine and Owikeno Sockeye). Age composition data for Babine Sockeye was used to derive two estimates of recruits per spawner (R/S): 1) using the annual age composition data and 2) using the average age composition data for returns over the time series. This analysis for Babine Sockeye revealed substantial difference between the best estimates of R/S based on annual age composition and those derived using the average age composition estimate (Figure 7).

Previous reports have provided a number of recommendations for streamlining the data management and analysis procedures for NCC salmon (English et al. 2009; 2012). Most of recommendations related to database updating and analysis process were addressed to produce the estimates in this report. A summary of these improvements is provided below:

1. Procedures for updating the NCC Salmon Database have been streamlined using a program written in R that also created a record of the updating process for future reference.
2. The results from the NBSRR Model and Skeena Sockeye In-River Model have been linked using a MS Excel program to combine in-river harvest rates with marine harvest rates to compute Canadian and Total ERs for each Skeena Sockeye CU.
3. The Pink and Chum Models for Area 3-5 were streamlined using a R program that combines the historical effort data with the EHR relationships and recent catch and effort data from the NBSRR Model to produce the time-series of Canadian and Total ERs for Area 3, 4 and 5 Pink and Chum salmon from 1954-2017. Future updates will just require loading the latest catch and effort estimates for Area 3 and 4 fisheries and SSE Alaskan purse seine fisheries into the appropriate input tables in the Pink and Chum Models.
4. Results from these run reconstruction analyses have been loaded into an application that allows anyone with access to the internet to obtain the historical time-series of escapement, catch, Canadian ERs and Total ERs for each salmon species by SA or CU and the associated histogram showing the survey quality ratings for the annual escapement estimates (http://shiny.lglsidney.com/ncc-salmon/).

Streamlining the data compilation, analysis, and access for annual estimates of catch and escapement for each BC salmon CU has made it easier to update and maintain these time-series and ensure this important information is available to decision makers both inside and outside the management agencies in a timely manner. Much of this information is visualized by the PSF on the Pacific Salmon Explorer (www.salmonexplorer.ca), an online data visualization tool that allows the public to track and compare trends in abundance, catch, and survival for each individual CU in the NCC. Using a series of interactive maps and figures, users can explore the best available data for salmon CUs, and print 'snapshots' of salmon status. The data compiled in this project provide critical inputs into the Pacific Salmon Explorer, and maintaining this information is central to PSF's ongoing ability to provide timely access to salmon data for NCC salmon CUs.

RECOMMENDATIONS

While database organization and analysis procedures have been substantially improved over the past years, there are several important issues that need to be addressed within DFO's internal data management and updating processes:

1. The procedures for uploading escapement estimates into the NuSEDS database and completing the review of these data need to be streamlined. Data coordinators need to be identified for each region and assigned the responsibility of ensuring that escapement data are complete and uploaded into the NuSEDS database in a timely manner.
2. The most reliable annual escapement estimates for every indicator stream must be added to the NuSEDS database. This is important for ensuring consistency between the various

analyses conducted using salmon escapement data (e.g., Babine fence counts, Nass River escapement estimates derived using mark-recapture techniques).

3. Procedures and responsibilities for updating databases must be clearly defined. One individual in Prince Rupert and one in Bella Coola, with the necessary skills, should be responsible for ensuring that catch and exploitation rate data are uploaded into the appropriate DFO database.
4. DFO's catch databases for commercial, recreational and First Nation fisheries harvest statistics need to be upgraded to industry standards and more accessible to DFO staff (i.e., single source, consistent format, accessible through the web via high speed servers).

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TABLES

Table 1. Summary of the sources for Canadian and Alaskan exploitation rates used for Sockeye, Pink, and Chum salmon stock originating from each NCC Statistical Area.

	Canadian Exploitation Rates (CDN ERs)					Alaska Exploitation Rates (AK ERs)				
	Area 1, 2E, 2W	**Area 3**	**Area 4**	**Area 5**	**Area 6-10**	**Area 1, 2E, 2W**	**Area 3**	**Area 4**	**Area 5**	**Area 6-10**
Sockeye Salmon										
1954-1959	20%				TCC&E	Zero				Zero
1960-1981	20%		Adj. Hist. Skeena	Adj. Hist. Lakelse	TCC&E	Zero		Adj. Hist. Skeena	Adj. Hist. Lakelse	Zero
1982-2008	20%	NBSRR Model	NBSRR+SSIR Model	NBSRR+SSIR Lakelse	TCC&E	Zero	NBSRR Model	NBSRR Model	NBSRR Lakelse	Zero
Pink Salmon										
1954-1981	TCC&E	A3-EHR Model	A3+4 EHR Model	A4 ERs * 50%	TCC&E	Zero	AK EER Model	AK EER Model	A4 ER	Zero
1982-1995	TCC&E	A3 Inside Pink-RR	Skeena Pink-RR	A4 ERs * 50%	TCC&E	Zero	A3 Inside Pink-RR	Skeena Pink-RR	A4 ER	Zero
1996-2014	TCC&E	A3-EHR Model	A3+4 EHR Model	A4 ERs * 50%	TCC&E	Zero	AK EER Model	AK EER Model	A4 ER	Zero
Chum Salmon										
1954-1981	TCC&E	A3 Pink CDN ERs	A4 Pink CDN ERs	A4 ERs * 50%	TCC&E	Zero	A3 Pink AK ERs	A4 Pink AK ERs	A4 ER	Zero
1982-2014	TCC&E	A3 Chum Model	A4 Chum Model	A5 Chum Model	TCC&E	Zero	A3 Pink AK ERs	A4 Pink AK ERs	A4 ER	Zero

All Species

TCC&E= CDN ERs derived from Total Canadian Catch (TCC) and escapement (E) estimates for that statistical area, where ER= TCC/(TCC+E).

A4 ERs *50% = CDN ERs were set equal to 50% of the Canadian exploitation rates for Area 4 (Skeena) Pink salmon.

A4 ER = AK ERs were set equal to the Alaskan exploitation rates for Area 4 (Skeena) Pink salmon.

Sockeye

NBSRR Model = Northern Boundary Sockeye Run Reconstruction model provided the 1982-2014 time series of CDN and AK ERs for Area 3 (Nass) Sockeye stocks (English et al. 2004b; 2005, Alexander et al. 2010; in prep.).

NBSRR+SSIR Model = NBSRR and Skeena Sockeye In-River (SSIR) models provided the 1982-2014 time series of CDN and AK ERs for Area 4 (Skeena) Sockeye stocks (English et al. 2004b; 2005, Alexander et al. 2010; in prep.).

NBSRR+SSIR Lakelse = NBSRR and Skeena Sockeye In-River (SSIR) models provided the 1982-2014 time series of CDN and AK ERs for Lakesle Sockeye which have similar run timing to Area 5 Sockeye stocks (English et al. 2004b; 2005, Alexander et al. 2010; in prep.).

Adj. Hist. Skeena = Adjusted historical CDN and AK exploitation rates from DFO (Les Jantz, pers.comm.) were used to estimate the 1960-81 ERs for Skeena Sockeye.

Adj. Hist. Lakelse = Adjusted historical CDN and AK exploitation rates from DFO (Les Jantz, pers.comm.) were used to estimate the 1960-81 ERs for Lakelse Sockeye.

Pink Salmon

A3 Inside Pink RR = CDN ERs derived from Area 3 Inside Pink salmon Run Reconstruction estimates (Gazey and English 2000).

Skeena Pink RR = CDN ERs derived from Skeena Pink salmon Run Reconstruction estimates (Gazey and English 2000).

A3-EHR Model = CDN ERs derived from Effort-Harvest Rate (EHR) relationship for Area 3 Inside Pink salmon harvested in Area 3 fisheries using harvest rates from 1982-95 Skeena Pink salmon run reconstruction estimates (Gazey and English 2000).

A3+4 EHR Model = CDN ERs derived from Effort-Harvest Rate (EHR) relationship for Skeena Pink salmon harvested in Area 3+4 fisheries using harvest rates from 1982-95 Skeena Pink salmon run reconstruction estimates (Gazey and English 2000).

AK EER Model = AK ERs derived from Effort-Harvest Rate (EHR) relationship for Area 3 Inside and Skeena pink salmon harvested in Alaskan fisheries using harvest rates from 1982-95 Skeena pink salmon run reconstruction estimates (Gazey and English 2000).

Chum Salmon

A3 Chum Model = CDN ERs derived using weekly harvest rates from the 1982-14 NBSRR model for Nass Sockeye and estimates of Chum migration timing for Area 3 stocks, with adjustment for periods of non-retention in Area 3 gillnet and seine fisheries.

A4 Chum Model = CDN ERs derived using weekly harvest rates from the 1982-14 NBSRR model for Skeena Sockeye and estimates of Chum migration timing for Area 4 stocks, with adjustment for periods of non-retention in Area 3+4 gillnet and seine fisheries.

A5 Chum Model = CDN ERs derived using weekly harvest rates from the 1982-14 NBSRR model for Skeena Sockeye and estimates of Chum migration timing for Area 5 stocks, with adjustment for periods of non-retention in Area 3+4 gillnet and seine fisheries.

Table 2. Sockeye salmon Conservation Units and associated Statistical Areas and source for exploitation rate estimates.

		Exploitation Rate Indicator				Survey Quality Rating				
CU Code	Conservation Unit	Stock/Area Name	Stat. Area #	Total Streams	Indicator Streams	1	2	3	4	5
SX_L-15-01	Long	Area 10	10	3	2				2	
SX_L-15-02	Owikeno	Area 9	09	11	8		5	3		
SX_L-17-02	Awun	Area 1	01	1	1		1			
SX_L-17-05	Marian/Eden	Area 1	01	1	1		1			
SX_L-17-06	Mathers	Area 2E	02E	1	1		1			
SX_L-17-07	Mercer	Area 2W	02W	1	1			1		
SX_L-17-08	Skidegate	Area 2E	02E	1	1				1	
SX_L-17-09	Yakoun	Area 1	01	1	1			1		
SX_L-18-01	Backland	Area 6	06	1	1		1			
SX_L-18-02	Canoona	Area 6	06	1	1		1			
SX_L-18-04	Evelyn	Area 6	06	1	1			1		
SX_L-18-05	Kainet Creek	Area 7	07	1	1	1				
SX_L-18-08	Kitlope	Area 6	06	1	1		1			
SX_L-19-02	Bloomfield	Area 6	06	1	1		1			
SX_L-19-11	Curtis Inlet	Lakelse	05	1	1	1				
SX_L-19-14	Devon	Lakelse	05	1	1	1				
SX_L-19-20	Freeda/Brodie	Lakelse	05	1	1	1				
SX_L-19-21	Hartley Bay	Area 6	06	1	1		1			
SX_L-19-24	Kadjusdis River	Area 7	07	1	1		1			
SX_L-19-26	Keecha	Lakelse	05	1	1	1				
SX_L-19-33	Koeye	Area 8	08	1	1	1				
SX_L-19-34	Kooryet	Lakelse	05	1	1		1			
SX_L-19-36	Kwakwa Creek	Area 6	06	1	1		1			
SX_L-19-39	Lowe/Simpson/Weare	Lakelse	05	1	1	1				
SX_L-19-40	Mary Cove Creek	Area 7	07	1	1	1				
SX_L-19-43	Mikado	Lakelse	05	1	1		1			
SX_L-19-45	Namu	Area 8	08	1	1		1			
SX_L-19-46	Port John	Area 8	08	1	1	1				
SX_L-19-49	Prudhomme	Lakelse	04	2	2		2			
SX_L-19-50	Roderick	Area 7	07	1	1	1				
SX_L-19-54	Shawatlan	Lakelse	04	1	1			1		
SX_L-19-60	Tankeeah River	Area 7	07	1	1			1		
SX_L-19-62	Tsimtack Lakes	Lakelse	05	1	1	1				
SX_L-19-70	Yeo	Area 7	07	1	1	1				
SX_L-20-01	Alastair	Alastair	04	4	2		2			
SX_L-20-05	Johnston	Johnston	04	2	1	1				
SX_L-20-06	Kitsumkalum	Kalum	04	7	2		1	1		
SX_L-20-07	Lakelse	Lakelse	04	10	3	1	1	1		
SX_L-20-08	Mcdonell	Zymoetz	04	1	1			1		
SX_L-21-02	Babine Complex	Area 4	04	33	9		2	7		
SX_L-21-05	Kitwancool	Kitwanga	04	1	1					1
SX_L-21-07	Morice	Morice+	04	4	1		1			
SX_L-21-09	Stephens	Swan+	04	2	1		1			
SX_L-21-10	Swan	Swan+	04	6	3		1	2		
SX_L-21-11	Tahlo/Morrison	Babine WM	04	2	1		1			
SX_L-22-01	Asitika	Bear+	04	1	1		1			
SX_L-22-02	Azuklotz	Bear+	04	1	1		1			
SX_L-22-03	Bear	Bear+	04	3	2	1	1			
SX_L-22-04	Damshilgwit	Slamgeesh	04	1	1			1		
SX_L-22-08	Motase	Motase	04	1	1		1			
SX_L-24-02	Damdochax/Wiminasik	Damdochax	03	1	1	1				

		Exploitation Rate Indicator				Survey Quality Rating				
CU Code	Conservation Unit	Stock/Area Name	Stat. Area #	Total Streams	Indicator Streams	1	2	3	4	5
SX_L-24-03	Fred Wright	Kwinagees	03	1	1		1			
SX_L-24-05	Meziadin	Hanna-Tin, MezBeach Average	03	1	1					1
SX_R16	Northern Coastal Fjords	Area 6,7,8 Average	5,6,7,8	74	4	3	1			
SX_R19	Skeena River-high interior	Swan+	04	1	1			1		
SX_R20	Lower Nass-Portland	Gingit+	03	15	1			1		
SX_R21	Upper Nass River	BrownBear	03	3	1			1		
Total		57		222	84	19	36	24	3	2

Table 3. Pink salmon Conservation Units and associated Statistical Areas and source for exploitation rate estimates.

CU		Exploitation Rate Indicator		Total	Indicator	Survey Quality Ratings				
Code	Pink Conservation Units (odd years)	Stock/Area Name	Stat. Area #	Streams	Streams	1	2	3	4	5
Pko-8	Homathko-Klinaklini-Smith-Rivers-Bella Coola-Dean	Area 8-10 Average	8,9,10	46	10	6	2	2		
Pko-9	East Haida Gwaii	Area 2E	2E	56	6		1	3	2	
Pko-12	Hecate Strait-Lowlands	Area 5-10 Average	5,6,7,8,9,10	178	35	2	22	11		
Pko-13	Hecate Strait-Fjords	Area 6-8 Average	6,7,8	102	52	2	29	20	1	
Pko-14	Nass-Skeena Estuary	Area 3	3,4,5	34	13	1	5	7		
Pko-15	Lower Skeena	Area 4	4	55	5	2	3			
Pko-16	Middle & Upper Skeena	Area 4	4	58	3		1	1	1	
Pko-17	Nass-Portland-Observatory	Area 3	3	60	16	1	7	7	1	
Total		8		587	140	14	70	51	5	0

CU		Exploitation Rate Indicator		Total	Indicator	Survey Quality Ratings				
Code	Pink Conservation Units (even years)	Stock/Area Name	Stat. Area #	Streams	Streams	1	2	3	4	5
Pke-5	Hecate Lowlands	Area 5-10 Average	5,6,7,8,9,10	179	39	4	24	11		
Pke-6	Hecate Strait-Fjords	Area 6-10 Average	6,7,8,9,10	147	70	9	35	25	1	
Pke-7	Nass-Skeena Estuary	Area 3	3,4,5	152	37	4	18	14	1	
Pke-8	Middle-Upper Skeena	Area 4	4	56	3		1	1	1	
Pke-9	North Haida Gwaii	Area 1 (Masset)	1	17	7			4	3	
Pke-10	East Haida Gwaii	Area 2E	2E	98	23		3	13	7	
Pke-11	West Haida Gwaii	Area 2W	2E,2W	66	12		4	6	2	
Total		7		715	191	17	85	74	15	0

Table 4. Chum salmon Conservation Units and associated Statistical Areas and source for exploitation rate estimates.

CU		Exploitation Rate Indicator		Total	Indicator	Survey Quality Ratings				
Code	Chum Conservation Units	Stock/Area Name	Stat. Area #	Streams	Streams	1	2	3	4	5
12	Smith Inlet	Area 9-10 Average	9,10	11	5		3	2		
13	Rivers Inlet	Area 9	9	15	5	2	1	2		
15	Spiller-Fitz-Hugh-Burke	Area 7-9 Average	7,8,9	69	28	4	17	6	1	
16	Bella Colla-Dean Rivers	Area 8	8	22	8	1	2	4	1	
17	Bella Coola River-Late	Area 8	8	9	6		1	5		
18	Hecate Lowlands	Area 3-7 Average	3,4,5,6,7	142	41	7	30	4		
19	Mussel-Kynock	Area 6-7 Average	6,7	14	12	3	7	2		
20	Douglas-Gardner	Area 6	6	63	27		20	7		
21	East Haida Gwaii	Area 2E	2E	95	32		10	14	8	
22	Skidegate	Area 2E	2E	40	13			11	2	
23	West Haida Gwaii	Area 2W	2W	61	31	5	16	10		
24	North Haida Gwaii	Area 1	1	11	3		3			
25	North Haida Gwaii-Stanley	Area 1	1	1	1			1		
26	Skeena Estuary	Area 4	3,4,5	21	5	1	3			
27	Lower Skeena	Area 4	4	33	6	3	2	1		
28	Middle Skeena	Area 4	4	16	2	1	1			
30	3Portland Inlet	Area 3	3	19	5	1	2	2		
31	Lower Nass	Area 3	3	20	1	1				
32	Portland Canal-Observatory	Area 3	3	15	6	1	2	2	1	
Total		18		677	232	30	120	73	13	0

Table 5. Coho salmon Conservation Units and associated Statistical Areas and source for exploitation rate estimates.

		Exploitation Rate Indicator		Total	Indicator	Survey Quality Ratings				
CU Code	Coho Conservation Units	Stock/Area Name	Stat. Area #	Streams	Streams	1	2	3	4	5
CO-20	Smith Inlet	Area 9-10	10	12	2		1		1	
CO-21	Rivers Inlet	Area 9-10	9	24	2	2				
CO-22	Bella Coola - Dean Rivers	Area 8	8	31	11	4	6	1		
CO-23	Haida Gwaii|Hecate Strait - Q.C. Sound	Area 2E	2E	110	5			3	2	
CO-24	Haida Gwaii|Outer Graham Island	Area 2W	2W	62	3	1	2			
CO-25	Haida Gwaii-Graham Island Lowlands	Area 2WE		28	1			1		
CO-26	Mussel-Kynoch	Area 6-8	7	14	2	2				
CO-27	Hecate Strait Mainland	Area 4-9	5	176	36	26	8	2		
CO-28	Brim-Wahoo	Area 6	6	2	2		2			
CO-29	Douglas Channel-Kitimat Arm	Area 6	6	33	2	2				
CO-30	Northern Coastal Streams	Area 6-8		59	17	1	12	4		
CO-31	Skeena Estuary	Area 3	3	23	3		2	1		
CO-32	Lower Skeena	Area 4	4	84	20	2	11	6		
CO-33	Middle Skeena	Area 4	4	76	20	1	7	8		1
CO-34	Upper Skeena	Area 4	4	17	4	1	2		1	
CO-35	Lower Nass	Area 3	3	22	4		2	1	1	
CO-36	Upper Nass	Area 3	3	13	2			2		
CO-37	Portland Sound-Observatory Inlet-Portland Canal	Area 3	3	28	2	1	1			
Total		18		814	138	43	56	29	5	1

Table 6. Chinook salmon Conservation Units and associated Statistical Areas and source for exploitation rate estimates.

CU Code	Chinook Conservation Units	Exploitation Rate Indicator		Total Streams	Indicator Streams	Survey Quality Ratings				
		Stock/Area Name	Stat. Area #			1	2	3	4	5
36	Docee	Area 10	10	1	1	1				
37	Rivers Inlet	A9 Summer	9, 10	14	6	2	4			
38	Wannock	A9 Wannock	9	1	1	1				
39	Bella Coola-Bentinck	Area 8	8	5	1				1	
40	Dean River	Area 8	8	1	1		1			
41	NCC-late timing	Area 6	5, 6, 7, 8, 9	16	1	1				
42	NCC-early timing	Area 6	5, 6, 7, 8	39	3	3				
46	Ecstall	Skeena	4	4	1		1			
48	Lower Skeena	Skeena	4	15	4	1	3			
49	Kalum-Early	10% of Skeena	4	2	1		1			
50	Kalum-Late	Skeena	4	7	1				1	
53	Middle Skeena-large lakes	Skeena	4	12	5	1	2	1	1	
54	Middle Skeena mainstem tributaries	Skeena	4	24	3		2	1		
55	Upper Bulkley River	10% of Skeena	4	4	1			1		
57	Portland Sound-Observatory Inlet-Lower Nass	Nass	3	14	3		1	2		
58	Upper Nass	Nass	3	17	3		1	2		
Total		18		175	36	10	16	7	3	0

Table 7. Summary of the number of CUs, total number of streams, and number of indicators by survey quality code by species for all NCC Statistical Areas.

Species	Number of CUs	Total Streams	Indicator Streams	Survey Quality Ratings 1	2	3	4	5
Sockeye salmon	57	222	84	19	36	24	3	2
Pink salmon (odd years)	8	587	140	14	70	51	5	0
Pink salmon (even years)	7	715	191	17	85	74	15	0
Chum salmon	18	677	232	29	117	73	13	0
Coho salmon	18	814	138	43	56	29	5	1
Chinook salmon	18	175	36	10	16	7	3	0
Total (odd years)	119	2475	630	115	295	184	29	3
Total (even years)	118	2603	681	118	310	207	39	3
Percentage				17.8%	46.2%	29.8%	5.2%	0.5%

Table 8. Canadian and total exploitation rates for Sockeye salmon stocks summarized by NCC Statistical Area, 1954-2017.

	Sockeye Canadian Exploitation Rates										
Year	**01**	**02E**	**02W**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**
1954	20%	20%	20%				40%	34%	44%	55%	69%
1955	20%	20%	20%				60%	39%	26%	50%	75%
1956	20%	20%	20%				65%	43%	32%	61%	83%
1957	20%	20%	20%				36%	22%	10%	37%	74%
1958	20%	20%	20%				64%	43%	81%	55%	91%
1959	20%	20%	20%				38%	14%	25%	25%	69%
1960	20%	20%	20%		42%	13%	47%	47%	43%	62%	92%
1961	20%	20%	20%		50%	15%	33%	45%	53%	67%	90%
1962	20%	20%	20%		49%	15%	24%	45%	42%	46%	70%
1963	20%	20%	20%		26%	8%	9%	45%	48%	13%	72%
1964	20%	20%	20%		47%	14%	49%	50%	77%	39%	83%
1965	20%	20%	20%		34%	10%	56%	81%	64%	72%	96%
1966	20%	20%	20%		61%	18%	39%	37%	62%	51%	77%
1967	20%	20%	20%		60%	18%	31%	48%	68%	60%	86%
1968	20%	20%	20%		58%	18%	38%	62%	89%	62%	70%
1969	20%	20%	20%		46%	14%	73%	38%	27%	77%	61%
1970	20%	20%	20%		50%	15%	63%	74%	56%	7%	54%
1971	20%	20%	20%		54%	17%	36%	53%	35%	37%	52%
1972	20%	20%	20%		52%	16%	86%	78%	44%	45%	44%
1973	20%	20%	20%		60%	18%	47%	62%	46%	39%	63%
1974	20%	20%	20%		65%	20%	44%	85%	43%	7%	79%
1975	20%	20%	20%		42%	13%	33%	66%	61%	3%	46%
1976	20%	20%	20%		54%	16%	39%	83%	64%	45%	60%
1977	20%	20%	20%		53%	16%	35%	76%	46%	58%	30%
1978	20%	20%	20%		53%	16%	73%	69%	49%	40%	74%
1979	20%	20%	20%		52%	16%	75%	84%	69%	4%	37%
1980	20%	20%	20%		44%	13%	63%	88%	67%	0%	2%
1981	20%	20%	20%		53%	16%	80%	93%	58%	6%	42%
1982	20%	20%	20%	45%	60%	15%	53%	92%	35%	2%	58%
1983	20%	20%	20%	39%	35%	5%	60%	69%	62%	3%	40%
1984	20%	20%	20%	37%	45%	11%	17%	71%	23%	8%	20%
1985	20%	20%	20%	30%	48%	20%	48%	49%	50%	12%	60%
1986	20%	20%	20%	25%	41%	14%	46%	76%	66%	20%	66%
1987	20%	20%	20%	36%	36%	8%	46%	76%	70%	29%	49%
1988	20%	20%	20%	26%	50%	28%	64%	12%	63%	31%	60%
1989	20%	20%	20%	40%	40%	18%	7%	35%	42%	11%	32%
1990	20%	20%	20%	24%	44%	21%	63%	71%	69%	24%	30%
1991	20%	20%	20%	44%	47%	20%	27%	71%	41%	23%	69%
1992	20%	20%	20%	46%	50%	35%	28%	53%	48%	38%	77%
1993	20%	20%	20%	49%	51%	31%	10%	52%	57%	13%	56%
1994	20%	20%	20%	33%	38%	23%	26%	60%	76%	19%	56%
1995	20%	20%	20%	50%	56%	27%	19%	41%	30%	16%	32%
1996	20%	20%	20%	45%	66%	29%	21%	4%	17%	0%	14%
1997	20%	20%	20%	33%	56%	41%	14%	10%	35%	0%	0%
1998	20%	20%	20%	25%	24%	15%	34%	1%	20%	0%	0%
1999	20%	20%	20%	52%	15%	14%	18%	65%	7%	0%	0%
2000	20%	20%	20%	54%	64%	27%	33%	0%	5%	0%	0%
2001	20%	20%	20%	36%	56%	11%	36%	3%	3%	0%	0%
2002	20%	20%	20%	62%	50%	21%	30%	2%	4%	0%	0%

Sockeye Canadian Exploitation Rates

Year	01	02E	02W	03	04	05	06	07	08	09	10
2003	20%	20%	20%	65%	29%	11%	54%	6%	24%	0%	0%
2004	20%	20%	20%	48%	28%	13%	10%	16%	6%	0%	0%
2005	20%	20%	20%	45%	16%	7%	45%	1%	5%	0%	0%
2006	20%	20%	20%	49%	50%	18%	2%	0%	4%	0%	0%
2007	20%	20%	20%	31%	30%	7%	25%	0%	9%	0%	0%
2008	20%	20%	20%	30%	54%	6%	1%	0%	5%	0%	0%
2009	20%	20%	20%	31%	17%	7%	36%	0%	6%	0%	0%
2010	20%	20%	20%	37%	24%	8%	4%	0%	1%	0%	0%
2011	20%	20%	20%	33%	40%	8%	25%	0%	2%	0%	24%
2012	20%	20%	20%	45%	42%	7%	0%	0%	2%	0%	0%
2013	20%	20%	20%	45%	8%	3%	9%	0%	9%	0%	0%
2014	20%	20%	20%	41%	37%	7%	35%	0%	2%	0%	2%
2015	20%	20%	20%	42%	23%	4%	0%	0%	6%		
2016	20%	20%	20%	19%	24%	7%	0%	2%	20%		
2017	20%	20%	20%	29%	5%						

Sockeye Total Exploitation Rates

Year	01	02E	02W	03	04	05	06	07	08	09	10
1954	20%	20%	20%				40%	34%	44%	55%	69%
1955	20%	20%	20%				60%	39%	26%	50%	75%
1956	20%	20%	20%				65%	43%	32%	61%	83%
1957	20%	20%	20%				36%	22%	10%	37%	74%
1958	20%	20%	20%				64%	43%	81%	55%	91%
1959	20%	20%	20%				38%	14%	25%	25%	69%
1960	20%	20%	20%		55%	17%	47%	47%	43%	62%	92%
1961	20%	20%	20%		52%	16%	33%	45%	53%	67%	90%
1962	20%	20%	20%		56%	17%	24%	45%	42%	46%	70%
1963	20%	20%	20%		35%	11%	9%	45%	48%	13%	72%
1964	20%	20%	20%		55%	17%	49%	50%	77%	39%	83%
1965	20%	20%	20%		46%	14%	56%	81%	64%	72%	96%
1966	20%	20%	20%		64%	20%	39%	37%	62%	51%	77%
1967	20%	20%	20%		71%	22%	31%	48%	68%	60%	86%
1968	20%	20%	20%		63%	19%	38%	62%	89%	62%	70%
1969	20%	20%	20%		51%	16%	73%	38%	27%	77%	61%
1970	20%	20%	20%		52%	16%	63%	74%	56%	7%	54%
1971	20%	20%	20%		56%	17%	36%	53%	35%	37%	52%
1972	20%	20%	20%		58%	18%	86%	78%	44%	45%	44%
1973	20%	20%	20%		64%	20%	47%	62%	46%	39%	63%
1974	20%	20%	20%		69%	21%	44%	85%	43%	7%	79%
1975	20%	20%	20%		43%	13%	33%	66%	61%	3%	46%
1976	20%	20%	20%		59%	18%	39%	83%	64%	45%	60%
1977	20%	20%	20%		59%	18%	35%	76%	46%	58%	30%
1978	20%	20%	20%		62%	19%	73%	69%	49%	40%	74%
1979	20%	20%	20%		58%	18%	75%	84%	69%	4%	37%
1980	20%	20%	20%		61%	19%	63%	88%	67%	0%	2%
1981	20%	20%	20%		59%	18%	80%	93%	58%	6%	42%
1982	20%	20%	20%	62%	67%	16%	53%	92%	35%	2%	58%
1983	20%	20%	20%	66%	51%	7%	60%	69%	62%	3%	40%
1984	20%	20%	20%	63%	54%	13%	17%	71%	23%	8%	20%
1985	20%	20%	20%	52%	57%	21%	48%	49%	50%	12%	60%
1986	20%	20%	20%	68%	56%	17%	46%	76%	66%	20%	66%
1987	20%	20%	20%	63%	40%	9%	46%	76%	70%	29%	49%

	Sockeye Total Exploitation Rates										
Year	**01**	**02E**	**02W**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**
1988	20%	20%	20%	61%	63%	31%	64%	12%	63%	31%	60%
1989	20%	20%	20%	78%	54%	21%	7%	35%	42%	11%	32%
1990	20%	20%	20%	61%	61%	24%	63%	71%	69%	24%	30%
1991	20%	20%	20%	68%	63%	21%	27%	71%	41%	23%	69%
1992	20%	20%	20%	66%	67%	37%	28%	53%	48%	38%	77%
1993	20%	20%	20%	75%	63%	32%	10%	52%	57%	13%	56%
1994	20%	20%	20%	63%	58%	23%	26%	60%	76%	19%	56%
1995	20%	20%	20%	77%	66%	28%	19%	41%	30%	16%	32%
1996	20%	20%	20%	79%	74%	31%	21%	4%	17%	0%	14%
1997	20%	20%	20%	75%	73%	43%	14%	10%	35%	0%	0%
1998	20%	20%	20%	63%	42%	16%	34%	1%	20%	0%	0%
1999	20%	20%	20%	75%	22%	17%	18%	65%	7%	0%	0%
2000	20%	20%	20%	67%	69%	27%	33%	0%	5%	0%	0%
2001	20%	20%	20%	71%	66%	12%	36%	3%	3%	0%	0%
2002	20%	20%	20%	71%	53%	23%	30%	2%	4%	0%	0%
2003	20%	20%	20%	78%	36%	13%	54%	6%	24%	0%	0%
2004	20%	20%	20%	78%	40%	13%	10%	16%	6%	0%	0%
2005	20%	20%	20%	66%	32%	11%	45%	1%	5%	0%	0%
2006	20%	20%	20%	67%	57%	18%	2%	0%	4%	0%	0%
2007	20%	20%	20%	73%	48%	9%	25%	0%	9%	0%	0%
2008	20%	20%	20%	43%	56%	7%	1%	0%	5%	0%	0%
2009	20%	20%	20%	57%	23%	7%	36%	0%	6%	0%	0%
2010	20%	20%	20%	48%	29%	9%	4%	0%	1%	0%	0%
2011	20%	20%	20%	50%	48%	9%	25%	0%	2%	0%	24%
2012	20%	20%	20%	57%	45%	9%	0%	0%	2%	0%	0%
2013	20%	20%	20%	58%	12%	3%	9%	0%	9%	0%	0%
2014	20%	20%	20%	53%	50%	8%	35%	0%	2%	0%	2%
2015	20%	20%	20%	55%	39%	5%	0%	0%	6%		
2016	20%	20%	20%	38%	43%	9%	0%	2%	20%		
2017	20%	20%	20%	37%	11%						

Table 9. Canadian and total exploitation rates for Pink salmon stocks summarized by NCC Statistical Area, 1954-2017.

	Pink Canadian Exploitation Rates										
Year	**01**	**02E**	**02W**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**
1954	18%	32%	61%	26%	37%	19%	72%	41%	67%	75%	55%
1955		40%		25%	30%	15%	67%	51%	25%	90%	40%
1956	17%	25%	23%	42%	37%	19%	74%	68%	46%	42%	32%
1957		64%		34%	36%	18%	71%	31%	29%	81%	51%
1958	46%	45%	38%	28%	32%	16%	71%	54%	64%	74%	91%
1959		2%		25%	28%	14%	26%	21%	35%	48%	34%
1960	24%	24%	49%	22%	26%	13%	52%	52%	38%	92%	84%
1961		21%		22%	30%	15%	45%	54%	48%	80%	77%
1962	35%	44%	0%	12%	23%	12%	46%	74%	67%	77%	73%
1963		0%		4%	20%	10%	34%	50%	64%	58%	35%
1964	26%	16%	1%	15%	26%	13%	44%	58%	71%	67%	96%
1965		0%		26%	26%	13%	60%	78%	63%	48%	71%
1966	43%	27%	32%	18%	28%	14%	67%	64%	60%	58%	79%
1967		3%		38%	39%	19%	41%	23%	30%	95%	97%
1968	29%	29%	45%	25%	30%	15%	67%	54%	64%	91%	88%
1969		9%		23%	27%	13%	16%	11%	16%	99%	91%
1970	29%	31%	42%	18%	23%	11%	79%	69%	66%	46%	74%
1971		1%		17%	28%	14%	28%	31%	9%	33%	37%
1972	27%	24%	53%	18%	27%	14%	81%	78%	35%	51%	79%
1973		1%		12%	26%	13%	50%	56%	20%	72%	54%
1974	21%	27%	52%	23%	35%	17%	54%	71%	57%	61%	70%
1975		15%		10%	24%	12%	7%	54%	30%	16%	72%
1976	1%	66%	16%	7%	16%	8%	26%	61%	48%	62%	57%
1977		18%		38%	38%	19%	64%	45%	17%	88%	43%
1978	5%	25%	48%	28%	27%	13%	69%	51%	33%	70%	40%
1979		0%		21%	29%	15%	47%	46%	29%	26%	22%
1980	20%	0%	23%	26%	26%	13%	70%	60%	28%	7%	42%
1981		2%		26%	36%	18%	68%	69%	61%	42%	34%
1982	3%	0%	8%	31%	22%	11%	48%	44%	9%	1%	23%
1983		0%		48%	33%	17%	82%	17%	27%	14%	20%
1984	27%	13%	53%	39%	42%	21%	35%	34%	8%	29%	46%
1985		25%		36%	40%	20%	47%	65%	23%	25%	32%
1986	41%	25%	19%	34%	38%	19%	66%	71%	33%	25%	49%
1987		0%		47%	46%	23%	49%	64%	42%	39%	45%
1988	18%	14%	20%	42%	51%	25%	76%	51%	65%	30%	69%
1989		6%		31%	25%	13%	6%	8%	17%	9%	21%
1990	39%	20%	49%	25%	35%	18%	61%	41%	47%	29%	72%
1991		0%		54%	41%	21%	39%	30%	3%	22%	32%
1992	23%	2%	43%	30%	53%	27%	41%	14%	29%	42%	96%
1993		1%		42%	43%	21%	2%	4%	13%	14%	45%
1994	7%	10%	21%	17%	35%	17%	23%	3%	45%	14%	78%
1995		0%		42%	49%	24%	3%	13%	20%	14%	4%
1996	10%	2%	0%	29%	41%	21%	24%	5%	10%	0%	5%
1997		3%		28%	35%	18%	21%	8%	16%	0%	0%
1998	6%	15%	57%	13%	13%	6%	38%	2%	30%	0%	0%
1999		0%		48%	39%	19%	2%	15%	8%	0%	
2000	0%	3%	51%	24%	40%	20%	34%	1%	3%	0%	0%
2001		0%		13%	27%	14%	39%	23%	18%	0%	
2002	0%	3%	5%	18%	25%	13%	34%	14%	25%	0%	0%

Pink Canadian Exploitation Rates

Year	01	02E	02W	03	04	05	06	07	08	09	10
2003		0%		14%	19%	9%	60%	10%	27%	0%	0%
2004	0%	0%	34%	25%	27%	13%	5%	23%	22%	0%	
2005		0%		16%	15%	8%	65%	7%	28%	0%	0%
2006	0%	11%	0%	12%	39%	20%	2%	8%	12%	0%	0%
2007		0%		23%	26%	13%	42%	2%	15%	0%	0%
2008	0%	0%	0%	4%	18%	9%	1%	0%	1%	0%	0%
2009		0%		8%	9%	5%	61%	0%	6%	0%	0%
2010	9%	15%	2%	2%	2%	1%	5%	0%	0%	0%	
2011		0%		7%	14%	7%	45%	3%	0%	0%	
2012	0%	13%	0%	6%	11%	5%	0%	6%	2%	0%	
2013		0%		7%	7%	3%	57%	4%	23%	0%	
2014		0%	0%	7%	15%	8%	27%	17%	24%	0%	
2015				10%	11%	5%	5%	22%	24%		
2016				10%	11%	6%	24%	10%	28%		
2017											

Pink Total Exploitation Rates

Year	01	02E	02W	03	04	05	06	07	08	09	10
1954	18%	32%	61%	45%	56%	37%	72%	41%	67%	75%	55%
1955		40%		44%	49%	34%	67%	51%	25%	90%	40%
1956	17%	25%	23%	60%	56%	37%	74%	68%	46%	42%	32%
1957		64%		53%	54%	36%	71%	31%	29%	81%	51%
1958	46%	45%	38%	47%	50%	34%	71%	54%	64%	74%	91%
1959		2%		43%	46%	32%	26%	21%	35%	48%	34%
1960	24%	24%	49%	41%	44%	31%	52%	52%	38%	92%	84%
1961		21%		40%	49%	34%	45%	54%	48%	80%	77%
1962	35%	44%	0%	30%	42%	30%	46%	74%	67%	77%	73%
1963		0%		22%	38%	28%	34%	50%	64%	58%	35%
1964	26%	16%	1%	34%	44%	31%	44%	58%	71%	67%	96%
1965		0%		45%	45%	32%	60%	78%	63%	48%	71%
1966	43%	27%	32%	37%	47%	33%	67%	64%	60%	58%	79%
1967		3%		56%	57%	38%	41%	23%	30%	95%	97%
1968	29%	29%	45%	44%	48%	33%	67%	54%	64%	91%	88%
1969		9%		42%	45%	32%	16%	11%	16%	99%	91%
1970	29%	31%	42%	37%	41%	30%	79%	69%	66%	46%	74%
1971		1%		35%	46%	32%	28%	31%	9%	33%	37%
1972	27%	24%	53%	37%	46%	32%	81%	78%	35%	51%	79%
1973		1%		31%	44%	31%	50%	56%	20%	72%	54%
1974	21%	27%	52%	41%	53%	36%	54%	71%	57%	61%	70%
1975		15%		28%	42%	30%	7%	54%	30%	16%	72%
1976	1%	66%	16%	26%	34%	26%	26%	61%	48%	62%	57%
1977		18%		56%	57%	38%	64%	45%	17%	88%	43%
1978	5%	25%	48%	46%	45%	32%	69%	51%	33%	70%	40%
1979		0%		40%	48%	33%	47%	46%	29%	26%	22%
1980	20%	0%	23%	44%	44%	31%	70%	60%	28%	7%	42%
1981		2%		44%	55%	37%	68%	69%	61%	42%	34%
1982	3%	0%	8%	44%	32%	21%	48%	44%	9%	1%	23%
1983		0%		70%	60%	43%	82%	17%	27%	14%	20%
1984	27%	13%	53%	55%	62%	41%	35%	34%	8%	29%	46%
1985		25%		51%	55%	36%	47%	65%	23%	25%	32%
1986	41%	25%	19%	56%	58%	40%	66%	71%	33%	25%	49%
1987		0%		55%	54%	31%	49%	64%	42%	39%	45%

	Pink Total Exploitation Rates										
Year	**01**	**02E**	**02W**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**
1988	18%	14%	20%	53%	64%	39%	76%	51%	65%	30%	69%
1989		6%		58%	49%	36%	6%	8%	17%	9%	21%
1990	39%	20%	49%	44%	51%	33%	61%	41%	47%	29%	72%
1991		0%		81%	72%	51%	39%	30%	3%	22%	32%
1992	23%	2%	43%	47%	70%	43%	41%	14%	29%	42%	96%
1993		1%		69%	63%	41%	2%	4%	13%	14%	45%
1994	7%	10%	21%	34%	57%	40%	23%	3%	45%	14%	78%
1995		0%		60%	65%	41%	3%	13%	20%	14%	4%
1996	10%	2%	0%	48%	60%	39%	24%	5%	10%	0%	5%
1997		3%		42%	48%	30%	21%	8%	16%	0%	0%
1998	6%	15%	57%	29%	27%	21%	38%	2%	30%	0%	0%
1999		0%		62%	52%	32%	2%	15%	8%	0%	
2000	0%	3%	51%	36%	51%	31%	34%	1%	3%	0%	0%
2001		0%		29%	42%	29%	39%	23%	18%	0%	
2002	0%	3%	5%	29%	36%	23%	34%	14%	25%	0%	0%
2003		0%		28%	32%	23%	60%	10%	27%	0%	0%
2004	0%	0%	34%	40%	40%	27%	5%	23%	22%	0%	
2005		0%		30%	28%	21%	65%	7%	28%	0%	0%
2006	0%	11%	0%	18%	45%	25%	2%	8%	12%	0%	0%
2007		0%		38%	39%	26%	42%	2%	15%	0%	0%
2008	0%	0%	0%	15%	28%	19%	1%	0%	1%	0%	0%
2009		0%		21%	22%	17%	61%	0%	6%	0%	0%
2010	9%	15%	2%	15%	14%	13%	5%	0%	0%	0%	
2011		0%		15%	21%	14%	45%	3%	0%	0%	
2012	0%	13%	0%	20%	24%	18%	0%	6%	2%	0%	
2013		0%		21%	19%	16%	57%	4%	23%	0%	
2014		0%	0%	23%	30%	22%	27%	17%	24%	0%	
2015				23%	22%	17%	5%	22%	24%		
2016				23%	23%	18%	24%	10%	28%		
2017											

Table 10. Canadian and total exploitation rates for Chum salmon stocks summarized by NCC Statistical Area, 1954-2017.

	Chum Canadian Exploitation Rates										
Year	**01**	**02E**	**02W**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**
1954	15%	40%	36%	26%	37%	19%	53%	44%	37%	32%	44%
1955	8%	57%	38%	25%	30%	15%	29%	36%	57%	62%	78%
1956	37%	23%	54%	42%	37%	19%	57%	48%	40%	21%	40%
1957	20%	9%	2%	34%	36%	18%	51%	62%	57%	28%	62%
1958	20%	6%	5%	28%	32%	16%	53%	35%	46%	17%	14%
1959	6%	0%	17%	25%	28%	14%	42%	23%	33%	28%	33%
1960	8%	1%	1%	22%	26%	13%	37%	39%	46%	30%	44%
1961	2%	19%	2%	22%	30%	15%	51%	44%	50%	31%	47%
1962	12%	20%	1%	12%	23%	12%	37%	40%	61%	27%	40%
1963	21%	26%	0%	4%	20%	10%	42%	45%	42%	23%	44%
1964	9%	50%	35%	15%	26%	13%	37%	46%	48%	28%	56%
1965	4%	18%	52%	26%	26%	13%	47%	30%	67%	77%	64%
1966	13%	21%	19%	18%	28%	14%	32%	29%	46%	13%	85%
1967	34%	50%	17%	38%	39%	19%	14%	21%	38%	46%	24%
1968	30%	57%	26%	25%	30%	15%	31%	40%	37%	39%	80%
1969	34%	14%	29%	23%	27%	13%	37%	35%	39%	83%	80%
1970	44%	52%	59%	18%	23%	11%	68%	58%	45%	53%	74%
1971	32%	50%	35%	17%	28%	14%	38%	45%	32%	35%	31%
1972	77%	53%	48%	18%	27%	14%	55%	59%	36%	33%	27%
1973	44%	58%	42%	12%	26%	13%	27%	66%	34%	51%	26%
1974	24%	36%	55%	23%	35%	17%	31%	58%	44%	34%	21%
1975	11%	2%	52%	10%	24%	12%	11%	48%	47%	24%	26%
1976	3%	18%	6%	7%	16%	8%	12%	48%	59%	60%	19%
1977	6%	41%	17%	38%	38%	19%	31%	28%	26%	69%	13%
1978	6%	25%	18%	28%	27%	13%	40%	45%	71%	44%	35%
1979	11%	2%	12%	21%	29%	15%	41%	45%	55%	32%	42%
1980	35%	34%	30%	26%	26%	13%	59%	74%	62%	14%	18%
1981	30%	12%	10%	26%	36%	18%	43%	47%	69%	20%	9%
1982	10%	9%	31%	29%	22%	14%	40%	45%	48%	4%	15%
1983	5%	0%	12%	35%	24%	20%	54%	11%	55%	6%	7%
1984	7%	35%	52%	43%	22%	18%	16%	50%	25%	22%	18%
1985	36%	57%	41%	26%	28%	20%	32%	49%	58%	21%	36%
1986	45%	36%	19%	28%	27%	23%	32%	58%	76%	35%	24%
1987	8%	29%	21%	36%	31%	24%	40%	53%	68%	20%	22%
1988	15%	50%	8%	20%	35%	25%	53%	48%	70%	29%	14%
1989	16%	23%	35%	26%	20%	15%	4%	27%	52%	59%	22%
1990	54%	39%	39%	25%	30%	24%	31%	46%	58%	67%	8%
1991	61%	44%	31%	31%	26%	18%	26%	32%	61%	37%	30%
1992	49%	37%	19%	39%	40%	30%	29%	36%	44%	55%	49%
1993	24%	32%	31%	42%	28%	21%	8%	35%	44%	39%	34%
1994	22%	31%	19%	23%	20%	13%	24%	47%	54%	33%	45%
1995	44%	9%	16%	32%	27%	18%	8%	34%	66%	26%	11%
1996	9%	26%	2%	29%	24%	15%	16%	13%	41%	0%	3%
1997	49%	17%	7%	17%	13%	8%	10%	13%	41%	0%	0%
1998	5%	20%	11%	13%	2%	1%	37%	15%	53%	0%	0%
1999	2%	21%	14%	39%	2%	1%	23%	19%	35%	0%	0%
2000	1%	22%	20%	23%	15%	10%	18%	10%	14%	0%	0%
2001	0%	0%	0%	10%	10%	6%	34%	26%	48%	0%	0%
2002	0%	4%	1%	14%	12%	6%	37%	33%	48%	0%	0%

Chum Canadian Exploitation Rates

Year	01	02E	02W	03	04	05	06	07	08	09	10
2003	0%	3%	0%	11%	6%	3%	55%	33%	49%	0%	0%
2004	0%	0%	6%	9%	8%	6%	44%	41%	62%	0%	0%
2005	0%	9%	35%	6%	0%	0%	71%	17%	50%	0%	0%
2006	3%	9%	15%	12%	14%	10%	20%	8%	52%	0%	0%
2007	0%	0%	0%	6%	7%	4%	19%	5%	48%	0%	0%
2008	0%	2%	0%	5%	9%	5%	10%	0%	9%	0%	0%
2009	0%	0%	0%	5%	1%	0%	25%	1%	25%	0%	0%
2010	0%	7%	0%	3%	1%	1%	4%	5%	7%	0%	0%
2011	0%	0%	0%	6%	9%	7%	7%	38%	8%	0%	0%
2012	0%	0%	0%	2%	1%	1%	5%	35%	40%	0%	0%
2013		0%	0%	4%	0%	0%	0%	35%	49%		0%
2014		0%	0%	2%	2%	1%	0%	39%	24%	0%	0%
2015		28%		9%	1%	1%	18%	58%	51%		
2016				1%	3%	2%	10%	29%	44%		0%
2017											

Chum Total Exploitation Rates

Year	01	02E	02W	03	04	05	06	07	08	09	10
1954	15%	40%	36%	45%	56%	37%	53%	44%	37%	32%	44%
1955	8%	57%	38%	44%	49%	34%	29%	36%	57%	62%	78%
1956	37%	23%	54%	60%	56%	37%	57%	48%	40%	21%	40%
1957	20%	9%	2%	53%	54%	36%	51%	62%	57%	28%	62%
1958	20%	6%	5%	47%	50%	34%	53%	35%	46%	17%	14%
1959	6%	0%	17%	43%	46%	32%	42%	23%	33%	28%	33%
1960	8%	1%	1%	41%	44%	31%	37%	39%	46%	30%	44%
1961	2%	19%	2%	40%	49%	34%	51%	44%	50%	31%	47%
1962	12%	20%	1%	30%	42%	30%	37%	40%	61%	27%	40%
1963	21%	26%	0%	22%	38%	28%	42%	45%	42%	23%	44%
1964	9%	50%	35%	34%	44%	31%	37%	46%	48%	28%	56%
1965	4%	18%	52%	45%	45%	32%	47%	30%	67%	77%	64%
1966	13%	21%	19%	37%	47%	33%	32%	29%	46%	13%	85%
1967	34%	50%	17%	56%	57%	38%	14%	21%	38%	46%	24%
1968	30%	57%	26%	44%	48%	33%	31%	40%	37%	39%	80%
1969	34%	14%	29%	42%	45%	32%	37%	35%	39%	83%	80%
1970	44%	52%	59%	37%	41%	30%	68%	58%	45%	53%	74%
1971	32%	50%	35%	35%	46%	32%	38%	45%	32%	35%	31%
1972	77%	53%	48%	37%	46%	32%	55%	59%	36%	33%	27%
1973	44%	58%	42%	31%	44%	31%	27%	66%	34%	51%	26%
1974	24%	36%	55%	41%	53%	36%	31%	58%	44%	34%	21%
1975	11%	2%	52%	28%	42%	30%	11%	48%	47%	24%	26%
1976	3%	18%	6%	26%	34%	26%	12%	48%	59%	60%	19%
1977	6%	41%	17%	56%	57%	38%	31%	28%	26%	69%	13%
1978	6%	25%	18%	46%	45%	32%	40%	45%	71%	44%	35%
1979	11%	2%	12%	40%	48%	33%	41%	45%	55%	32%	42%
1980	35%	34%	30%	44%	44%	31%	59%	74%	62%	14%	18%
1981	30%	12%	10%	44%	55%	37%	43%	47%	69%	20%	9%
1982	10%	9%	31%	42%	32%	24%	40%	45%	48%	4%	15%
1983	5%	0%	12%	57%	51%	46%	54%	11%	55%	6%	7%
1984	7%	35%	52%	59%	42%	37%	16%	50%	25%	22%	18%
1985	36%	57%	41%	41%	44%	36%	32%	49%	58%	21%	36%
1986	45%	36%	19%	50%	48%	43%	32%	58%	76%	35%	24%
1987	8%	29%	21%	44%	39%	31%	40%	53%	68%	20%	22%

	Chum Total Exploitation Rates										
Year	**01**	**02E**	**02W**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**
1988	15%	50%	8%	31%	49%	39%	53%	48%	70%	29%	14%
1989	16%	23%	35%	53%	44%	39%	4%	27%	52%	59%	22%
1990	54%	39%	39%	45%	45%	39%	31%	46%	58%	67%	8%
1991	61%	44%	31%	57%	56%	48%	26%	32%	61%	37%	30%
1992	49%	37%	19%	56%	56%	46%	29%	36%	44%	55%	49%
1993	24%	32%	31%	70%	48%	42%	8%	35%	44%	39%	34%
1994	22%	31%	19%	40%	42%	36%	24%	47%	54%	33%	45%
1995	44%	9%	16%	50%	43%	35%	8%	34%	66%	26%	11%
1996	9%	26%	2%	48%	42%	34%	16%	13%	41%	0%	3%
1997	49%	17%	7%	31%	26%	21%	10%	13%	41%	0%	0%
1998	5%	20%	11%	28%	17%	15%	37%	15%	53%	0%	0%
1999	2%	21%	14%	53%	15%	14%	23%	19%	35%	0%	0%
2000	1%	22%	20%	35%	26%	20%	18%	10%	14%	0%	0%
2001	0%	0%	0%	26%	25%	21%	34%	26%	48%	0%	0%
2002	0%	4%	1%	26%	22%	17%	37%	33%	48%	0%	0%
2003	0%	3%	0%	26%	19%	17%	55%	33%	49%	0%	0%
2004	0%	0%	6%	24%	22%	20%	44%	41%	62%	0%	0%
2005	0%	9%	35%	20%	13%	13%	71%	17%	50%	0%	0%
2006	3%	9%	15%	18%	19%	15%	20%	8%	52%	0%	0%
2007	0%	0%	0%	21%	20%	17%	19%	5%	48%	0%	0%
2008	0%	2%	0%	16%	18%	15%	10%	0%	9%	0%	0%
2009	0%	0%	0%	19%	13%	13%	25%	1%	25%	0%	0%
2010	0%	7%	0%	16%	13%	12%	4%	5%	7%	0%	0%
2011	0%	0%	0%	14%	16%	14%	7%	38%	8%	0%	0%
2012	0%	0%	0%	16%	14%	14%	5%	35%	40%	0%	0%
2013		0%	0%	18%	12%	12%	0%	35%	49%		0%
2014		0%	0%	17%	17%	16%	0%	39%	24%	0%	0%
2015		28%		21%	12%	13%	18%	58%	51%		
2016				14%	15%	14%	10%	29%	44%		0%
2017											

Table 11. Canadian and total exploitation rates for Coho salmon stocks summarized by NCC Statistical Area, 1954-2017.

	Coho Canadian Exploitation Rates										
Year	**01**	**02E**	**02W**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**
1954		21%	21%	21%	36%	23%	23%	22%	23%	22%	22%
1955		21%	21%	21%	36%	23%	23%	22%	23%	22%	22%
1956		21%		21%	36%	23%	23%	22%	23%	22%	
1957		21%	21%	21%	36%	23%	23%	22%	23%	22%	
1958		21%		21%	36%	23%	23%	22%	23%	22%	22%
1959		21%		21%	36%	23%	23%	22%	23%	22%	22%
1960		21%			36%	23%	23%	22%	23%	22%	22%
1961		21%		21%	36%	23%	23%	22%	23%	22%	22%
1962		21%		21%	36%	23%	23%	22%	23%	22%	22%
1963		19%		19%	33%	21%	21%	20%	21%	20%	20%
1964		24%	24%	24%	41%	26%	26%	25%	26%	25%	25%
1965		18%	18%	18%	31%	20%	20%	19%	20%	19%	19%
1966		23%	23%	23%	39%	24%	24%	23%	24%	24%	24%
1967		18%	18%	18%	31%	19%	19%	19%	19%	19%	19%
1968		23%	23%	23%	39%	24%	24%	23%	24%	24%	24%
1969		19%	19%	19%	33%	21%	21%	20%	21%	20%	20%

Coho Canadian Exploitation Rates

Year	01	02E	02W	03	04	05	06	07	08	09	10
1970		22%	22%	22%	37%	23%	24%	23%	23%	23%	23%
1971		22%	22%	22%	37%	23%	24%	23%	23%	23%	23%
1972		25%	25%	25%	43%	27%	27%	26%	27%	27%	
1973		19%	19%	19%	33%	21%	21%	20%	21%	21%	21%
1974		21%	21%	21%	37%	23%	23%	22%	23%	23%	23%
1975		18%	18%	18%	30%	19%	19%	18%	19%	19%	
1976		18%		18%	30%	19%	19%	18%	19%	19%	
1977		23%	23%	23%	39%	24%	24%	23%	24%	24%	
1978		26%	26%	26%	45%	28%	29%	27%	28%	28%	
1979		27%	27%	27%	46%	29%	29%	28%	29%	29%	
1980		28%	28%	28%	48%	30%	31%	29%	30%	30%	
1981		26%	26%	26%	44%	28%	28%	27%	28%	27%	
1982		22%	22%	22%	38%	24%	24%	23%	24%	23%	
1983		31%	31%	31%	53%	33%	33%	32%	33%	33%	
1984		27%	27%	27%	47%	30%	30%	29%	30%	29%	
1985		29%	29%	29%	49%	31%	31%	30%	31%	30%	
1986		32%	32%	32%	54%	34%	34%	33%	34%	33%	
1987		24%	24%	24%	42%	26%	26%	25%	26%	26%	
1988		24%	24%	24%	41%	26%	26%	25%	26%	25%	
1989		23%	23%	23%	40%	25%	25%	24%	25%	25%	
1990		27%	27%	27%	46%	29%	29%	28%	29%	28%	
1991		19%	19%	19%	33%	21%	21%	20%	21%		
1992		17%	17%	17%	29%	18%	18%	18%	18%		
1993		16%	16%	16%	29%	18%	18%	17%	18%		
1994		19%	19%	19%	30%	19%	19%	18%	19%		
1995		14%	14%	14%	20%		12%	12%	12%		
1996		23%	23%	23%	47%		30%	29%	30%		
1997		19%	19%	9%	13%	23%	18%	22%	23%		
1998		0%	0%	2%	2%	5%	3%	5%	5%	5%	5%
1999		0%	0%	2%	3%	4%	3%	4%	4%		4%
2000		0%	0%	12%	5%	4%	2%	3%	4%		4%
2001		0%	0%	12%	5%	6%	4%	5%	6%		6%
2002		0%	0%	6%	10%	7%	5%	6%	7%	6%	6%
2003		5%	5%	12%	9%	8%	6%	7%	8%		8%
2004		55%		14%	18%	13%	8%	12%	13%	13%	13%
2005		44%	44%	14%	6%	9%	12%	8%	9%	8%	8%
2006		17%		12%	6%	8%	7%	7%	8%		7%
2007		16%		12%	15%	7%	10%	6%	7%	6%	6%
2008		16%	16%	9%	6%	7%	7%	6%	7%	6%	6%
2009		15%	15%	9%	5%	8%	15%	7%	8%	7%	7%
2010		27%		11%	7%	9%	9%	8%	9%	8%	8%
2011		9%		9%	17%	7%	17%	10%	10%	7%	7%
2012		13%		17%	7%	3%	7%	4%	4%	3%	3%
2013		17%		14%	10%	4%	10%	6%	6%	4%	4%
2014		15%		8%	7%	3%	7%	4%	4%		3%
2015			0%	17%	18%	7%	18%	11%	11%		
2016		0%		14%	18%	7%	18%		11%		
2017											

Coho Total Exploitation Rates

Year	01	02E	02W	03	04	05	06	07	08	09	10
1954		24%	24%	51%	55%	30%	42%	33%	34%	26%	26%
1955		24%	24%	51%	55%	30%	42%	33%	34%	26%	26%
1956		24%		51%	55%	30%	42%	33%	34%	26%	
1957		24%	24%	51%	55%	30%	42%	33%	34%	26%	
1958		24%		51%	55%	30%	42%	33%	34%	26%	26%
1959		24%		51%	55%	30%	42%	33%	34%	26%	26%
1960		24%			55%	30%	42%	33%	34%	26%	26%
1961		24%		51%	55%	30%	42%	33%	34%	26%	26%
1962		24%		51%	55%	30%	42%	33%	34%	26%	26%
1963		22%		46%	50%	27%	38%	30%	31%	24%	24%
1964		28%	28%	59%	63%	35%	48%	38%	39%	30%	30%
1965		21%	21%	45%	48%	26%	36%	29%	30%	23%	23%
1966		26%	26%	55%	59%	32%	45%	36%	37%	28%	28%
1967		21%	21%	44%	47%	26%	36%	28%	29%	22%	22%
1968		26%	26%	55%	59%	32%	45%	36%	37%	28%	28%
1969		22%	22%	46%	50%	27%	38%	30%	31%	24%	24%
1970		25%	25%	53%	57%	31%	43%	35%	35%	27%	27%
1971		25%	25%	53%	57%	31%	43%	35%	35%	27%	27%
1972		29%	29%	61%	66%	36%	50%	40%	41%	31%	
1973		23%	23%	47%	51%	28%	39%	31%	32%	24%	24%
1974		25%	25%	52%	56%	31%	43%	34%	35%	26%	26%
1975		20%	20%	43%	46%	25%	35%	28%	28%	22%	
1976		20%		43%	46%	25%	35%	28%	28%	22%	
1977		26%	26%	55%	59%	32%	45%	36%	37%	28%	
1978		31%	31%	64%	69%	38%	52%	42%	43%	33%	
1979		31%	31%	66%	71%	39%	54%	43%	44%	34%	
1980		33%	33%	69%	74%	41%	56%	45%	46%	35%	
1981		30%	30%	62%	67%	37%	51%	41%	41%	32%	
1982		26%	26%	54%	58%	32%	44%	35%	36%	27%	
1983		36%	36%	75%	81%	45%	62%	49%	50%	38%	
1984		32%	32%	67%	72%	40%	55%	44%	45%	34%	
1985		33%	33%	70%	75%	41%	57%	45%	46%	35%	
1986		37%	37%	77%	83%	46%	63%	50%	51%	39%	
1987		28%	28%	59%	64%	35%	49%	39%	40%	30%	
1988		28%	28%	59%	63%	35%	48%	38%	39%	30%	
1989		27%	27%	57%	61%	34%	47%	37%	38%	29%	
1990		31%	31%	65%	70%	38%	53%	42%	43%	33%	
1991		22%	22%	66%	62%	32%	50%	38%	38%		
1992		19%	19%	64%	65%	33%	55%	39%	40%		
1993		19%	19%	64%	57%	29%	46%	34%	35%		
1994		22%	22%	73%	66%	33%	55%	40%	40%		
1995		16%	16%	69%	38%		31%	23%	24%		
1996		26%	26%	62%	74%		57%	45%	46%		
1997		22%	22%	55%	50%	38%	55%	45%	45%		
1998		4%	4%	48%	20%	12%	21%	15%	16%	9%	9%
1999		2%	2%	50%	22%	12%	22%	15%	16%		8%
2000		0%	0%	53%	18%	9%	14%	11%	11%		6%
2001		0%	0%	54%	28%	16%	27%	19%	20%		10%
2002		0%	0%	22%	23%	12%	19%	14%	15%	9%	9%
2003		5%	5%	46%	27%	16%	24%	18%	19%		11%
2004		56%		55%	40%	22%	29%	25%	26%	17%	17%
2005		63%	63%	57%	27%	17%	33%	21%	22%	13%	13%
2006		21%		48%	23%	14%	24%	17%	18%		11%
2007		19%		50%	42%	18%	38%	23%	24%	12%	12%
2008		19%	19%	40%	34%	18%	35%	22%	23%	12%	12%

	Coho Total Exploitation Rates										
Year	**01**	**02E**	**02W**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**
2009		17%	17%	35%	37%	21%	47%	27%	27%	14%	14%
2010		27%		46%	30%	18%	32%	22%	23%	13%	13%
2011		9%		51%	43%	17%	43%	26%	26%	12%	12%
2012		13%		55%	34%	14%	34%	20%	20%	8%	8%
2013		18%		66%	37%	15%	37%	22%	22%	9%	9%
2014		18%		42%	24%	10%	24%	15%	15%		6%
2015		0%	0%	58%	40%	16%	40%	24%	24%		
2016		0%		70%	41%	17%	41%		25%		
2017											

Table 12. Canadian and total exploitation rates for Chinook salmon stocks summarized by NCC Statistical Area, 1980-2017.

	Chinook Canadian Exploitation Rates											
Year	**01**	**02E**	**02W**	**03**	**04**	**05**	**06**	**07**	**08**	**9S**	**9W**	**10**
1980										16%	16%	14%
1981										13%	13%	12%
1982										17%	17%	16%
1983										15%	15%	18%
1984					28%					16%	16%	12%
1985					34%		25%		19%	14%	14%	47%
1986				20%	50%		25%		19%	17%	17%	31%
1987				19%	25%		25%		20%	15%	15%	16%
1988				19%	37%		25%		18%	16%	16%	12%
1989				20%	31%		25%		19%	13%	13%	20%
1990				20%	37%		23%		17%	13%	13%	13%
1991				33%	46%		24%		18%	16%	16%	16%
1992				49%	30%		29%		25%	15%	15%	27%
1993				42%	37%		23%		21%	19%	19%	14%
1994				41%	35%		25%		14%	16%	16%	12%
1995				58%	47%		20%		21%	10%	10%	7%
1996				44%	24%		13%		21%	11%	11%	7%
1997				43%	25%		14%		27%	22%	22%	15%
1998				45%	16%		19%		31%	20%	20%	11%
1999				55%	29%		11%		20%	21%	21%	12%
2000				40%	25%		11%		23%	18%	18%	11%
2001				32%	22%		16%		25%	23%	23%	13%
2002				47%	21%		33%		37%	22%	22%	13%
2003				35%	21%		41%		43%	23%	23%	14%
2004				49%	18%		34%		36%	24%	24%	15%
2005				45%	23%		35%		40%	23%	23%	14%
2006				34%	25%		18%		25%	24%	24%	13%
2007				37%	18%		27%		28%	18%	18%	10%
2008				27%	46%		12%		24%	13%	13%	5%
2009				24%	16%		32%		39%	14%	14%	
2010				24%	24%		25%		36%	23%	23%	
2011				41%	31%		40%		39%	21%	21%	10%
2012				37%	24%		23%		30%	17%	17%	
2013				44%	25%		13%		28%	16%	16%	

	Chinook Canadian Exploitation Rates											
Year	**01**	**02E**	**02W**	**03**	**04**	**05**	**06**	**07**	**08**	**9S**	**9W**	**10**
2014				43%	26%		15%		31%	15%	15%	
2015				35%	26%		15%		26%	23%	23%	
2016				41%	24%		11%		32%	17%	17%	
2017				52%	32%		11%		33%	18%	18%	

	Chinook Total Exploitation Rates											
Year	**01**	**02E**	**02W**	**03**	**04**	**05**	**06**	**07**	**08**	**9S**	**9W**	**10**
1980										30%	30%	28%
1981										24%	24%	23%
1982										31%	31%	31%
1983										26%	26%	30%
1984					54%					28%	28%	24%
1985					59%		20%		32%	26%	26%	59%
1986				21%	56%		20%		32%	32%	32%	46%
1987				22%	40%		20%		32%	29%	29%	30%
1988				23%	65%		20%		32%	28%	28%	24%
1989				22%	50%		20%		32%	26%	26%	32%
1990				22%	50%		33%		43%	27%	27%	27%
1991				39%	67%		13%		26%	32%	32%	32%
1992				51%	46%		20%		35%	26%	26%	38%
1993				44%	52%		21%		33%	27%	27%	23%
1994				43%	48%		15%		24%	22%	22%	17%
1995				61%	63%		11%		28%	14%	14%	11%
1996				46%	41%		5%		25%	15%	15%	11%
1997				45%	44%		11%		33%	30%	30%	23%
1998				47%	29%		14%		39%	21%	21%	13%
1999				58%	49%		13%		28%	26%	26%	18%
2000				42%	43%		10%		30%	23%	23%	15%
2001				34%	43%		12%		34%	29%	29%	20%
2002				49%	41%		20%		43%	27%	27%	19%
2003				36%	37%		24%		49%	25%	25%	16%
2004				51%	35%		21%		47%	35%	35%	26%
2005				45%	44%		32%		56%	33%	33%	23%
2006				38%	44%		19%		35%	33%	33%	23%
2007				38%	35%		22%		47%	25%	25%	17%
2008				27%	55%		12%		33%	20%	20%	12%
2009				27%	36%		18%		49%	24%	24%	
2010				26%	33%		23%		48%	32%	32%	
2011				43%	43%		31%		57%	48%	48%	37%
2012				40%	39%		20%		45%	27%	27%	
2013				47%	38%		8%		33%	33%	33%	
2014				43%	38%		15%		38%	49%	49%	
2015				38%	44%		19%		30%	60%	60%	
2016				43%	43%		17%		38%	48%	48%	
2017				55%	45%		17%		38%	37%	37%	

FIGURES

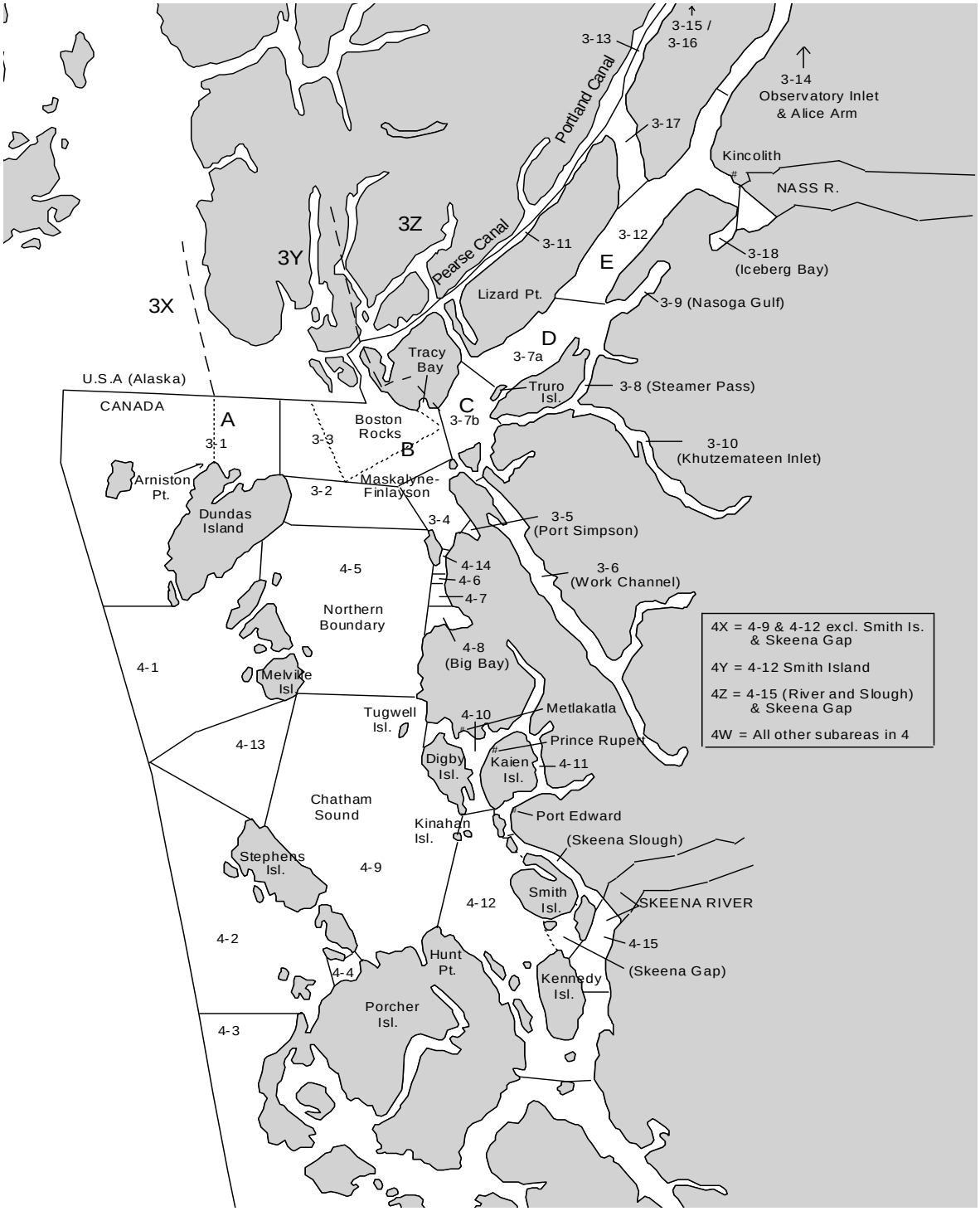

Figure 1. DFO PFMA 3 and 4 with Northern Boundary Sockeye Run Reconstruction areas overlaid.

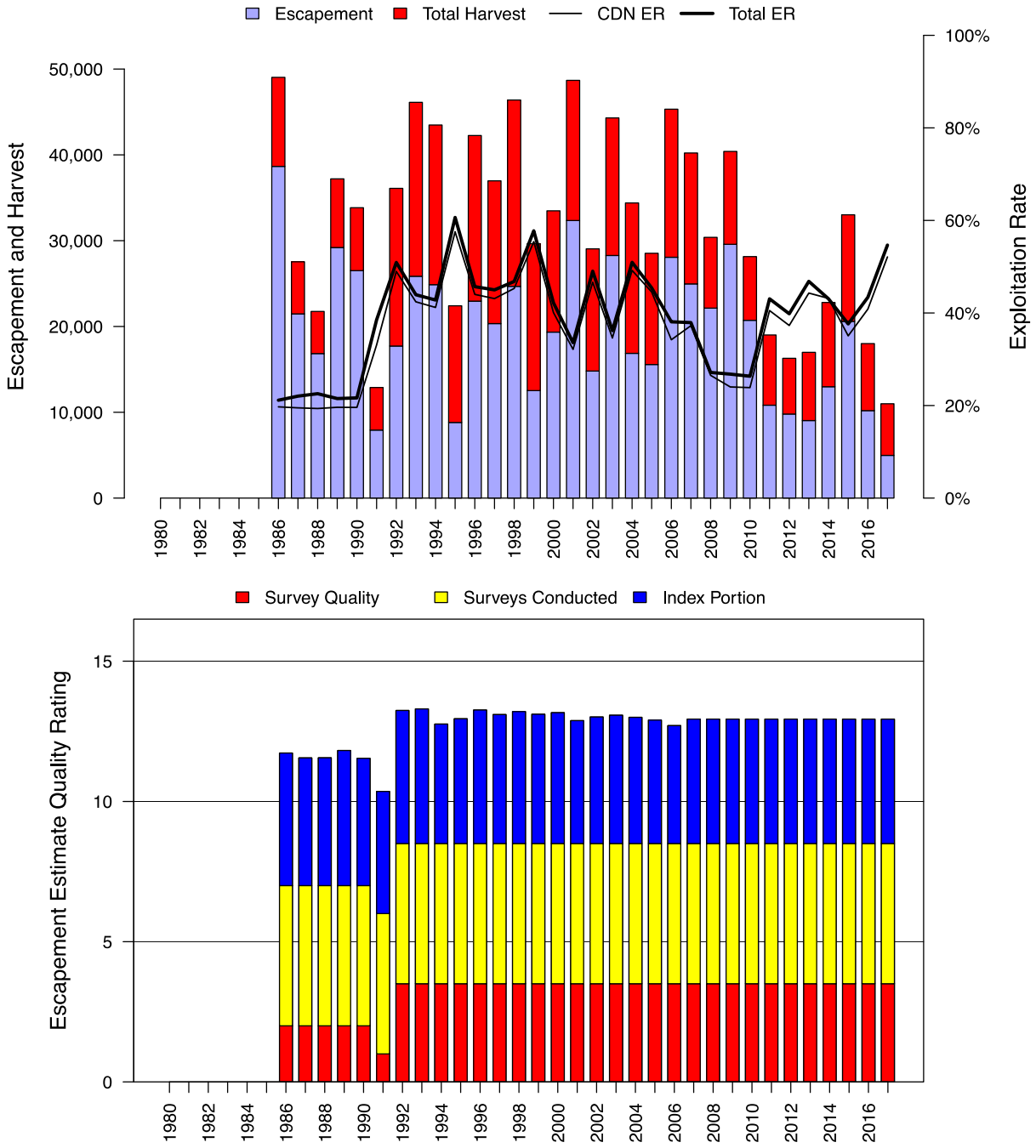

Figure 2. Escapement, harvests, and exploitation rate trends for Area 3 (Nass) Chinook.

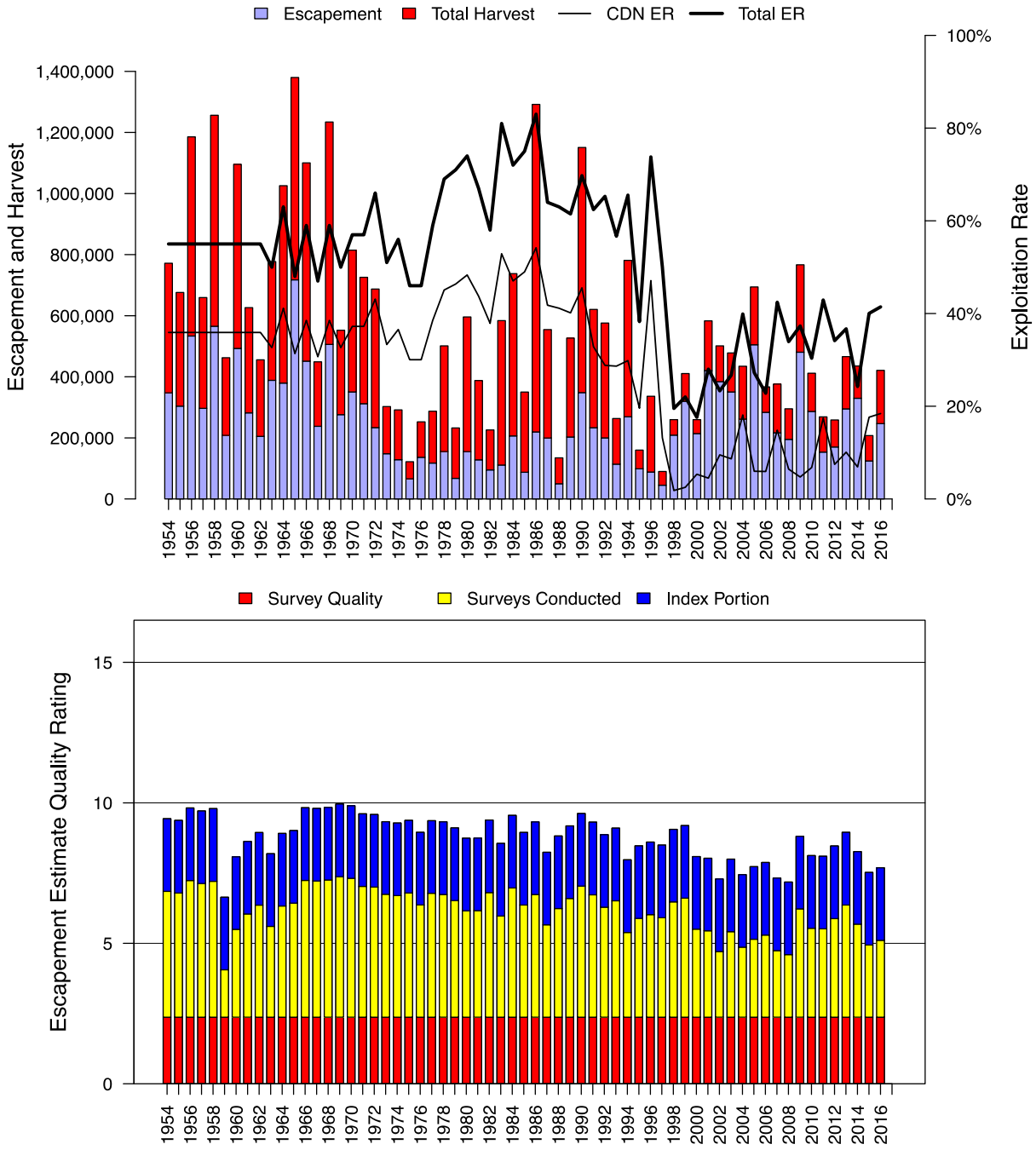

Figure 3. Escapement, harvests, and exploitation rate trends for Area 4 (Skeena) Coho.

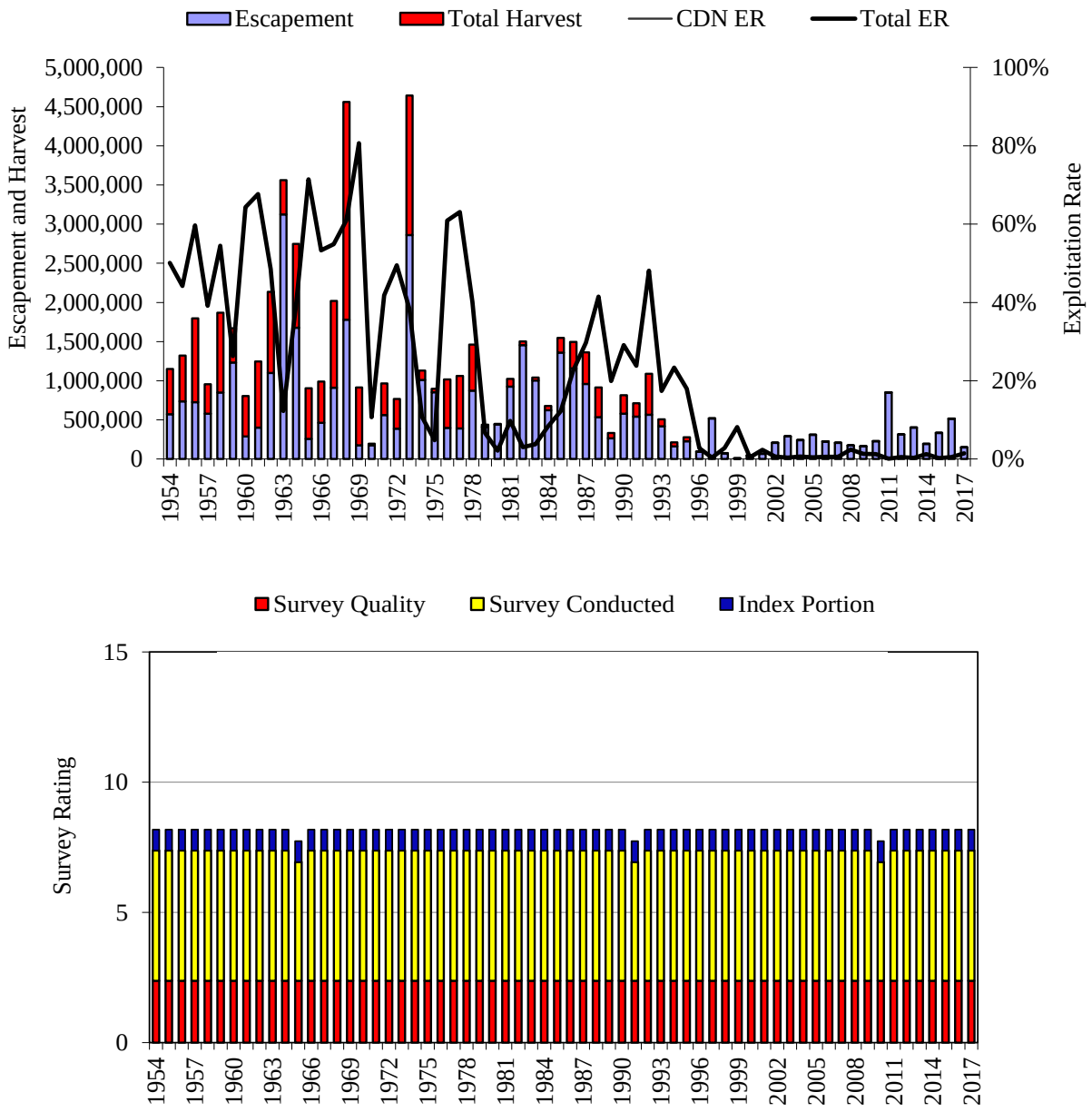

Figure 4. Escapement, harvests, and exploitation rate trends for Owikeno Lake Sockeye CU (Area 09 Sockeye).

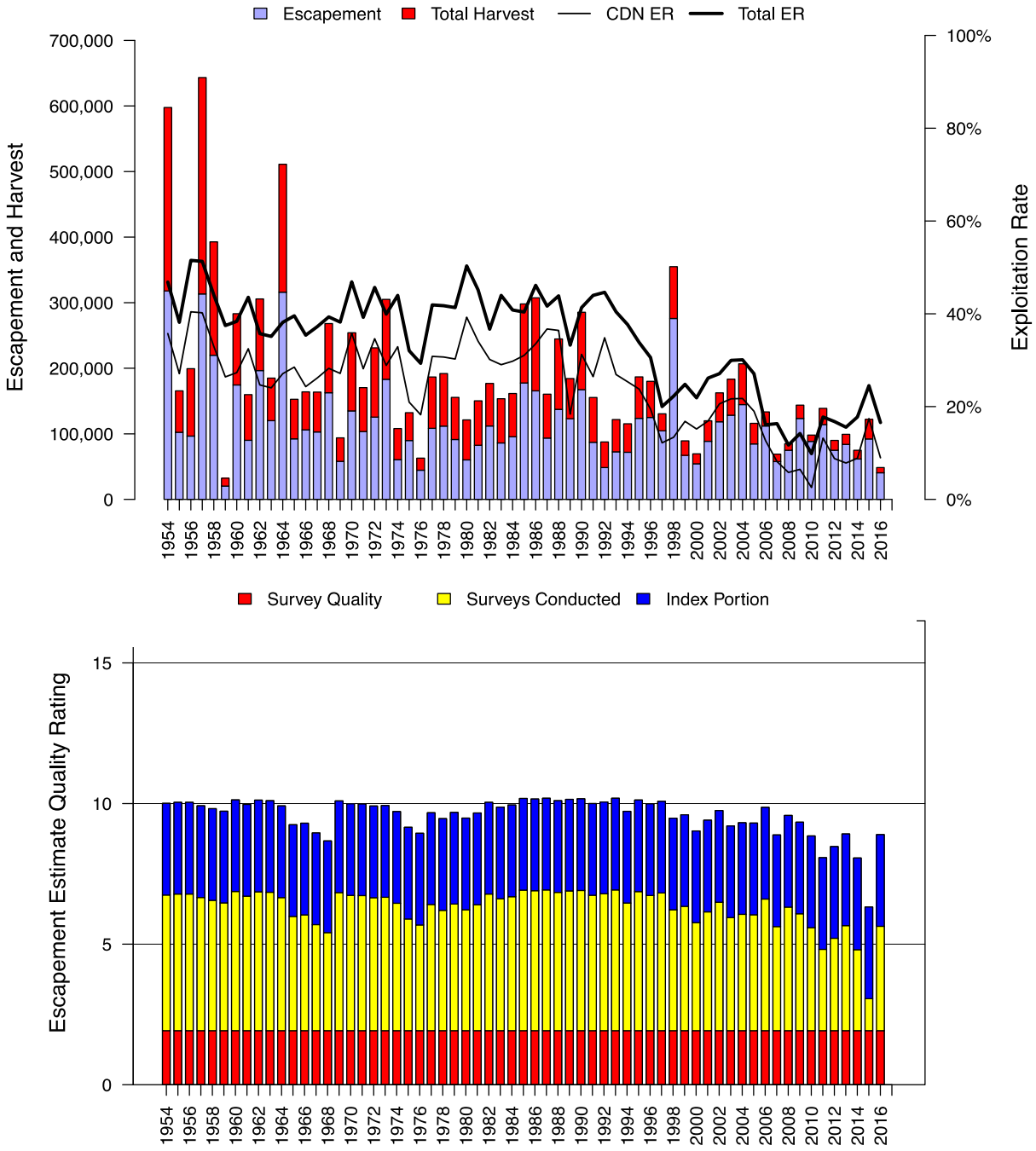

Figure 5. Escapement, harvests, and exploitation rate trends for the Hecate Lowlands Chum salmon CU.

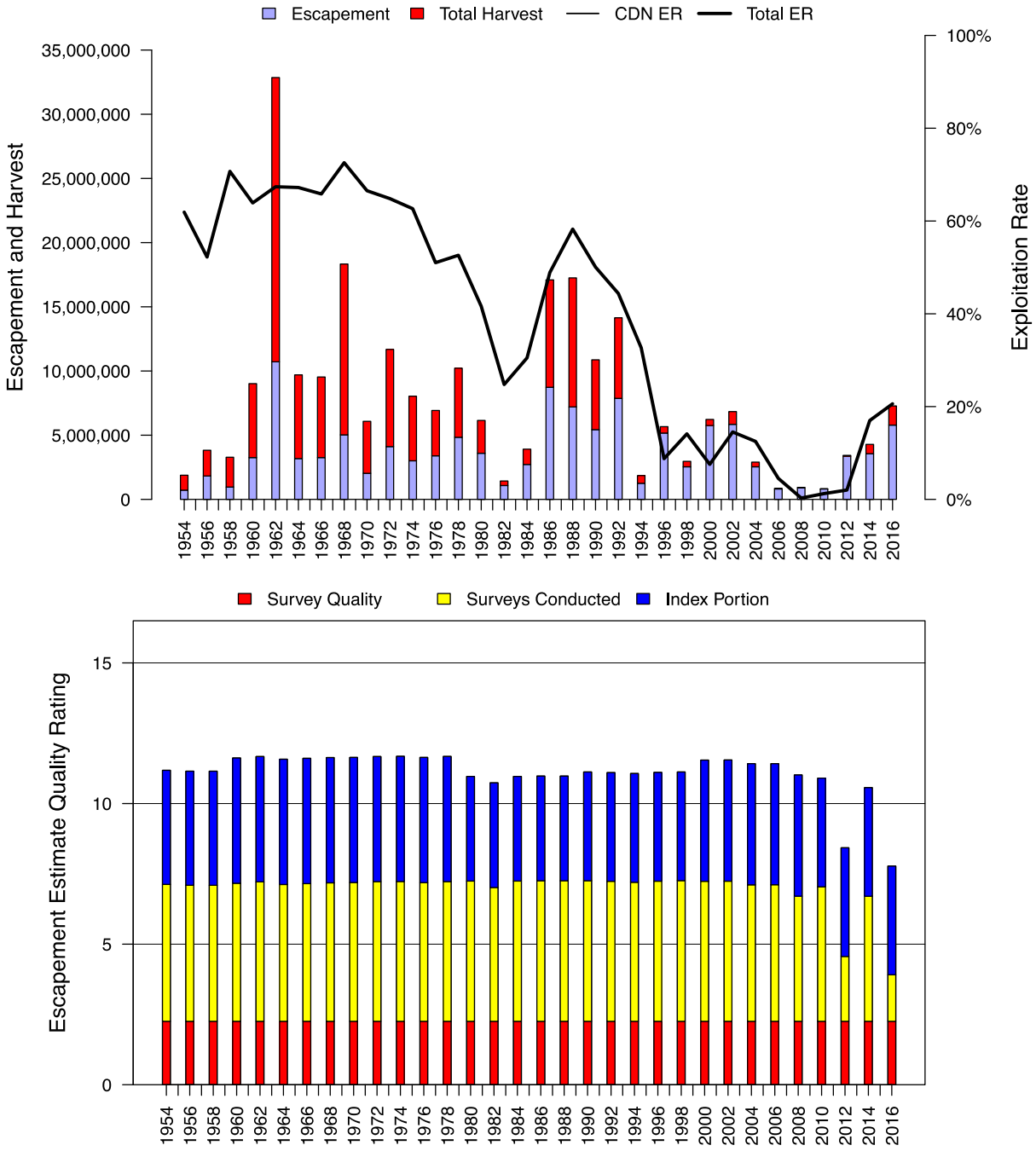

Figure 6. Escapement, harvests, and exploitation rate trends for Hecate Strait Fjords even year Pink salmon CU.

Figure 7. Comparison of estimates of recruits per spawner for Babine Sockeye using average and annual age composition estimates for brood years 1956-2005. The 1:1 line is displayed in black.

APPENDICES

APPENDIX A: Methods used to estimate total escapement, the total return to Canada and total run size for North and Central coast salmon stocks.

The assessment of long-term trends in abundance is critical for determining stock status, setting annual fisheries management goals and defining harvest sharing agreements for First Nations, sport and commercial fisheries. The first task in any stock assessment is to define the stocks to be assessed. For salmon populations, the resolution of stock units range from specific run-timing groups for a specific spawning area to numerous spawning streams within a geographic region. While sound biological and genetic rationale are available to define some of these stock groups, the practical constraints on our ability to assess long-trend trends in abundance for specific salmon stocks is largely determined by the quantity and quality of the available catch and escapement data. For all salmon stocks, the minimum requirement for stock specific assessments is information on the number of adults returning to the spawning area (i.e., spawning escapement). Escapement data are available for a large number of streams but not all streams and all species within each statistical area. Since both escapement and catch data are routinely organized by statistical area (SA), we used the North Coast and Central Coast (NCC) statistical areas (Areas 1-10) as the basic units for our initial assessment. Within these statistical areas there are a number of instances where the assessment is limited to a specific stock or stock group because of data quality or limitations (e.g., Skeena Sockeye, Nass Sockeye, Nass Coho, Bella Coola Chinook). The goal for these analyses was to provide systematic estimates of the total escapement, total return to Canadian waters, total run size and exploitation rates for each salmon species by statistical area. The exploitations rates for each statistical area could then be applied to escapement estimates for each Conservation Unit (CU) to produce estimates of total run size for each CU.

The major sources of data and estimates used in these analyses were:

- Annual escapement data for all monitored streams within a statistical area;
- Weekly catch data for Sockeye, Pink and Chum by gear type for each statistical area;
- Annual exploitation rate estimates for Chinook and Coho from CWT data and the NCC Coho Model; and
- Annual estimates of the catch and escapement for Nass and Skeena Sockeye aggregates and CUs from the Northern Boundary run reconstruction (NBSRR) Model.

The procedures used for each combination of species and statistical area were determined by the quantity and quality of the available data. The most common approach used to estimate total escapement was the indicator stream method, where a series of expansions were used to convert the observed escapement for frequently monitored streams into a series of annual escapement estimates for a statistical area. The procedures and equations used to estimate the total annual escapement are described below.

Symbols and notation

a = statistical area

i = indicator stream or river (sum = I)

j = non-indicator stream or river (sum = J)

s = species

d = decade (1=1980-89, 2=1990-99)

y = year in a decade with escapement survey data (max. 10)

Y_{siad} = total years of escapement survey data, by stratum

w = weighting factor

C = catch

$\bar{E}_{siad}$ = observed indicator stream escapement, averaged over years with survey data, by stratum

$\bar{E}_{sjad}$ = observed non-indicator stream escapement, averaged over years with survey data, by stratum

E_{siady} = observed escapement to an indicator stream, by stratum

E'_{sady} = adjusted observed escapement to all indicator streams, by stratum

$\hat{E}_{sady}$ = total estimated escapement by stratum

P = portion of total mean escapements of all streams accounted for by stream r

F'_{sady} = correction factor for missing indicator stream survey data, by stratum

F''_{sady} = correction factor non-indicator stream contributions, by stratum

F'''_{sa} = correction factor for observer efficiency, by species and area

ER_{Total} = total exploitation rate (i.e., total harvest) for a specific year, species and statistical area

ER_{CDN} = Canadian exploitation rate for a specific year, species and statistical area

$TRTC$ = total return to Canada for a specific year, species and statistical area

Description of estimators

The following series of calculations are used to convert the reported "observed" escapements to indicator streams into estimates of the total annual escapement to each SA or CU. The first set of equations below are used to account for missing escapement estimates for some of the indicator streams in specific years. The observed escapement of a species to an indicator stream, average over years with survey data in a decade and stratum is:

$$\overline{E}_{siad} = \frac{\sum_{y=1}^{Y_{srd}} E_{siady}}{Y_{siad}}$$

The indicator stream escapement contribution to that of all indicator streams in a stratum is

$$P_{siad} = \frac{\overline{E}_{siad}}{\sum_{i=1}^{I} \overline{E}_{siad}}$$

An expansion factor is used to weight the contributions of indicator streams with missing survey data, and give an adjusted observed escapement to all indicator streams in a stratum

$$F'_{sady} = \frac{1}{\sum_{i=1}^{I} \left(P_{siad} \cdot w_{siady} \right)} \qquad \begin{cases} w_{siady} = 0 \text{ if } E_{siady} = 0 \\ w_{siady} = 1 \text{ if } E_{siady} > 0 \end{cases}$$

$$E'_{sady} = F'_{sady} \sum_{i=1}^{I} E_{siady}$$

The second set of equations are used to expand the adjusted total escapement estimate for all indicator streams to an "observed" estimate for all streams that support that salmon species for a specific SA or CU. The overall observed escapement to all streams in an area is obtained by accounting for the contribution of non-indicator streams to the total average escapement for all streams in that statistical area for the user defined decade or period with the best survey coverage for that statistical area (Appendix Table A1).

$$F''_{sady} = \frac{\sum_{i=1}^{I} \overline{E}_{siady} + \sum_{j=1}^{J} \overline{E}_{sjady}}{\sum_{i=1}^{I} \overline{E}_{siady}}$$

$$E_{sady} = E'_{sady} \cdot F''_{sady}$$

The same approach was used to account for the contribution of non-indicator streams within a CU. The decade or period with best survey coverage has to be defined for each CU (Appendix Table A2) since the historical pattern of stream survey effort and number of indicator streams associated with each CU could be substantially different from the totals for the associated statistical area. Summaries of the resulting F''_{sady} values for each species by year and statistical area are provided in Appendix Tables (A3).

Finally, the total estimated escapement to a statistical area is obtained by accounting for observer efficiency, as determined by the regional DFO staff familiar with the escapement monitoring techniques used in each statistical area (Table A4). In the current analyses, the correction factors are considered to be constant over all years for each species, but vary both between species and in some instances between survey areas

$$\hat{E}_{sady} = E_{sady} \cdot F'''_{sa}$$

The stock-specific exploitation rates were derived from indicator stocks for Chinook and Coho salmon or by combining catch and escapement data for individual or groups of statistical areas for Sockeye, Pink, and Chum salmon. A summary of the methods and sources used to compute these exploitation rates are described in the report for all species with additional information provided in Appendix B for Sockeye and Appendix C for Chinook.

The Total Run (TR) in a given year for each species and statistical area was estimated by combining the estimated total escapement (TE) with an estimate of the annual exploitation rate for all fisheries (ER_{Total}) in the following equation:

$$TR = TE / (1\text{-}ER_{Total})$$

The Total Return to Canada (TRTC) in a given year for each species and statistical area was estimated by combining the estimated total escapement (TE) with an estimate of the annual exploitation rate for Canadian fisheries (ER_{CDN}) in the following equation:

$$TRTC = TE + TR * ER_{CDN}$$

For a few area-species combinations, the desired estimates were derived from formal run reconstruction or Cohort analyses (e.g., Nass and Skeena Sockeye, Atnarko Chinook).

Table A-1. Summary of the number of streams, number of indicator streams, and portion of the total escapement represented by indicator stream by decade for each North Coast and Central Coast Statistical Area. Shaded cells indicate the specific periods used when decadal averages are not appropriate.

Area	Species	TotalNoStreams	Streams1950s	Streams1960s	Streams1970s	Streams1980s	Streams1990s	Streams2000s	Streams2010s	Indicators	Indicators1950s	Indicators1960s	Indicators1970s	Indicators1980s	Indicators1990s	Indicators2000s	Indicators2010s	Ind_Proportion1950s	Ind_Proportion1960s	Ind_Proportion1970s	Ind_Proportion1980s	Ind_Proportion1990s	Ind_Proportion2000s	Ind_Proportion2010s	AvgPeriod Code
01	CM	12	8	8	10	10	7	11	4	4	4	4	4	4	4	4	4	0.99	1.00	0.90	0.98	1.00	0.99	1.00	0
02E	CM	125	57	80	90	114	111	84	61	40	31	36	39	39	39	40	37	0.77	0.72	0.75	0.77	0.84	0.95	0.95	1
02W	CM	71	52	53	56	56	68	60	43	36	31	34	35	35	36	36	33	0.85	0.82	0.73	0.75	0.90	0.94	0.97	0
03	CM	58	24	25	36	40	31	28	21	13	11	12	12	12	12	13	11	0.86	0.80	0.89	0.89	0.99	0.99	0.96	1
04	CM	59	19	35	27	42	40	11	16	10	6	10	9	10	10	7	10	0.51	0.83	0.68	0.78	0.74	0.99	0.89	4
05	CM	49	37	34	36	34	30	23	14	11	11	11	9	10	10	11	8	0.47	0.58	0.35	0.59	0.89	0.91	0.99	4
06	CM	140	108	110	108	129	104	84	77	52	47	49	50	51	52	52	50	0.54	0.62	0.70	0.74	0.45	0.55	0.69	1*
07	CM	80	48	46	55	66	64	56	47	37	31	31	31	32	32	37	36	0.87	0.90	0.87	0.89	0.96	0.99	0.98	4
08	CM	57	28	28	30	38	38	43	32	24	13	13	14	14	14	24	22	0.81	0.88	0.88	0.90	0.94	0.95	0.97	0
09	CM	23	13	12	17	21	19	16	9	7	6	6	7	7	7	7	7	0.69	0.66	0.57	0.54	0.68	0.99	0.99	0
10	CM	5	3	3	3	4	4	5	5	3	2	2	2	3	3	3	3	0.83	0.48	0.79	0.91	0.94	0.99	0.93	0
01	CN	2	1	1	2	2	1	1		1	1	1	1	1	1	1		1.00	1.00	0.99	0.99	1.00	1.00		0
02E	CN	6		1			5	2	1																
03	CN	31	9	16	24	20	22	10	7	6	4	5	6	6	6	6	5	0.60	0.38	0.49	0.45	0.49	0.93	0.98	4
04	CN	88	23	52	49	59	55	38	24	17	10	13	14	15	17	17	12	0.95	0.83	0.80	0.87	0.95	0.99	0.96	4
05	CN	3	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	0.96	1.00	1.00	5
06	CN	42	20	25	21	29	20	12	8	3	2	3	3	3	3	3	2	0.10	0.07	0.04	0.02	0.01	0.76	0.42	0
07	CN	5	1	3		2																			
08	CN	10	4	4	5	9	7	4	3	2	2	2	2	2	2	2	2	0.95	0.97	0.96	0.98	0.98	1.00	1.00	4
09	CN	15	6	8	11	11	10	9	3	7	4	6	7	7	7	7	3	0.97	0.99	0.97	0.98	1.00	1.00	1.00	1
10	CN	2	1	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1.00	0.99	0.97	0.97	0.99	1.00	1.00	4
01	CO	16	12	13	15	15	13	11																	
02E	CO	126	49	66	74	116	106	58	20	6	6	6	6	6	6	6	6	0.42	0.46	0.45	0.46	0.54	0.83	0.96	4
02W	CO	58	30	35	30	43	45	31	10	3	1	3	3	3	3	3	1	0.03	0.05	0.09	0.13	0.09	0.08	0.15	4
03	CO	67	17	25	47	58	27	20	14	8	3	6	8	8	6	8	8	0.17	0.09	0.18	0.30	0.67	0.85	0.92	1
04	CO	192	68	109	104	123	121	95	53	47	27	38	40	40	41	42	32	0.63	0.67	0.57	0.63	0.72	0.65	0.74	4
05	CO	54	43	43	48	50	41	6	10	29	28	28	28	28	28	4	7	0.90	0.87	0.95	0.88	0.86	0.92	0.97	4
06	CO	143	104	102	92	133	88	38	32	22	19	20	20	21	22	22	19	0.17	0.31	0.36	0.34	0.23	0.88	0.63	1
07	CO	63	41	39	39	50	45	22	9	5	5	5	4	5	5	5	4	0.14	0.26	0.21	0.33	0.74	0.85	0.99	4
08	CO	55	24	21	23	23	16	34	26	14	5	5	5	5	5	14	13	0.68	0.69	0.56	0.77	0.96	0.94	0.93	3
09	CO	26	12	19	22	23	17	6	5	2	2	2	2	2	2	2	2	0.31	0.28	0.22	0.18	0.72	0.89	0.99	1
10	CO	12	8	7	6	5	6	2	3	2	1	2	2		1	1	1	0.16	0.47	0.10		0.92	0.99	0.99	5
01	PKe	17	13	13	15	15	15	14	10	7	6	7	7	7	7	7	7	0.93	0.93	0.91	0.98	0.99	0.99	0.94	0
02E	PKe	101	37	50	55	74	85	59	42	23	20	20	23	23	23	23	23	0.99	0.96	0.93	0.93	0.97	0.98	0.97	4
02W	PKe	63	31	33	43	49	53	38	23	12	9	9	12	12	12	12	11	0.92	0.77	0.83	0.94	0.88	0.88	0.98	4
03	PKe	76	21	28	49	64	51	36	35	22	12	12	18	20	22	22	20	0.87	0.91	0.91	0.86	0.88	0.94	0.95	4
04	PKe	123	46	60	64	88	86	21	21	14	13	14	14	14	14	14	12	0.68	0.84	0.79	0.77	0.85	0.93	1.00	4
05	PKe	52	40	42	48	47	49	31	22	15	15	15	15	15	15	15	14	0.52	0.65	0.54	0.66	0.72	0.86	0.92	4
06	PKe	136	106	105	106	125	106	78	79	50	45	47	47	50	50	50	49	0.56	0.76	0.68	0.89	0.73	0.84	0.85	4
07	PKe	69	43	45	50	55	52	44	38	21	20	21	21	21	21	21	21	0.82	0.78	0.71	0.80	0.89	0.94	0.93	4
08	PKe	49	27	27	29	37	34	35	17	14	14	14	14	14	14	14	10	0.90	0.98	0.96	0.69	0.81	0.99	0.99	0
09	PKe	26	10	10	21	23	22	16	7	12	8	8	12	12	12	12	7	0.97	0.98	0.98	0.84	0.95	0.99	1.00	0

Area	Species	TotalNoStreams	Streams1950s	Streams1960s	Streams1970s	Streams1980s	Streams1990s	Streams2000s	Streams2010s	Indicators	Indicators1950s	Indicators1960s	Indicators1970s	Indicators1980s	Indicators1990s	Indicators2000s	Indicators2010s	Ind_Proportion1950s	Ind_Proportion1960s	Ind_Proportion1970s	Ind_Proportion1980s	Ind_Proportion1990s	Ind_Proportion2000s	Ind_Proportion2010s	AvgPeriod Code
10	PKe	6	2	2	2	5	3	3	1	1	1	1	1	1	1	1		0.98	1.00	0.98	0.99	0.98	0.99		4
01	PKo	13	4	7	11	13	4																		
02E	PKo	57	13	23	35	36	35	7	4	6	5	6	6	6	6	5	3	0.97	0.70	0.86	0.88	0.80	1.00	1.00	0
02W	PKo	35	7	7	7	17	23	7	1																
03	PKo	70	21	29	43	57	42	43	30	20	11	12	14	20	20	20	14	0.78	0.82	0.83	0.76	0.91	0.95	0.92	4
04	PKo	127	45	64	69	101	85	42	23	13	10	13	13	13	13	13	12	0.42	0.67	0.62	0.62	0.70	0.95	0.98	4
05	PKo	53	42	40	41	48	45	37	22	12	12	12	12	12	12	12	12	0.61	0.62	0.56	0.63	0.70	0.81	0.93	4
06	PKo	131	106	104	96	120	92	90	73	48	42	44	45	48	48	48	46	0.76	0.89	0.89	0.85	0.86	0.88	0.76	4
07	PKo	71	41	43	54	59	46	46	39	21	20	21	21	21	21	21	19	0.91	0.90	0.84	0.88	0.93	0.93	0.93	0
08	PKo	51	26	27	29	35	30	42	19	13	13	13	13	13	13	13	7	0.98	0.98	0.98	0.98	0.99	0.98	0.98	0
09	PKo	24	9	9	17	21	17	18	10	6	4	5	6	6	6	6	5	0.77	0.89	0.27	0.50	0.88	0.97	0.95	0
10	PKo	7	3	1	2	6	4	3		1	1	1	1	1	1	1		1.00	1.00	0.99	0.98	0.98	0.97		4
01	SX	7	5	7	6	6	5	4	5	3	3	3	3	3	3	3	3	0.97	0.87	0.92	0.91	0.99	0.96	1.00	4
02E	SX	15	2	4	4	12	6	5	3	2	1	2	2	2	2	2	2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1
02W	SX	25	2	2	4	7	21	6	1	1	1	1	1	1	1	1	1	0.95	0.80	0.64	0.81	0.80	0.95	1.00	4
03	SX	25	10	12	17	19	9	7	10	5	4	4	5	5	4	5	5	0.97	0.82	0.84	0.87	0.91	1.00	1.00	1
04	SX	106	52	69	67	69	69	54	52	35	27	29	30	31	29	35	33	0.45	0.42	0.33	0.19	0.25	0.26	0.30	4
05	SX	29	20	23	21	18	27	11	11	8	8	8	7	8	8	8	8	0.60	0.68	0.55	0.74	0.86	0.87	0.96	4
06	SX	92	34	43	29	57	54	32	32	9	6	7	7	9	9	9	8	0.47	0.82	0.66	0.72	0.85	0.87	0.80	4
07	SX	41	18	15	20	32	22	17	15	7	6	6	6	7	7	7	7	0.71	0.75	0.64	0.86	0.96	0.99	0.98	1
08	SX	22	8	9	12	15	20	13	7	4	4	4	4	4	4	4	4	0.91	0.91	0.73	0.70	0.79	0.95	0.93	4
09	SX	19	11	12	15	19	13	9	6	8	8	8	8	8	8	8	6	0.73	0.59	0.57	0.46	0.40	1.00	1.00	4
10	SX	7	3	3	4	4	5	2	2	2	2	2	2	2	2	2	2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	4

* Note: Kitamat Hatchery Chum major recent producer and not an indicator stock

Table A-2. Summary of the number of streams, number of indicator streams, and portion of the total escapement represented by indicator stream by decade for each North Coast and Central Coast Conservation Unit. Shaded cells indicate the specific periods used when decadal averages are not appropriate.

Species	CU Code	CU Name	TotalNoStreams	Streams1950s	Streams1960s	Streams1970s	Streams1980s	Streams1990s	Streams2000s	Streams2010s	Indicators	Indicators1950s	Indicators1960s	Indicators1970s	Indicators1980s	Indicators1990s	Indicators2000s	Indicators2010s	Ind_Proportion1950s	Ind_Proportion1960s	Ind_Proportion1970s	Ind_Proportion1980s	Ind_Proportion1990s	Ind_Proportion2000s	Ind_Proportion2010s	AvgPeriod Code
CM	CM_12	Smith Inlet	11	7	6	7	8	9	9	7	5	3	3	4	5	5	5	5	0.82	0.63	0.82	0.92	0.94	0.99	0.95	0
CM	CM_13	Rivers Inlet	15	7	7	11	15	12	11	7	5	5	5	5	5	5	5	5	0.99	1.00	0.99	0.63	0.96	0.99	0.98	0
CM	CM_14	Wannock	1	1	1	1	1	1																		
CM	CM_15	Spiller-Fitz Hugh-Burke	69	39	36	44	55	49	50	38	28	22	21	22	23	23	28	26	0.81	0.87	0.85	0.84	0.93	0.94	0.97	0
CM	CM_16	Bella Coola-Dean Rivers	22	11	11	12	15	16	16	9	7	3	3	3	3	3	7	7	0.69	0.85	0.88	0.87	0.92	0.92	1.00	0
CM	CM_17	Bella Coola River_late	9	1	1	1	1	2	8	7	7	1	1	1	1	1	7	7	1.00	1.00	1.00	1.00	0.97	1.00	1.00	3
CM	CM_18	Hecate Lowlands	142	111	108	113	124	112	70	56	41	39	40	41	41	41	41	37	0.57	0.65	0.55	0.71	0.90	0.97	0.86	1
CM	CM_19	Mussel-Kynoch	14	12	13	13	13	13	13	13	12	11	12	12	12	12	12	12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0
CM	CM_20	Douglas-Gardner	63	44	45	44	58	43	45	46	27	24	25	25	26	27	27	27	0.45	0.59	0.68	0.70	0.38	0.47	0.65	0
CM	CM_21	East HG	95	46	66	75	89	84	57	43	32	25	30	32	32	32	32	30	0.69	0.70	0.70	0.72	0.82	0.95	0.95	4
CM	CM_22	Skidegate	40	17	18	20	32	36	39	27	13	11	11	12	12	12	13	12	0.91	0.79	0.86	0.87	0.86	0.92	0.93	0
CM	CM_23	West Haida Gwaii	61	46	49	51	49	59	48	34	31	26	29	30	30	31	31	28	0.82	0.81	0.72	0.73	0.91	0.95	0.99	0
CM	CM_24	North Haida Gwaii	11	7	7	9	9	6	10	3	3	3	3	3	3	3	3	3	0.99	1.00	0.89	0.97	1.00	0.99	1.00	0
CM	CM_25	North Haida Gwaii-Stanley Creek	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0
CM	CM_26	Skeena Estuary	21	7	10	6	8	11	9	4	5	4	5	2	3	3	3	3	0.90	0.67	0.41	0.15	0.05	0.59	0.96	5
CM	CM_27	Lower Skeena	33	12	24	19	26	24	9	10	6	3	6	5	6	6	6	6	0.72	0.86	0.73	0.79	0.76	0.98	0.88	4
CM	CM_28	Middle Skeena	16	4	7	5	12	10	1	3	2	1	2	2	2	2	1	2	0.29	0.31	0.24	0.73	0.59	1.00	0.91	4
CM	CM_29	Upper Skeena<<Deleted>>	1							1																
CM	CM_30	Portland Inlet	19	8	7	7	10	10	17	9	5	5	5	5	5	5	5	4	0.90	0.99	0.99	1.00	0.99	0.99	0.99	0
CM	CM_31	Lower Nass	20	7	8	16	13	8	1	4	1	1	1	1	1	1	1	1	0.05	0.31	0.00	0.01	0.06	1.00	0.28	4
CM	CM_32	Portland Canal-Observatory	15	9	9	13	15	10	7	7	6	5	5	6	6	6	6	5	0.91	0.68	0.92	0.99	0.99	1.00	0.94	1
CN	CN_36	Docee	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0
CN	CN_37	Rivers Inlet	14	5	8	10	11	10	8	2	6	3	5	6	6	6	6	2	0.82	0.93	0.84	0.88	0.98	1.00	1.00	1
CN	CN_38	Wannock	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0
CN	CN_39	Bella Coola-Bentinck	5	2	1	2	4	4	2	2	1	1	1	1	1	1	1	1	0.99	1.00	1.00	0.99	0.98	1.00	1.00	4
CN	CN_40	Dean River	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0
CN	CN_41	North and Central Coast-late timing	16	7	8	3	6	6	2	2	1	1	1	1	1	1	1	1	0.12	0.00	0.00	0.04	0.15	0.99	0.95	4
CN	CN_42	North and Central Coast-early timing	39	16	23	22	31	18	12	7	3	2	3	3	3	3	3	2	0.11	0.09	0.05	0.02	0.01	0.75	0.42	0
CN	CN_43	Haida Gwaii-North	2	1	1	2	2	1	1		1	1	1	1	1	1	1		1.00	1.00	0.99	0.99	1.00	1.00		0
CN	CN_44	Haida Gwaii-East	5		1			4	1																	
CN	CN_45	Skeena Estuary	4	1	3	2	4	1	1	2																
CN	CN_46	Ecstall	4	4	4	3	4	2	2		1	1	1	1	1	1	1		0.73	0.56	0.23	0.15	0.15	0.41		1
CN	CN_48	Lower Skeena	15	2	9	12	15	11	10	4	4		2	3	4	4	4	2		0.38	0.19	0.18	0.36	0.78	0.89	0
CN	CN_49	Kalum_early timing	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	0.76	0.38	0.86	0.81	0.84	0.96	1.00	0
CN	CN_50	Kalum_late timing	7		7	3	3	3	1	2	1		1	1	1	1	1	1		0.92	0.95	0.98	0.99	1.00	0.88	4
CN	CN_51	Lakelse	5	1	3	2	3	2		1																
CN	CN_53	Middle Skeena-large lakes	12	6	7	8	7	9	7	6	5	5	5	5	5	5	5	5	0.99	0.99	0.98	1.00	1.00	1.00	1.00	0
CN	CN_54	Middle Skeena-mainstem tributaries	24	5	13	12	15	17	8	5	3	2	2	2	2	3	3	2	0.96	0.43	0.77	0.73	0.93	0.97	0.96	4
CN	CN_55	Upper Bulkley River	4	2	2	2	3	3	1		1	1	1	1	1	1	1		0.99	0.99	0.97	0.97	0.98	1.00		4
CN	CN_56	Upper Skeena	5			2	2	2	2	2																
CN	CN_57	Portland Sound-Observatory Inlet-Lower Nass	14	5	8	11	7	10	5	3	3	2	2	3	3	3	3	2	0.62	0.57	0.48	0.51	0.55	0.98	0.95	4
CN	CN_58	Upper Nass	17	4	8	13	13	12	5	4	3	2	3	3	3	3	3	3	0.60	0.24	0.50	0.44	0.47	0.91	0.98	4
CN	CN_80	Zymoetz	6		2	1	1	3	4	1	1					1	1	1					0.19	0.75	1.00	0
CN	CN_9002	(P)Hatchery Exclusion-Pallant Creek	1					1	1	1																
CO	CO_20	Smith Inlet	12	9	7	6	5	5	2	3	2	1	2	2		1	1	1	0.16	0.47	0.10		0.92	0.99	0.99	3
CO	CO_21	Rivers Inlet	24	10	18	21	22	16	6	5	2	2	2	2	2	2	2	2	0.41	0.33	0.23	0.18	0.72	0.89	0.99	1
CO	CO_22	Bella Coola-Dean Rivers	31	7	6	7	7	4	25	22	11	2	2	2	2	2	11	10	0.84	0.94	0.85	0.92	0.96	0.95	0.78	3

Species	CU Code	CU Name	TotalNoStreams	Streams1950s	Streams1960s	Streams1970s	Streams1980s	Streams1990s	Streams2000s	Streams2010s	Indicators	Indicators1950s	Indicators1960s	Indicators1970s	Indicators1980s	Indicators1990s	Indicators2000s	Indicators2010s	Ind_Proportion1950s	Ind_Proportion1960s	Ind_Proportion1970s	Ind_Proportion1980s	Ind_Proportion1990s	Ind_Proportion2000s	Ind_Proportion2010s	AvgPeriod Code
CO	CO_23	Haida Gwaii-East	110	47	62	69	101	93	51	19	5	5	5	5	5	5	5	5	0.19	0.29	0.33	0.34	0.45	0.75	0.93	4
CO	CO_24	Haida Gwaii-West	62	30	36	31	46	48	32	10	3	1	3	3	3	3	3	1	0.03	0.05	0.09	0.13	0.09	0.08	0.15	4
CO	CO_25	Haida Gwaii-Graham Island Lowlands	28	14	16	19	27	23	17	1	1	1	1	1	1	1	1	1	0.56	0.40	0.13	0.16	0.28	0.57	1.00	4
CO	CO_26	Mussel-Kynoch	14	10	10	10	12	11	9	1	2	2	2	2	2	2	2	1	0.33	0.55	0.63	0.80	0.84	0.91	1.00	4
CO	CO_27	Hecate Strait Mainland	176	137	137	131	155	119	33	22	36	35	35	34	35	35	11	13	0.35	0.50	0.49	0.56	0.54	0.76	0.75	1
CO	CO_28	Northern Coastal Streams	2	1	2	2	2	2	2	2	2	1	2	2	2	2	2	2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0
CO	CO_29	Douglas Channel-Kitimat Arm	33	12	12	11	32	9	5	6	2	1	1	1	2	2	2	2	0.05	0.05	0.08	0.03	0.01	0.55	0.48	1
CO	CO_30	Northern Coastal Streams	59	45	38	40	47	45	26	24	17	16	16	16	16	17	17	15	0.39	0.41	0.37	0.45	0.77	0.93	0.71	4
CO	CO_31	Skeena Estuary	23	8	14	10	21	12	4	4	3	2	2	2	3	3	3	2	0.76	0.30	0.25	0.49	0.69	1.00	0.26	1
CO	CO_32	Lower Skeena	84	25	40	39	56	71	45	19	20	15	17	18	19	20	19	12	0.81	0.84	0.68	0.72	0.82	0.83	0.78	4
CO	CO_33	Middle Skeena	74	32	52	50	49	36	36	23	20	9	18	18	18	16	16	14	0.40	0.39	0.45	0.43	0.47	0.55	0.65	1
CO	CO_34	Upper Skeena	17	4	5	7	3	4	10	7	4	1	1	2		2	4	4	0.65	0.81	0.11		0.78	0.99	0.95	3
CO	CO_35	Lower Nass	22	5	11	18	22	12	6	5	4	1	4	4	4	3	4	4	0.01	0.12	0.15	0.17	0.56	0.92	0.97	1
CO	CO_36	Upper Nass	13		3	12	13	6	3	3	2		1	2	2	1	2	2		0.26	0.32	0.42	0.89	0.94	0.87	1
CO	CO_37	Portland Sound-Observatory Inlet-Portland Canal	28	12	10	17	19	9	11	6	2	2	1	2	2	2	2	2	0.25	0.03	0.13	0.34	0.64	0.74	0.92	1
PKe	PKe_5	Hecate Lowlands	179	123	124	135	155	143	88	68	39	38	38	38	39	39	39	37	0.61	0.72	0.66	0.77	0.78	0.93	0.96	4
PKe	PKe_6	Hecate Strait-Fjords	147	94	96	110	126	112	110	91	70	61	64	68	70	70	70	60	0.85	0.90	0.89	0.76	0.81	0.93	0.86	0
PKe	PKe_7	Nass-Skeena Estuary	152	61	79	95	128	104	60	55	37	26	27	33	35	37	37	33	0.77	0.83	0.76	0.79	0.85	0.91	0.97	4
PKe	PKe_8	Middle-Upper Skeena	54	17	20	27	31	40	6	6	3	3	3	3	3	3	3	3	0.49	0.77	0.93	0.77	0.84	1.00	1.00	4
PKe	PKe_9	North Haida Gwaii	17	13	13	15	15	15	14	10	7	6	7	7	7	7	7	7	0.93	0.93	0.91	0.98	0.99	0.99	0.94	0
PKe	PKe_10	East Haida Gwaii	98	36	48	54	72	83	58	41	23	20	20	23	23	23	23	23	0.99	0.97	0.93	0.93	0.97	0.98	0.97	4
PKe	PKe_11	West Haida Gwaii	66	32	35	44	51	55	39	24	12	9	9	12	12	12	12	11	0.92	0.76	0.83	0.94	0.88	0.88	0.98	4
PKe	PKe_12	Upper Nass	5			2	4	4																		
PKo	PKo_8	Homathko-Klinaklini-Smith-Rivers-Bella Coola-Dean	44	16	17	25	32	24	35	15	10	9	10	10	10	10	10	6	1.00	0.99	0.98	0.98	0.99	0.99	0.98	0
PKo	PKo_9	East Haida Gwaii	56	13	22	35	36	34	7	4	6	5	6	6	6	6	5	3	0.97	0.70	0.86	0.88	0.80	1.00	1.00	4
PKo	PKo_10	North Haida Gwaii	13	4	7	11	13	4																		
PKo	PKo_11	West Haida Gwaii	36	7	8	7	17	24	7	1																
PKo	PKo_12	Hecate Strait-Lowlands	178	123	118	125	156	117	97	66	35	33	33	35	35	35	35	31	0.77	0.74	0.68	0.65	0.81	0.86	0.92	1
PKo	PKo_13	Hecate Strait-Fjords	102	77	78	79	90	82	94	77	52	46	49	49	52	52	52	48	0.95	0.94	0.97	0.90	0.89	0.89	0.79	0
PKo	PKo_14	Nass-Skeena Estuary	33	24	23	21	29	29	24	14	13	10	10	10	13	13	13	11	0.29	0.33	0.39	0.58	0.40	0.86	0.92	4
PKo	PKo_15	Lower Skeena	54	16	29	32	46	33	17	9	5	2	5	5	5	5	5	4	0.88	0.75	0.79	0.65	0.72	0.94	0.99	4
PKo	PKo_16	Middle and Upper Skeena	58	17	24	27	41	38	16	7	3	3	3	3	3	3	3	3	0.31	0.57	0.49	0.57	0.74	0.99	0.99	4
PKo	PKo_17	Nass-Portland-Observatory	60	20	27	40	49	35	37	27	16	10	11	13	16	16	16	12	0.78	0.82	0.82	0.76	0.91	0.95	0.92	4
PKo	PKo_18	Upper Nass	5		1	2	4	3	1	1																
SX	SX_L-15-01	Long	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5
SX	SX_L-15-02	Owikeno	11	10	10	11	11	11	9	6	8	8	8	8	8	8	8	6	0.87	0.76	0.68	0.59	0.54	1.00	1.00	5
SX	SX_L-15-04	Wannock[Owikeno]	1	1	1	1	1	1																		
SX	SX_L-17-01	Ain/Skundale/Ian	1	1	1	1	1	1	1	1																
SX	SX_L-17-02	Awun	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5
SX	SX_L-17-03	Fairfax	1	1	1	1	1	1	1																	
SX	SX_L-17-04	Jalun	1		1	1	1	1																		
SX	SX_L-17-05	Marian/Eden	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5
SX	SX_L-17-06	Mathers	1		1	1	1	1	1	1	1		1	1	1	1	1	1		1.00	1.00	1.00	1.00	1.00	1.00	0
SX	SX_L-17-07	Mercer	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0
SX	SX_L-17-08	Skidegate	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5
SX	SX_L-17-09	Yakoun	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5
SX	SX_L-18-01	Backland	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0
SX	SX_L-18-02	Canoona	1		1	1	1	1	1	1	1		1	1	1	1	1	1		1.00	1.00	1.00	1.00	1.00	1.00	5
SX	SX_L-18-03	Dome	1					1																		
SX	SX_L-18-04	Evelyn	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5
SX	SX_L-18-05	Kainet Creek	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5
SX	SX_L-18-06	Kimsquit	1	1	1	1	1	1	1																	
SX	SX_L-18-07	Kitkiata	1	1	1	1	1	1	1	1																
SX	SX_L-18-08	Kitlope	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0

Species	CU Code	CU Name	TotalNoStreams	Streams1950s	Streams1960s	Streams1970s	Streams1980s	Streams1990s	Streams2000s	Streams2010s	Indicators	Indicators1950s	Indicators1960s	Indicators1970s	Indicators1980s	Indicators1990s	Indicators2000s	Indicators2010s	Ind_Proportion1950s	Ind_Proportion1960s	Ind_Proportion1970s	Ind_Proportion1980s	Ind_Proportion1990s	Ind_Proportion2000s	Ind_Proportion2010s	AvgPeriod Code
SX	SX_L-18-09	Pine River	1	1	1	1	1		1																	
SX	SX_L-18-11	Whalen	1					1																		
SX	SX_L-19-01	Banks	1	1	1	1	1	1	1																	
SX	SX_L-19-02	Bloomfield	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0
SX	SX_L-19-03	Bolton Creek	1	1	1	1		1																		
SX	SX_L-19-04	Bonilla	1	1	1	1	1	1	1																	
SX	SX_L-19-05	Borrowman Creek	1	1	1	1	1	1																		
SX	SX_L-19-06	Busey Creek	1	1	1																					
SX	SX_L-19-07	Cartwright Creek	1	1	1		1																			
SX	SX_L-19-08	Chic Chic	1					1																		
SX	SX_L-19-09	Tuwartz	1	1	1	1	1																			
SX	SX_L-19-10	Fannie Cove	2	1	1	1	1	1	2	1																
SX	SX_L-19-11	Curtis Inlet	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5
SX	SX_L-19-12	Dallain Creek	1	1	1	1																				
SX	SX_L-19-13	Deer	1	1	1	1	1	1		1																
SX	SX_L-19-14	Devon	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5
SX	SX_L-19-15	Douglas Creek	1	1	1		1	1																		
SX	SX_L-19-16	Elizabeth	1	1																						
SX	SX_L-19-17	Elsie/Hoy	1		1	1	1	1																		
SX	SX_L-19-18	End Hill Creek	1	1	1	1	1	1																		
SX	SX_L-19-19	Evinrude Inlet	1	1	1	1	1	1																		
SX	SX_L-19-20	Freeda/Brodie	1	1	1		1	1	1	1	1	1	1		1	1	1	1	1.00	1.00		1.00	1.00	1.00	1.00	0
SX	SX_L-19-21	Hartley Bay	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5
SX	SX_L-19-22	Hevenor Inlet	1		1	1	1	1																		
SX	SX_L-19-23	Higgins Lagoon	1	1	1	1	1																			
SX	SX_L-19-24	Kadjusdis River	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0
SX	SX_L-19-25	Kdelmashan Creek	1	1	1	1	1																			
SX	SX_L-19-26	Keecha	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5
SX	SX_L-19-27	Kent Inlet Lagoon Creek	1				1		1	1																
SX	SX_L-19-28	Kenzuwash Creeks	1		1	1		1																		
SX	SX_L-19-29	Keswar Creek	1	1	1	1	1	1																		
SX	SX_L-19-30	Kildidt Creek	1	1		1	1																			
SX	SX_L-19-31	Kildidt Lagoon Creek	1			1	1																			
SX	SX_L-19-32	Kisameet	1	1	1	1	1	1	1	1																
SX	SX_L-19-33	Koeye	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5
SX	SX_L-19-34	Kooryet	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0
SX	SX_L-19-35	Kunsoot River	1				1	1																		
SX	SX_L-19-36	Kwakwa Creek	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5
SX	SX_L-19-37	Lewis Creek	1	1	1	1		1																		
SX	SX_L-19-38	Limestone Creek	1		1	1	1	1																		
SX	SX_L-19-39	Lowe/Simpson/Weare	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0
SX	SX_L-19-40	Mary Cove Creek	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0
SX	SX_L-19-41	Mcdonald Creek	1	1	1	1	1																			
SX	SX_L-19-42	Mcloughlin	1	1	1	1	1	1																		
SX	SX_L-19-43	Mikado	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0
SX	SX_L-19-44	Monckton Inlet Creek	1	1	1		1	1																		
SX	SX_L-19-45	Namu	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5
SX	SX_L-19-46	Port John	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5
SX	SX_L-19-47	Powles Creek	1	1	1		1	1																		
SX	SX_L-19-48	Price Creek	1	1	1	1	1	1	1																	
SX	SX_L-19-49	Prudhomme	2	1	1	1	2	2	2	2	2	1	1	1	2	2	2	2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5
SX	SX_L-19-50	Roderick	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5
SX	SX_L-19-51	Ryan Creek	1		1	1	1	1																		
SX	SX_L-19-52	Salter	1	1	1	1																				
SX	SX_L-19-53	Scoular/Kilpatrick	1	1	1	1	1	1																		
SX	SX_L-19-54	Shawatlan	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5
SX	SX_L-19-55	Sheneeza Inlet	1	1	1	1	1	1																		
SX	SX_L-19-56	Ship Point Creek	1	1	1	1	1																			

Species	CU Code	CU Name	TotalNoStreams	Streams1950s	Streams1960s	Streams1970s	Streams1980s	Streams1990s	Streams2000s	Streams2010s	Indicators	Indicators1950s	Indicators1960s	Indicators1970s	Indicators1980s	Indicators1990s	Indicators2000s	Indicators2010s	Ind_Proportion1950s	Ind_Proportion1960s	Ind_Proportion1970s	Ind_Proportion1980s	Ind_Proportion1990s	Ind_Proportion2000s	Ind_Proportion2010s	AvgPeriod Code
SX	SX_L-19-57	Spencer Creek	1	1	1	1		1	1																	
SX	SX_L-19-58	Stannard Creek	1	1	1		1	1																		
SX	SX_L-19-59	Talamoosa Creek	1	1	1	1	1	1																		
SX	SX_L-19-60	Tankeeah River	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5
SX	SX_L-19-61	Treneman Creek	1			1	1																			
SX	SX_L-19-62	Tsimtack Lakes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5
SX	SX_L-19-63	Tuno Creek East	1	1	1	1	1	1																		
SX	SX_L-19-64	Tuno Creek West	1	1	1	1	1																			
SX	SX_L-19-65	Tyler Creek	1				1	1																		
SX	SX_L-19-66	Wale Creek	1	1	1	1	1																			
SX	SX_L-19-67	Watt Bay	1																							
SX	SX_L-19-68	West Creek	1	1	1	1	1																			
SX	SX_L-19-69	Yaaklele Lagoon	1	1	1	1																				
SX	SX_L-19-70	Yeo	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0
SX	SX_L-20-01	Alastair	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	0.96	0.97	1.00	1.00	1.00	1.00	1.00	5
SX	SX_L-20-04	Ecstall/Lower	1			1	1	1	1																	
SX	SX_L-20-05	Johnston	2	1	1	1	2	2	1		1	1	1	1	1	1	1		1.00	1.00	1.00	1.00	0.99	1.00		0
SX	SX_L-20-06	Kitsumkalum	7	5	7	6	6	3	2	2	2	2	2	2	2	1	2	2	0.40	0.19	0.37	0.32	0.94	1.00	1.00	5
SX	SX_L-20-07	Lakelse	10	2	5	5	7	6	5	6	3	2	3	3	3	3	3	3	1.00	0.99	0.98	0.93	0.98	0.99	0.99	5
SX	SX_L-20-08	Mcdonell	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5
SX	SX_L-21-02	Babine Complex	33	23	23	24	23	28	21	22	9	9	9	9	9	9	9	9	0.38	0.37	0.31	0.17	0.22	0.23	0.22	5
SX	SX_L-21-03	Bulkley	1		1	1																				
SX	SX_L-21-05	Kitwancool	1		1	1	1	1	1	1	1		1	1	1	1	1	1		1.00	1.00	1.00	1.00	1.00	1.00	5
SX	SX_L-21-07	Morice	4	1	4	4	2	1	2	1	1	1	1	1	1	1	1	1	1.00	0.84	0.94	0.98	1.00	0.99	1.00	5
SX	SX_L-21-08	Babine Complex	1			1	1	1																		
SX	SX_L-21-09	Stephens	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1.00	0.87	0.87	0.96	0.99	1.00	1.00	5
SX	SX_L-21-10	Stephens	6	1	1	1	1	3	5	4	3	1	1	1	1	1	3	3	1.00	1.00	1.00	1.00	0.66	0.92	0.99	5
SX	SX_L-21-11	Tahlo/Morrison	2	2	2	2	2	2	1	2	1	1	1	1	1	1	1	1	0.93	0.96	0.96	1.00	1.00	1.00	0.92	5
SX	SX_L-22-01	Asitika	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0
SX	SX_L-22-02	Azuklotz	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5
SX	SX_L-22-03	Bear	3	3	3	3	2	2	2	1	2	2	2	2	2	1	2	1	0.99	0.50	0.52	1.00	0.80	1.00	1.00	5
SX	SX_L-22-04	Damshilgwit	1						1	1	1						1	1						1.00	1.00	0
SX	SX_L-22-05	Johanson	1	1	1	1	1	1																		
SX	SX_L-22-06	Kluatantan	1			1																				
SX	SX_L-22-07	Kluayaz	1			1																				
SX	SX_L-22-08	Motase	1			1	1	1	1	1	1			1	1	1	1	1			1.00	1.00	1.00	1.00	1.00	5
SX	SX_L-22-09	Sicintine	1		1																					
SX	SX_L-22-10	Slamgeesh	2		1	1	1		1																	
SX	SX_L-22-11	Spawning	1		1																					
SX	SX_L-22-12	Sustut	1	1	1	1	1	1		1																
SX	SX_L-23-01	Clements	1	1	1	1	1																			
SX	SX_L-23-02	Split Mountain/Leverson	1	1	1	1	1																			
SX	SX_L-24-01	Bowser	1		1	1	1	1																		
SX	SX_L-24-02	Damdochax/Wiminasik	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0
SX	SX_L-24-03	Fred Wright	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0
SX	SX_L-24-05	Meziadin	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5
SX	SX_L-24-06	Oweegee	1			1	1																			
SX	SX_R12	Rivers-Smith Inlets	8			3	7	2																		
SX	SX_R13	East Haida Gwaii	13	1	2	2	10	4	3	1																
SX	SX_R14	West Haida Gwaii	23			2	5	19	4																	
SX	SX_R15	North Haida Gwaii	2	1	2	1	1			1																
SX	SX_R16	Northern Coastal Fjords	74	5	12	14	42	52	34	32	4	1	1	1	4	4	4	3	0.99	0.99	0.97	0.89	0.93	0.91	0.30	5
SX	SX_R17	Northern Coastal Streams	34	12	12	7	17	15	4	4																
SX	SX_R18	Skeena River	13	2	6	2	7	6																		
SX	SX_R19	Skeena River-high interior	1						1	1	1						1	1						1.00	1.00	0
SX	SX_R20	Lower Nass-Portland	15	5	6	9	10	3	3	6	1	1	1	1	1	1	1	1	0.73	0.69	0.84	0.88	0.94	1.00	0.96	5
SX	SX_R21	Upper Nass River	3			1	2	2	1	1	1			1	1		1	1			1.00	0.94		1.00	1.00	0

Table A-3. Summary of the average factors used to expand the observed escapement to indicator streams to estimate the total escapement for each species by Statistical Area.

Species	Stat. Area	Factor 1	Factor 2	Factor 3
Chum Salmon				
	01	2.53	1.05	1.50
	02E	1.08	1.31	1.50
	02W	1.23	1.25	1.50
	03	1.09	1.19	1.50
	04	4.11	1.48	1.30
	05	1.37	2.03	1.50
	06	1.06	1.38	1.50
	07	1.10	1.10	1.50
	08	1.34	1.14	1.50
	09	1.18	1.72	1.50
	10	1.44	1.30	1.50
Chinook Salmon				
	03	1.00	1.11	1.00
	04	1.00	1.00	1.00
	06	1.47	4.01	1.00
	08	1.00	1.04	1.03
	10	1.03	1.00	1.50
	9S	1.83	1.44	1.50
	9W	1.00	1.00	1.98
Coho Salmon				
	02E	1.15	2.21	3.00
	02W	1.77	20.71	5.00
	03	2.57	4.03	3.00
	04	1.38	1.94	3.00
	05	5.65	1.35	3.00
	06	1.41	3.16	3.00
	07	1.51	2.41	3.00
	08	1.78	1.12	1.50
	09	1.33	7.78	3.00
	10	1.88	1.36	3.00
Pink Salmon (even)				
	01	1.02	1.07	1.50
	02E	7.23	1.06	1.50
	02W	1.30	1.14	1.50
	03	1.36	1.25	1.50
	04	1.20	1.33	1.50
	05	1.08	1.60	1.50
	06	1.02	1.27	1.50

Species	Stat. Area	Factor 1	Factor 2	Factor 3
	07	1.03	1.20	1.50
	08	3.56	1.14	1.50
	09	1.38	1.11	1.50
	10	1.00	1.04	1.50
Pink Salmon (odd)				
	02E	3.55	1.30	1.50
	03	1.18	1.31	1.50
	04	1.04	1.76	1.50
	05	1.09	1.65	1.50
	06	1.05	1.23	1.50
	07	1.03	1.15	1.50
	08	1.29	1.03	1.50
	09	1.72	1.73	1.50
	10	1.00	1.04	1.50
Sockeye Salmon				
	01	1.13	1.13	2.00
	02E	1.15	1.01	2.00
	02W	1.00	1.23	2.00
	03	1.00	1.00	1.00
	04	1.00	1.00	1.00
	05	1.77	1.31	2.00
	06	1.16	1.47	2.00
	07	1.51	1.32	2.00
	08	1.24	1.42	2.00
	09	1.08	2.27	2.00
	10	1.00	1.00	1.00

Table A-4. Summary of the average factors used to expand the observed escapement to indicator streams to estimate the total escapement for each salmon Conservation Unit (CU). Highlighted cells are unusually large expansion factors.

Species	CU No.	CU Name	Factor 1	Factor 2	Factor 3
Chum Salmon					
	CM_12	Smith Inlet	1.20	1.21	1.50
	CM_13	Rivers Inlet	1.22	1.32	1.50
	CM_15	Spiller-Fitz Hugh-Burke	1.17	1.16	1.50
	CM_16	Bella Coola-Dean Rivers	1.46	1.17	1.50
	CM_17	Bella Coola River_late	1.48	1.00	1.50
	CM_18	Hecate Lowlands	1.20	1.53	1.50
	CM_19	Mussel-Kynoch	1.02	1.00	1.50
	CM_20	Douglas-Gardner	1.02	2.25	1.50
	CM_21	East HG	1.03	1.34	1.50
	CM_22	Skidegate	1.08	1.19	1.50
	CM_23	West Haida Gwaii	1.26	1.26	1.50
	CM_24	North Haida Gwaii	1.30	1.05	1.50
	CM_25	North Haida Gwaii-Stanley Creek	1.00	1.00	1.50
	CM_26	Skeena Estuary	5.04	3.31	1.50
	CM_27	Lower Skeena	10.41	1.42	1.50
	CM_28	Middle Skeena	7.99	1.78	1.38
	CM_30	Portland Inlet	2.26	1.05	1.50
	CM_31	Lower Nass	1.00	180.67	1.50
	CM_32	Portland Canal-Observatory	1.11	1.05	1.50
Chinook Salmon					
	CN_36	Docee	1.03	1.00	1.50
	CN_37	Rivers Inlet	1.83	1.44	1.50
	CN_38	Wannock	1.00	1.00	1.98
	CN_39	Bella Coola-Bentinck	1.00	1.00	1.00
	CN_40	Dean River	1.00	1.00	1.00
	CN_41	North and Central Coast-late timing	1.00	11.44	1.50
	CN_42	North and Central Coast-early timing	1.47	4.01	1.00
	CN_43	Haida Gwaii-North	1.00	1.03	1.50
	CN_46	Ecstall	1.00	6.72	1.30
	CN_48	Lower Skeena	1.39	3.64	1.30
	CN_49	Kalum_early timing	1.00	1.17	1.30
	CN_50	Kalum_late timing	1.00	1.06	1.00
	CN_53	Middle Skeena-large lakes	1.45	1.00	1.30
	CN_54	Middle Skeena-mainstem tributaries	10.16	1.33	1.30
	CN_55	Upper Bulkley River	1.00	1.14	1.30
	CN_57	Portland Sound-Observatory Inlet-Lower Nass	1.00	1.95	1.00
	CN_58	Upper Nass	1.00	1.00	1.00
Coho Salmon					
	CO_20	Smith Inlet	1.88	1.11	2.03

Species	CU No.	CU Name	Factor 1	Factor 2	Factor 3
	CO_21	Rivers Inlet	1.33	7.45	3.00
	CO_22	Bella Coola-Dean Rivers	3.09	1.09	1.15
	CO_23	Haida Gwaii-East	1.09	2.77	3.00
	CO_24	Haida Gwaii-West	1.77	20.91	5.00
	CO_25	Haida Gwaii-Graham Island Lowlands	1.00	7.10	2.00
	CO_26	Mussel-Kynoch	1.13	1.51	3.00
	CO_27	Hecate Strait Mainland	2.48	1.93	3.00
	CO_28	Northern Coastal Streams	1.25	1.00	3.00
	CO_29	Douglas Channel-Kitimat Arm	1.38	33.80	3.00
	CO_30	Northern Coastal Streams	1.39	2.26	3.00
	CO_31	Skeena Estuary	1.92	2.93	3.00
	CO_32	Lower Skeena	1.55	1.56	3.00
	CO_33	Middle Skeena	1.64	2.36	3.00
	CO_33a	Babine	1.00	1.00	1.00
	CO_34	Upper Skeena	2.93	1.12	3.00
	CO_35	Lower Nass	1.89	6.10	3.00
	CO_36	Upper Nass	1.04	3.22	1.00
	CO_37	Portland Sound-Observatory Inlet-Portland Canal	1.14	3.52	3.00
Pink Salmon (even)					
	PKe_10	East Haida Gwaii	7.23	1.06	1.50
	PKe_11	West Haida Gwaii	1.30	1.14	1.50
	PKe_5	Hecate Lowlands	1.13	1.39	1.50
	PKe_6	Hecate Strait-Fjords	1.12	1.22	1.50
	PKe_7	Nass-Skeena Estuary	1.23	1.29	1.50
	PKe_8	Middle-Upper Skeena	1.15	1.41	1.50
	PKe_9	North Haida Gwaii	1.02	1.07	1.50
Pink Salmon (odd)					
	PKo_12	Hecate Strait-Lowlands	1.06	1.62	1.50
	PKo_13	Hecate Strait-Fjords	1.04	1.16	1.50
	PKo_14	Nass-Skeena Estuary	1.44	2.05	1.50
	PKo_15	Lower Skeena	1.02	1.64	1.50
	PKo_16	Middle and Upper Skeena	1.05	1.90	1.50
	PKo_17	Nass-Portland-Observatory	1.17	1.31	1.50
	PKo_8	Homathko-Klinaklini-Smith-Rivers-Bella Coola-Dean	1.02	1.02	1.50
	PKo_9	East Haida Gwaii	3.55	1.34	1.50
Sockeye Salmon					
	SX_L-15-01	Long	1.00	1.00	1.00
	SX_L-15-02	Owikeno	1.08	1.68	2.00
	SX_L-17-02	Awun	1.00	1.00	2.00
	SX_L-17-05	Marian/Eden	1.00	1.00	2.00
	SX_L-17-06	Mathers	1.00	1.00	1.75
	SX_L-17-07	Mercer	1.00	1.00	2.00
	SX_L-17-08	Skidegate	1.00	1.00	1.73

Species	CU No.	CU Name	Factor 1	Factor 2	Factor 3
	SX_L-17-09	Yakoun	1.00	1.00	2.00
	SX_L-18-01	Backland	1.00	1.00	2.00
	SX_L-18-02	Canoona	1.00	1.00	2.00
	SX_L-18-04	Evelyn	1.00	1.00	2.00
	SX_L-18-05	Kainet Creek	1.00	1.00	2.00
	SX_L-18-08	Kitlope	1.00	1.00	2.00
	SX_L-19-02	Bloomfield	1.00	1.00	2.00
	SX_L-19-11	Curtis Inlet	1.00	1.00	2.00
	SX_L-19-14	Devon	1.00	1.00	2.00
	SX_L-19-20	Freeda/Brodie	1.00	1.00	2.00
	SX_L-19-21	Hartley Bay	1.00	1.00	2.00
	SX_L-19-24	Kadjusdis River	1.00	1.00	2.00
	SX_L-19-26	Keecha	1.00	1.00	2.00
	SX_L-19-33	Koeye	1.00	1.00	2.00
	SX_L-19-34	Kooryet	1.00	1.00	2.00
	SX_L-19-36	Kwakwa Creek	1.00	1.00	2.00
	SX_L-19-39	Lowe/Simpson/Weare	1.00	1.00	2.00
	SX_L-19-40	Mary Cove Creek	1.00	1.00	2.00
	SX_L-19-43	Mikado	1.00	1.00	2.00
	SX_L-19-45	Namu	1.00	1.00	2.00
	SX_L-19-46	Port John	1.00	1.00	2.00
	SX_L-19-49	Prudhomme	1.40	1.00	2.00
	SX_L-19-50	Roderick	1.00	1.00	2.00
	SX_L-19-54	Shawatlan	1.00	1.00	2.00
	SX_L-19-60	Tankeeah River	1.00	1.00	2.00
	SX_L-19-62	Tsimtack Lakes	1.00	1.00	2.00
	SX_L-19-70	Yeo	1.00	1.00	2.00
	SX_L-20-01	Alastair	1.02	1.12	2.00
	SX_L-20-05	Johnston	1.00	1.00	2.00
	SX_L-20-06	Kitsumkalum	1.05	2.08	2.00
	SX_L-20-07	Lakelse	1.30	1.09	2.00
	SX_L-20-08	Mcdonell	1.00	1.00	2.00
	SX_L-21-02-EW	Babine-Early-Wild	1.00	1.00	1.00
	SX_L-21-02-F	Babine-Fulton	1.00	1.00	1.00
	SX_L-21-02-LW	Babine-Late-Wild	1.00	1.00	1.00
	SX_L-21-02-MW	Babine-Mid-Wild	1.00	1.00	1.00
	SX_L-21-02-P	Babine-Pinkut	1.00	1.00	1.00
	SX_L-21-05	Kitwancool	1.00	1.00	1.41
	SX_L-21-07	Morice	1.00	1.20	1.37
	SX_L-21-09	Stephens	1.00	1.12	2.00
	SX_L-21-10	Stephens	2.29	2.30	2.00
	SX_L-21-11	Tahlo/Morrison	1.00	1.15	2.00
	SX_L-22-01	Asitika	1.00	1.00	2.00
	SX_L-22-02	Azuklotz	1.00	1.00	2.00
	SX_L-22-03	Bear	1.86	1.42	2.00
	SX_L-22-04	Damshilgwit	1.00	1.00	1.00

Species	CU No.	CU Name	Factor 1	Factor 2	Factor 3
	SX_L-22-08	Motase	1.00	1.00	2.00
	SX_L-24-02	Damdochax/Wiminasik	1.00	1.00	1.00
	SX_L-24-03	Fred Wright	1.00	1.00	1.00
	SX_L-24-05	Meziadin	1.00	1.00	1.00
	SX_R16	Northern Coastal Fjords	38.68	1.15	2.00
	SX_R19	Skeena River-high interior	1.00	1.00	1.00
	SX_R20	Lower Nass-Portland	1.00	1.40	2.00
	SX_R21	Upper Nass River	1.00	1.07	1.00

APPENDIX B: Northern Boundary Sockeye run reconstruction model run timing parameters for Nass and Skeena Sockeye Conservation Units.

This appendix provides a brief description of the run timing parameters and modifications made to the Northern Boundary Sockeye Run Reconstruction (NBSRR) model and Skeena Sockeye In-River (SSIR) Model to derive Canadian and Total exploitation rate (ER) estimates for each Sockeye run timing group and CU within the Nass and Skeena watersheds.

The NBSRR was recently modified to incorporate the DNA estimates of the contribution of Central Coast Sockeye stocks to the Northern Boundary fisheries from 2002-2017. This is the primary reason for the small but notable reductions in the Canadian catch and exploitation rates for Nass and Skeena stocks compared to those reported previously (English et al. 2016).

The available data and methods needed to derive ERs for Nass and Skeena Sockeye CUs were examined by Steve Cox-Rogers, Karl English, Bill Gazey, and Richard Alexander on 5 October 2011 during a one-day workshop and updated in 2018. In the absence of detailed historic stock composition data for each fishery that harvests Nass and Skeena Sockeye, we used existing information on run timing and geographic distribution of CUs within the Nass and Skeena watersheds to define the stock groups to be included in the model. While we could have defined separate sub-stocks for each CU, there was little point in deriving separate ER estimates for CUs that had similar timing and were exposed to all the same fisheries. For two of the major CUs (Meziadin and Babine), there was sufficient differences in run timing within these CUs to warrant the disaggregation of these CUs. These initial discussions resulted in the definition of 10 sub-stocks for Nass Sockeye (Table B1) and 20 sub-stocks for Skeena Sockeye (Table B2).

Test fisheries on the lower portions of the Nass and Skeena watersheds have documented substantial year to year variability in the run timing for the total Sockeye returns to these watersheds. Daily escapement estimates for Nass and Skeena Sockeye from test fishery data have been used in the NBSRR model to derive estimates of harvest and ER for major northern boundary Sockeye stocks from 1982-2017. In order to retain information on the annual variability in run timing for the aggregate Nass and Skeena stocks, the timing for each sub-stock was defined using a number of days "offset" relative to the 50% point for the aggregate stocks. For example: an offset of -14 days for Gingit Sockeye indicates a run timing two weeks earlier than that for the aggregate for all Nass Sockeye stocks and an offset of 14 days for Damdochax and Kwinageese Sockeye indicates that these stocks are typically two weeks later than the Nass aggregate (Table B1). The average CU timing offset from the mean run timing for the Nass Sockeye aggregate was estimated using DNA stock composition data reported in Hall et al. (2011). The average CU timing offset from the mean run timing for the Skeena Sockeye aggregate was derived from Cox-Rogers (2012). The timing distribution for each CU is defined by a normal curve with its peak defined by the offset parameter and duration determined by the standard deviation (SD) parameter (e.g., a duration of 9 weeks = 63d = a SD of 10.5d). The duration of runs for Nass Sockeye varied between 63 and 105 days for the different sub-stocks based on fairly consistent run timing patterns from recent DNA data. The duration of runs for Skeena Sockeye varied between 47 and 94 days for the different sub-stocks based on run timing patterns from recent DNA data reported in Cox-Rogers (2012) (Table B2).

For Nass Sockeye, the run timing offset and duration parameters were held constant for all years. While the available DNA data does suggest that there can been substantial difference in the relative timing and run duration for major stock components of Nass Sockeye, these data are

only available for a few recent years in the 1982-2014 time-series. Appendix Figure B1 provides an example of the shape of the 2005 aggregate run based on the average timing and duration parameters for Nass Sockeye and Appendix Figure B2 shows the 2005 using parameters derived from the 2005 DNA data.

For Skeena Sockeye, the run timing offset parameters were held constant for all years and the run duration parameters were constant for every year, except 2006 when the aggregate run timing was late and the duration of the Babine enhanced Sockeye notably longer than in other years. Appendix Figures B3-B5 provide examples of the Skeena run timing distributions for an example of a later than "normal" run timing (2006), "normal" run timing (2007) and earlier than "normal" run timing (2008), respectively.

Appendix Tables B3 and B4 provide the preliminary estimates of the total exploitation rates and Canadian exploitation rates for each Nass and Skeena Sockeye CU. These exploitation rates include all Nass and Skeena Sockeye harvested in marine and freshwater fisheries. The values in the "Total" column represent the exploitation rates for the all Nass Sockeye (Area3) and all Skeena Sockeye (Area 4), respectively. The aggregate values are the same as the 1982-2017 values in Table 8 for Area 3 and 4 Sockeye.

Table B-1. Relative abundance, run timing and duration parameters for ten Nass Sockeye sub-stocks.

Sub-stock Number	Sub-Stock Name	Timing Offset	Timing SD	Average % of Escapement
1	Damdochax	14	14	1.5%
2	Kwinagees	14	10.5	3.4%
3	Oweegee	14	14	0.1%
4	Bowser	14	14	8.3%
5	Hanna-Tin	-7	17.5	56.9%
6	MezBeach	21	14	25.4%
7	BrownBear	21	17.5	2.1%
8	Cranberry	21	17.5	0.7%
9	Gingit+	-14	10.5	1.2%
10	Zolzap	0	17.5	0.3%

Table B-2. Relative abundance, run timing and duration parameters for twenty Skeena Sockeye sub-stocks.

#	Stocks (Geographic CUs)	Short Name	CUs in Group	Offset (days)	Duration (days)	Default SD (days)	2006 SD (days)	Avg Escapement	Avg %
1	Kluatantan/Kluayaz	Kluatan+	2	-10.5	84	14.0	14.0	1,000	0.1%
2	Motase	Motase	1	3.5	74	12.3	12.3	442	0.0%
3	Sustut/Johanson/Spawning	Sustut+	3	-3.5	67	11.2	11.2	3,362	0.3%
4	Bear/Azuklotz/Asitka	Bear+	3	-3.5	67	11.2	11.2	5,301	0.4%
5	Slamgeesh/Damshilgwit	Slamgeesh	2	-3.5	67	11.2	11.2	1,000	0.1%
6	Sicintine	Sicintine	1	-3.5	67	11.2	11.2	1,000	0.1%
7	Babine W Early	Babine-WE	1	-10.5	67	11.2	11.2	50,658	4.0%
8	Babine W Middle	Babine-WM	1	-3.5	67	11.2	11.2	22,134	1.8%
9	Babine W Late	Babine-WL	1	10.5	67	11.2	11.2	214,920	17.1%
10	Babine Pinkut	Babine-P	1	-3.5	67	11.2	14.0	291,396	23.1%
11	Babine Fulton	Babine-F	1	3.5	67	11.2	14.0	578,934	45.9%
12	Swan/Stephans/Club	Swan+	3	-10.5	60	10.1	10.1	19,305	1.5%
13	Bulkley/Maxan	Bulkley+	2	-10.5	84	14.0	14.0	1,000	0.1%
14	Morice/Atna	Morice+	2	-10.5	84	14.0	14.0	14,781	1.2%
15	Kitwanga	Kitwanga	1	3.5	94	15.7	15.7	2,213	0.2%
16	Zymoetz [1]	Zymoetz	3	-17.5	47	7.8	7.8	6,275	0.5%
17	Kalum	Kalum	1	-3.5	84	14.0	14.0	14,293	1.1%
18	Lakelse	Lakelse	1	-21.0	64	10.6	10.6	11,688	0.9%
19	Alastair	Alastair	1	-14.0	87	14.6	14.6	16,345	1.3%
20	Johnston	Johnston	1	-21.0	64	10.6	10.6	4,373	0.3%

[1] Zymoetz includes three sockeye lake CUs in the Zymoetz watershed (Mcdonell, Aldrich and Dennis)

Table B-3. Canadian and total exploitation rate estimates (%) for each Nass Sockeye CU, 1982-2017.

	Nass Sockeye - Canadian Stock Exploitation Rate by CU										
	Damdochax	Kwinagees	Oweegee	Bowser	Hanna-Tin	MezBeach	BrownBear	Cranberry	Gingit+	Zolzap	**Total**
1982	44.9	46.4	44.9	44.9	45.2	43.6	39.4	39.4	47.4	44.7	**44.8**
1983	47.9	53.6	47.9	47.9	31.6	45.2	39.1	39.1	12.3	38.0	**38.7**
1984	40.2	42.1	40.2	40.2	32.6	40.3	38.1	38.1	29.2	35.2	**36.6**
1985	37.3	40.1	37.3	37.3	23.4	38.0	32.6	32.6	14.8	27.7	**30.0**
1986	26.3	29.4	26.3	26.3	23.1	23.9	22.1	22.1	19.1	24.4	**25.0**
1987	42.3	43.7	42.3	42.3	26.7	45.8	43.4	43.4	16.7	31.8	**36.0**
1988	30.3	32.8	30.3	30.3	22.4	30.5	27.6	27.6	16.9	24.7	**25.8**
1989	42.0	45.5	42.0	42.0	34.8	39.6	36.0	36.0	28.2	37.5	**40.1**
1990	26.1	26.2	26.1	26.1	20.0	28.9	27.9	27.9	18.3	21.5	**23.7**
1991	49.2	53.1	49.2	49.2	39.8	47.6	44.6	44.6	30.2	43.3	**43.6**
1992	51.4	53.4	51.4	51.4	42.2	50.4	47.7	47.7	32.4	45.7	**45.9**
1993	54.4	57.3	54.4	54.4	44.9	52.7	51.4	51.4	33.4	49.0	**48.7**
1994	32.8	32.4	32.8	32.8	34.3	31.4	31.6	31.6	35.0	34.4	**33.4**
1995	54.5	59.3	54.5	54.5	50.2	48.5	45.3	45.3	42.0	52.9	**50.5**
1996	46.3	49.6	46.3	46.3	46.7	41.2	40.0	40.0	42.0	47.6	**45.1**
1997	30.4	29.3	30.4	30.4	35.2	27.6	29.8	29.8	36.7	34.5	**32.5**
1998	18.3	18.8	18.3	18.3	32.1	13.2	13.4	13.4	40.0	28.1	**25.3**
1999	50.3	52.4	50.3	50.3	53.5	46.0	42.7	42.7	55.1	52.6	**51.5**
2000	54.4	54.8	54.4	54.4	54.4	51.3	50.2	50.2	52.7	55.0	**53.5**
2001	32.8	33.2	32.8	32.8	38.6	31.5	31.0	31.0	43.9	36.2	**36.2**
2002	63.1	63.7	63.1	63.1	62.5	59.7	58.9	58.9	59.8	63.2	**62.2**
2003	56.9	56.7	56.9	56.9	70.2	47.3	48.0	48.0	74.0	67.8	**64.8**
2004	37.7	39.4	37.7	37.7	55.8	27.5	28.4	28.4	59.5	51.6	**47.6**
2005	34.6	34.2	34.6	34.6	49.6	29.5	30.9	30.9	54.2	45.9	**44.6**
2006	38.4	35.3	38.4	38.4	55.1	34.0	36.5	36.5	60.5	51.3	**49.1**
2007	23.4	28.5	23.4	23.4	41.6	14.9	12.8	12.8	47.7	35.9	**30.8**
2008	32.1	33.8	32.1	32.1	30.1	29.9	27.9	27.9	28.5	31.0	**30.5**
2009	24.7	24.9	24.7	24.7	35.3	19.2	19.6	19.6	38.5	32.6	**31.1**
2010	28.6	27.1	28.6	28.6	40.2	24.9	26.3	26.3	46.6	37.3	**37.1**
2011	31.0	32.9	31.0	31.0	33.5	28.6	28.1	28.1	35.7	32.7	**32.6**
2012	42.3	41.8	42.3	42.3	46.3	39.4	40.1	40.1	47.4	45.6	**44.8**
2013	39.6	38.9	39.6	39.6	47.4	34.7	35.1	35.1	49.9	45.8	**44.7**
2014	30.0	29.7	30.0	30.0	44.9	26.5	26.6	26.6	53.3	40.7	**40.7**
2015	37.7	41.1	37.7	37.7	44.4	32.1	30.9	30.9	46.0	42.8	**41.8**
2016	15.6	14.9	15.6	15.6	22.0	14.9	15.6	15.6	24.2	19.7	**19.4**
2017	22.1	21.9	22.1	22.1	33.3	21.2	21.7	21.7	32.0	28.6	**29.4**

Table B-3 (cont'd).

	Nass Sockeye - Total Stock Exploitation Rate by CU										
	Damdochax	Kwinagees	Oweegee	Bowser	Hanna-Tin	MezBeach	BrownBear	Cranberry	Gingit+	Zolzap	**Total**
1982	66.6	67.6	66.6	66.6	58.2	68.5	68.0	68.0	55.1	60.8	**62.0**
1983	77.0	77.2	77.0	77.0	50.0	83.1	82.5	82.5	25.6	60.6	**66.0**
1984	71.9	70.6	71.9	71.9	49.3	79.1	78.2	78.2	38.7	57.0	**62.8**
1985	61.4	61.7	61.4	61.4	39.7	69.3	68.6	68.6	29.1	46.5	**51.6**
1986	75.7	75.1	75.7	75.7	51.1	82.8	81.8	81.8	34.8	59.5	**67.6**
1987	72.7	73.2	72.7	72.7	47.6	79.3	76.3	76.3	31.3	56.0	**62.7**
1988	69.9	71.3	69.9	69.9	52.8	74.6	72.5	72.5	41.4	58.3	**61.2**
1989	83.5	84.3	83.5	83.5	61.7	88.6	87.0	87.0	49.6	69.4	**78.3**
1990	70.8	71.7	70.8	70.8	49.4	76.5	73.3	73.3	36.9	56.1	**61.4**
1991	77.1	77.3	77.1	77.1	56.7	82.6	80.6	80.6	41.0	63.8	**67.8**
1992	74.8	73.9	74.8	74.8	55.9	80.0	78.5	78.5	41.6	62.3	**65.7**
1993	81.8	83.3	81.8	81.8	68.5	83.5	81.9	81.9	59.4	73.5	**75.0**
1994	68.1	68.8	68.1	68.1	59.6	68.2	67.3	67.3	54.6	63.2	**63.0**
1995	85.0	87.0	85.0	85.0	70.2	84.6	82.5	82.5	58.4	76.6	**77.4**
1996	84.5	83.9	84.5	84.5	72.8	87.0	86.2	86.2	63.8	77.5	**79.3**
1997	79.1	81.5	79.1	79.1	71.4	76.7	75.2	75.2	65.7	74.6	**74.8**
1998	64.9	59.7	64.9	64.9	57.8	72.5	73.2	73.2	60.9	60.0	**62.6**
1999	77.8	77.3	77.8	77.8	72.7	80.4	80.0	80.0	71.2	74.1	**75.0**
2000	72.5	73.4	72.5	72.5	64.4	71.9	69.8	69.8	59.0	67.3	**67.3**
2001	73.8	73.6	73.8	73.8	68.0	77.8	76.8	76.8	69.2	69.4	**71.4**
2002	72.8	72.9	72.8	72.8	70.9	70.2	69.8	69.8	67.1	72.1	**71.1**
2003	73.8	70.8	73.8	73.8	79.4	72.7	74.7	74.7	82.9	78.8	**77.5**
2004	77.4	74.8	77.4	77.4	77.9	79.4	80.4	80.4	79.3	78.0	**78.1**
2005	63.0	62.9	63.0	63.0	67.8	61.5	61.3	61.3	71.4	66.7	**66.3**
2006	64.0	63.6	64.0	64.0	69.2	61.6	62.1	62.1	72.2	68.4	**67.2**
2007	76.6	70.7	76.6	76.6	65.1	84.1	85.6	85.6	64.1	68.5	**72.6**
2008	47.5	47.3	47.5	47.5	38.8	51.0	50.9	50.9	35.2	41.5	**42.6**
2009	58.6	56.1	58.6	58.6	56.6	60.3	61.8	61.8	54.9	58.0	**57.4**
2010	42.3	39.6	42.3	42.3	49.1	41.9	43.2	43.2	54.4	47.7	**47.7**
2011	50.2	53.5	50.2	50.2	50.3	47.1	45.4	45.4	53.2	50.5	**50.2**
2012	53.3	51.3	53.3	53.3	58.7	51.3	53.1	53.1	61.2	57.8	**56.9**
2013	57.1	55.4	57.1	57.1	58.5	56.6	57.0	57.0	58.7	58.6	**58.1**
2014	46.9	45.6	46.9	46.9	54.5	45.8	46.5	46.5	61.4	52.9	**52.7**
2015	59.5	60.5	59.5	59.5	53.4	59.0	57.4	57.4	51.1	55.9	**55.2**
2016	39.7	41.4	39.7	39.7	35.9	39.8	38.0	38.0	35.0	36.7	**37.5**
2017	31.7	31.4	31.7	31.7	39.9	32.3	32.3	32.3	38.1	35.8	**37.1**

Table B-4. Canadian and total exploitation rate estimates (%) for each Skeena Sockeye CU, 1982-2017.

	Skeena Sockeye - Canadian Stock Exploitation Rate by CU																				
	Kluatan+	Motase	Sustut+	Bear+	Slamgeesh	Sicintine	Babine-WE	Babine-WM	Babine-WL	Babine-P	Babine-F	Swan+	Bulkley+	Morice+	Kitwanga	Zymoetz	Kalum	Lakelse	Alastair	Johnston	**Total**
1982	46.1	60.4	57.1	57.1	57.1	57.1	48.3	58.6	61.0	58.6	63.4	42.5	59.2	59.2	48.9	17.0	49.6	14.6	32.7	12.3	**60.0**
1983	31.7	34.3	33.6	33.6	33.6	33.6	32.7	35.2	33.7	35.2	36.7	23.8	48.4	48.4	25.8	5.9	24.4	5.4	13.4	3.4	**34.7**
1984	35.0	45.1	42.7	42.7	42.7	42.7	35.2	43.7	44.6	43.7	47.9	29.5	59.5	59.5	34.9	10.6	34.0	10.6	23.6	9.7	**45.1**
1985	38.8	48.2	49.3	49.3	49.3	49.3	43.0	49.6	44.8	49.6	50.4	42.1	53.8	53.8	40.0	31.3	41.8	19.5	28.6	18.7	**47.9**
1986	36.0	40.2	41.7	41.7	41.7	41.7	39.8	43.5	38.3	43.5	42.8	33.7	50.0	50.0	33.1	18.2	31.8	13.7	22.1	11.8	**41.1**
1987	24.7	37.2	31.5	31.5	31.5	31.5	25.8	32.5	42.2	32.5	38.4	22.0	42.7	42.7	32.0	10.1	26.7	7.6	15.4	6.1	**36.3**
1988	45.7	49.4	51.6	51.6	51.6	51.6	48.9	52.4	45.4	52.4	51.6	46.2	62.2	62.2	42.2	35.0	45.2	28.5	36.5	27.3	**50.0**
1989	37.6	39.2	40.8	40.8	40.8	40.8	40.8	42.0	37.5	42.0	40.9	35.6	40.6	40.6	32.5	24.1	33.0	18.0	24.5	16.0	**39.7**
1990	38.1	44.1	43.9	43.9	43.9	43.9	39.7	45.0	42.2	45.0	46.7	35.4	55.0	55.0	36.0	23.9	37.4	21.1	28.7	19.8	**44.4**
1991	40.1	46.4	48.9	48.9	48.9	48.9	43.2	49.7	41.5	49.7	49.7	40.4	49.0	49.0	35.9	26.5	41.1	19.8	30.7	19.2	**46.7**
1992	47.1	48.2	51.3	51.3	51.3	51.3	52.3	54.0	44.5	54.0	52.2	47.0	59.8	59.8	39.6	41.9	45.6	35.4	41.1	34.2	**50.3**
1993	43.9	46.7	51.2	51.2	51.2	51.2	55.0	57.5	43.0	57.5	53.4	48.1	54.3	54.3	37.9	39.3	45.2	31.2	37.8	29.5	**51.1**
1994	35.8	34.8	53.3	40.2	40.2	40.2	41.7	42.9	29.6	42.9	39.1	37.2	48.6	48.6	28.2	28.5	32.8	22.8	28.3	20.5	**37.6**
1995	47.2	53.2	57.0	57.0	57.0	57.0	52.5	59.6	47.0	59.6	59.5	49.1	62.2	62.2	40.3	32.5	47.9	27.0	37.3	25.4	**55.8**
1996	51.5	60.3	67.1	63.3	63.3	63.3	57.6	65.3	55.0	69.8	70.6	56.6	57.0	57.0	48.5	39.1	55.0	29.0	42.4	28.1	**65.9**
1997	53.0	49.8	61.2	57.2	57.2	57.2	59.7	60.7	41.8	66.4	56.8	56.9	64.5	64.5	43.6	47.9	48.7	41.0	45.3	39.4	**55.9**
1998	31.2	22.1	41.9	30.6	30.6	30.6	35.0	32.1	15.3	32.1	24.6	28.7	44.4	44.4	13.1	19.3	17.4	15.0	16.4	10.5	**24.2**
1999	19.3	11.8	29.2	13.5	13.5	13.5	20.9	17.4	12.9	17.4	15.2	10.7	17.7	17.7	7.1	6.2	6.0	13.7	12.5	11.7	**15.1**
2000	50.0	54.1	66.9	58.9	58.9	58.9	56.5	61.1	47.8	70.2	68.1	51.1	55.0	55.0	42.9	35.4	44.5	27.1	36.3	25.2	**64.1**
2001	27.8	41.7	46.0	40.4	40.4	40.4	42.2	51.0	44.3	59.2	70.1	29.2	34.7	34.7	31.6	15.7	33.0	11.3	20.4	10.4	**55.8**
2002	40.6	48.8	56.4	48.2	48.2	48.2	44.3	50.5	48.2	50.5	52.6	39.4	40.1	40.1	39.7	22.7	39.2	20.5	29.8	16.9	**49.6**
2003	24.4	28.3	50.2	30.1	30.1	30.1	28.8	32.2	26.1	32.2	31.3	24.2	23.8	23.8	20.8	13.5	22.7	10.9	15.9	8.7	**29.3**
2004	26.6	26.6	45.5	28.0	28.0	28.0	30.9	31.0	25.6	31.0	29.6	22.8	23.2	23.2	19.6	15.4	19.8	12.5	14.0	8.5	**28.0**
2005	22.7	12.8	50.9	16.1	16.1	16.1	26.2	20.6	12.9	20.6	16.2	11.7	13.8	13.8	7.4	7.3	6.5	7.1	5.8	2.5	**15.9**
2006	33.3	38.8	68.6	42.0	42.0	42.0	43.3	48.2	45.2	50.5	54.4	37.1	40.0	40.0	30.5	25.2	30.4	17.6	21.7	15.0	**50.1**
2007	19.9	26.3	36.8	27.5	27.5	27.5	25.3	31.8	25.1	31.8	33.0	19.8	19.6	19.6	17.2	8.2	20.7	7.1	13.0	5.2	**29.7**
2008	27.0	42.9	78.7	34.0	34.0	34.0	35.4	46.1	54.6	55.0	57.6	19.5	34.8	34.8	33.9	5.1	28.4	6.1	16.6	3.7	**54.3**
2009	13.0	10.8	66.4	12.1	12.1	12.1	23.4	20.2	14.5	20.2	17.6	10.1	18.7	18.7	7.4	7.0	6.7	6.7	5.3	2.5	**16.5**
2010	23.6	21.3	70.8	22.5	22.5	22.5	30.8	28.7	23.4	28.7	26.8	17.1	23.2	23.2	12.8	8.2	10.0	7.7	7.2	2.5	**24.4**
2011	22.5	28.3	42.8	25.5	25.5	25.5	28.1	30.8	33.0	30.8	53.1	18.8	19.9	19.9	23.7	8.5	19.0	7.6	11.5	4.3	**40.4**
2012	23.1	28.6	48.0	27.6	27.6	27.6	31.4	34.1	30.0	64.1	42.8	20.9	22.7	22.7	21.9	6.7	20.4	6.8	13.9	4.9	**42.0**
2013	12.2	7.9	37.5	9.2	9.2	9.2	14.1	10.9	7.7	10.9	9.2	7.2	13.9	13.9	4.5	3.2	3.0	2.8	2.4	1.0	**8.3**
2014	18.0	19.1	31.5	23.6	23.6	23.6	25.0	28.0	14.0	35.3	42.2	18.5	17.0	17.0	12.2	7.4	15.5	6.8	11.2	5.3	**36.6**
2015	10.2	7.6	38.9	8.7	8.7	8.7	14.3	12.0	8.8	12.6	32.4	7.6	12.3	12.3	5.5	4.7	4.2	4.2	3.2	1.7	**23.5**
2016	18.2	15.7	38.9	17.2	17.2	17.2	28.8	24.2	17.0	24.7	29.1	14.9	16.8	16.8	11.8	8.5	10.4	7.0	6.8	3.2	**23.7**
2017	3.0	4.2	25.0	4.2	4.2	4.2	4.5	5.2	4.5	6.3	5.3	1.8	2.2	2.2	1.8	0.2	1.2	0.3	0.5	0.2	**4.8**

Table B-4 (cont'd).

	Skeena Sockeye - Total Stock Exploitation Rate by CU																				
	Kluatan+	Motase	Sustut+	Bear+	Slamgeesh	Sicintine	Babine-WE	Babine-WM	Babine-WL	Babine-P	Babine-F	Swan+	Bulkley+	Morice+	Kitwanga	Zymoetz	Kalum	Lakelse	Alastair	Johnston	**Total**
1982	50.6	68.0	63.2	63.2	63.2	63.2	52.7	64.7	70.4	64.7	70.6	46.8	63.7	63.7	61.3	18.9	56.0	16.1	36.5	13.9	**67.2**
1983	38.8	52.3	43.2	43.2	43.2	43.2	38.6	44.9	60.7	44.9	52.2	29.6	55.5	55.5	53.2	8.6	37.3	7.3	18.8	5.3	**50.5**
1984	38.9	55.5	46.9	46.9	46.9	46.9	37.8	47.9	62.8	47.9	56.5	31.8	63.4	63.4	51.7	12.7	41.1	12.7	27.0	11.8	**54.0**
1985	42.5	58.8	54.4	54.4	54.4	54.4	45.9	54.8	61.4	54.8	60.0	44.8	57.4	57.4	54.1	33.0	48.6	20.9	31.4	20.1	**57.1**
1986	42.7	57.2	50.2	50.2	50.2	50.2	44.7	51.9	63.9	51.9	58.6	38.0	56.7	56.7	53.3	21.9	43.3	17.4	27.8	15.5	**56.1**
1987	26.8	41.8	34.2	34.2	34.2	34.2	27.6	35.2	49.0	35.2	42.8	23.7	44.8	44.8	37.0	11.6	30.0	8.7	17.1	7.2	**40.4**
1988	51.9	63.4	60.0	60.0	60.0	60.0	54.1	60.9	65.3	60.9	64.9	51.1	68.4	68.4	58.9	37.6	55.1	30.8	41.5	29.7	**62.5**
1989	44.2	55.3	49.7	49.7	49.7	49.7	46.3	51.0	61.1	51.0	55.7	40.8	47.1	47.1	53.6	27.4	44.2	20.5	29.7	18.6	**54.0**
1990	46.4	62.9	54.3	54.3	54.3	54.3	46.5	55.3	70.0	55.3	63.5	42.0	63.4	63.4	61.0	28.1	51.1	24.3	35.5	23.0	**61.3**
1991	45.7	65.3	56.4	56.4	56.4	56.4	46.4	57.1	71.2	57.1	66.3	42.9	54.6	54.6	62.0	27.7	53.3	20.9	34.9	20.2	**63.2**
1992	53.1	67.6	58.8	58.8	58.8	58.8	55.6	61.6	75.1	61.6	69.3	49.8	65.9	65.9	65.6	43.3	58.1	36.7	45.9	35.5	**67.2**
1993	47.9	60.2	56.8	56.8	56.8	56.8	57.7	63.2	65.5	63.2	65.0	50.4	58.2	58.2	60.9	40.4	53.7	32.1	40.8	30.4	**62.6**
1994	42.1	58.0	61.8	48.7	48.7	48.7	44.9	51.5	67.2	51.5	59.3	39.7	54.8	54.8	59.3	29.2	47.2	23.5	32.9	21.1	**57.6**
1995	50.4	65.8	61.0	61.0	61.0	61.0	54.2	63.5	69.5	63.5	69.5	50.5	65.4	65.4	64.0	33.2	55.8	27.7	39.8	26.1	**66.4**
1996	55.2	69.6	71.0	67.2	67.2	67.2	60.3	69.2	71.3	73.7	78.1	59.1	60.6	60.6	64.2	41.6	61.2	31.5	45.6	30.5	**73.9**
1997	61.0	69.0	72.8	68.8	68.8	68.8	66.8	72.3	70.2	78.0	74.7	63.7	72.5	72.5	67.6	50.3	62.0	43.3	51.7	41.7	**72.8**
1998	36.5	43.7	49.6	38.3	38.3	38.3	38.8	39.9	51.4	39.9	42.5	32.3	49.6	49.6	44.2	21.1	30.1	16.3	20.4	11.8	**41.9**
1999	23.0	19.9	32.6	16.9	16.9	16.9	24.2	20.8	27.8	20.8	21.7	13.9	21.4	21.4	20.7	10.7	11.6	17.2	15.9	15.2	**22.0**
2000	51.7	60.2	69.2	61.2	61.2	61.2	57.6	63.5	59.4	72.6	73.5	52.0	56.6	56.6	51.1	35.8	48.1	27.5	37.6	25.6	**69.3**
2001	31.4	54.1	51.6	46.1	46.1	46.1	44.8	56.7	63.9	64.9	81.0	31.7	38.3	38.3	49.0	16.6	40.8	12.0	23.0	11.1	**66.5**
2002	43.2	52.3	59.2	51.0	51.0	51.0	46.9	53.3	53.1	53.3	55.9	42.0	42.7	42.7	44.7	25.0	42.3	22.6	32.3	19.0	**52.9**
2003	27.4	36.4	53.4	33.3	33.3	33.3	31.1	35.4	40.8	35.4	38.0	26.2	26.8	26.8	35.1	16.1	27.8	13.2	18.5	10.9	**36.1**
2004	29.9	40.5	50.3	32.9	32.9	32.9	33.1	35.8	49.6	35.8	41.3	24.7	26.5	26.5	40.7	16.5	27.9	13.3	16.4	9.3	**39.5**
2005	29.5	31.5	62.1	27.3	27.3	27.3	32.8	31.8	37.1	31.8	34.8	18.4	20.6	20.6	25.4	12.2	18.1	10.9	11.2	6.3	**32.2**
2006	35.6	46.4	73.3	46.7	46.7	46.7	45.4	52.7	53.9	55.2	62.4	39.1	42.3	42.3	37.2	25.9	34.9	18.2	23.3	15.6	**56.6**
2007	26.0	48.0	43.8	34.6	34.6	34.6	29.1	38.9	62.4	38.9	50.1	23.2	25.7	25.7	53.7	11.4	34.5	9.5	17.8	7.6	**47.8**
2008	27.9	45.3	79.4	34.7	34.7	34.7	36.0	46.8	59.8	55.7	59.2	20.1	35.7	35.7	44.4	5.7	30.2	6.7	17.3	4.2	**56.2**
2009	15.0	19.0	69.2	14.8	14.8	14.8	24.6	22.9	30.5	22.9	24.2	11.2	20.7	20.7	21.6	7.6	11.4	7.2	6.8	3.0	**23.3**
2010	25.5	26.9	72.8	24.6	24.6	24.6	32.2	30.7	34.4	30.7	31.3	18.5	25.0	25.0	25.1	9.3	13.6	8.6	8.9	3.5	**28.7**
2011	25.8	37.0	47.0	29.7	29.7	29.7	30.5	35.0	47.0	35.0	60.9	21.1	23.2	23.2	34.8	10.3	24.8	9.0	14.3	5.7	**47.7**
2012	24.9	32.2	49.3	28.9	28.9	28.9	32.8	35.4	37.9	65.4	45.3	22.2	24.5	24.5	31.8	9.2	23.1	8.8	15.6	6.9	**44.6**
2013	13.7	12.6	39.4	11.1	11.1	11.1	15.3	12.8	16.9	12.8	12.9	8.3	15.4	15.4	13.2	3.9	6.0	3.3	3.5	1.4	**11.8**
2014	22.4	36.6	37.8	29.8	29.8	29.8	27.6	34.3	42.8	41.5	57.4	20.7	21.3	21.3	37.9	8.4	25.8	7.8	14.5	6.3	**50.1**
2015	15.1	26.2	47.5	17.3	17.3	17.3	17.7	20.6	35.1	21.2	50.4	10.4	17.2	17.2	24.9	6.0	15.1	5.2	6.6	2.7	**38.7**
2016	26.1	38.8	52.0	30.2	30.2	30.2	35.5	37.3	48.5	37.7	51.3	21.4	24.7	24.7	35.8	11.7	25.6	9.2	12.6	5.4	**43.3**
2017	5.0	12.9	27.4	6.5	6.5	6.5	5.7	7.5	21.5	8.7	11.6	3.0	4.2	4.2	19.8	1.0	6.4	1.1	2.1	1.0	**10.9**

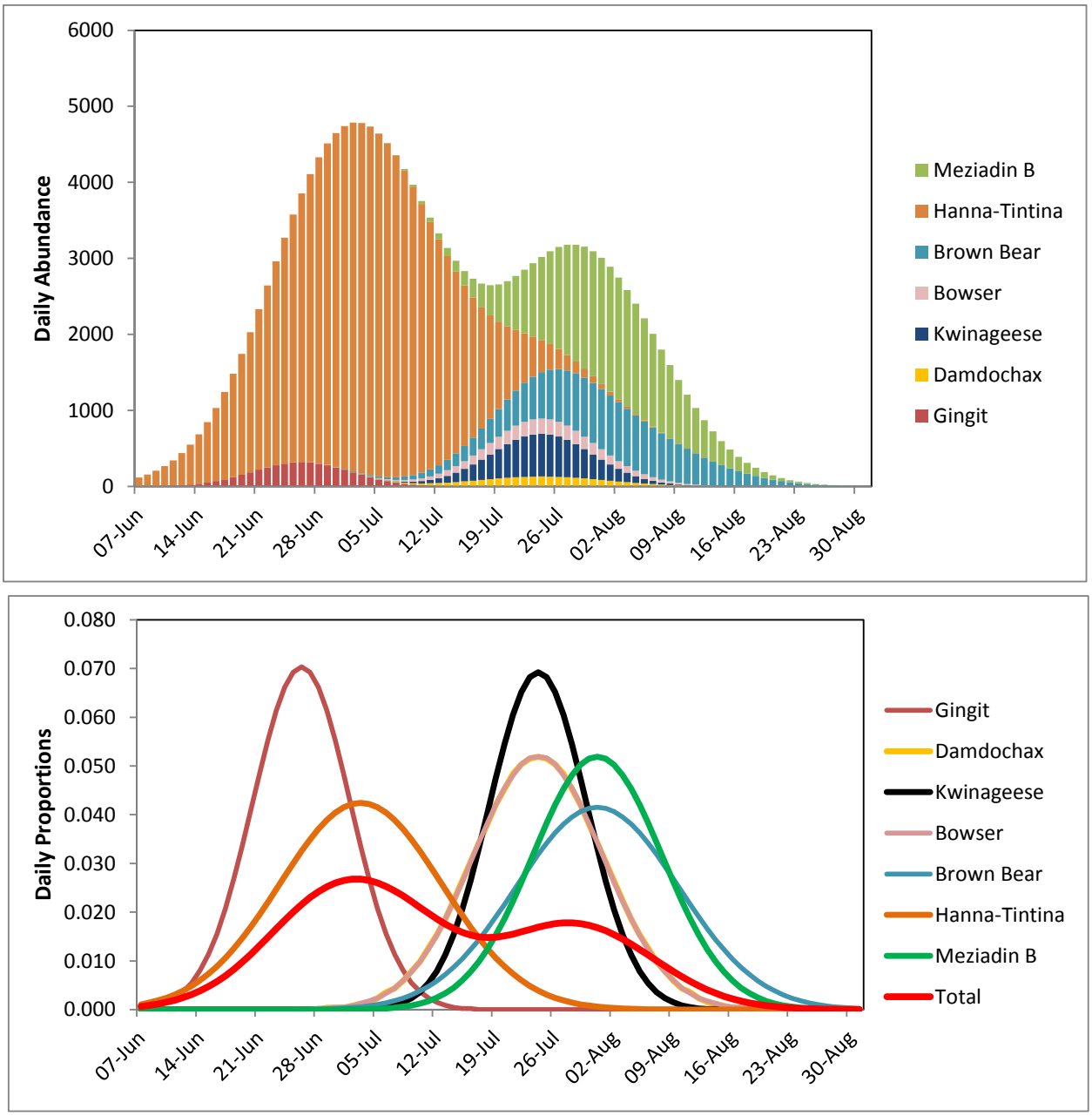

Figure B-1. Run timing distributions for Nass Sockeye sub-stocks using average timing parameters for the 2005 Sockeye return.

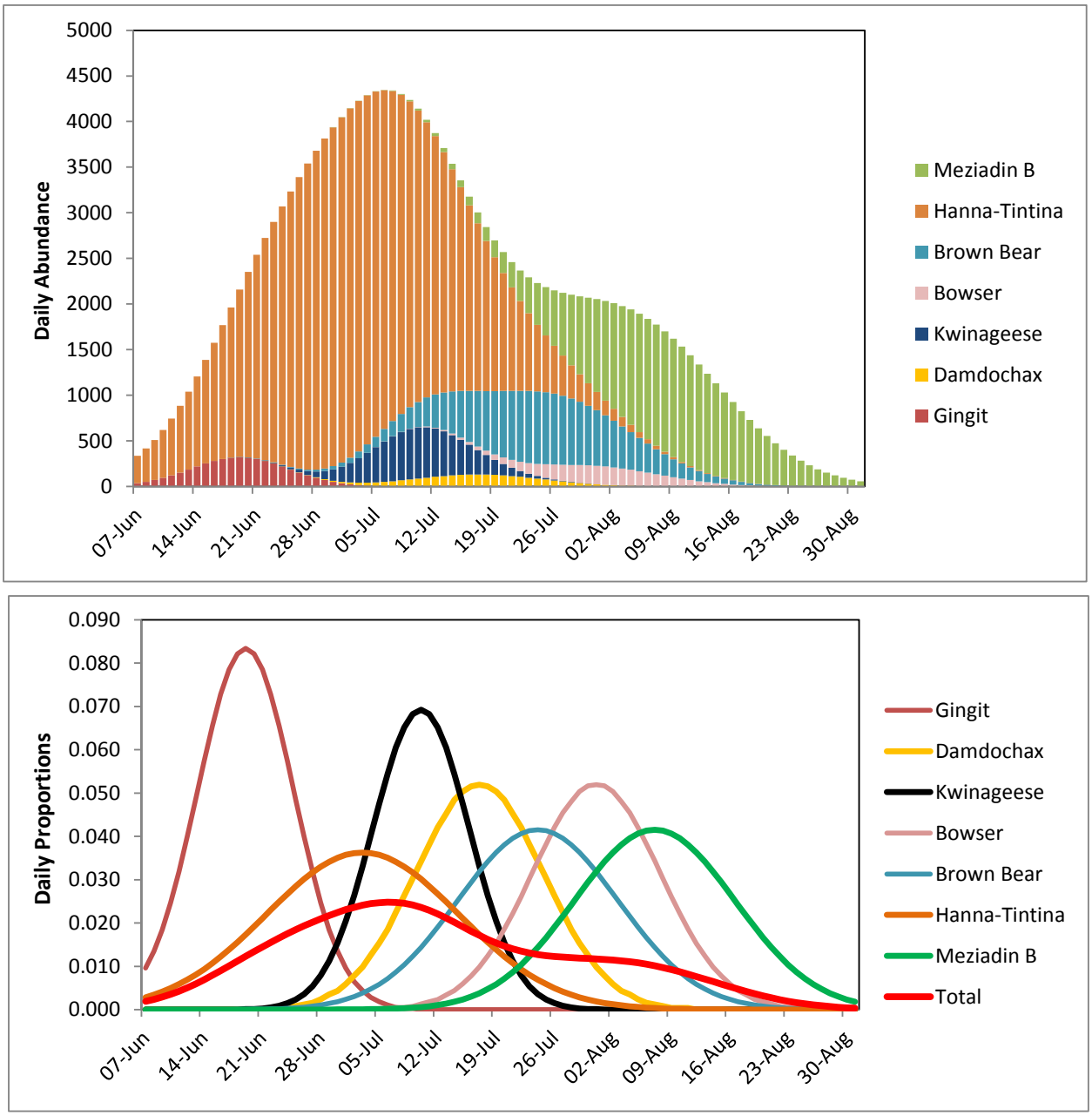

Figure B-2. Run timing distributions for Nass Sockeye sub-stocks using run timing parameters derived from 2005 DNA data for the 2005 Sockeye return.

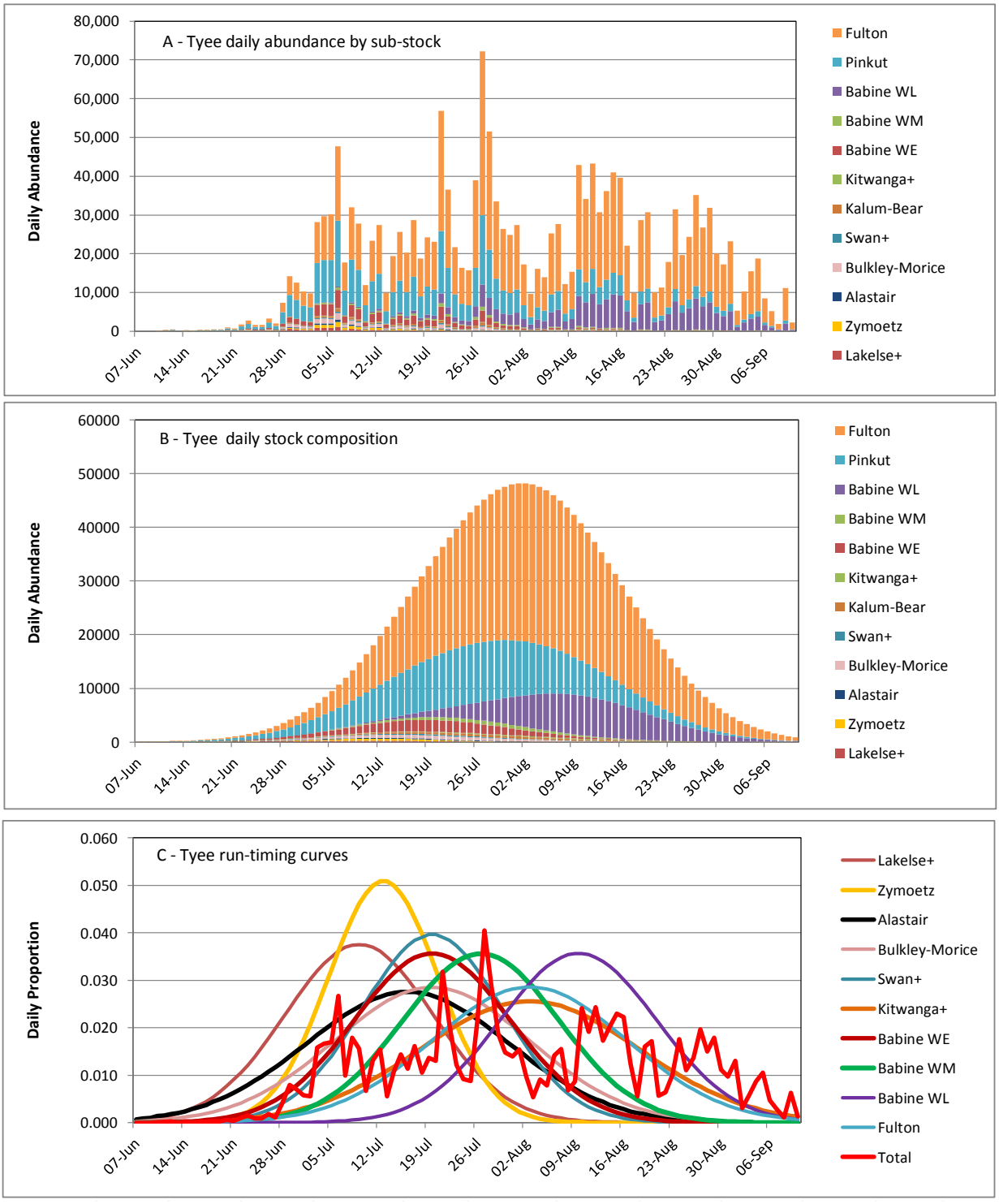

Figure B-3. Estimated Tyee daily abundance, stock composition and run-timing curves for Skeena Sockeye stocks in 2006 (late run-timing year).

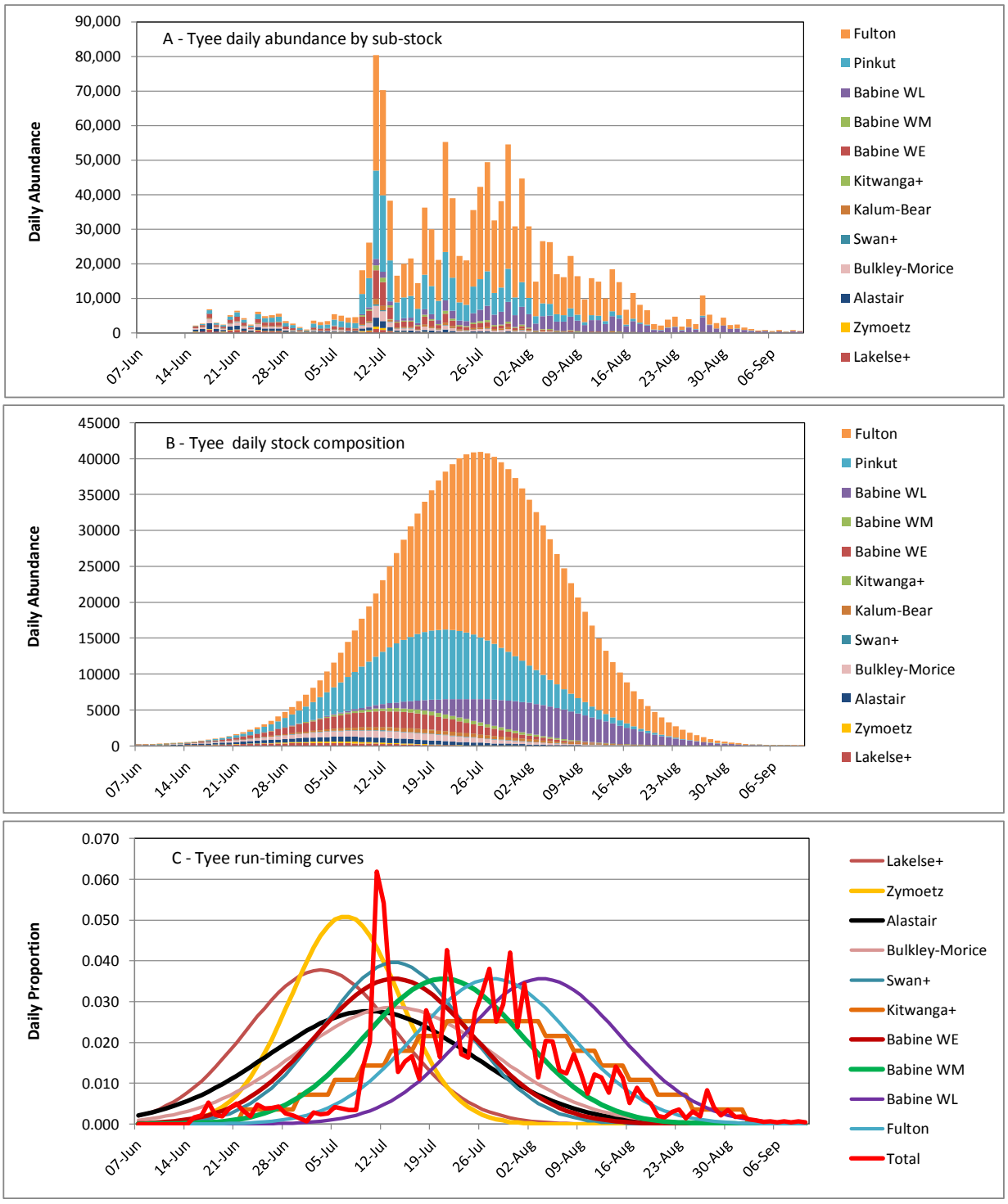

Figure B-4. Estimated Tyee daily abundance, stock composition, and run-timing curves for Skeena Sockeye stocks in 2007 (average run-timing year).

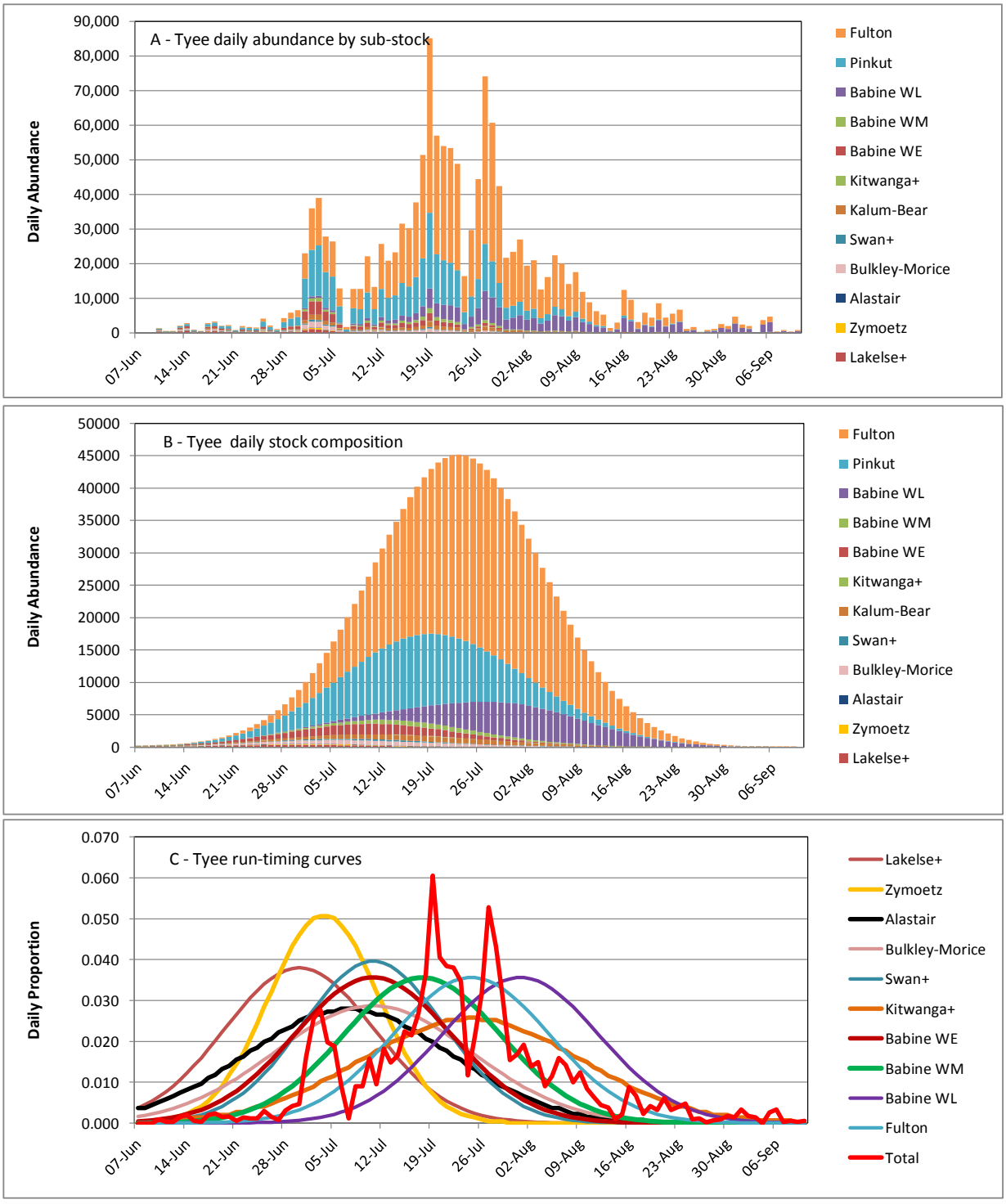

Figure B-5. Estimated Tyee daily abundance, stock composition and run-timing curves for Skeena Sockeye stocks in 2008 (early run-timing year).

APPENDIX C: Annual escapement and run size estimates for North and Central coast Coho salmon

Table C-1. Annual estimates of escapement catch and total stock size estimates for Coho salmon returning to the Nass River, 1992-2017.

	Catch						Net Escapement						Exploitation rates [10]		
	Marine		In-river												
Year	Alaska [1]	Canadian [2]	Nisga'a [3]	Other FN [4]	Sport [5]	Total	Coastal [6]	Lower [7]	Mid-to-Upper [8]	Total	TRTC	Total run size [9]	US	Can	Total
				0.25%	0.27%										
1992	144,947	47,298	3,393	*160*	*168*	195,966	27,248	18,527	63,409	109,184	160,204	305,151	*47.5%*	*16.7%*	64.2%
1993	56,528	18,446	595	*48*	*50*	75,668	11,954	12,438	18,947	43,340	62,479	119,007	47.5%	16.1%	63.6%
1994	407,335	141,088	2,530	*362*	*379*	551,694	33,719	30,099	143,026	206,844	351,203	758,539	53.7%	19.0%	72.7%
1995	82,480	19,416	1,402	*56*	*59*	103,413	13,949	10,930	22,219	47,098	68,031	150,511	54.8%	13.9%	68.7%
1996	81,389	44,431	2,178	*110*	*116*	128,224	23,205	12,553	43,642	79,400	126,235	207,623	39.2%	22.6%	61.8%
1997	27,590	5,348	293	*31*	*33*	33,295	9,342	5,714	12,420	27,476	33,181	60,771	45.4%	9.4%	54.8%
1998	61,661	0	2,075	*95*	*100*	63,930	20,833	11,717	37,565	70,115	72,384	134,045	46.0%	1.7%	47.7%
1999	99,986	2,484	1,122	*144*	*151*	103,887	29,601	16,533	56,988	103,123	107,024	207,010	48.3%	1.9%	50.2%
2000	92,413	25,080	1,950	98	271	119,812	29,115	5,885	71,137	106,136	133,535	225,949	40.9%	12.1%	53.0%
2001	176,003	32,686	14,706	399	500	224,294	47,639	67,395	79,726	194,761	243,052	419,055	42.0%	11.5%	53.5%
2002	62,532	12,431	9,016	26	369	84,374	63,016	68,045	161,262	292,323	314,165	376,697	16.6%	5.8%	22.4%
2003	88,564	15,889	14,882	68	178	119,581	23,508	49,829	67,564	140,901	171,918	260,483	34.0%	11.9%	45.9%
2004	90,984	11,317	20,336	44	232	122,912	30,501	22,542	45,955	98,998	130,927	221,911	41.0%	14.4%	55.4%
2005	*163,381*	*34,717*	14,969	718	505	214,290	40,488	32,219	87,153	159,861	210,770	374,150	*43.7%*	*13.6%*	57.3%
2006	*68,624*	*14,582*	8,425	392	91	92,114	31,394	22,162	48,137	101,693	125,183	193,807	*35.4%*	*12.1%*	47.5%
2007	*106,795*	*22,693*	9,515	127	638	139,768	41,205	51,738	48,987	141,930	174,903	281,698	*37.9%*	*11.7%*	49.6%
2008	*61,471*	*13,062*	3,450	54	97	78,134	12,526	18,847	84,105	115,477	132,141	193,611	*31.7%*	*8.6%*	40.4%
2009	*124,546*	*26,465*	13,794	327	1,658	166,790	43,342	79,443	188,903	311,688	353,932	478,478	*26.0%*	*8.8%*	34.9%
2010	*96,545*	*20,515*	10,292	193	264	127,809	29,250	35,227	83,786	148,263	179,527	276,072	*35.0%*	*11.3%*	46.3%
2011	85,521	14,168	2,635	18	259	102,601	19,744	5,399	72,864	98,006	115,086	200,607	42.6%	8.5%	51.1%
2012	99,536	30,563	12,082	187	152	142,520	26,389	26,248	62,326	114,962	157,946	257,482	38.7%	16.7%	55.4%
2013	530,297	130,062	19,370	46	311	680,086	70,938	166,029	117,263	354,229	504,018	1,034,315	51.3%	14.5%	65.8%
2014	137,653	23,607	8,452	60	294	170,066	24,774	89,279	117,657	231,710	264,123	401,776	34.3%	8.1%	42.3%
2015	55,131	14,088	7,905	38	444	77,606	8,139	6,090	41,725	55,954	78,429	133,559	41.3%	16.8%	58.1%
2016	341,111	80,256	8,234	82	141	429,825	25,971	23,700	133,562	183,234	271,947	613,059	55.6%	14.5%	70.1%
2017	165,874	81,717	10,300	336	1,527	259,754	9,265	71,388	109,481	190,135	284,015	449,889	36.9%	20.9%	57.7%
Mean: 92-99	120,239	34,814	1,699	126	132	157,010	21,231	14,814	49,777	85,822	122,593	242,832	47.8%	12.7%	60.5%
Mean: 00-curr.	141,499	33,550	10,573	179	441	186,241	32,067	46,748	90,088	168,903	213,645	355,144	38.0%	12.3%	50.4%

[1] From 1992-2004 and since 2011, Alaskan catch of Nass Coho was derived from the total marine harvest estimate less Canadian catch based on coded-wire-tagging marine exploitation rate data from Zolzap Creek (Baxter and Stephens 2005; Nisga'a Fisheries 2013). From 2005-2010, Alaskan catch was derived from the 1993-2004 mean harvest rate (82%) of the estimated marine catch of Nass Coho in Areas 1-4 from NJTC estimates.

[2] From 1992-2004, and since 2011, Canadian marine catch of Nass Coho was derived from the total marine harvest estimate less Alaskan catch based on CWT marine exploitation rate data from Zolzap Creek (Baxter and Stephens 2005; Nisga'a Fisheries 2013). From 2005-2010, Canadian catch of Nass Coho was estimated by the JTC for tidal sport, net, and troll fisheries in Areas 1-4.

[3] Nisga'a catch from annual catch monitoring program of the Nisga'a Fisheries Program (see annual reports).

[4] Other First Nation catch includes Gitanyow and was calculated for 1992-99 based on the average proportion (0.25%) of reported harvest to mid-to-Upper escapement from 2000-2010. Since 2000, catches were provided by the NJTC.

[5] Sport catch was calculated for 1992-99 based on the average proportion (0.27%) of reported harvests to mid-to-Upper escapement from 2000-2010. Since 2000, catches were provided by the NJTC.

[6] Coastal estimates are provided by NJTC based on annual Lower Nass habitat-capacity estimates (or if available, Coastal estimates from Lachmach, Kincolith, and/or Salmon Cove) prorated to a habitat-capacity estimates for Coastal Nass area streams (Bocking and Peacock 2004).

[7] Lower Nass estimates are provided by NJTC based on annual capacity estimates for index streams (Zolzap, Ansedegan, Diskangieq, and/or Ginlulak) prorated to a habitat-capacity model estimates developed for Lower Nass area streams (Bocking and Peacock 2004).

[8] Mid-to-Upper Nass escapement estimates are from the annual Nisga'a Fisheries fishwheel mark-recapture program.

[9] Total run size is the sum of the estimates of the total catch and escapement.

[10] Exploitation rates for 1992 (italics) are based on 1993 Zolzap CWT estimates plus estimated in-river harvests. US exploitation rates from 1993-2004, and since 2011, are based on CWT data from Zolzap Creek (Baxter and Stephens 2005; Nisga'a Fisheries 2013). US exploitation rates from 2005-2010 are estimated as 82% (92-04 average) of the total marine catch divided by the total run. Canadian ERs are estimated as the proportion of the total catch estimate of Nass Coho from Canadian marine (from CWT data from Zolzap) and in-river (from NJTC) areas divided by the total run.

Table C-2. Annual estimates of escapement catch and total stock size estimates for Coho salmon returning to the Skeena River, 1980-2017.

		Harvest by Major Fishery					Exploitation Rate						Portion of Harvest					
Year	Total Escape[1]	FN FSC	BC Comm.[2]	BC Sport[2]	Alaska[2]	Total Run	FN FSC	BC Comm.	BC Sport	Alaska	Total[3]	FN FSC	BC Comm.	BC Sport	Alaska	CDN ER	Total ER
1980	154,944	5,527	162,840	4,487	108,795	436,593	1%	37%	1%	25%	65%	2%	58%	2%	39%	40%	65%
1981	127,976	16,086	127,704	3,519	85,320	360,604	4%	35%	1%	24%	65%	7%	55%	2%	37%	41%	65%
1982	94,953	24,500	87,341	2,407	58,353	267,552	9%	33%	1%	22%	65%	14%	51%	1%	34%	43%	65%
1983	110,977	26,690	103,227	2,844	68,967	312,705	9%	33%	1%	22%	65%	13%	51%	1%	34%	42%	65%
1984	206,520	25,164	206,549	5,691	137,996	581,920	4%	35%	1%	24%	65%	7%	55%	2%	37%	41%	65%
1985	87,520	10,829	87,436	2,409	58,416	246,610	4%	35%	1%	24%	65%	7%	55%	2%	37%	41%	65%
1986	219,622	21,266	222,893	6,142	148,916	618,838	3%	36%	1%	24%	65%	5%	56%	2%	37%	40%	65%
1987	199,692	7,616	209,578	5,775	140,020	562,682	1%	37%	1%	25%	65%	2%	58%	2%	39%	40%	65%
1988	49,836	1,161	52,740	1,453	35,236	140,425	1%	38%	1%	25%	65%	1%	58%	2%	39%	39%	65%
1989	202,872	2,714	208,550	0	112,383	526,519	1%	40%	0%	21%	61%	1%	64%	0%	35%	40%	61%
1990	348,266	8,517	498,197	15,915	278,448	1,149,343	1%	43%	1%	24%	70%	1%	62%	2%	35%	45%	70%
1991	233,215	4,946	187,107	10,962	183,431	619,661	1%	30%	2%	30%	62%	1%	48%	3%	47%	33%	62%
1992	199,942	2,300	163,311	0	209,878	575,431	0%	28%	0%	36%	65%	1%	43%	0%	56%	29%	65%
1993	114,159	479	74,942	0	73,867	263,447	0%	28%	0%	28%	57%	0%	50%	0%	49%	29%	57%
1994	269,323	4,237	188,938	65,983	280,331	808,811	1%	23%	8%	35%	67%	1%	35%	12%	52%	32%	67%
1995	98,865	1,447	25,478	9,503	31,079	166,373	1%	15%	6%	19%	41%	2%	38%	14%	46%	22%	41%
1996	88,102	2,494	109,288	42,828	94,734	337,446	1%	32%	13%	28%	74%	1%	44%	17%	38%	46%	74%
1997	44,993	1,157	3,636	12,327	34,053	96,167	1%	4%	13%	35%	53%	2%	7%	24%	67%	18%	53%
1998	209,126	1,197	0	0	46,282	256,605	0%	0%	0%	18%	19%	3%	0%	0%	97%	0%	19%
1999	320,112	4,024	116	1,163	81,238	406,653	1%	0%	0%	20%	21%	5%	0%	1%	94%	1%	21%
2000	214,136	1,515	0	34,510	92,270	342,430	0%	0%	10%	27%	37%	1%	0%	27%	72%	11%	37%
2001	420,003	4,542	1,932	26,831	141,476	594,783	1%	0%	5%	24%	29%	3%	1%	15%	81%	6%	29%
2002	384,259	5,653	8,081	60,933	70,298	529,224	1%	2%	12%	13%	27%	4%	6%	42%	48%	14%	27%
2003	350,398	2,421	22,516	20,122	91,037	486,494	0%	5%	4%	19%	28%	2%	17%	15%	67%	9%	28%
2004	261,280	5,635	47,597	34,561	97,167	446,240	1%	11%	8%	22%	41%	3%	26%	19%	53%	20%	41%
2005	505,062	7,770	11,789	26,374	156,477	707,472	1%	2%	4%	22%	29%	4%	6%	13%	77%	6%	29%
2006	283,548	2,231	17,594	12,961	74,085	390,417	1%	5%	3%	19%	27%	2%	16%	12%	69%	8%	27%
2007	216,457	2,758	42,320	20,813	120,071	402,420	1%	11%	5%	30%	46%	1%	23%	11%	65%	16%	46%
2008	195,039	2,485	5,735	11,050	108,454	322,764	1%	2%	3%	34%	40%	2%	4%	9%	85%	6%	40%
2009	480,623	6,124	21,112	44,620	232,092	784,572	1%	3%	6%	30%	39%	2%	7%	15%	76%	9%	39%
2010	286,715	3,653	17,669	36,880	83,040	427,958	1%	4%	9%	19%	33%	3%	13%	26%	59%	14%	33%
2011	153,500	1,956	39,811	18,274	52,968	266,508	1%	15%	7%	20%	42%	2%	35%	16%	47%	23%	42%
2012	170,314	2,170	8,075	13,358	62,818	256,735	1%	3%	5%	24%	34%	3%	9%	15%	73%	9%	34%
2013	294,908	3,758	22,776	28,062	127,300	476,805	1%	5%	6%	27%	38%	2%	13%	15%	70%	11%	38%
2014	329,726	4,202	4,986	20,869	75,604	435,386	1%	1%	5%	17%	24%	4%	5%	20%	72%	7%	24%
2015	124,445	1,586	23,509	11,499	46,489	207,528	1%	11%	6%	22%	40%	2%	28%	14%	56%	18%	40%
2016	246,717	3,144	42,881	31,654	96,876	421,271	1%	10%	8%	23%	41%	2%	25%	18%	55%	18%	41%
2017																	
Average																	
1980-14	224,274	6,323	82,655	17,480	108,007	438,740	2%	18%	4%	24%	48%	3%	30%	11%	56%	23%	48%
1989-91	261,451	5,392	297,951	8,959	191,420	765,174	1%	38%	1%	25%	65%	1%	58%	2%	39%	39%	65%

[1] Escapement estimate derived by expanding the Area 4 indicator streams to the total escapement for Area 4 Coho.

[2] Catch estimates for BC commercial, BC sport and Alaska for 1980-88 are based on the average contributions for each of these fisheries for 1989-91.

[3] Total exploitation rates for 1980-88 are based on the average total exploitation rates for 1989-91.

Table C-3. Babine Coho escapement, catch and exploitation rate estimates for 1954-2017 derived from Babine fence counts, 1954-88 ERs from analysis by Blair Holtby and 1989-2017 ERs from Table C-2 based on Toboggan Creek CWT data.

Year	Adj. Babine Escapement[1]	Canadian Catch	Canadian ER	Total Return to Canada	Total Harvest	Total ER	Total Run
1954	3,359	2,680	36%	6,039	4,105	55%	7,464
1955	9,714	7,750	36%	17,464	11,873	55%	21,587
1956	9,857	7,864	36%	17,721	12,047	55%	21,904
1957	4,421	3,527	36%	7,948	5,403	55%	9,824
1958	8,438	6,732	36%	15,170	10,313	55%	18,751
1959	12,004	9,577	36%	21,581	14,672	55%	26,676
1960	7,942	6,336	36%	14,278	9,707	55%	17,649
1961	14,416	11,501	36%	25,917	17,620	55%	32,036
1962	15,183	12,113	36%	27,296	18,557	55%	33,740
1963	7,737	5,050	33%	12,787	7,737	50%	15,474
1964	10,689	11,880	41%	22,569	18,200	63%	28,889
1965	22,985	13,849	31%	36,834	21,217	48%	44,202
1966	13,377	12,565	39%	25,942	19,250	59%	32,627
1967	12,487	7,228	31%	19,715	11,073	47%	23,560
1968	13,054	12,262	39%	25,316	18,785	59%	31,839
1969	6,702	4,375	33%	11,077	6,702	50%	13,404
1970	10,404	9,002	37%	19,406	13,791	57%	24,195
1971	9,909	8,574	37%	18,483	13,135	57%	23,044
1972	5,381	6,818	43%	12,199	10,445	66%	15,826
1973	11,606	7,885	33%	19,491	12,080	51%	23,686
1974	13,661	11,349	37%	25,010	17,387	56%	31,048
1975	4,913	2,732	30%	7,645	4,185	46%	9,098
1976	4,499	2,502	30%	7,001	3,832	46%	8,331
1977	10,474	9,838	39%	20,312	15,072	59%	25,546
1978	11,861	17,232	45%	29,093	26,400	69%	38,261
1979	2,909	4,649	46%	7,558	7,122	71%	10,031
1980	5,046	9,374	48%	14,420	14,362	74%	19,408
1981	2,486	3,295	44%	5,781	5,047	67%	7,533
1982	2,673	2,409	38%	5,082	3,691	58%	6,364
1983	3,402	9,467	53%	12,869	14,503	81%	17,905
1984	3,241	5,440	47%	8,681	8,334	72%	11,575
1985	2,129	4,169	49%	6,298	6,387	75%	8,516
1986	3,671	11,699	54%	15,370	17,923	83%	21,594
1987	2,101	2,438	42%	4,539	3,735	64%	5,836
1988	3,225	3,584	41%	6,809	5,491	63%	8,716
1989	5,228	5,444	40%	10,672	8,340	61%	13,568
1990	8,038	12,062	45%	20,100	18,489	70%	26,527
1991	6,720	5,850	33%	12,571	11,136	62%	17,856
1992	2,610	2,162	29%	4,772	4,901	65%	7,511
1993	2,899	1,915	29%	4,814	3,791	57%	6,690
1994	4,656	4,480	32%	9,136	9,326	67%	13,982
1995	2,653	977	22%	3,630	1,811	41%	4,464
1996	3,120	5,475	46%	8,595	8,830	74%	11,950
1997	621	236	18%	857	706	53%	1,327
1998	4,547	26	0%	4,573	1,032	19%	5,579
1999	14,954	248	1%	15,201	4,043	21%	18,996
2000	2,239	377	11%	2,615	1,341	37%	3,580
2001	21,625	1,715	6%	23,340	8,999	29%	30,624
2002	12,478	2,425	14%	14,903	4,708	27%	17,186
2003	7,888	1,014	9%	8,902	3,064	28%	10,952
2004	9,047	3,040	20%	12,087	6,404	41%	15,451
2005	24,486	2,227	6%	26,713	9,813	29%	34,299
2006	16,595	1,919	8%	18,514	6,255	27%	22,850
2007	7,473	2,275	16%	9,748	6,421	46%	13,894
2008	16,180	1,599	6%	17,779	10,596	40%	26,776
2009	20,723	3,098	9%	23,821	13,105	39%	33,828
2010	9,546	1,938	14%	11,484	4,703	33%	14,249
2011	12,933	5,059	23%	17,992	9,522	42%	22,455
2012	11,480	1,591	9%	13,071	5,825	34%	17,305
2013	28,068	5,196	11%	33,264	17,312	38%	45,380
2014	23,692	2,160	7%	25,851	7,592	24%	31,284
2015	9,192	2,703	18%	11,895	6,137	40%	15,329
2016	7,656	2,410	18%	10,066	5,417	41%	13,073
2017	26,514	8,348	18%	34,862	18,759	41%	45,273

[1] Adjusted to account for the portion of the run passing when the Babine fence was not operational.

Table C-4. Summary of available exploitation rates for Area 2E-2W, 3, and 4 Coho.

	Area 2E & 2W - Haida Gwaii					Area 3 - Lower and Middle Nass					Area 4 - Middle and Upper Skeena				
	Deena CAN ER	Model CAN ER	Best CAN ER	Model AK ER	Best TOT ER	Nisga'a CAN ER	Model CAN ER	Best CAN ER	Nisga'a AK ER	TOT ER	CAN ER	Model CAN ER	Best CAN ER	AK ER	TOT ER
1954-88 -->	(Adj. Babine)		(Adj. Babine)	(Adj. Deena)	CDN+AK			(Adj. Babine)	(Adj. Babine)	CDN+AK			Babine	Babine	CDN+AK
1989-91 -->	(Adj. Babine)		(Adj. Babine)	(Adj. Deena)	CDN+AK	(Avg A3)		(Adj. Babine)	(Adj. Babine)	CDN+AK	(A4)		(A4)	(A4)	CDN+AK
1992-96 -->	(Area 3)		(Area 3)	(Adj. Deena)	CDN+AK	(A3)		(A3)	(A3)	CDN+AK	(A4)		(A4)	(A4)	CDN+AK
1997-10 -->	Deena		Deena	Deena	CDN+AK	(A3)		(A3)	(A3)	CDN+AK	(A4)		(A4)	(A4)	CDN+AK
2011-17 -->	Deena		Deena	Deena	CDN+AK	(A3)		(A3)	(A3)	CDN+AK	(A4)		(A4)	(A4)	CDN+AK
Year															
1954	20.0%		20.0%	2.9%	23.0%			20.0%	30.3%	50.4%			35.9%	19.1%	55.0%
1955	20.0%		20.0%	2.9%	23.0%			20.0%	30.3%	50.4%			35.9%	19.1%	55.0%
1956	20.0%		20.0%	2.9%	23.0%			20.0%	30.3%	50.4%			35.9%	19.1%	55.0%
1957	20.0%		20.0%	2.9%	23.0%			20.0%	30.3%	50.4%			35.9%	19.1%	55.0%
1958	20.0%		20.0%	2.9%	23.0%			20.0%	30.3%	50.4%			35.9%	19.1%	55.0%
1959	20.0%		20.0%	2.9%	23.0%			20.0%	30.3%	50.4%			35.9%	19.1%	55.0%
1960	20.0%		20.0%	2.9%	23.0%			20.0%	30.3%	50.4%			35.9%	19.1%	55.0%
1961	20.0%		20.0%	2.9%	23.0%			20.0%	30.3%	50.4%			35.9%	19.1%	55.0%
1962	20.0%		20.0%	2.9%	23.0%			20.0%	30.3%	50.4%			35.9%	19.1%	55.0%
1963	18.2%		18.2%	2.7%	20.9%			18.2%	27.6%	45.8%			32.6%	17.4%	50.0%
1964	23.0%		23.0%	3.4%	26.3%			23.0%	34.8%	57.7%			41.1%	21.9%	63.0%
1965	17.5%		17.5%	2.6%	20.0%			17.5%	26.5%	44.0%			31.3%	16.7%	48.0%
1966	21.5%		21.5%	3.1%	24.6%			21.5%	32.6%	54.1%			38.5%	20.5%	59.0%
1967	17.1%		17.1%	2.5%	19.6%			17.1%	25.9%	43.1%			30.7%	16.3%	47.0%
1968	21.5%		21.5%	3.1%	24.6%			21.5%	32.6%	54.1%			38.5%	20.5%	59.0%
1969	18.2%		18.2%	2.7%	20.9%			18.2%	27.6%	45.8%			32.6%	17.4%	50.0%
1970	20.8%		20.8%	3.0%	23.8%			20.8%	31.4%	52.2%			37.2%	19.8%	57.0%
1971	20.8%		20.8%	3.0%	23.8%			20.8%	31.4%	52.2%			37.2%	19.8%	57.0%
1972	24.1%		24.1%	3.5%	27.6%			24.1%	36.4%	60.5%			43.1%	22.9%	66.0%
1973	18.6%		18.6%	2.7%	21.3%			18.6%	28.1%	46.7%			33.3%	17.7%	51.0%
1974	20.4%		20.4%	3.0%	23.4%			20.4%	30.9%	51.3%			36.6%	19.4%	56.0%
1975	16.8%		16.8%	2.4%	19.2%			16.8%	25.4%	42.1%			30.0%	16.0%	46.0%
1976	16.8%		16.8%	2.4%	19.2%			16.8%	25.4%	42.1%			30.0%	16.0%	46.0%
1977	21.5%		21.5%	3.1%	24.6%			21.5%	32.6%	54.1%			38.5%	20.5%	59.0%
1978	25.1%		25.1%	3.7%	28.8%			25.1%	38.1%	63.2%			45.0%	24.0%	69.0%
1979	25.9%		25.9%	3.8%	29.7%			25.9%	39.2%	65.0%			46.3%	24.7%	71.0%
1980	27.0%	15.4%	27.0%	3.9%	30.9%	17.7%	25.9%	27.0%	40.8%	67.8%	39.6%	33.5%	48.3%	25.7%	74.0%
1981	24.4%	15.4%	24.4%	3.6%	28.0%	17.7%	25.9%	24.4%	37.0%	61.4%	40.9%	33.5%	43.7%	23.3%	67.0%
1982	21.1%	15.4%	21.1%	3.1%	24.2%	17.7%	25.9%	21.1%	32.0%	53.1%	42.7%	33.5%	37.9%	20.1%	58.0%
1983	29.5%	15.4%	29.5%	4.3%	33.8%	17.7%	25.9%	29.5%	44.7%	74.2%	42.5%	33.5%	52.9%	28.1%	81.0%
1984	26.2%	15.4%	26.2%	3.8%	30.1%	17.7%	25.9%	26.2%	39.7%	66.0%	40.8%	33.5%	47.0%	25.0%	72.0%
1985	27.3%	15.4%	27.3%	4.0%	31.3%	17.7%	25.9%	27.3%	41.4%	68.7%	40.8%	33.5%	49.0%	26.0%	75.0%
1986	30.2%	15.4%	30.2%	4.4%	34.7%	17.7%	25.9%	30.2%	45.8%	76.0%	40.4%	33.5%	54.2%	28.8%	83.0%
1987	23.3%	15.4%	23.3%	3.4%	26.7%	17.7%	25.9%	23.3%	35.3%	58.6%	39.6%	33.5%	41.8%	22.2%	64.0%
1988	23.0%	15.4%	23.0%	3.4%	26.3%	17.7%	25.9%	23.0%	34.8%	57.7%	39.4%	33.5%	41.1%	21.9%	63.0%
1989	22.4%	15.4%	22.4%	3.3%	25.7%	17.7%	25.9%	22.4%	33.9%	56.3%	40.1%	33.5%	40.1%	21.3%	61.5%
1990	25.4%	15.4%	25.4%	3.7%	29.1%	17.7%	25.9%	25.4%	38.5%	63.9%	45.5%	33.5%	45.5%	24.2%	69.7%
1991	18.3%	15.4%	18.3%	2.7%	21.0%	17.7%	25.9%	18.3%	47.0%	65.3%	32.8%	33.5%	32.8%	29.6%	62.4%
1992	16.7%	15.4%	16.7%	2.4%	19.2%	16.7%	25.9%	16.7%	47.5%	64.2%	28.8%	33.5%	28.8%	36.5%	65.3%
1993	16.1%	15.4%	16.1%	2.3%	18.4%	16.1%	25.9%	16.1%	47.5%	63.6%	28.6%	33.5%	28.6%	28.0%	56.7%
1994	19.0%	15.4%	19.0%	2.8%	21.8%	19.0%	25.9%	19.0%	53.7%	72.7%	32.0%	33.5%	32.0%	34.7%	66.7%
1995	13.9%	15.4%	13.9%	2.0%	15.9%	13.9%	25.9%	13.9%	54.8%	68.7%	21.9%	33.5%	21.9%	18.7%	40.6%
1996	22.6%	15.4%	22.6%	3.3%	25.9%	22.6%	25.9%	22.6%	39.2%	61.8%	45.8%	33.5%	45.8%	28.1%	73.9%
1997	18.9%	12.7%	18.9%	3.3%	22.3%	9.4%	12.4%	9.4%	45.4%	54.8%	17.8%	24.1%	17.8%	35.4%	53.2%
1998	0.0%	2.3%	0.0%	4.3%	4.3%	1.7%	3.2%	1.7%	46.0%	47.7%	0.5%	6.4%	0.5%	18.0%	18.5%
1999	0.0%	1.0%	0.0%	2.1%	2.1%	1.9%	4.8%	1.9%	48.3%	50.2%	1.3%	6.0%	1.3%	20.0%	21.3%
2000	0.0%	0.7%	0.0%	0.0%	0.0%	12.1%	3.5%	12.1%	40.9%	53.0%	10.5%	6.9%	10.5%	26.9%	37.5%
2001	0.0%	1.3%	0.0%	0.1%	0.1%	11.5%	4.8%	11.5%	42.0%	53.5%	5.6%	12.8%	5.6%	23.8%	29.4%
2002	0.0%	2.9%	0.0%	0.0%	0.0%	5.8%	6.7%	5.8%	16.6%	22.4%	14.1%	13.7%	14.1%	13.3%	27.4%
2003	5.0%	3.4%	5.0%	0.1%	5.1%	11.9%	7.1%	11.9%	34.0%	45.9%	9.3%	9.7%	9.3%	18.7%	28.0%
2004	54.7%	4.0%	54.7%	1.2%	55.9%	14.4%	9.5%	14.4%	41.0%	55.4%	19.7%	10.9%	19.7%	21.8%	41.4%
2005	44.4%	2.9%	44.4%	18.3%	62.7%	13.6%	8.1%	13.6%	43.7%	57.3%	6.5%	9.8%	6.5%	22.1%	28.6%
2006	17.0%	4.0%	17.0%	3.6%	20.6%	12.1%	8.0%	12.1%	35.4%	47.5%	8.4%	11.8%	8.4%	19.0%	27.4%
2007	16.2%	4.0%	16.2%	2.4%	18.6%	11.7%	9.6%	11.7%	37.9%	49.6%	16.4%	12.1%	16.4%	29.8%	46.2%
2008	16.2%	4.8%	16.2%	2.4%	18.6%	8.6%	6.7%	8.6%	31.7%	40.4%	6.0%	10.4%	6.0%	33.6%	39.6%
2009	15.5%	5.5%	15.5%	1.1%	16.6%	8.8%	8.4%	8.8%	26.0%	34.9%	9.2%	11.4%	9.2%	29.6%	38.7%
2010	27.1%	6.3%	27.1%	0.1%	27.2%	11.3%	7.9%	11.3%	35.0%	46.3%	13.6%	11.3%	13.6%	19.4%	33.0%
2011	10.3%		10.3%	0.3%	10.6%	8.5%		8.5%	42.6%	51.1%	22.5%		22.5%	19.9%	42.4%
2012	13.9%		13.9%	0.4%	14.3%	16.7%		16.7%	38.7%	55.4%	9.2%		9.2%	24.5%	33.7%
2013	17.5%		17.5%	0.5%	18.0%	14.5%		14.5%	51.3%	65.8%	11.5%		11.5%	26.7%	38.1%
2014	15.0%		15.0%	2.6%	17.6%	8.1%		8.1%	34.3%	42.3%	6.9%		6.9%	17.4%	24.3%
2015	14.2%		14.2%	1.0%	15.1%	16.8%		16.8%	41.3%	58.1%	17.6%		17.6%	22.4%	40.0%
2016	14.2%		14.2%	1.0%	15.1%	14.5%		14.5%	55.6%	70.1%	18.4%		18.4%	23.0%	41.4%
2017	14.2%		14.2%	1.0%	15.1%	20.9%		20.9%	36.9%	57.7%					
Average (1992-1997) -->			17.9%	2.7%	20.6%			16.3%	48.0%				29.2%	30.2%	
Average (1997-2017) -->			15.0%	2.2%	17.1%			11.2%	39.3%				11.2%	23.3%	

Table C-5. Summary of available exploitation rates for Area 6-8 Coho.

	Area 6 - Douglas Channel-Kitimat Arm					Area 6-8 - Northern Coastal Streams					Area 8 - Bella Coola & Dean Rivers				
	CAN ER	Model CAN ER	Best CAN ER	AK ER	TOT ER	CAN ER	Model CAN ER	Best CAN ER	AK ER	TOT ER	CAN ER	Model CAN ER	Best CAN ER	AK ER	TOT ER
1954-88 -->	Babine		(Adj Babine)	Babine	CDN+AK	Babine		(Adj Babine)	Babine*60%	CDN+AK	Babine		(Adj Babine)	Babine*60%	CDN+AK
1989-91 -->	(A4)		(Adj A4)	(A4)	CDN+AK	(A4)		(Adj A4)	A4*60%	CDN+AK	(A4)		(Adj A4)	A4*60%	CDN+AK
1992-96 -->	(A4)		(Adj A4)	(A4)	CDN+AK	(A4)		(Adj A4)	A4*60%	CDN+AK	(A4)		(Adj A4)	A4*60%	CDN+AK
1997-10 -->	(A4)		Model	(A4)	CDN+AK	(A4)		Model	A4*60%	CDN+AK	(A4)		Model	A4*60%	CDN+AK
2011-17 -->	(A4)		(A4)	(A4)	CDN+AK	(A4)		A4*60%	A4*60%	CDN+AK	(A4)		A4*60%	A4*60%	CDN+AK
Year															
1954	35.9%		22.6%	19.1%	41.7%	35.9%		21.8%	11.5%	33.3%	35.9%		22.5%	11.5%	34.0%
1955	35.9%		22.6%	19.1%	41.7%	35.9%		21.8%	11.5%	33.3%	35.9%		22.5%	11.5%	34.0%
1956	35.9%		22.6%	19.1%	41.7%	35.9%		21.8%	11.5%	33.3%	35.9%		22.5%	11.5%	34.0%
1957	35.9%		22.6%	19.1%	41.7%	35.9%		21.8%	11.5%	33.3%	35.9%		22.5%	11.5%	34.0%
1958	35.9%		22.6%	19.1%	41.7%	35.9%		21.8%	11.5%	33.3%	35.9%		22.5%	11.5%	34.0%
1959	35.9%		22.6%	19.1%	41.7%	35.9%		21.8%	11.5%	33.3%	35.9%		22.5%	11.5%	34.0%
1960	35.9%		22.6%	19.1%	41.7%	35.9%		21.8%	11.5%	33.3%	35.9%		22.5%	11.5%	34.0%
1961	35.9%		22.6%	19.1%	41.7%	35.9%		21.8%	11.5%	33.3%	35.9%		22.5%	11.5%	34.0%
1962	35.9%		22.6%	19.1%	41.7%	35.9%		21.8%	11.5%	33.3%	35.9%		22.5%	11.5%	34.0%
1963	32.6%		20.6%	17.4%	37.9%	32.6%		19.8%	10.4%	30.2%	32.6%		20.4%	10.4%	30.9%
1964	41.1%		25.9%	21.9%	47.8%	41.1%		25.0%	13.1%	38.1%	41.1%		25.8%	13.1%	38.9%
1965	31.3%		19.8%	16.7%	36.4%	31.3%		19.0%	10.0%	29.0%	31.3%		19.6%	10.0%	29.6%
1966	38.5%		24.3%	20.5%	44.8%	38.5%		23.4%	12.3%	35.7%	38.5%		24.1%	12.3%	36.4%
1967	30.7%		19.3%	16.3%	35.7%	30.7%		18.6%	9.8%	28.4%	30.7%		19.2%	9.8%	29.0%
1968	38.5%		24.3%	20.5%	44.8%	38.5%		23.4%	12.3%	35.7%	38.5%		24.1%	12.3%	36.4%
1969	32.6%		20.6%	17.4%	37.9%	32.6%		19.8%	10.4%	30.2%	32.6%		20.4%	10.4%	30.9%
1970	37.2%		23.5%	19.8%	43.3%	37.2%		22.6%	11.9%	34.5%	37.2%		23.3%	11.9%	35.2%
1971	37.2%		23.5%	19.8%	43.3%	37.2%		22.6%	11.9%	34.5%	37.2%		23.3%	11.9%	35.2%
1972	43.1%		27.2%	22.9%	50.1%	43.1%		26.1%	13.8%	39.9%	43.1%		27.0%	13.8%	40.7%
1973	33.3%		21.0%	17.7%	38.7%	33.3%		20.2%	10.6%	30.8%	33.3%		20.9%	10.6%	31.5%
1974	36.6%		23.0%	19.4%	42.5%	36.6%		22.2%	11.7%	33.9%	36.6%		22.9%	11.7%	34.6%
1975	30.0%		18.9%	16.0%	34.9%	30.0%		18.2%	9.6%	27.8%	30.0%		18.8%	9.6%	28.4%
1976	30.0%		18.9%	16.0%	34.9%	30.0%		18.2%	9.6%	27.8%	30.0%		18.8%	9.6%	28.4%
1977	38.5%		24.3%	20.5%	44.8%	38.5%		23.4%	12.3%	35.7%	38.5%		24.1%	12.3%	36.4%
1978	45.0%		28.4%	24.0%	52.4%	45.0%		27.3%	14.4%	41.7%	45.0%		28.2%	14.4%	42.6%
1979	46.3%		29.2%	24.7%	53.9%	46.3%		28.1%	14.8%	42.9%	46.3%		29.0%	14.8%	43.8%
1980	48.3%	25.6%	30.5%	25.7%	56.2%	48.3%	24.7%	29.3%	15.4%	44.7%	48.3%	25.5%	30.3%	15.4%	45.7%
1981	43.7%	25.6%	27.6%	23.3%	50.8%	43.7%	24.7%	26.5%	14.0%	40.5%	43.7%	25.5%	27.4%	14.0%	41.4%
1982	37.9%	25.6%	23.9%	20.1%	44.0%	37.9%	24.7%	23.0%	12.1%	35.1%	37.9%	25.5%	23.7%	12.1%	35.8%
1983	52.9%	25.6%	33.3%	28.1%	61.5%	52.9%	24.7%	32.1%	16.9%	49.0%	52.9%	25.5%	33.1%	16.9%	50.0%
1984	47.0%	25.6%	29.6%	25.0%	54.6%	47.0%	24.7%	28.5%	15.0%	43.5%	47.0%	25.5%	29.4%	15.0%	44.4%
1985	49.0%	25.6%	30.9%	26.0%	56.9%	49.0%	24.7%	29.7%	15.6%	45.3%	49.0%	25.5%	30.7%	15.6%	46.3%
1986	54.2%	25.6%	34.2%	28.8%	63.0%	54.2%	24.7%	32.9%	17.3%	50.2%	54.2%	25.5%	33.9%	17.3%	51.2%
1987	41.8%	25.6%	26.3%	22.2%	48.6%	41.8%	24.7%	25.4%	13.3%	38.7%	41.8%	25.5%	26.2%	13.3%	39.5%
1988	41.1%	25.6%	25.9%	21.9%	47.8%	41.1%	24.7%	25.0%	13.1%	38.1%	41.1%	25.5%	25.8%	13.1%	38.9%
1989	40.1%	25.6%	25.3%	21.3%	46.6%	40.1%	24.7%	24.4%	12.8%	37.2%	40.1%	25.5%	25.1%	12.8%	37.9%
1990	45.5%	25.6%	28.7%	24.2%	52.9%	45.5%	24.7%	27.6%	14.5%	42.1%	45.5%	25.5%	28.5%	14.5%	43.0%
1991	32.8%	25.6%	20.7%	29.6%	50.3%	32.8%	24.7%	19.9%	17.8%	37.6%	32.8%	25.5%	20.5%	17.8%	38.3%
1992	28.8%	25.6%	18.1%	36.5%	54.6%	28.8%	24.7%	17.5%	21.9%	39.4%	28.8%	25.5%	18.0%	21.9%	39.9%
1993	28.6%	25.6%	18.1%	28.0%	46.1%	28.6%	24.7%	17.4%	16.8%	34.2%	28.6%	25.5%	17.9%	16.8%	34.8%
1994	32.0%	25.6%	20.2%	34.7%	54.9%	32.0%	24.7%	19.4%	20.8%	40.2%	32.0%	25.5%	20.1%	20.8%	40.9%
1995	21.9%	25.6%	13.8%	18.7%	32.5%	21.9%	24.7%	13.3%	11.2%	24.5%	21.9%	25.5%	13.7%	11.2%	24.9%
1996	45.8%	25.6%	28.9%	28.1%	57.0%	45.8%	24.7%	27.8%	16.8%	44.7%	45.8%	25.5%	28.7%	16.8%	45.6%
1997	17.8%	18.3%	18.3%	35.4%	53.7%	17.8%	22.5%	22.5%	21.2%	43.7%	17.8%	23.3%	23.3%	21.2%	44.5%
1998	0.5%	3.4%	3.4%	18.0%	21.5%	0.5%	4.6%	4.6%	10.8%	15.5%	0.5%	5.3%	5.3%	10.8%	16.1%
1999	1.3%	2.7%	2.7%	20.0%	22.7%	1.3%	3.6%	3.6%	12.0%	15.6%	1.3%	4.3%	4.3%	12.0%	16.3%
2000	10.5%	2.0%	2.0%	26.9%	29.0%	10.5%	3.2%	3.2%	16.2%	19.3%	10.5%	3.9%	3.9%	16.2%	20.1%
2001	5.6%	3.8%	3.8%	23.8%	27.5%	5.6%	5.2%	5.2%	14.3%	19.5%	5.6%	6.2%	6.2%	14.3%	20.4%
2002	14.1%	5.2%	5.2%	13.3%	18.5%	14.1%	5.6%	5.6%	8.0%	13.6%	14.1%	6.5%	6.5%	8.0%	14.5%
2003	9.3%	6.2%	6.2%	18.7%	24.9%	9.3%	7.4%	7.4%	11.2%	18.7%	9.3%	8.4%	8.4%	11.2%	19.6%
2004	19.7%	7.5%	7.5%	21.8%	29.3%	19.7%	12.4%	12.4%	13.1%	25.5%	19.7%	13.3%	13.3%	13.1%	26.4%
2005	6.5%	11.6%	11.6%	22.1%	33.7%	6.5%	7.9%	7.9%	13.3%	21.2%	6.5%	8.9%	8.9%	13.3%	22.1%
2006	8.4%	7.1%	7.1%	19.0%	26.1%	8.4%	6.8%	6.8%	11.4%	18.2%	8.4%	7.7%	7.7%	11.4%	19.1%
2007	16.4%	10.0%	10.0%	29.8%	39.8%	16.4%	6.0%	6.0%	17.9%	23.9%	16.4%	6.9%	6.9%	17.9%	24.8%
2008	6.0%	7.4%	7.4%	33.6%	41.0%	6.0%	5.7%	5.7%	20.2%	25.9%	6.0%	6.6%	6.6%	20.2%	26.8%
2009	9.2%	14.5%	14.5%	29.6%	44.1%	9.2%	7.0%	7.0%	17.7%	24.7%	9.2%	7.9%	7.9%	17.7%	25.6%
2010	13.6%	8.7%	8.7%	19.4%	28.1%	13.6%	8.1%	8.1%	11.6%	19.7%	13.6%	9.0%	9.0%	11.6%	20.6%
2011	22.5%		22.5%	19.9%	42.4%	22.5%		13.5%	11.9%	25.4%	22.5%		13.5%	11.9%	25.4%
2012	9.2%		9.2%	24.5%	33.7%	9.2%		5.5%	14.7%	20.2%	9.2%		5.5%	14.7%	20.2%
2013	11.5%		11.5%	26.7%	38.1%	11.5%		6.9%	16.0%	22.9%	11.5%		6.9%	16.0%	22.9%
2014	6.9%		6.9%	17.4%	24.3%	6.9%		4.1%	10.4%	14.6%	6.9%		4.1%	10.4%	14.6%
2015	17.6%		17.6%	22.4%	40.0%	17.6%		10.6%	13.4%	24.0%	17.6%		10.6%	13.4%	24.0%
2016	18.4%		18.4%	23.0%	41.4%	18.4%		11.1%	13.8%	24.9%	18.4%		11.1%	13.8%	24.9%
2017															
Avg (1980-96)	40.7%	25.6%	25.6%			40.7%	24.7%	24.7%			40.7%	25.5%	25.5%		

Table C-6. Summary of available exploitation rates for Area 4-9 and 9-10 Coho.

	Area 4-9 - Hecate Strait Mainland					Area 9-10 - Rivers Inlet & Smith Inlet				
	CAN ER	Model CAN ER	Best CAN ER	AK ER	TOT ER	CAN ER	Model CAN ER	Best CAN ER	AK ER	TOT ER
1954-88 -->	Babine		(Adj Babine)	Babine*40%	CDN+AK	Babine		(Adj Babine)	Babine*20%	CDN+AK
1989-91 -->	(A4)		(Adj A4)	A4*40%	CDN+AK	(A4)		(Adj A4)	A4*20%	CDN+AK
1992-96 -->	(A4)		(Adj A4)	A4*40%	CDN+AK	(A4)		(Adj A4)	A4*20%	CDN+AK
1997-10 -->	(A4)		Model	A4*40%	CDN+AK	(A4)		Model	A4*20%	CDN+AK
2011-17 -->	(A4)		A4*40%	A4*40%	CDN+AK	(A4)		A4*40%	A4*20%	CDN+AK
Year										
1954	35.9%		22.5%	7.6%	30.1%	35.9%		22.1%	3.8%	25.9%
1955	35.9%		22.5%	7.6%	30.1%	35.9%		22.1%	3.8%	25.9%
1956	35.9%		22.5%	7.6%	30.1%	35.9%		22.1%	3.8%	25.9%
1957	35.9%		22.5%	7.6%	30.1%	35.9%		22.1%	3.8%	25.9%
1958	35.9%		22.5%	7.6%	30.1%	35.9%		22.1%	3.8%	25.9%
1959	35.9%		22.5%	7.6%	30.1%	35.9%		22.1%	3.8%	25.9%
1960	35.9%		22.5%	7.6%	30.1%	35.9%		22.1%	3.8%	25.9%
1961	35.9%		22.5%	7.6%	30.1%	35.9%		22.1%	3.8%	25.9%
1962	35.9%		22.5%	7.6%	30.1%	35.9%		22.1%	3.8%	25.9%
1963	32.6%		20.4%	6.9%	27.4%	32.6%		20.0%	3.5%	23.5%
1964	41.1%		25.8%	8.8%	34.5%	41.1%		25.3%	4.4%	29.6%
1965	31.3%		19.6%	6.7%	26.3%	31.3%		19.2%	3.3%	22.6%
1966	38.5%		24.1%	8.2%	32.3%	38.5%		23.7%	4.1%	27.8%
1967	30.7%		19.2%	6.5%	25.7%	30.7%		18.8%	3.3%	22.1%
1968	38.5%		24.1%	8.2%	32.3%	38.5%		23.7%	4.1%	27.8%
1969	32.6%		20.4%	6.9%	27.4%	32.6%		20.0%	3.5%	23.5%
1970	37.2%		23.3%	7.9%	31.2%	37.2%		22.9%	4.0%	26.8%
1971	37.2%		23.3%	7.9%	31.2%	37.2%		22.9%	4.0%	26.8%
1972	43.1%		27.0%	9.2%	36.2%	43.1%		26.5%	4.6%	31.0%
1973	33.3%		20.9%	7.1%	27.9%	33.3%		20.4%	3.5%	24.0%
1974	36.6%		22.9%	7.8%	30.7%	36.6%		22.5%	3.9%	26.3%
1975	30.0%		18.8%	6.4%	25.2%	30.0%		18.4%	3.2%	21.6%
1976	30.0%		18.8%	6.4%	25.2%	30.0%		18.4%	3.2%	21.6%
1977	38.5%		24.1%	8.2%	32.3%	38.5%		23.7%	4.1%	27.8%
1978	45.0%		28.2%	9.6%	37.8%	45.0%		27.7%	4.8%	32.5%
1979	46.3%		29.0%	9.9%	38.9%	46.3%		28.5%	4.9%	33.4%
1980	48.3%	25.5%	30.3%	10.3%	40.5%	48.3%	25.0%	29.7%	5.1%	34.8%
1981	43.7%	25.5%	27.4%	9.3%	36.7%	43.7%	25.0%	26.9%	4.7%	31.5%
1982	37.9%	25.5%	23.7%	8.1%	31.8%	37.9%	25.0%	23.3%	4.0%	27.3%
1983	52.9%	25.5%	33.1%	11.3%	44.4%	52.9%	25.0%	32.5%	5.6%	38.1%
1984	47.0%	25.5%	29.4%	10.0%	39.4%	47.0%	25.0%	28.9%	5.0%	33.9%
1985	49.0%	25.5%	30.7%	10.4%	41.1%	49.0%	25.0%	30.1%	5.2%	35.3%
1986	54.2%	25.5%	33.9%	11.5%	45.5%	54.2%	25.0%	33.3%	5.8%	39.0%
1987	41.8%	25.5%	26.2%	8.9%	35.1%	41.8%	25.0%	25.7%	4.4%	30.1%
1988	41.1%	25.5%	25.8%	8.8%	34.5%	41.1%	25.0%	25.3%	4.4%	29.6%
1989	40.1%	25.5%	25.1%	8.5%	33.7%	40.1%	25.0%	24.6%	4.3%	28.9%
1990	45.5%	25.5%	28.5%	9.7%	38.2%	45.5%	25.0%	27.9%	4.8%	32.8%
1991	32.8%	25.5%	20.5%	11.8%	32.4%	32.8%	25.0%	20.1%	5.9%	26.0%
1992	28.8%	25.5%	18.0%	14.6%	32.6%	28.8%	25.0%	17.7%	7.3%	25.0%
1993	28.6%	25.5%	17.9%	11.2%	29.2%	28.6%	25.0%	17.6%	5.6%	23.2%
1994	32.0%	25.5%	20.1%	13.9%	33.9%	32.0%	25.0%	19.7%	6.9%	26.6%
1995	21.9%	25.5%	13.7%	7.5%	21.2%	21.9%	25.0%	13.4%	3.7%	17.2%
1996	45.8%	25.5%	28.7%	11.2%	39.9%	45.8%	25.0%	28.1%	5.6%	33.8%
1997	17.8%	23.3%	23.3%	14.2%	37.4%	17.8%	22.8%	22.8%	7.1%	29.9%
1998	0.5%	5.3%	5.3%	7.2%	12.5%	0.5%	5.2%	5.2%	3.6%	8.8%
1999	1.3%	4.3%	4.3%	8.0%	12.3%	1.3%	4.1%	4.1%	4.0%	8.1%
2000	10.5%	3.9%	3.9%	10.8%	14.7%	10.5%	3.7%	3.7%	5.4%	9.1%
2001	5.6%	6.2%	6.2%	9.5%	15.7%	5.6%	5.7%	5.7%	4.8%	10.4%
2002	14.1%	6.5%	6.5%	5.3%	11.8%	14.1%	6.0%	6.0%	2.7%	8.7%
2003	9.3%	8.4%	8.4%	7.5%	15.8%	9.3%	7.9%	7.9%	3.7%	11.6%
2004	19.7%	13.3%	13.3%	8.7%	22.0%	19.7%	12.8%	12.8%	4.4%	17.2%
2005	6.5%	8.9%	8.9%	8.8%	17.7%	6.5%	8.4%	8.4%	4.4%	12.8%
2006	8.4%	7.7%	7.7%	7.6%	15.3%	8.4%	7.2%	7.2%	3.8%	11.0%
2007	16.4%	6.9%	6.9%	11.9%	18.9%	16.4%	6.4%	6.4%	6.0%	12.4%
2008	6.0%	6.6%	6.6%	13.4%	20.1%	6.0%	6.1%	6.1%	6.7%	12.8%
2009	9.2%	7.9%	7.9%	11.8%	19.7%	9.2%	7.4%	7.4%	5.9%	13.3%
2010	13.6%	9.0%	9.0%	7.8%	16.7%	13.6%	8.5%	8.5%	3.9%	12.4%
2011	22.5%		9.0%	7.9%	17.0%	22.5%		9.0%	4.0%	13.0%
2012	9.2%		3.7%	9.8%	13.5%	9.2%		3.7%	4.9%	8.6%
2013	11.5%		4.6%	10.7%	15.3%	11.5%		4.6%	5.3%	9.9%
2014	6.9%		2.8%	6.9%	9.7%	6.9%		2.8%	3.5%	6.2%
2015	17.6%		7.1%	9.0%	16.0%	17.6%		7.1%	4.5%	11.5%
2016	18.4%		7.4%	9.2%	16.6%	18.4%		7.4%	4.6%	12.0%
2017										
Avg (1980-96)	40.7%	25.5%	25.5%			40.7%	25.0%	25.0%		

APPENDIX D: Annual escapement and run size estimates for North and Central coast Chinook salmon

Table D-1. Annual escapement, catch and total stock size estimates for adult Chinook salmon returning to the Nass River, 1986-2017.

	Upper & Middle Nass River								Lower Nass R. & Coastal Nass Area				Total Nass Area													
		In-river Catch							In-river Catch				In-river Catch				Marine Catch[h]			Release Mortality					
		Sport											Sport													
Year	Net Esc.[a]	Git.[b]	[c]	Nisga'a[d]	Total	Run size to GW[e]	Coastal Esc. Obs.	Factor	Net Esc.[f]	Sport[c]	Nisga'a[d]	Total	Net Esc.[g]	Git.[b]	[c]	Nisga'a[d]	Total	Comm.	Sport	Total	Comm	Sport	Nisga'a	Total Return to Canada[i]	Alaskan catch[j]	Total Run[k]
1986	36,523	*166*	*331*	*939*	*1,436*	*37,959*			2,138	*0*	*3,038*	*3,038*	38,661	*166*	*331*	*3,977*	*4,474*	*3,259*	*1,933*	*5,192*				48,327	700	49,027
1987	19,540	*92*	*184*	*521*	*797*	*20,337*			1,930	*0*	*1,687*	*1,687*	21,470	*92*	*184*	*2,208*	*2,484*	*1,810*	*1,074*	*2,884*				26,838	700	27,538
1988	15,345	*72*	*144*	*409*	*625*	*15,970*			1,503	*0*	*1,324*	*1,324*	16,848	*72*	*144*	*1,733*	*1,949*	*1,420*	*842*	*2,262*				21,059	700	21,759
1989	28,133	*125*	*250*	*709*	*1,084*	*29,217*			1,068	*0*	*2,295*	*2,295*	29,201	*125*	*250*	*3,004*	*3,379*	*2,461*	*1,460*	*3,921*				36,501	700	37,201
1990	24,051	*114*	*227*	*644*	*985*	*25,036*			2,460	*0*	*2,083*	*2,083*	26,511	*114*	*227*	*2,727*	*3,068*	*2,235*	*1,326*	*3,561*				33,140	700	33,840
1991	6,907	*73*	*146*	*415*	*634*	*7,541*			1,019	*0*	*1,341*	*1,341*	7,926	*73*	*146*	*1,756*	*1,975*	*1,439*	*854*	*2,293*				12,194	700	12,894
1992	16,808	612	1,339	1,308	3,259	20,067	605	*1.50*	908	0	5,751	5,751	17,716	612	1,339	7,059	9,010	5,465	3,207	8,672				35,397	700	36,097
1993	24,814	600	983	1,526	3,109	27,923	693	*1.50*	1,039	0	4,060	4,060	25,853	600	983	5,586	7,169	7,809	4,583	12,393				45,414	700	46,114
1994	21,169	120	893	2,098	3,111	24,280	2,468	*1.50*	3,703	0	4,115	4,115	24,872	120	893	6,213	7,226	6,731	3,951	10,682				42,780	700	43,480
1995	7,844	72	695	1,812	2,579	10,423	649	*1.50*	973	0	4,904	4,904	8,817	72	695	6,716	7,483	3,409	2,001	5,409				21,709	700	22,409
1996	21,842	49	477	1,834	2,360	24,202	738	*1.50*	1,108	0	5,866	5,866	22,950	49	477	7,700	8,226	6,538	3,837	10,376				41,551	700	42,251
1997	18,702	41	203	1,877	2,121	20,823	1,090	*1.50*	1,635	0	4,828	4,828	20,337	41	203	6,705	6,949	5,664	3,324	8,989				36,275	700	36,975
1998	23,213	345	196	1,595	2,136	25,349	975	*1.50*	1,462	0	7,470	7,470	24,675	345	196	9,065	9,606	7,191	4,221	11,412				45,693	700	46,393
1999	11,544	193	82	1,608	1,883	13,427	655	*1.50*	982	0	7,309	7,309	12,526	193	82	8,917	9,192	4,562	2,677	7,239				28,957	700	29,657
2000	18,047	49	1,023	2,498	3,570	21,617	868	*1.50*	1,302	214	6,828	7,042	19,348	49	1,237	9,326	10,612	1,826	986	2,812				32,773	700	33,473
2001	28,329	195	722	5,457	6,374	34,703	1,551	*2.59*	4,011	328	6,307	6,635	32,340	195	1,050	11,764	13,009	928	1,705	2,633				47,982	700	48,682
2002	13,352	151	703	1,875	2,729	16,081	731	*1.99*	1,452	167	3,556	3,723	14,804	151	870	5,431	6,452	5,980	1,116	7,096				28,352	700	29,052
2003	25,848	181	1,030	2,403	3,614	29,462	1,415	*1.71*	2,425	160	4,306	4,466	28,274	181	1,190	6,709	8,080	6,076	1,167	7,243				43,597	700	44,297
2004	15,185	230	643	1,926	2,799	17,984	831	*2.03*	1,691	287	3,950	4,237	16,875	230	930	5,876	7,036	6,689	1,925	8,614	1080	84	108	33,797	598	34,395
2005	13,706	179	617	2,262	3,058	16,764	750	*2.49*	1,865	156	4,283	4,439	15,571	179	773	6,545	7,497	3,115	1,542	4,657	498	0	56	28,279	251	28,530
2006	23,594	456	1,043	3,525	5,024	28,618	1,292	*3.46*	4,467	268	4,181	4,449	28,061	456	1,311	7,706	9,473	4,513	983	5,496	437	0	103	43,570	1750	45,320
2007	22,136	24	993	4,020	5,037	27,173	1,212	*2.33*	2,828	525	2,704	3,229	24,964	24	1,518	6,724	8,266	4,031	1,810	5,841	781	0	90	39,942	274	40,216
2008	19,630	174	798	1,085	2,057	21,687	1,075	*2.33*	2,508	519	3,365	3,884	22,138	174	1,317	4,450	5,941	385	1,620	2,005	92	0	26	30,202	190	30,392
2009	26,226	148	1,103	2,785	4,036	30,262	1,436	*2.33*	3,350	193	2,650	2,843	29,576	148	1,296	5,435	6,879	1,123	1,316	2,439	304	0	84	39,282	1111	40,393
2010	18,381	88	534	1,703	2,325	20,706	1,006	*2.33*	2,348	13	2,878	2,891	20,729	88	547	4,581	5,216	822	399	1,221	173	46	62	27,447	696	28,143
2011	9,600	103	542	1,232	1,877	11,477	526	*2.33*	1,226	27	3,352	3,379	10,826	103	569	4,584	5,256	1,204	898	2,102	254	73	21	18,532	482	19,014
2012	8,688	105	532	1,460	2,097	10,785	476	*2.33*	1,110	18	2,087	2,105	9,797	105	550	3,547	4,202	794	494	1,288	503	15	66	15,871	413	16,284
2013	8,011	52	466	1,711	2,229	10,240	439	*2.33*	1,023	6	2,641	2,647	9,034	52	472	4,352	4,876	1,084	518	1,602	898	42	107	16,559	431	16,990
2014	11,509	72	863	1,941	2,876	14,385	630	*2.33*	1,470	1	3,973	3,974	12,979	72	864	5,914	6,850	1,645	734	2,379	415	79	116	22,818	584	22,792
2015	18,262	252	573	3,175	4,000	22,262	1,000	*2.33*	2,333	16	5,076	5,092	20,595	252	589	8,251	9,092	1,800	686	2,486				32,173	846	33,019
2016	9,037	114	339	1,519	1,972	11,009	495	*2.33*	1,154	2	3,877	3,879	10,192	114	341	5,396	5,851	739	764	1,503				17,546	461	18,007
2017	4,419	65	146	1,047	1,258	5,677	242	*2.33*	565	53	2,596	2,649	4,984	65	199	3,643	3,907	1,047	776	1,823				10,714	282	10,996
Mean:																										
1992-1999	18,200	300	600	1,700	2,600	20,800			1,500	0	5,500	5,500	19,700	300	600	7,200	8,100	5,900	3,500	9,400				37,200	700	37,900
2000+	16,300	100	700	2,300	3,200	18,800			2,100	200	3,800	4,000	18,400	100	900	6,100	7,100	2,400	1,100	3,500	500	0	100	29,400	600	30,000
1994+	16,600	100	600	2,200	3,000	19,000			2,000	100	4,300	4,400	18,600	100	800	6,500	7,400	3,200	1,600	4,900	500	0	100	31,100	600	31,700
Min	4,419	24	82	1,047	1,258	5,677			565	0	2,087	2,105	4,984	24	82	3,547	3,907	385	399	1,221	92	0	21	10,714	190	10,996
Max	28,329	612	1,339	5,457	6,374	34,703			4,467	525	7,470	7,470	32,340	612	1,518	11,764	13,009	7,809	4,583	12,393	1,080	84	116	47,982	1,750	48,682

Table D-1 cont.

[a] Net escapement estimates are from radio telemetry (1992-1993; Koski et al. 1996ab) and mark recapture (1994-current) fishwheel programs (see annual reports cited in text) conducted by Nisga'a Fisheries.

[b] Chinook salmon catches in the Gitanyow fishery are from radio telemetry estimates for 1992-1993, and for other years from DFO (Jim Steward, Prince Rupert, BC, pers. comm.) and GFA (Greg Rush, Kitwanga, BC).

[c] In-river sport catch estimates of Nass Chinook salmon from 1992-2004 are from Baxter (2005), and 2005-10 are from Nisga'a Fisheries (2006-2011).

[d] Nisga'a catch estimates of Nass River Chinook salmon from 1992 to 2005 are from Stephens and Humble (2006), and 2006-10 are from Nisga'a Fisheries (2007-2011).

[e] Run size estimates of Nass River Chinook salmon to Gitwinksihlkw are derived by summing the Upper and Middle net escapement and in-river catch.

[f] Net escapement estimates of Chinook salmon for the Lower Nass and Coastal areas are calculated in two steps. The first step sums observed escapements from DFO aerial surveys of Ishkeenickh, Iknouk, Kincolith, Kwinamass, and Kitsault systems; and correcting for missing data based on proportions among systems for 1977-current year. The second step expands the summed escapement in step 1 to account for true escapement; 150% for 1992-2000; 2001-2006 by observed proportion of mark-recapture (Kwinamass) and/or weir (Kincolith) estimates to visual surveys conducted on Kwinamass and Kincolith rivers; and 233% for 2007-current year as the mean mark-recapture expansion estimate from Kwinamass (2002-2006), respectively.

[g] The total net escapement estimate of adult Nass Chinook salmon to the Nass River are derived by summing the Upper and Middle net escapement to the Lower and Coastal net escapement estimate.

[h] Estimates are provided by the Nisga'a-Canada-BC Joint technical committee.

[i] Total Return to Canada estimates for Nass River Chinook salmon are derived by summing the total estimates of net escapement, in-river catch and marine catch.

[j] Alaskan catch data were updated by DFO (Ivan Winther, Prince Rupert, BC) in May 2011 for 1992-2010 based on results from genetic analyses. For 2011-current year, 2.7% ER (from 2010) is being used to calculate Alaskan catch until genetic data are available.

[k] Total run size estimates for Nass River Chinook salmon are derived by summing the Total Return to Canada and Alaskan catch.

Table D-2. Annual escapement estimates for Chinook indicator streams and total stock size estimates for Skeena River Chinook, 1984-2017. Revised escapement estimates from Tyee Test fishery DNA and Kitsumkalum estimates (Ivan Winther, DFO, pers. comm.).

Year	Babine	Bear	Kispiox	Morice	Kitsumkalum	Johnston	Index Streams Totals		Stat. Area 4		Revised	First Nation	Commercial	Sport	Return to	Alaska	Total
	River	River	River	River	River	Creek	Obs.	Adj.	Obs.	Est.[1]	Esc.	Harvest [2]	Catch [3]	Catch [3]	Canada	Catch[4]	Run
	fence count																
1984	1,400	12,000	1,100	4,500	11,825	100	30,925	30,925	38,707	46,935	**51,348**	9,585	22,182	0	83,115	29,166	112,281
1985	658	21,500	2,300	11,300	8,308	600	44,666	44,666	55,906	67,789	**30,875**	12,390	12,980	0	56,245	19,155	75,400
1986	252	17,000	4,000	15,000	10,151	600	47,003	47,003	58,831	71,336	**28,398**	21,344	9,948	1,008	60,698	4,470	65,168
1987	711	7,200	4,000	10,000	24,508	200	46,619	46,619	58,351	70,753	**150,874**	11,770	41,147	10,106	213,898	38,501	252,398
1988	1,057	14,000	5,000	12,000	22,755	800	55,612	55,612	69,607	84,402	**91,496**	17,035	63,532	15,944	188,007	74,570	262,578
1989	1,983	12,500	3,500	10,200	19,900	250	48,333	48,333	60,496	73,355	**72,422**	14,814	20,580	8,857	116,674	28,265	144,939
1990	1,604	10,000	4,500	12,000	20,000	300	48,404	48,404	58,811	70,828	**64,188**	23,752	15,268	8,621	111,829	15,476	127,304
1991	1,043	5,500	3,500	25,500	9,200	150	44,893	44,893	54,545	65,691	**41,940**	15,375	28,912	15,085	101,312	27,312	128,624
1992	1,685	10,500	14,000	16,000	14,000		56,185	56,349	68,464	82,454	**103,365**	15,526	29,935	11,974	160,800	30,111	190,912
1993	1,290	23,000	3,400	18,000	15,000	50	60,740	60,740	73,799	88,879	**119,780**	13,062	68,110	9,629	210,582	37,108	247,690
1994	395		4,500		14,000	50	18,945	49,446	60,077	72,353	**78,228**	9,811	34,269	8,567	130,875	19,241	150,116
1995	493	9,500	2,300	10,500	6,312		29,105	29,190	35,466	42,713	**62,272**	6,544	59,852	12,099	140,768	27,264	168,032
1996	1,893	19,000	4,300	30,000	11,849		67,042	67,238	81,693	98,387	**155,637**	6,091	45,913	12,192	219,832	45,913	265,745
1997	1,128	9,500	3,700	18,000	5,342		37,670	37,780	45,902	55,282	**57,368**	7,730	7,313	10,163	82,574	20,136	102,710
1998	2,753	8,500	5,500	14,000	9,521		40,274	40,391	49,075	59,104	**80,677**	11,577	1,219	5,690	99,163	14,124	113,287
1999	579	6,000	6,000	17,000	10,000		39,579	39,694	48,229	58,084	**53,418**	17,316	1,818	11,515	84,067	19,913	103,980
2000	2,927	10,000		17,000	14,533	200	44,660	51,990	64,082	77,433	**95,563**	13,452	10,926	17,851	137,792	29,546	167,338
2001	3,531	12,000	8,000	18,000	24,076	150	65,757	65,757	81,051	97,938	**145,120**	10,354	26,519	18,907	200,901	55,003	255,904
2002	2,332	2,500	3,514	7,500	23,849		39,695	39,860	49,130	59,367	**89,235**	6,290	6,875	18,871	121,271	30,574	151,845
2003	3,348	6,000	6,400	10,000	23,608		49,356	49,561	61,088	73,815	**114,346**	10,803	10,800	16,115	152,064	30,001	182,065
2004	1,667	3,000		4,800	25,767		35,234	41,215	50,801	61,385	**142,141**	11,428	4,320	23,862	181,750	35,381	217,131
2005	1,876	1,400		7,000	15,046		25,322	29,620	36,510	44,116	**77,531**	7,958	4,177	19,840	109,505	28,715	138,221
2006	3,538	1,700		13,000	12,368		30,606	35,801	44,128	53,322	**84,199**	8,396	12,801	16,641	122,036	28,446	150,482
2007	2,096	800		11,000	16,265		30,161	35,281	43,487	52,547	**85,179**	5,829	4,614	12,845	108,468	22,074	130,542
2008	2,363	7,818		6,000	10,374		26,555	31,063	38,287	46,264	**71,446**	10,318	21,301	41,270	144,335	13,905	158,239
2009	1,618	8,597		12,082	10,703		33,000	38,602	47,580	57,493	**80,900**	8,136	2,369	9,950	101,354	24,163	125,518
2010	3,161	6,646	3,357	11,897	13,712		38,773	35,507	43,765	52,883	**101,486**	8,061	4,730	23,078	137,355	14,047	151,403
2011	1,835	1,638		16,263	12,105		31,841	32,337	39,858	48,162	**53,682**	7,179	7,446	14,027	82,334	11,256	93,590
2012	1,370	3,066		17,471	9,363		31,270	31,757	39,143	47,298	**33,473**	7,050	1,168	5,011	46,702	8,466	55,168
2013	1,795	2,668		9,321	10,934		24,718	25,103	30,941	37,388	**39,179**	5,573	3,970	6,213	54,935	8,169	63,105
2014	978	4,582		9,047	10,308		24,915	25,303	31,188	37,686	**44,200**	5,617	1,715	11,611	63,143	8,510	71,653
2015	2,803	4,711		16,282	14,500		38,296	38,892	47,938	57,926	**53,770**	8,634	3,432	12,760	78,597	17,953	96,550
2016	2,083	1,842		14,728	10,500		29,153	29,607	36,493	44,096	**31,297**	6,573	4,866	1,690	44,426	10,449	54,876
2017		1,328	NI	3,388			4,716				**16,837**	4,500	1,531	3,853	26,721	3,700	30,421
Averages																	
1980s	1,010	14,033	3,317	10,500	16,241	425	45,526	45,526	56,983	69,095	70,902	14,490	28,395	5,986	119,773	32,355	152,127
1990s	1,286	11,278	5,170	17,889	11,522	138	44,284	47,413	57,606	69,377	81,687	12,678	29,261	10,553	134,180	25,660	159,840
2000s	2,530	5,382	5,971	10,638	17,659	175	38,035	41,875	51,614	62,368	98,566	9,296	10,470	19,615	137,948	29,781	167,728
2010s	2,004	3,310	3,357	12,300	11,632		27,960	31,215	38,475	46,491	46,741	6,648	3,607	9,780	66,777	10,319	77,096
1980s	2%	31%	7%	23%	36%	1%			80%			30%	58%	12%			
1990s	3%	24%	11%	38%	24%	0%			82%			24%	56%	20%			
2000s	6%	13%	14%	25%	42%	0%			81%			24%	27%	50%			
2010s	6%	11%	11%	39%	37%	0%			81%			33%	18%	49%			

[1] Estimated total escapement = (104% of index stock escapement + 135% of other stock escapement)* 110% for missed stocks (mainstem spawners).

[2] FN chinook catch estimates for 2011-16 based on ratio of the 2000-09 average FN Catch to Area 4 escapement.

[3] Canadian commercial and sport catch estimates for 1984-2014 derived from the total mortality estimates for Kalum Chinook, 2016 estimates based on DNA data.

[4] Alaska catch estimates for 1984-2014 derived from the total mortality estimates for Kalum Chinook, 2015-16 estimates based on 2014 Kalum estimates.

Table D-3. Annual escapement and total stock size estimates for Area 6 Chinook Salmon, 1980-2017.

Year	Wahoo River	Brim River	Khutze River	Index Stream Total Obs.	Index Stream Total Adj. [1]	Total Area 6 Escapement [2]	Exp Factor 2	CDN Harvest	Alaska Harvest	Total Run	Marine CDN ER	Marine TOT ER
1980	50	150	60	260	260	1,044	4.0	404	193	1,640	25%	36%
1981	100	150	10	260	260	1,044	4.0	404	193	1,640	25%	36%
1982	150	200	35	385	385	1,545	4.0	598	285	2,429	25%	36%
1983	100	200	40	340	340	1,365	4.0	528	252	2,145	25%	36%
1984	50	200	38	288	288	1,156	4.0	447	213	1,817	25%	36%
1985	50	125	30	205	205	823	4.0	318	152	1,293	25%	36%
1986	50	200	40	290	290	1,164	4.0	450	215	1,829	25%	36%
1987	10	150	71	231	231	927	4.0	359	171	1,457	25%	36%
1988		50	20	70	156	627	4.0	243	116	986	25%	36%
1989		50	25	75	167	672	4.0	260	124	1,056	25%	36%
1990	200	20	60	280	280	1,124	4.0	482	496	2,102	23%	47%
1991	25	10	62	97	97	389	4.0	133	38	560	24%	30%
1992	100	20	30	150	150	602	4.0	284	90	976	29%	38%
1993	200	10	42	252	252	1,012	4.0	350	173	1,534	23%	34%
1994	110	25	20	155	155	622	4.0	226	73	921	25%	32%
1995	78	12	29	119	119	478	4.0	128	37	643	20%	26%
1996	100			100	181	727	4.0	114	27	868	13%	16%
1997	70	25	55	150	150	602	4.0	105	45	751	14%	20%
1998	180	12	38	230	230	923	4.0	242	97	1,262	19%	27%
1999	35	16	31	82	82	329	4.0	47	35	411	11%	20%
2000			25	25	167	672	4.0	85	53	809	11%	17%
2001	185	20	12	217	217	871	4.0	189	104	1,164	16%	25%
2002	185	20		205	241	967	4.0	509	86	1,562	33%	38%
2003	130	10	35	175	175	702	4.0	540	69	1,311	41%	46%
2004	80	30	17	127	127	510	4.0	313	90	913	34%	44%
2005	130	5	16	151	151	606	4.0	433	181	1,220	35%	50%
2006	200		19	219	312	1,253	4.0	323	177	1,753	18%	29%
2007	500			500	906	3,636	4.0	1,794	1,102	6,532	27%	44%
2008	110		35	145	207	830	4.0	131	104	1,065	12%	22%
2009	322			322	583	2,342	4.0	1,282	375	3,999	32%	41%
2010	60	10		70	82	330	4.0	129	63	522	25%	37%
2011	4			4	7	29	4.0	26	9	65	40%	55%
2012	30			30	54	218	4.0	80	49	347	23%	37%
2013	140	3		143	168	675	4.0	112	43	829	13%	19%
2014	185	20		205	241	967	4.0	193	89	1,249	15%	23%
2015	230			230	414	1,656	4.0	309	89	2,053	15%	19%
2016	120	3		123	145	578	4.0	78	44	700	11%	17%
2017	125			125	225	900	4.0	121	68	1,089	11%	17%

[1] Filled in missing data for indicator streams using 1980-2010 average contribution.

[2] Expansion for other streams with no enhancement in Area 6 using 1980-2010 average contribution.

Table D-4. Annual escapement and total stock size estimates for Area 8 Chinook Salmon, 1985-2017.

Year	Atnarko River[1]	Bella Coola River[2]	Dean River[3]	Index Stream Total Obs.	Index Stream Total Adj.[4]	Total Area 8 Escapement[5]	First Nation Harvest[6]	Commercial Catch[7]	Sport Catch[7]	Return to Canada	Alaska Harvest[7]	Total Run
1985		27,560	4,000	31,560	32,960	33,765	1,656	5,056	2,543	43,021	6,851	49,871
1986		21,300	3,300	24,600	25,755	26,009	1,984	3,647	1,835	33,474	4,941	38,416
1987		14,425	1,144	15,569	15,969	16,618	1,305	2,317	1,166	21,406	3,139	24,545
1988		15,000	1,300	16,300	16,755	17,398	791	2,627	1,322	22,138	3,559	25,697
1989		22,000	2,300	24,300	25,105	25,422	1,961	3,557	1,789	32,729	4,819	37,549
1990	14,537	17,000	2,000	19,000	19,700	20,282	1,689	4,168	278	26,416	9,446	35,863
1991	12,098	17,800	2,400	20,200	21,040	21,283	1,631	1,770	1,770	26,454	2,288	28,742
1992	28,590	27,000	3,000	30,000	31,050	31,442	2,779	6,242	3,121	43,584	5,144	48,728
1993	30,824	35,000	700	35,700	35,945	37,152	2,738	5,068	3,530	48,488	6,788	55,276
1994	24,514	26,800	1,300	28,100	28,555	29,514	1,275	2,895	1,434	35,117	3,625	38,742
1995	20,376	32,000	1,100	33,100	33,485	34,609	3,201	3,490	3,604	44,904	3,037	47,941
1996	18,067	25,000	2,000	27,000	27,700	28,630	3,015	2,163	2,941	36,749	1,214	37,963
1997	9,788	18,000	1,400	19,400	19,890	20,558	3,036	2,757	2,543	28,894	1,820	30,714
1998	11,719	22,000	3,000	25,000	26,050	26,925	4,827	4,551	4,298	40,601	3,455	44,056
1999	14,398	25,000	1,800	26,800	27,430	28,351	3,103	1,618	3,126	36,197	3,345	39,543
2000	15,096	25,000	1,200	26,200	26,620	27,514	3,335	2,914	2,951	36,713	2,508	39,221
2001	20,929	24,000	3,795	27,795	29,123	30,101	3,606	4,331	3,479	41,516	4,331	45,847
2002	10,427	14,000	3,700	17,700	18,995	19,633	2,832	6,760	2,883	32,108	2,038	34,145
2003	11,925	15,000	3,700	18,700	19,995	20,666	3,103	5,367	8,811	37,947	2,563	40,510
2004	10,287	17,500	3,500	21,000	22,225	22,971	3,838	5,466	6,020	38,295	4,843	43,138
2005	10,159	17,500	2,200	19,700	20,470	21,157	3,894	6,013	9,187	40,251	7,739	47,990
2006	16,781	26,000	3,700	29,700	30,995	32,036	3,878	3,288	4,931	44,133	5,001	49,134
2007	7,160	11,000	2,300	13,300	14,105	14,579	1,896	2,326	3,645	22,446	5,196	27,642
2008	6,341	9,000	1,100	10,100	10,485	10,837	2,821	856	285	14,799	1,426	16,225
2009	8,917	10,600	1,400	12,000	12,490	12,909	3,729	3,558	2,689	22,886	2,648	25,534
2010	9,317	13,389	1,600	14,989	15,549	16,071	3,626	4,316	3,353	27,366	3,815	31,182
2011	8,082	9,100	750	9,850	10,113	10,452	1,767	4,523	3,216	19,957	4,171	24,128
2012	4,622	5,800	909	6,709	7,028	7,264	1,126	2,199	683	11,272	2,033	13,305
2013	19,962	24,777	3,885	28,662	30,022	31,030	4,811	4,755	3,703	44,300	2,347	46,647
2014		20,800	3,262	24,062	25,203	26,049	4,039	4,904	4,339	39,331	2,935	42,266
2015	44,594	44,594	1,500	46,094	46,619	48,184	8,659	4,657	4,789	66,289	2,836	69,125
2016	24,634	24,634	3,863	28,497	29,849	30,851	4,783	6,285	4,696	46,615	2,891	49,506
2017	10,934	10,934	730	11,664	11,920	12,320	2,123	2,510	1,875	18,828	1,154	19,983
Averages												
2000-09	11,802	16,960	2,660			21,240	3,293					
1990-94								4,029	2,026	36,012	5,458	
								35%	18%		47%	

Assumptions:

[1] Atnarko escapement estimates (excluding jacks) from Velez-Espino et a. (2014)

[2] Bella Coola escapement estimates from NuSEDS database (Bruce Baxter, DFO, pers. comm. 2015).

[3] Filled in missing Dean escapement estimates for 2012-14 and 2016 using ratio of Dean to Bella Coola escapement for 2000-09.

[4] Expansion factor for Dean River observer efficiency & small stream observer efficiency: 1.35

[5] Filled in missing data for small stream stocks from 1993-2003 using the average ratio of BC/Dean counts to small stream counts from 1977-92: 1.034

[6] Filled in missing First Nations catch harvest estimates for 2011-17 using ratio of FN Harvest to Bella Coola escapement for 2000-09. 19.4%

[7] Canadian commercial and sport catch and Alaska catch estimated using 2016 exploitation rates.

Table D-5. Annual escapement and total stock size estimates for Area 9 summer Chinook salmon, 1980-2017.

	Kilbella	Chuckwalla	Ashlulm	Neechanz	Index Stream Totals		Stat. Area 9		First Nation	Central	North	North	Canadian	Return to	Alaska	Total	CDN	Total
Year	River	River	Creek	River	Obs.	Adj.	Obs.	Est.[1]	Harvest[2]	Sport[3]	Sport[3]	Comm[3]	Catch	Canada	Catch[3]	Run	ER	ER
1980			25		25	651	939	1,409		139	0	178	321	1,729	282	2,012	16%	30%
1981	75	25	25		125	140	201	302		22	0	29	51	353	46	399	13%	24%
1982	400	550	50	75	1,075	1,075	1,551	2,327		246	0	316	562	2,889	500	3,389	17%	31%
1983	1,000	400	20	75	1,495	1,495	2,157	3,236		259	0	333	639	3,875	526	4,402	15%	26%
1984	175	400		75	650	676	975	1,463		126	0	161	327	1,790	255	2,045	16%	28%
1985	300	40	4	14	358	358	517	775		62	0	80	147	922	126	1,048	14%	26%
1986	150	25	60	26	261	261	377	565		62	0	80	145	710	127	836	17%	32%
1987	500	200	12	20	732	732	1,056	1,584		148	0	190	343	1,927	300	2,227	15%	29%
1988	200	175	10	20	405	405	584	877		69	0	115	189	1,066	146	1,212	16%	28%
1989	23	25	3	200	251	251	362	543		40	0	57	97	640	90	730	13%	26%
1990	80	40	15	400	535	535	772	1,158		95	0	115	211	1,369	227	1,596	13%	27%
1991	75	50	10		135	151	218	326		33	0	42	75	402	76	478	16%	32%
1992	400	150	10		560	625	902	1,353		141	0	141	282	1,635	193	1,829	15%	26%
1993	250	125	10	50	435	435	628	942		122	0	122	244	1,186	113	1,298	19%	27%
1994	200	100			300	350	505	758		72	4	81	157	915	56	971	16%	22%
1995	55	45			100	117	168	253		12	2	14	29	282	11	293	10%	14%
1996	300	200			500	583	842	1,263		82	0	82	164	1,427	59	1,486	11%	15%
1997	600	320	60		980	1,094	1,579	2,369		378	0	378	757	3,125	254	3,379	22%	30%
1998	1,000	780	10	22	1,812	1,812	2,615	3,922		477	0	496	990	4,912	59	4,971	20%	21%
1999	1,710	453	8	20	2,191	2,191	3,162	4,742		664	0	671	1,335	6,077	365	6,442	21%	26%
2000	1,232	898	230	149	2,509	2,509	3,620	5,431		620	0	625	1,245	6,676	340	7,016	18%	23%
2001	1,298	700	147	444	2,589	2,589	3,736	5,604		885	0	893	1,779	7,383	486	7,869	23%	29%
2002	1,600	600	250	330	2,780	2,780	4,012	6,017		890	0	898	1,790	7,807	489	8,296	22%	27%
2003	600	300	80		980	1,094	1,579	2,369		359	0	359	717	3,086	81	3,167	23%	25%
2004	550	400	100	140	1,190	1,190	1,717	2,576		477	0	477	954	3,530	444	3,974	24%	35%
2005	725	360	70	120	1,275	1,275	1,840	2,760		466	0	471	958	3,718	394	4,112	23%	33%
2006	610	320	65	115	1,110	1,110	1,602	2,403		397	0	452	857	3,260	349	3,608	24%	33%
2007	295	205	65	95	660	660	952	1,429		158	2	181	343	1,771	125	1,896	18%	25%
2008	350	180	70	100	700	700	1,010	1,515		78	0	138	239	1,754	145	1,899	13%	20%
2009	350	200	60	100	710	710	1,025	1,537		126	0	146	284	1,821	211	2,033	14%	24%
2010	150	75			225	262	379	568		86	0	100	188	756	79	835	23%	32%
2011		200			200	591	853	1,280		203	0	313	524	1,804	680	2,484	21%	48%
2012	170				170	328	473	709		71	0	90	165	874	102	976	17%	27%
2013	500				500	964	1,390	2,086		214	0	261	483	2,569	535	3,104	16%	33%
2014	300				300	578	834	1,251		151	0	218	376	1,627	830	2,458	15%	49%
2015	157	126			283	330	476	715		143	0	261	405	1,120	652	1,772	23%	60%
2016	81	78			159	185	268	402		42	0	89	132	534	232	766	17%	48%
2017	134	58			192	224	323	485		64	0	64	138	623	150	773	18%	37%

Assumptions:

[1] The adjusted escapement estimates are 150% of the recorded escapement.

[2] First Nations catch in Area 9 was assumed to be Wannock chinook.

[3] Exploitation rates for Area 9 summer Chinook were assumed to be equal to those for Wannock Chinook for each marine fishery.

Table D-6. Annual escapement and total stock size estimates for Area 9 Wannock Chinook salmon, 1980-2017.

Year	Wannock River [1]	Adjusted Escapement [2]	First Nation Harvest[3]	Central Sport[4]	North Sport[5]	North Comm[6]	Canadian Catch	Return to Canada[7]	Alaska Catch	Total Run	CDN ER	Total ER	Alaska ER
1980	2,000	3,885	10	383	0	492	885	4,770	779	5,549	16%	30%	14%
1981	3,000	5,827		432	0	555	987	6,814	878	7,692	13%	24%	11%
1982	750	1,457		154	0	198	352	1,809	313	2,122	17%	31%	15%
1983	1,750	3,399	50	272	0	350	672	4,071	553	4,623	15%	26%	12%
1984	750	1,457	40	125	0	161	326	1,783	254	2,037	16%	28%	12%
1985	3,000	5,827	37	467	0	600	1,104	6,931	949	7,880	14%	26%	12%
1986	6,000	11,654	50	1,285	0	1,652	2,987	14,641	2,612	17,253	17%	32%	15%
1987	4,500	8,740	28	815	0	1,047	1,890	10,630	1,657	12,287	15%	29%	13%
1988	4,000	7,769	50	612	0	1,015	1,677	9,446	1,292	10,738	16%	28%	12%
1989	3,000	5,827	0	428	0	610	1,038	6,865	964	7,829	13%	26%	12%
1990	3,500	6,798	0	560	0	678	1,238	8,036	1,335	9,370	13%	27%	14%
1991	4,000	7,769		793	0	1,004	1,797	9,566	1,818	11,384	16%	32%	16%
1992	7,500	14,567	3	1,516	0	1,516	3,035	17,602	2,079	19,681	15%	26%	11%
1993	8,000	15,538	1	2,013	0	2,013	4,027	19,565	1,859	21,424	19%	27%	9%
1994	3,500	6,798		650	36	727	1,413	8,211	499	8,710	16%	22%	6%
1995	3,000	5,827	0	286	51	333	669	6,496	261	6,758	10%	14%	4%
1996	2,500	4,856		316	0	316	632	5,488	227	5,715	11%	15%	4%
1997	4,000	7,769		1,241	0	1,241	2,482	10,251	832	11,083	22%	30%	8%
1998	3,500	6,798	30	826	0	860	1,716	8,514	103	8,617	20%	21%	1%
1999	500	971		136	0	137	273	1,244	75	1,319	21%	26%	6%
2000	4,500	8,740		997	0	1,007	2,004	10,744	548	11,291	18%	23%	5%
2001	3,000	5,827	1	920	0	929	1,850	7,677	505	8,182	23%	29%	6%
2002	2,800	5,438	2	804	0	812	1,618	7,056	442	7,497	22%	27%	6%
2003	1,000	1,942		294	0	294	588	2,530	66	2,596	23%	25%	3%
2004	3,000	5,827	0	1,079	0	1,079	2,158	7,985	1,005	8,990	24%	35%	11%
2005	4,500	8,740	67	1,477	0	1,491	3,035	11,775	1,246	13,022	23%	33%	10%
2006	3,000	5,827	22	962	0	1,095	2,079	7,906	845	8,752	24%	33%	10%
2007	4,500	8,740	12	968	11	1,105	2,096	10,836	765	11,602	18%	25%	7%
2008	5,000	9,711	149	501	0	884	1,534	11,245	929	12,174	13%	20%	8%
2009	3,800	7,381	63	604	0	699	1,366	8,747	1,016	9,763	14%	24%	10%
2010	4,000	7,769	21	1,181	0	1,372	2,574	10,343	1,077	11,420	23%	32%	9%
2011	4,200	8,157	55	1,293	0	1,994	3,342	11,499	4,331	15,830	21%	48%	27%
2012	3,800	4,200	22	423	0	532	977	5,177	601	5,778	17%	27%	10%
2013	4,000	6,400	25	658	0	801	1,484	7,884	1,643	9,526	16%	33%	17%
2014	3,740	3,960	22	478	0	690	1,190	5,150	2,628	7,778	15%	49%	34%
2015	5,054	9,540	22	1,907	0	3,481	5,410	14,950	8,701	23,651	23%	60%	37%
2016	5,200	7,840	15	823	0	1,742	2,580	10,420	4,538	14,959	17%	48%	30%
2017	1,029	5,970	131	782	0	782	1,695	7,665	1,849	9,514	18%	37%	19%

Assumptions:

[1] Mark recapture (MR) studies were conducted in 1991 (4,000 females), 1992 (15,000 fish), 1993 (17,400 fish) and 2000 (7,433 fish; PST report). Carcass counts were expanded by the average ratio of MR estimates to carcass counts in 1992, 1993 and 2000.

[2] DIDSON/ARIS sonar system counts for 2012-17 (English et al. 2018); expansion factor (1980-2011) based on ratio of MR and carcass counts: 1.94

[3] First Nations catch in Area 9 was assumed to be Wannock chinook and a component of the escapement estimates, therefore, not included in the total catch estimates.

[4] Central Coast sport catch of Wannock chinook derived from annual catch estimates and adjusted escapement estimates.

[5] North Coast sport catch estimate was derived form CWT data using the ratio of the estimated CWT recoveries in the Central Sport and North Sport fisheries.

[6] North Coast commercial catch estimate was derived form CWT data using the ratio of the estimated CWT recoveries in the Central Sport and North commercial fisheries.

[7] Total return to Canada = sum of the Canadian catch and adjusted escapement estimates.

Table D-7. Annual escapement and total stock size estimates for Area 10 Chinook salmon, 1980-2011.

	Docee	Nekite	Index Stream Totals		Stat. Area 10		First Nation	Commercial	Sport	Return to	Alaska	Total
Year	River	River	Obs.	Adj.	Obs.	Est.[1]	Harvest[2]	Catch[3]	Catch[4]	Canada	Catch[5]	Run
1980	1200		1,200	1,250	1,250	1,875	19	149	185	2,228	364	2,591
1981	1000	20	1,020	1,020	1,020	1,530	15	104	113	1,763	227	1,990
1982	1500		1,500	1,562	1,562	2,343	23	275	248	2,890	500	3,390
1983	1000	50	1,050	1,050	1,050	1,575	16	252	126	1,968	267	2,236
1984	750	20	770	770	770	1,155	12	72	99	1,337	191	1,528
1985	200	30	230	230	230	345	3	361	28	737	101	838
1986	500	32	532	532	532	798	8	360	88	1,254	224	1,478
1987	1000	50	1,050	1,050	1,050	1,575	16	205	147	1,943	303	2,245
1988	1000	50	1,050	1,050	1,050	1,575	16	107	124	1,822	249	2,071
1989	200	25	225	225	225	338	3	70	25	435	61	496
1990	500	10	510	510	510	765	8	66	63	902	150	1,051
1991	500		500	521	521	781	8	99	80	967	184	1,151
1992	500		500	521	521	781	8	256	81	1,126	133	1,259
1993	1000	50	1,050	1,050	1,050	1,575	16	67	204	1,862	177	2,038
1994	750	15	765	765	765	1,148	11	40	110	1,308	79	1,388
1995	400		400	417	417	625	6	12	31	674	27	701
1996	250		250	260	260	391	4	2	25	421	17	439
1997	100		100	104	104	156	2	5	25	187	15	203
1998	1100		1,100	1,146	1,146	1,718	17	0	209	1,944	23	1,968
1999	500		500	521	521	781	8	0	109	898	54	952
2000	500		500	521	521	781	8	0	89	878	45	923
2001	300		300	312	312	469	5	0	74	547	36	583
2002	300		300	312	312	469	5	0	69	543	34	577
2003	300		300	312	312	469	5	0	71	544	14	559
2004	480		480	500	500	750	7	0	139	896	113	1,009
2005	300		300	312	312	469	5	0	79	553	58	611
2006	700		700	729	729	1,094	11	0	181	1,285	137	1,422
2007	600		600	625	625	937	9	0	104	1,051	74	1,125
2008	315		315	328	328	492	0	0	25	517	43	560
2009												
2010												
2011	250		250	260	260	391			62	452	170	623

Assumptions:

[1] The adjusted escapement estimates are 150% of the recorded escapement. No estimates are available after 2011.

[2] First Nations catch was estimated to be 1% of the adjusted escapement estimate.

[3] Commercial catch was estimated using fixed %'s of the Area 10 commercial harvest (2% of troll, 5% of gillnet).

[4] Sport catch estimated using the Central Coast sport harvest rate for Wannock Chinook.

[5] Alaska catch was estimated using the exploitation rate for Wannock Chinook in Alaskan fisheries.

APPENDIX E: Model Assumptions and Uncertainties

Many of the following assumptions are similar to those reported in English et al. (2012), however, some have been revised as a result of changes to the analytical procedures and some new assumptions have been added to the list. All new assumptions have a letter code after the assumption number (e.g. Assumption 26a).

Escapement Estimation

The assumptions associated with deriving escapement estimates for a specific CU are:

A. **Assumption 1 – Selection of indicator streams:** The escapement estimates for the selected set of indicator streams within a CU provide a reliable indication of the year to year variability and trends in escapement for that CU;
B. **Assumption 2 – Correction factors for missing estimates for indicator streams (Factor 1):** For decades with at least one escapement estimate for each indicator stream, the average of the available escapement estimates for each indicator streams within a CU represent the relative contribution of each indicator stream to the total for all indicator streams in a CU;
C. **Assumption 3 – Correction factors for converting the total estimate for indicator streams to a total for all streams in a CU (Factor 2):** The average of the escapement estimates for the period when the largest number of streams were surveyed within a CU (e.g., 1980-1999 for many CUs) provide an adequate estimate of the contribution the indicator streams to the total escapement for a CU;
D. **Assumption 4 – Correction factor for observer efficiency (Factor 3):** on average the recorded escapement estimates for streams within a CU tend to underestimate the total escapement.
    a. For a specific species and statistical area, this correction factor is the same across all years; therefore, this factor will not affect the trend in escapement estimates.
    b. The purpose of this factor is to increase the escapement estimates in order to obtain a more realistic estimate of total run size and exploitation rate (ER) for some species and areas.
    c. This factor does not affect our ER estimates for those statistical areas and CUs where ERs were derived from analyses of CWT data (all Coho and some Chinook CUs), the NBSRR model or the Chum Models which use the NBSRR harvest rates (HRs) to derive ERs for Area 3-5 Chum CUs.

E. For Pink and Chum returns to Area 1, 2E, 2W and Areas 6-10, and Sockeye returns to Area 6-10, where run size is estimated by adding local area catch estimates to the escapement estimate (TCC&E), the above methods used to correct for escapement underestimation in the NuSEDS data will result in higher escapement estimates and thus lower ERs estimates.
F. There are a few instances where indicator streams and the above correction factors were not used because better escapement estimates have been derived from other sources. For Nass (Area 3) Sockeye, Chinook and Coho, the 1992-2014 escapement estimates were derived from mark-recapture studies which estimate the total number of fish migrating upstream of a canyon in the lower Nass River (see Nisga'a Fisheries Annual Reports and Appendix Table C1 and D1). For Skeena (Area 4) Sockeye, the escapement time series was derived by combining Sockeye counts

from the Babine fence with escapement estimates for non-Babine stocks (see Alexander et al. 2010).

Total Canadian Catch and Escapement (TCC&E) Estimates

G. **Assumption 5 – Stock composition in fisheries:** The Sockeye, Pink or Chum harvested in a specific statistical area are destined to spawn in streams within that statistical area.
H. **Assumption 6 – Catch estimates for Area 1, 2E, 2W and Area 6-10:** The catch estimates derived from DFO databases for commercial fisheries in these statistical areas represent all of the harvest of Sockeye, Pink and Chum in these statistical areas.
I. **Assumption 7 – Alaska catch estimates:** Alaska fisheries do not harvest significant numbers of Sockeye, Pink and Chum salmon originating from Area 1, 2E, 2W and Area 6-10.

Northern Boundary Sockeye Run Reconstruction Model

J. **Assumption 8 – Marine ERs for aggregate Sockeye stocks 1982-17:** The combination of fishery-specific stock composition estimates, migration route parameters and daily escapement estimates for Nass and Skeena Sockeye used in the NBSRR model produce reliable estimates of the marine ERs for Canadian and Alaskan fisheries.
K. **Assumption 9 – Marine ERs for Nass and Skeena Sockeye CUs:** the migration routes are the same for all Nass Sockeye CUs and the available data on differences in migration timing for Nass Sockeye CUs is sufficient to estimate marine ERs for Nass Sockeye CUs.
L. **Assumption 10 – Marine ERs for Skeena Sockeye CUs:** The migration routes are that same for all Skeena Sockeye CUs and the available data on differences in migration timing for Skeena Sockeye CUs is sufficient to estimate marine ERs for Skeena Sockeye CUs.
M. **Assumption 11 – Area 5 Sockeye ERs:** ERs for Area 5 Sockeye stocks in Canadian and Alaskan fisheries are the same as those estimated for the Lakelse Sockeye CU.
N. Note: the ER estimates provided in Appendix B are different from those presented in previous reports because they include all harvests in marine and freshwater fisheries and both Canadian and Total ERs are provided for each CU and the aggregate Nass and Skeena stocks.

Pink Salmon Run Reconstruction Model

O. **Assumption 12 – HRs for Area 3 Inside and Area 4 Pink salmon stocks 1982-95:** The combination of daily catch estimates, migration route, run timing and annual escapement estimates for Northern Boundary Pink salmon stocks in the Gazey and English (2000) run reconstruction model produced reliable estimates of the HRs for Area 3 Inside and Area 4 Pink salmon stocks in Area 3 and Area 4 fisheries and ERs in Alaskan fisheries.
P. **Assumption 13 – Equal vulnerability:** The vulnerability of each Pink salmon stock in each Northern Boundary fishery will be proportional to the abundance of that stock in that fishery during each fishing period.

Effort–Harvest Rate (EHR) Analysis Models

Q. **Assumption 14 – Area 3 HRs for Area 3 Inside Pink salmon:** The EHR relationship derived for Area 3 Inside Pink salmon stocks harvested in Area 3 fisheries for 1982-95 can be used to

estimate annual HRs for 1954-81 and 1996-2014 using weekly fishing effort estimates and Pink salmon CPE estimates for Area 3 seine and gillnet fisheries in these years.

R. **Assumption 15 –Area 3 and 4 HRs for Area 4 Pink salmon:** The EHR relationship derived for Area 4 Pink salmon stocks in harvested Area 3 and 4 fisheries for 1982-95 can be used to estimate annual HRs for 1954-81 and 1996-2014 using weekly fishing effort estimates and Pink salmon CPE estimates for Area 3 and 4 seine and gillnet fisheries in these years.

S. **Assumption 16 –Area 3 and 4 HRs for Area 5 Pink salmon:** Only half (50%) of Area 5 Pink salmon are vulnerable to fisheries in Area 3 and 4; and the run-timing of Area 5 Pink salmon is one week later than that for Area 4 Pink salmon. The Effort–HR relationship for Area 4 Pink salmon stocks is appropriate for estimating HRs for Area 5 Pink salmon stocks.

T. **Assumption 17 – Alaska ERs for Area 3 Inside and Area 4 Pink salmon:** Effort-HR relationships for Area 3 Inside and Area 4 Pink salmon stocks harvested in Alaska seine fisheries in Districts 101-104 for 1982-95 can be used to estimate annual ERs 1996-2014 from annual fishing effort estimates for these Alaskan fisheries from 1996-2014. The average Alaska ERs for 1982-95 provide a reasonable estimate of the annual Alaska ERs for Area 3 and Area 4 Pink salmon from 1954-81.

U. **Assumption 18 – Alaska ERs for Area 5 Pink salmon:** ERs for Area 5 Pink salmon in Alaskan fisheries is the same as that estimated for Area 4 Pink salmon.

V. **Assumption 19 – Canadian ERs for Area 3 Inside, Area 4 and Area 5 Pink salmon:** The average portion that Area 3 and Area 4 HRs were of the total Canadian HRs during the 1982-95 period is appropriate for the 1954-81 and 1996-2014 to expand the Area 3 and 4 HRs to total Canadian HRs that can be combined with Alaskan ERs to compute total Canadian ERs for Area 3 Inside, Area 4 and Area 5 Pink salmon stocks.

Chum Models

W. **Assumption 20 – Canadian HRs for Area 3 Chum stocks for 1982-14:** Area 3 Chum migrating through fisheries in Area 3, 4 and 5 have the same weekly HR as those estimated for co-migrating Nass (Area 3) Sockeye using the NBSRR model results for 1982-14;

X. **Assumption 21 – Canadian HRs for Area 4 Chum stocks for 1982-14:** Area 4 Chum migrating through fisheries in Area 3, 4 and 5 have the same weekly HRs as those estimated for co-migrating Skeena (Area 4) Sockeye using the NBSRR model results for 1982-14;

Y. **Assumption 22 – Canadian HRs for Area 5 Chum stocks for 1982-14:** Area 5 Chum migrating through fisheries in Area 3, 4 and 5 have the same weekly HRs as those estimated for co-migrating Skeena (Area 4) Sockeye using the NBSRR model results for 1982-14.

Z. **Assumption 23 – Run timing for Area 3-5 Chum salmon:** The 1994-2009 daily Nass fishwheel Chum catch per effort provides a reasonable estimate of the run timing for Area 3 Chum stocks; the Skeena test fishery provides a reasonable estimate of the run timing for Area 4 Chum stocks; and the run timing for Area 5 Chum was estimated to be one week later than that for Area 4 Chum.

AA. **Assumption 24 – Non-retention fisheries:** The mortality rate for Chum salmon released during non-retention fisheries was assumed to be 10% for purse seine fisheries and 60% for gillnet fisheries. Therefore, weekly HRs estimated for Sockeye salmon were reduced by these factors during weeks when Chum non-retention regulations were in effect.

BB. **Assumption 25 – Alaska ERs for Area 3 Chum salmon**: Area 3 Chum migrating through Alaskan fisheries have the same annual ER as those estimated for Nass (Area 3) Pink salmon from the Area 3 EHR Model for all years.

CC. **Assumption 26 – Alaska ERs for Area 4-5 Chum salmon:** Area 4 and 5 Chum migrating through Alaskan fisheries have the same annual ER as those estimated for Skeena (Area 4) Pink salmon from the Area 3+4 EHR Model for all years.

DD. **Assumption 26a – Canadian HRs for Area 3, 4 and 5 Chum stocks from 1954-81:** Canadian HRs for Area 3, 4 and 5 Chum stock from 1954-81 were assumed to be equal to those estimated for Pink salmon for these years using the A3-EHR Model and A3+4 EHR Model.

Coho Exploitation Rates

EE. Table 5 in the report describes the link between the various Coho ER indicator stocks and the NCC statistical areas. Table 5 defines the link between each CU and the Coho ERs estimated for each statistical area or group of statistical areas.

FF. **Assumption 27 – Coho CWT data:** The available information on the number of CWT Coho caught in fisheries and escaping to spawning areas is adequate to estimate ERs for these indicator stocks and these ERs are appropriate for other unmarked Coho populations in the associated statistical area or CU.

GG. **Assumption 28 – NCC Coho Model:** Dave Peacock will need to provide the assumptions associated with this model.

HH. **Assumption 28a – Area 3 Coho ERs** – Canadian and Alaskan ERs for 1954-91 were assumed to be equal to those for Babine Coho, adjusted by the ratio of the average Area 3 ER to average Babine ER for 1992-97. Canadian and Alaskan ERs for 1992-14 were derived by the Nisga'a Joint Technical Committee based CWT recovery data for Zolzap Creek Coho and escapement estimates for Coho streams in the Nass Area (see Appendix Table C1, Richard Alexander, pers. comm.).

II. **Assumption 28b – Area 4 Coho ERs** – Canadian and Alaskan ERs for 1954-88 were assumed to be equal to those for Babine Coho in Holtby (1999). Canadian and Alaskan ERs for 1989-14 were derived by combining CWT recovery data for Toboggan Creek Coho with First Nation catch estimates for Skeena River fisheries and the annual escapement estimates for Coho streams in Area 4. (see Appendix Table C2 and C3).

JJ. **Assumption 28c – Haida Gwaii Coho ERs** – Canadian ERs for 1954-96 were assumed to be equal to those for Area 3 Coho described above. Alaskan ERs for 1954-96 were assumed to be equal to those for Area 3 Coho, adjusted by the ratio of the average Area 3 ER to average Deena ER for Alaskan fisheries for 1997-14. Canadian and Alaskan ERs for 1997-14 were derived from the CWT recovery data for Deena River Coho (Joel Sawada, DFO Nanaimo, pers. comm.) (see Appendix Table C4).

KK. **Assumption 28d – Area 6 Coho ERs** – Area 6 Canadian ERs for 1997-2010 were from the NCC Coho Model (Dave Peacock, pers. comm.). The Canadian ER estimates for 2011-2014 were assumed to be equal to those for Babine/Area 4 Coho, as described above. The Canadian ERs for 1954-96 were derived using the ratio of the average Canadian ERs for Babine/Area 4 Coho for 1980-96 to the baseline Canadian ER estimate of 25.6% for Area 5/6 Coho from the NCC Coho Model. The Alaska ERs for Area 6 Coho were assumed to be equal to those estimated for Area 4 Coho for all years (see Appendix Table C5).

LL. **Assumption 28e – Area 6-8 Coho ERs** – Area 6-8 Canadian ERs for 1997-2010 were from the NCC Coho Model (Dave Peacock, pers. comm.). The Canadian ER estimates for 2011-2014 were assumed to be 60% of those for Babine/Area 4 Coho. The Canadian ERs for 1954-96 were derived using the ratio of the average Canadian ERs for Babine/Area 4 Coho for 1980-96 to the baseline Canadian ER estimate of 24.7% for Area 6-8 Coho from the NCC Coho Model. The Alaska ERs for Area 6-8 Coho were assumed to be 60% of those estimated for Area 4 Coho for all years (see Appendix Table C5).

MM. **Assumption 28f – Area 8 Coho ERs** – Area 8 Canadian ERs for 1997-2010 were from the NCC Coho Model (Dave Peacock, pers. comm.). The Canadian ER estimates for 2011-2014 were assumed to be 60% of those for Babine/Area 4 Coho. The Canadian ERs for 1954-96 were derived using the ratio of the average Canadian ERs for Babine/Area 4 Coho for 1980-96 to the baseline Canadian ER estimate of 25.5% for Area 8 Coho from the NCC Coho Model. The Alaska ERs for Area 8 Coho were assumed to be 60% of those estimated for Area 4 Coho for all years (see Appendix Table C5).

NN. **Assumption 28g– Area 4-9 Coho ERs** – Area 4-9 Canadian ERs for 1997-2010 were from the NCC Coho Model (Dave Peacock, pers. comm.). The Canadian ER estimates for 2011-2014 were assumed to be 40% of those for Babine/Area 4 Coho. The Canadian ERs for 1954-96 were derived using the ratio of the average Canadian ERs for Babine/Area 4 Coho for 1980-96 to the baseline Canadian ER estimate of 25.5% for Area 4-9 Coho from the NCC Coho Model. The Alaska ERs for Area 4-9 Coho were assumed to be 40% of those estimated for Area 4 Coho for all years (see Appendix Table C6).

OO. **Assumption 28h Area 9-10 Coho ERs** – Area 9-10 Canadian ERs for 1997-2010 were from the NCC Coho Model (Dave Peacock, pers. comm.). The Canadian ER estimates for 2011-2014 were assumed to be 20% of those for Babine/Area 4 Coho. The Canadian ERs for 1954-96 were derived using the ratio of the average Canadian ERs for Babine/Area 4 Coho for 1980-96 to the baseline Canadian ER estimate of 25.0% for Area 4-9 Coho from the NCC Coho Model. The Alaska ERs for Area 9-10 Coho were assumed to be 20% of those estimated for Area 4 Coho for all years (see Appendix Table C6).

Chinook Exploitation Rates

PP. Table 6 in the report defines the link between each CU and the Chinook ERs estimated for each Chinook ER indicator stock. Appendix D provides the tables with the escapement and catch estimates and assumptions used to derive these ERs. The analysis years along with the primary source for data and assumptions are provided in the overarching assumptions for each Chinook ER indicator stock below.

QQ. **Assumption 29 – Nass Chinook:** Estimates of escapement and catch for Nass River Chinook derived by the Nisga'a Joint Technical Committee for 1992-2017 are adequate to produce reliable annual ER estimates for Nass Chinook (see Table D-1).

RR. **Assumption 30 – Skeena Chinook:** Estimates of escapement and catch for Skeena River Chinook derived by DFO for 1984-2017 (Ivan Winther, DFO, pers. comm. 2018) are adequate to produce reliable annual ER estimates for Skeena Chinook (see Table D-2).

SS. **Assumption 31 – Area 6 Chinook:** The marine ERs for Skeena Chinook are appropriate for Area 6 Chinook streams where production has not been directly affected by the release of hatchery reared fish (see Table D-3).

TT. **Assumption 32 – Area 8 Chinook:** The ERs for Area 8 Chinook were derived from analysis of Atnarko River Chinook CWT data (see Table D-4 and Velez-Espino et al. 2011 for assumptions associated with these analyses).

UU. **Assumption 33 – Area 9 summer Chinook:** Canadian and Alaskan Marine ERs were assumed to be equal to those estimated for Wannock Chinook. It is likely that the Canadian ERs for Area 9 Summer Chinook are higher than those for Wannock Chinook, however, the CWT recovery data for Area 9 Summer Chinook is very limited compared to that for Wannock Chinook (see Table D-5).

VV. **Assumption 34 – Area 9 Wannock Chinook:** Estimates of escapement and recreational fishery catch estimates for the Central Coast 1980-14 alone with CWT recovery data for Wannock Chinook 1988-14 are adequate to produce reliable annual ER estimates for Wannock Chinook (see Table D-6).

WW. **Assumption 35 – Area 10 Chinook:** Harvest estimates for Area 10 Chinook in Canadian were derived using the following assumptions: 1) First Nations catch was 1% of the adjusted escapement estimate; 2) commercial catch was 2% of the Area 10 Troll Catch and 5% of the Area 10 gillnet catch; and 3) the harvest rate for Area 10 Chinook in the central coast recreational fishery was equal to the harvest rate for Wannock Chinook in the Area 7-9 recreational fisheries. Exploitation Rate estimates for Area 10 Chinook in Alaskan fisheries were assumed to be equal to those derived for Wannock Chinook in Alaskan fisheries (see Table D-7).

APPENDIX F: Area 3-4-5 Chum Salmon Model

Introduction

Chum Salmon in each of DFO PFMAs 3 to 5 are the least abundant salmon species, return to the fewest number of streams and are intercepted in both Canadian and U.S. fisheries. Chum Salmon originating in Areas 3 and 4 are considered depressed with recent escapements to Area 3 being below the provisional escapement target of 45,000. Thus harvest of wild Chum Salmon is limited such that the Canadian average exploitation rate is below 10%, however, opportunity for harvest of enhanced US Chum Salmon by Canadian fishers occurs when they are exploitable in Canadian waters. When enhanced US Chum Salmon are targeted, estimates of total harvest of non-enhanced origin Chum Salmon are available via otolith analysis, however this harvest cannot be allocated to specific stocks due to low resolution of DNA stock differentiation in Chum Salmon. Thus, no direct estimates of stock specific harvest or exploitation rates are available for Canadian origin Chum Salmon. Herein, we describe and document a method to estimate harvest rates of Chum Salmon originating in DFO PFMAs 3 to 5 using Chum Salmon run timing and Sockeye Salmon harvest rates to estimates harvest rates for Area 3, 4 and 5 Chum Salmon.

Analysis Objectives

Harvest rate estimates of Chum Salmon originating from DFO PFMAs 3 to 5 are not available via traditional DNA stock ID of catch or run reconstruction methods. However, estimates of harvest rates are necessary to assess management actions against management targets – specifically ensuring that exploitation rates of Chum Salmon from PFMAs 3 and 4 does not exceed 10%. The Area 3-4-5 Chum Salmon Model provides a repeatable process for estimating Chum harvest rates using readily available annual harvest rate estimates for Area 3 and 4 Sockeye and area-specific run timing information of Chum Salmon.

Data Sources and Preparation

Run Timing

The migration timing for Area 3 Chum Salmon was derived from the 1994-2009 daily Nass fishwheel Chum Salmon catch data, adjusted for weekly variability in fishwheel catch efficiencies and annual variability in the duration of fishwheel operations (Will Duguid, LGL Limited, pers. comm.). The Area 4 Chum Salmon run timing was derived from the Tyee Test Fishery data, and is equivalent to the Chum Salmon run timing used in the Skeena Model (used to evaluate alternative fishing plans for Skeena Sockeye Salmon; Dave Peacock, pers. comm.). The Chum Salmon run timing for Area 5 Chum is set to be one week later than that for Area 4 Chum Salmon stocks.

Fishery Definitions and Patterns

Fishery definitions are identical to those used by DFO, Alaska Department of Fish and Game and the Pacific Salmon Commission (PSC) when evaluating the Northern Boundary Sockeye Run Reconstruction (NBSRR) model (English et al. 2004; Alexander et al. 2018).

Opportunity for harvest of wild Canadian Chum in these areas has recently been very limited and most often occurs as bycatch in the fisheries targeting Sockeye Salmon. When fishing opportunities occur it may be for up to a few days in a specific week, with each week being standardized to weeks used within the NBSRR model.

Catch

Aggregate harvests and releases of Chum Salmon are available for each fishery opening when Chum Salmon are a directed species and when they are caught incidentally as bycatch and either released or retained. However, due to poor DNA stock ID of Chum Salmon, fisheries biologists are unable to allocate harvest to specific CU or stock of origin resulting in an inability to determine harvest or exploitation rates via traditional methods.

Aggregate harvests of (presumed) enhanced US origin Chum Salmon are also available when these fisheries occur, and otolith analysis is conducted to determine the proportion of harvests that are of enhanced US origin. Currently DFO is unable to allocate the harvest of Chum Salmon that are found to not be of enhanced US origin (i.e. if they were US wild Chum Salmon or Canadian wild Chum Salmon from Area 3, Area 4 or other).

Model Details

Model Assumptions

The assumptions associated with the Area 3-4-5 Chum Salmon Model include:

a. The run timing for adult Chum Salmon returning to each area is the same each year.
b. The harvest rates for Area 3 and 4 origin Chum Salmon are the same as those estimated for Area 3 and 4 origin Sockeye Salmon in each fishery and week.
c. Chum Salmon are caught in only two main gear types (gillnet and seine) and the gear-specific mortality rates after release are: 60% and 10% for Chum caught by gillnets and purse seines, respectively.
d. All Chum Salmon are retained during directed fisheries.

Model Documentation

The model has changed little since it was first developed and the variations over the years are due more to changes in input data than the mechanics of the model specifically. For example, any changes to the NBSRR model could result in altered outputs which become inputs to the Area 3-4-5 Chum Salmon Model. Table F-1 provides the original source and contact for each model input table and list the output tables. Table F-2 provide a more detailed description of the format and contents for each input and output table.

Macro Function and Model Structure

When called, the macro first reads in all the input data, including:

- The weekly stock-specific run timing proportions ($RT_{s,w}$) from the sheet called "Panel" (Table F-3). The code checks to make sure that the values add up to 100% for each of the three stocks (to three decimal places), and throws an error message if the sums are too low (<100%) or too high (> 100%).
- The worksheet named "Sockeye Data" contains estimates of the Sockeye abundance entering each fishery in Area 3 and 4, and catch of Sockeye in each fishery for each week by gear type by stock (i.e. Nass and Skeena) derived from NBSRR Model results for 1982-2017.
- A specific NR value for each unique combination of gear type (g: gillnet and seine), fishery (f: 3A, 3B, 3C, 3D, 3E, 4W, 4X, 4Y, 4Z, Area 5, Other), year (y), and week (w),

i.e., $NR_{g,f,y,w}$. NR values are the proportion of non-retained Chum Salmon that survive being released. These data are read in from sheets called "NR 2001" through "NR 2017". NR values from the "NR other" sheet are used for years that do not have their own specific "NR" sheet (e.g., Sockeye data start at 1982, but the first NR sheet is for 2001). There is a macro (accessible from the sheet called "Panel") that adds new NR sheets, which should be used when additional years of NR data become available.

Table F-1. Model inputs and outputs for Area 3-4-5 Chum Salmon Model and data sources.

Tab Name	**Description**	**Data file source**	**Data source**
Sockeye Data	Weekly catch and abundance estimates for Nass and Skeena origin Sockeye Salmon in Area 3 and 4 fisheries from 1982 – 2017.	Northern Boundary Sockeye Salmon Run Reconstruction, tab = "fsw"	Richard Alexander LGL Limited ralexander@lgl.com
NR 2001 – 2017	Annual tabs describing gear-specific Chum Salmon mortalities rates by fishery by week. Where retention is permitted, mortality = 1.0. Where retention is not permitted mortality = 0.6 (Gillnet) and 0.1 (Seine).	User-created from data found at the DFO fishery notice webpage: http://www-ops2.pac.dfo-mpo.gc.ca/fns-sap/index-eng.cfm	Katie Beach DFO North Coast Chum Biologist Katie.Beach@dfo-mpo.gc.ca
Panel	Contains triggers to run two macros: 1. Run model. 2. Create new NR XXXX sheet Contains Chum Salmon run timing data for: • Nass River • Skeena River • Area 5	For run timing data source, see methods section (Chum Salmon).	No annual update required.
Nass Chum	Nass Chum Salmon harvest rates by week and year	Model (macro) created	Model (macro) created
Skeena Chum	Skeena Chum Salmon harvest rates by week and year	Model (macro) created	Model (macro) created
Area 5 Chum	Area 5 Chum Salmon harvest rates by week and year	Model (macro) created	Model (macro) created
Summary	Annual Chum Salmon harvest rates with plot	Model (macro) created	Model (macro) created

Table F-2. Model input and output data description for Area 3-4-5 Chum Salmon Model.

Tab Name	Column Name	Description
Sockeye Data	ID	Unique row #; not used
	Year	Year in which data applies
	Fishery	Location of data. Refer to Figure 1 for specific locations of subareas 3A to 3E and 4W to 4Z.
	Week	Alaska stat week to which data applies
	Date	Day-specific reference
	Stock	Nass or Skeena origin Sockeye Salmon
	Abundance	Abundance of Sockeye Salmon entering said fishery on said date
	G-Catch	Gillnet Sockeye Salmon catch from DFO Hail data
	S_Catch	Seine Sockeye Salmon catch from DFO Hail data
	T_Catch	Total Sockeye Salmon catch from DFO Hail data
	G_Effort	Gillnet Sockeye-directed effort (#boats) from DFO Hail data
	S_Effort	Seine Sockeye-directed effort (#boats) from DFO Hail data
	T_Effort	Total Sockeye-directed effort (#boats) from DFO Hail data
NR 2001 – 2017	Week (20 – 40)	Alaska catch week as described in tab = "Sockeye Data"
	Area (3A-E; 4W-Z; Area 5; Other)	Location where fishery occurred (see Figure 1)
Panel	Nass/Skeena/Area 5	Proportional run timing by week
	Week (20 – 40)	Alaska catch week as described in tab = "Sockeye Data"
	Macro 1	Generates updated harvest rates
	Macro 2	Generates blank NR YYYY tabs for populating
Nass Chum/ Skeena Chum/ Area 5 Chum	Week (22 – 38)	Alaska catch week as described in tab = "Sockeye Data"
	Year (1982 – current)	Year
Summary	Nass/Skeena/Area 5	Annual Chum harvest rates for each area

- Sockeye Salmon catch and abundance estimates for each unique combination of stock (s: Nass, Skeena), fishery, year and week. Data are drawn from the sheet called "Sockeye Data", where there should only be one record for each unique combination of stock, fishery, year and week (if multiples occur, only the last one will be considered). Sockeye Salmon escapement ($E_{s,f,y,w}$) is the abundance ($A_{s,f,y,w}$, column G) minus gillnet ($G_{s,f,y,w}$, column H) and seine ($S_{s,f,y,w}$, column I) catches. Sockeye Salmon Catch is the sum of NR-adjusted gillnet and seine catches: $C_{s,f,y,w} = G_{s,f,y,w} \cdot NR_{gillnet,f,y,w} + S_{s,f,y,w} \cdot NR_{seine,f,y,w}$

- Fishery, year, and week-specific Sockeye Salmon catch and escapement values for the Area 4 stocks are combined with run timing information for Area 5 Chum stocks to estimate the weekly harvest rate for Area 5 Chum stocks.

Table F-3. Proportional weekly Chum Salmon run timing to each of Areas 3 to 5.

Week	Area 3	Area 4	Area 5
20			
21			
22			
23			
24	0.000	0.000	
25	0.001	0.000	0.000
26	0.002	0.000	0.000
27	0.006	0.000	0.000
28	0.022	0.019	0.000
29	0.041	0.035	0.019
30	0.075	0.049	0.035
31	0.089	0.091	0.049
32	0.097	0.160	0.091
33	0.137	0.175	0.160
34	0.150	0.221	0.175
35	0.147	0.160	0.221
36	0.138	0.070	0.160
37	0.079	0.020	0.070
38	0.016		0.020
39			
40			

Next, Sockeye and Chum salmon harvest rates are calculated separately for each stock, and outputted onto sheets called "Nass Chum", "Skeena Chum", and "Area 5 Chum".

- Year and week-specific Sockeye Salmon catches adjusted for non-retention periods are calculated by summing over select fisheries: $\hat{C}_{s,y,w} = \sum_{f_s} C_{s,f,y,w} * NR_{f,y,w}$. For the Nass stock, $C_{s,f,y,w}$ is summed over seven fisheries ($f_{Nass} \in \{3A, 3B, 3C, 3D, 3E, 4W, 4X\}$). For Skeena and Area 5 stocks, $C_{s,f,y,w}$ is summed over eight fisheries ($f_{Skeena} \in \{3A, 3B, 3C, 4W, 4X, 4Y, 4Z, \text{Area } 5\}$). Then, to calculate annual total Sockeye Salmon catch, data are summed over weeks: $\hat{C}_{s,y} = \sum_w \hat{C}_{s,y,w}$.
- Sockeye Salmon escapement for the Nass stock is assumed to be that from the 3E fishery ($E_{Nass,3E,y,w}$). Sockeye Salmon escapement for the Skeena and Area 5 stocks is assumed to be that from the 4Z fishery ($E_{Skeena,4Z,y,w}$). To calculate annual total escapement, data are summed over weeks: $\hat{E}_{s,f,y} = \sum_w E_{s,f,y,w}$.
- Year and week-specific Sockeye Salmon abundance for the Nass stock are calculated as: $A_{Nass,y,w} = \hat{C}_{Nass,y,w} + E_{Nass,3E,y,w}$. Year and week-specific Sockeye Salmon

abundances for the Skeena and Area 5 stocks are calculated as: $A_{Skeena,y,w} = \hat{C}_{Skeena,y,w} + E_{Skeena,4Z,y,w}$. To calculate annual total abundances, data are summed over weeks: $\hat{A}_{s,y} = \sum_w A_{s,y,w}$.

- Sockeye harvest rates were calculated as: $\widehat{HR}_{SX,s,y,w} = \hat{C}_{s,y,w} / A_{s,y,w}$. Annual totals are calculated as: $\widehat{HR}_{SX,s,y} = \hat{C}_{s,y} / \hat{A}_{s,y}$.
- Chum harvest rates were calculated as: $\widehat{HR}_{CM,s,y,w} = \widehat{HR}_{SX,s,y,w} \cdot RT_{s,w}$. Annual totals are calculated by summing over weeks, ($\widehat{HR}_{CM,s,y} = \sum_w \widehat{HR}_{CM,s,y,w}$).

Lastly, the macro outputs annual stock-specific Chum Salmon harvest rates (Table F-4), and plots them over time (Figure F-1). Outputs appear on a sheet called "Summary".

Table F-4. Annual Chum Salmon harvest rates from 1982 – 2017 for Areas 3 to 5.

Year	Area 3	Area 4	Area 5
1982	0.334	0.248	0.157
1983	0.449	0.332	0.269
1984	0.516	0.275	0.219
1985	0.308	0.337	0.237
1986	0.358	0.345	0.285
1987	0.390	0.338	0.256
1988	0.227	0.406	0.294
1989	0.355	0.267	0.194
1990	0.315	0.355	0.279
1991	0.418	0.367	0.253
1992	0.467	0.477	0.360
1993	0.580	0.349	0.269
1994	0.282	0.253	0.173
1995	0.391	0.323	0.221
1996	0.360	0.290	0.188
1997	0.194	0.152	0.091
1998	0.150	0.026	0.011
1999	0.456	0.020	0.016
2000	0.260	0.172	0.108
2001	0.114	0.119	0.066
2002	0.162	0.131	0.071
2003	0.134	0.067	0.039
2004	0.106	0.093	0.071
2005	0.072	0.004	0.003
2006	0.123	0.150	0.108
2007	0.072	0.078	0.047
2008	0.053	0.100	0.058
2009	0.062	0.007	0.005
2010	0.030	0.012	0.007
2011	0.065	0.098	0.074
2012	0.026	0.015	0.008
2013	0.047	0.000	0.000
2014	0.020	0.028	0.017
2015	0.100	0.011	0.013
2016	0.009	0.036	0.025
2017	0.003	0.000	0.000

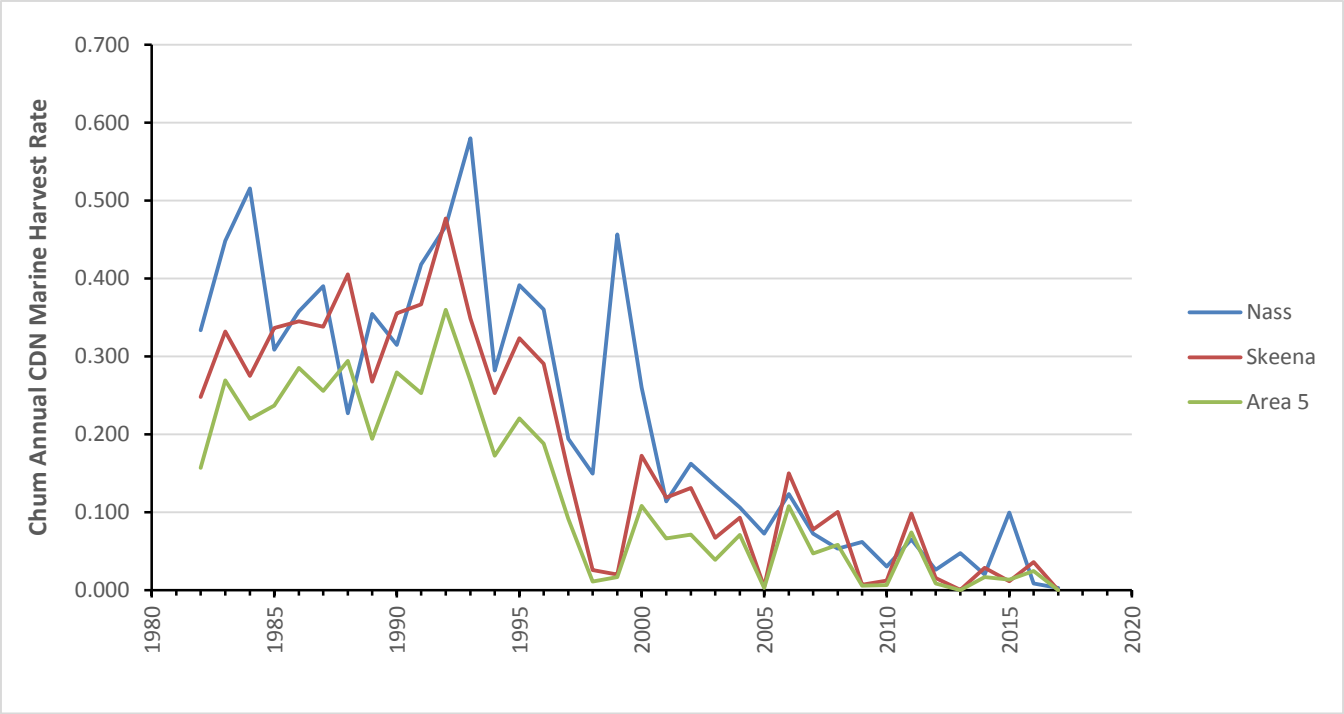

Figure F-1. Canadian harvest rate on Chum Salmon originating from Areas 3 to 5, by stock, 1982 – 2017.

Results and Discussion

Low abundances of Chum returning to each area 3 to 5 limit the utility (and reliability) of annual estimates of run timing, thus an average, static run timing is used. Run timing of Chum Salmon returning to Area 4 is also standardized as other models use the same data set, specifically the Skeena model for evaluating alternative fishing plans for Sockeye Salmon (Dave Peacock, pers. comm.).

Annual Chum Salmon harvest rates for all areas have been highly variable since 1982 but have generally exhibited a regular declining trend that started in the mid-1990s and has recently stabilized at very low levels (Table F-4, Figure F-1). In 2011, there were no opportunities for retention of Chum Salmon. In all subsequent years retention has been permitted, though most of these (limited) fisheries were intended to target enhanced US Chum Salmon.

Area 3 Chum Salmon are most regularly exploited during weeks 27 to 32 (1 July to 12 August; Table F-5) when, on average, 70% of harvest occurs, though the recent 10-year average harvest during this period was 87%. Area 4 and 5 Chum Salmon experienced a similar timing of peak harvest with the exception that Area 4 Chum Salmon were not harvested (ever) during week 27 (July 1-8) (Table F-6) and Area 5 Chum Salmon were not harvested until week 29 (July 17-24; Table F-7). Area 4 and 5 Chum Salmon were not harvested prior to these weeks as it is assumed that they had not yet recruited to coastal waters and were thus not exploitable.

Otolith analysis of Chum Salmon harvested in Area 3C and B (Figure 1) has occurred since 2011 when these fisheries were opened to exploit US enhanced Chum Salmon in Canadian waters. The assumption was that few, if any, Chum Salmon harvested would be of wild Canadian origin

Table F-5. Weekly Canadian harvest rates on Area 3 Chum Salmon from 1982 to 2017.

Year	24	25	26	27	28	29	30
1982		0.000	0.001	0.003	0.011	0.021	0.047
1983						0.010	0.059
1984			0.001		0.005	0.014	0.059
1985				0.002	0.002	0.007	0.038
1986					0.007	0.012	0.035
1987					0.003	0.005	0.043
1988				0.000	0.003	0.015	0.036
1989		0.000	0.000	0.001	0.007	0.021	0.058
1990		0.000	0.000	0.001	0.002	0.007	0.027
1991			0.000	0.001	0.010	0.019	0.045
1992				0.004	0.016	0.020	0.041
1993		0.000	0.001	0.002	0.011	0.027	0.053
1994		0.000	0.000	0.002	0.007	0.026	0.024
1995	0.000	0.000	0.001	0.004	0.016	0.031	0.064
1996	0.000	0.000	0.001	0.005	0.016	0.027	0.047
1997	0.000	0.000	0.001	0.003	0.011	0.027	0.043
1998		0.000	0.001	0.003	0.012	0.010	0.001
1999		0.000	0.000	0.005	0.013	0.015	0.048
2000		0.000	0.000	0.003	0.014	0.022	0.043
2001	0.000	0.000	0.001	0.003	0.004	0.007	0.018
2002	0.000	0.000	0.000	0.005	0.018	0.025	0.038
2003	0.000	0.000	0.001	0.006	0.018	0.023	0.027
2004	0.000	0.000	0.001	0.004	0.011	0.025	0.020
2005	0.000	0.000	0.001	0.004	0.010	0.016	0.018
2006	0.000	0.000	0.001	0.005	0.014	0.016	0.030
2007	0.000	0.000	0.001	0.003	0.012	0.004	0.015
2008			0.000	0.001	0.003	0.012	0.012
2009		0.000	0.000	0.003	0.009	0.020	0.029
2010		0.000	0.000	0.004	0.010	0.010	
2011			0.000	0.001	0.011	0.001	0.000
2012		0.000	0.000	0.004	0.008	0.001	0.006
2013		0.000	0.000	0.003	0.010		0.015
2014	0.000	0.000	0.001	0.004	0.004	0.003	0.000
2015	0.000	0.000	0.000	0.001	0.007	0.020	0.000
2016	0.000	0.000	0.000	0.001	0.003	0.001	0.001
2017	0.000	0.000	0.001	0.000	0.000	0.001	0.000

Table F-5 continued.

Year	31	32	33	34	35	36	37	HR
1982	0.045	0.028	0.074	0.040	0.044	0.019	0.003	0.334
1983	0.064	0.059	0.112	0.112	0.031			0.449
1984	0.047	0.058	0.100	0.091	0.090	0.051		0.516
1985	0.053	0.053	0.084	0.068				0.308
1986	0.043	0.052	0.075	0.082	0.042	0.010		0.358
1987	0.061	0.072	0.108	0.098				0.390
1988	0.035	0.055	0.031	0.050	0.002			0.227
1989	0.074	0.077	0.090	0.026				0.355
1990	0.057	0.061	0.077	0.068	0.012	0.001	0.003	0.315
1991	0.071	0.068	0.096	0.085	0.023			0.418
1992	0.064	0.071	0.097	0.124		0.028	0.002	0.467
1993	0.072	0.078	0.097	0.071	0.088	0.074	0.007	0.580
1994	0.044	0.033	0.058	0.040	0.032	0.015		0.282
1995	0.071	0.060	0.091	0.054				0.391
1996	0.056	0.078	0.079		0.051			0.360
1997	0.038	0.029	0.043					0.194
1998	0.023	0.035	0.018	0.021	0.024			0.150
1999	0.059	0.071	0.070	0.107	0.069			0.456
2000	0.051	0.040	0.073	0.013				0.260
2001	0.032	0.026	0.022	0.001				0.114
2002	0.037	0.028	0.006	0.006				0.162
2003	0.035	0.018	0.003	0.003				0.134
2004	0.026	0.013	0.005	0.000				0.106
2005	0.019	0.002	0.001	0.000	0.000			0.072
2006	0.022	0.005	0.005	0.024	0.000	0.000		0.123
2007	0.026	0.005	0.007					0.072
2008	0.016	0.010						0.053
2009	0.000	0.000						0.062
2010	0.006							0.030
2011	0.008	0.009	0.025	0.009				0.065
2012	0.004	0.001						0.026
2013	0.018							0.047
2014	0.008	0.001						0.020
2015	0.022	0.028	0.020		0.001			0.100
2016	0.000	0.000	0.001	0.000				0.009
2017	0.000	0.000						0.003

and otolith analysis would indicate the proportion of harvest that was from US hatcheries, as most hatcheries thermally mark their Chum Salmon. While it is impossible to determine if un-marked otoliths are wild US, wild Canadian or unmarked hatchery origin fish, the relative contribution to harvest can be used to assess how certain fisheries are avoiding wild Canadian Chum Salmon. Data from 2011 through 2016 indicated that, on average, 26% (or 94,000) harvested Chum Salmon were not thermally marked. These harvests are not included in the model herein discussed as direct catch estimates were not used, nor were we able to discern stock

of origin of these fish. However, it stands to reason that some of these fish were from Areas 3 to 5 and excluding them from our model may have resulted in an underestimation of harvest rates by some unknown amount.

Table F-6. Weekly Canadian harvest rates on Area 4 Chum Salmon from 1982 to 2017.

Year	28	29	30	31	32	33	34	35	36	37	HR
1982	0.012	0.016	0.041	0.065	0.065	0.021	0.019	0.007	0.001	0.000	0.248
1983		0.004	0.028	0.024	0.038	0.096	0.121	0.021			0.332
1984	0.002	0.015	0.033	0.044	0.043	0.068	0.047	0.014	0.009		0.275
1985	0.007	0.016	0.031	0.053	0.064	0.084	0.081				0.337
1986	0.005	0.006	0.030	0.048	0.030	0.070	0.112	0.041	0.003	0.000	0.345
1987	0.003	0.006	0.023	0.019	0.096	0.088	0.089	0.015			0.338
1988	0.005	0.019	0.037	0.036	0.119	0.057	0.111	0.022			0.406
1989	0.008	0.018	0.022	0.034	0.069	0.058	0.037	0.021			0.267
1990	0.003	0.010	0.029	0.044	0.090	0.109	0.044	0.016	0.009	0.000	0.355
1991	0.007	0.017	0.029	0.067	0.097	0.069	0.072	0.008			0.367
1992	0.009	0.011	0.031	0.062	0.113	0.094	0.142		0.016		0.477
1993	0.010	0.021	0.030	0.059	0.055	0.047	0.086	0.037	0.005		0.349
1994	0.007	0.017	0.015	0.048	0.050	0.054	0.062				0.253
1995	0.008	0.027	0.030	0.053	0.065	0.069	0.071				0.323
1996	0.012	0.027	0.036	0.049	0.099	0.063		0.004		0.001	0.290
1997	0.013	0.025	0.031	0.037	0.019	0.028					0.152
1998	0.006	0.010			0.009						0.026
1999	0.001	0.001	0.001	0.003	0.002	0.003	0.005	0.004			0.020
2000	0.012	0.017	0.037	0.026	0.044	0.035	0.001				0.172
2001	0.010	0.018	0.026	0.041	0.017	0.006	0.000				0.119
2002	0.010	0.021	0.020	0.046	0.031	0.002	0.002				0.131
2003	0.002	0.019	0.007	0.003	0.031	0.003	0.002				0.067
2004	0.004	0.006	0.013	0.005	0.010	0.053	0.002	0.000			0.093
2005	0.000	0.001	0.001	0.000	0.001	0.000	0.000	0.000			0.004
2006	0.009	0.009	0.014	0.021	0.020	0.026	0.047	0.000	0.004		0.150
2007	0.000	0.011	0.007	0.028	0.023	0.009					0.078
2008	0.000	0.007	0.016	0.023	0.054						0.100
2009	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.007
2010	0.000	0.001		0.011							0.012
2011	0.000	0.003	0.005	0.007	0.023	0.037	0.023				0.098
2012	0.002	0.004	0.008	0.000	0.000						0.015
2013	0.000										0.000
2014	0.001	0.007	0.011	0.009	0.001						0.028
2015	0.001	0.001	0.000	0.000	0.000	0.000		0.009			0.011
2016	0.001	0.002	0.005	0.000	0.015	0.011	0.002				0.036
2017	0.000	0.000	0.000	0.000	0.000						0.000

Table F-7. Weekly Canadian harvest rates on Area 5 Chum Salmon from 1982 to 2017.

Year	29	30	31	32	33	34	35	36	37	HR
1982	0.009	0.029	0.035	0.037	0.019	0.015	0.010	0.002	0.001	0.157
1983	0.002	0.020	0.013	0.022	0.088	0.096	0.029			0.269
1984	0.008	0.024	0.024	0.025	0.062	0.037	0.020	0.021		0.219
1985	0.009	0.022	0.029	0.036	0.077	0.064				0.237
1986	0.003	0.021	0.026	0.017	0.064	0.088	0.057	0.007	0.001	0.285
1987	0.003	0.016	0.010	0.054	0.080	0.070	0.021			0.256
1988	0.010	0.027	0.019	0.068	0.052	0.088	0.031			0.294
1989	0.010	0.016	0.018	0.039	0.053	0.029	0.028			0.194
1990	0.006	0.021	0.024	0.051	0.100	0.034	0.023	0.020	0.001	0.279
1991	0.009	0.021	0.036	0.055	0.063	0.057	0.011			0.253
1992	0.006	0.022	0.033	0.064	0.086	0.112		0.037		0.360
1993	0.011	0.021	0.032	0.031	0.043	0.068	0.051	0.011		0.269
1994	0.009	0.011	0.026	0.028	0.050	0.049				0.173
1995	0.015	0.022	0.028	0.037	0.063	0.056				0.221
1996	0.015	0.026	0.026	0.056	0.057		0.006		0.002	0.188
1997	0.014	0.022	0.020	0.011	0.025					0.091
1998	0.006			0.005						0.011
1999	0.000	0.000	0.002	0.001	0.003	0.004	0.006			0.016
2000	0.009	0.027	0.014	0.025	0.032	0.001				0.108
2001	0.010	0.019	0.022	0.010	0.006	0.000				0.066
2002	0.011	0.015	0.025	0.017	0.002	0.002				0.071
2003	0.010	0.005	0.002	0.018	0.003	0.002				0.039
2004	0.003	0.009	0.002	0.006	0.049	0.001	0.000			0.071
2005	0.001	0.001	0.000	0.000	0.000	0.000	0.000			0.003
2006	0.005	0.010	0.011	0.011	0.024	0.037	0.000	0.009		0.108
2007	0.006	0.005	0.015	0.013	0.008					0.047
2008	0.004	0.011	0.013	0.031						0.058
2009	0.000	0.001	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.005
2010	0.001		0.006							0.007
2011	0.002	0.004	0.004	0.013	0.033	0.018				0.074
2012	0.002	0.006	0.000	0.000						0.008
2013										
2014	0.004	0.008	0.005	0.000						0.017
2015	0.000	0.000	0.000	0.000	0.000		0.013			0.013
2016	0.001	0.004	0.000	0.008	0.010	0.002				0.025
2017	0.000	0.000	0.000	0.000						0.000

Literature Cited

English, K.K., W. J. Gazey, D. Peacock and G. Oliver. 2004. Assessment of the Canadian and Alaskan Sockeye Stocks Harvested in the Northern Boundary Fisheries using Run Reconstruction Techniques, 1982 – 2001. Pacific Salmon Comm. Tech. Rep. No. 13: 93p.

Alexander, R., K.K. English, S. Cox-Rogers. In prep. Assessment of the Canadian and Alaskan Sockeye Stocks harvested in the northern boundary fisheries using run reconstruction techniques, 2009-2017. Report for Pacific Salmon Comm. Northern Boundary Technical Committee.

APPENDIX G: Age Composition Estimates for Statistical Areas and Conservation Units.

Age composition data used for computing returns by age for statistical areas and conservations units are provided in Table G-1 and Table G-2 respectively. Age proportions were calculated based on age 3 to 7 catch only, the only exception was Pink salmon where all returns were assumed to be age 2. Finally, Sockeye Area 04 Babine age composition values were provided by Dave Peacock on Jan 5, 2012.

Table G-1. Age composition estimates for total returns by species and statistical area.

Species	Statistical Area	Sample Sizes		Age 2	Age 3	Age 4	Age 5	Age 6	Age 7
		Fish	Years						
CM	01	56	1		0.000	0.893	0.107	0.000	0.000
CM	02E	7,830	12		0.181	0.691	0.126	0.002	0.000
CM	02W	2,053	7		0.079	0.697	0.212	0.011	0.000
CM	03	463	13		0.089	0.760	0.145	0.006	0.000
CM	04	453	8		0.020	0.894	0.084	0.002	0.000
CM	05	175	4		0.097	0.874	0.029	0.000	0.000
CM	06	3,288	17		0.213	0.685	0.101	0.001	0.000
CM	07	3,603	20		0.276	0.657	0.066	0.001	0.000
CM	08	3,724	21		0.172	0.734	0.092	0.002	0.000
CM	09	18	6		0.167	0.667	0.167	0.000	0.000
CM	10	1,723	13		0.464	0.485	0.050	0.000	0.000
CN	01	202	3		0.000	0.119	0.762	0.119	0.000
CN	02E	5	1		0.000	0.000	1.000	0.000	0.000
CN	02W	1	1		0.000	1.000	0.000	0.000	0.000
CN	03	10,331	21		0.110	0.289	0.480	0.119	0.002
CN	04	14,108	22		0.028	0.166	0.456	0.343	0.008
CN	05	4	1		0.000	0.000	1.000	0.000	0.000
CN	06	409	4		0.081	0.364	0.521	0.032	0.002
CN	07	19	2		0.105	0.632	0.158	0.105	0.000
CN	08	3,255	17		0.081	0.333	0.508	0.078	0.000
CN	09	4,083	21		0.026	0.360	0.562	0.052	0.001
CN	10	195	8		0.046	0.631	0.297	0.026	0.000
CO	01	181	4		0.961	0.039	0.000	0.000	0.000
CO	02E	450	7		0.973	0.027	0.000	0.000	0.000
CO	02W	14	1		1.000	0.000	0.000	0.000	0.000
CO	03	15,921	21		0.599	0.399	0.002	0.000	0.000
CO	04	7,184	22		0.751	0.246	0.002	0.000	0.000
CO	06	1,107	8		0.817	0.178	0.005	0.000	0.000
CO	07	330	5		0.912	0.088	0.000	0.000	0.000
CO	08	243	5		0.749	0.251	0.000	0.000	0.000
CO	09	68	5		0.794	0.206	0.000	0.000	0.000
CO	10	2,585	22		0.775	0.225	0.000	0.000	0.000
PKe	01			1.000					
PKe	02E			1.000					
PKe	02W			1.000					
PKe	03			1.000					
PKe	04			1.000					
PKe	05			1.000					
PKe	06			1.000					
PKe	07			1.000					
PKe	08			1.000					
PKe	09			1.000					
PKe	10			1.000					
PKo	01			1.000					
PKo	02E			1.000					
PKo	02W			1.000					

Species	Statistical Area	Sample Sizes		Age 2	Age 3	Age 4	Age 5	Age 6	Age 7
		Fish	Years						
PKo	03			1.000					
PKo	04			1.000					
PKo	05			1.000					
PKo	06			1.000					
PKo	07			1.000					
PKo	08			1.000					
PKo	09			1.000					
PKo	10			1.000					
SX	01	269	2		0.004	0.851	0.138	0.007	0.000
SX	02E	588	4		0.027	0.611	0.362	0.000	0.000
SX	03	64,440	22		0.012	0.282	0.586	0.121	0.000
SX	04	20,222	22		0.013	0.466	0.510	0.011	0.000
SX	04 - Babine				0.010	0.410	0.520	0.060	
SX	06	156	4		0.058	0.776	0.167	0.000	0.000
SX	07	809	10		0.038	0.648	0.298	0.015	0.001
SX	08	696	7		0.128	0.609	0.250	0.013	0.000
SX	09	10,448	22		0.016	0.342	0.635	0.007	0.000
SX	10	5,281	22		0.003	0.367	0.619	0.011	0.000

Table G-2. Age composition estimates for total returns by species and conservation unit (CU). Where no age samples were available for a CU, the age composition was derived from the statistical areas or CU identified in the reference column (D. Peacock, pers. comm.).

				CU Sample Size		Reference Sample Size							
Species	**CU**	**CU Name**	**Reference Area/CU**	**Fish**	**Years**	**Fish**	**Years**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**
CM	CM_12	Smith Inlet		1,723	13				0.464	0.485	0.050	0.000	0.000
CM	CM_13	Rivers Inlet	CM_12	3	2	1,723	13		0.464	0.485	0.050	0.000	0.000
CM	CM_15	Spiller-Fitz Hugh-Burke	Area 08	663	4	3,724	21		0.172	0.734	0.092	0.002	0.000
CM	CM_16	Bella Coola-Dean Rivers	Area 08	943	17	3,724	21		0.172	0.734	0.092	0.002	0.000
CM	CM_17	Bella Coola River_late		2,781	21				0.186	0.735	0.078	0.001	0.000
CM	CM_18	Hecate Lowlands		3,207	21				0.291	0.645	0.063	0.001	0.000
CM	CM_19	Mussel-Kynoch	Area 07	120	4	3,603	20		0.276	0.657	0.066	0.001	0.000
CM	CM_20	Douglas-Gardner		3,037	17				0.202	0.693	0.104	0.001	0.000
CM	CM_21	East HG		6,199	12				0.214	0.674	0.111	0.001	0.000
CM	CM_22	Skidegate		1,703	6				0.054	0.756	0.186	0.004	0.000
CM	CM_23	West Haida Gwaii		1,981	7				0.082	0.696	0.211	0.012	0.000
CM	CM_24	North Haida Gwaii	Area 02W	56	1	2,053	7		0.079	0.697	0.212	0.011	0.000
CM	CM_25	North Haida Gwaii-Stanley Creek	Area 02W			2,053	7		0.079	0.697	0.212	0.011	0.000
CM	CM_26	Skeena Estuary	Area 04			453	8		0.020	0.894	0.084	0.002	0.000
CM	CM_27	Lower Skeena	Area 04	7	2	453	8		0.020	0.894	0.084	0.002	0.000
CM	CM_28	Middle Skeena	Area 04	421	6	453	8		0.020	0.894	0.084	0.002	0.000
CM	CM_30	Portland Inlet		209	6				0.144	0.694	0.158	0.005	0.000
CM	CM_31	Lower Nass		201	7				0.055	0.796	0.139	0.010	0.000
CM	CM_32	Portland Canal-Observatory	CM_30	53	1	209	6		0.144	0.694	0.158	0.005	0.000
CN	CN_36	Docee		195	8				0.046	0.631	0.297	0.026	0.000
CN	CN_37	Rivers Inlet		965	16				0.051	0.242	0.553	0.150	0.003
CN	CN_38	Wannock		3,105	20				0.018	0.397	0.564	0.021	0.000
CN	CN_39	Bella Coola-Bentinck		2,868	17				0.088	0.338	0.510	0.063	0.001
CN	CN_40	Dean River		579	6				0.028	0.221	0.601	0.150	0.000
CN	CN_41	North and Central Coast-late timing	Area 06	30	2	409	4		0.081	0.364	0.521	0.032	0.002
CN	CN_42	North and Central Coast-early timing	Area 06	349	3	409	4		0.081	0.364	0.521	0.032	0.002
CN	CN_43	Haida Gwaii-North		73	1				0.000	0.137	0.753	0.110	0.000
CN	CN_46	Ecstall	CN_48			156	1		0.006	0.564	0.288	0.135	0.006
CN	CN_48	Lower Skeena	CN_54	156	1	215	8		0.033	0.260	0.465	0.237	0.005
CN	CN_49	Kalum_early timing	CN_55	327	6	533	13		0.021	0.159	0.696	0.124	0.000
CN	CN_50	Kalum_late timing		8,564	22				0.026	0.109	0.383	0.470	0.012
CN	CN_53	Middle Skeena-large lakes		3,358	18				0.043	0.285	0.566	0.104	0.001
CN	CN_54	Middle Skeena-mainstem tributaries		215	8				0.033	0.260	0.465	0.237	0.005
CN	CN_55	Upper Bulkley River		533	13				0.021	0.159	0.696	0.124	0.000
CN	CN_57	Portland Sound-Observatory Inlet-Lower Nass		9,725	21				0.115	0.291	0.474	0.118	0.002
CN	CN_58	Upper Nass		606	5				0.045	0.259	0.574	0.122	0.000
CO	CO_20	Smith Inlet		2,585	22				0.775	0.225	0.000	0.000	0.000
CO	CO_21	Rivers Inlet		68	5				0.794	0.206	0.000	0.000	0.000
CO	CO_22	Bella Coola-Dean Rivers		37	3				0.946	0.054	0.000	0.000	0.000

Species	CU	CU Name	Reference Area/CU	CU Sample Size		Reference Sample Size		Age 2	Age 3	Age 4	Age 5	Age 6	Age 7
				Fish	Years	Fish	Years						
CO	CO_23	Haida Gwaii-East	CO_27	450	7	1,360	8		0.854	0.141	0.004	0.000	0.000
CO	CO_24	Haida Gwaii-West	CO_27	14	1	1,360	8		0.854	0.141	0.004	0.000	0.000
CO	CO_25	Haida Gwaii-Graham Island Lowlands	CO_27	1	1	1,360	8		0.854	0.141	0.004	0.000	0.000
CO	CO_26	Mussel-Kynoch	CO_27			1,360	8		0.854	0.141	0.004	0.000	0.000
CO	CO_27	Hecate Strait Mainland		1,360	8				0.854	0.141	0.004	0.000	0.000
CO	CO_28	Northern Coastal Streams	CO_27			1,360	8		0.854	0.141	0.004	0.000	0.000
CO	CO_29	Douglas Channel-Kitimat Arm	CO_27			1,360	8		0.854	0.141	0.004	0.000	0.000
CO	CO_30	Northern Coastal Streams		206	2				0.714	0.286	0.000	0.000	0.000
CO	CO_31	Skeena Estuary	CO_35			11,042	19		0.571	0.426	0.003	0.000	0.000
CO	CO_32	Lower Skeena	CO_35	28	1	11,042	19		0.571	0.426	0.003	0.000	0.000
CO	CO_33	Middle Skeena		5,235	22				0.752	0.246	0.002	0.000	0.000
CO	CO_34	Upper Skeena		984	9				0.615	0.380	0.005	0.000	0.000
CO	CO_35	Lower Nass		11,042	19				0.571	0.426	0.003	0.000	0.000
CO	CO_36	Upper Nass		4,154	18				0.681	0.318	0.001	0.000	0.000
CO	CO_37	Portland Sound-Observatory Inlet-Portland Canal		725	9				0.548	0.450	0.003	0.000	0.000
PKe	PKe_5	Hecate Lowlands						1.000					
PKe	PKe_6	Hecate Strait-Fjords						1.000					
PKe	PKe_7	Nass-Skeena Estuary						1.000					
PKe	PKe_8	Middle-Upper Skeena						1.000					
PKe	PKe_9	North Haida Gwaii						1.000					
PKe	PKe_10	East Haida Gwaii						1.000					
PKe	PKe_11	West Haida Gwaii						1.000					
PKe	PKo_8	Homathko-Klinaklini-Smith-Rivers-Bella Coola-Dean						1.000					
PKo	PKo_9	East Haida Gwaii						1.000					
PKo	PKo_12	Hecate Strait-Lowlands						1.000					
PKo	PKo_13	Hecate Strait-Fjords						1.000					
PKo	PKo_14	Nass-Skeena Estuary						1.000					
PKo	PKo_15	Lower Skeena						1.000					
PKo	PKo_16	Middle and Upper Skeena						1.000					
PKo	PKo_17	Nass-Portland-Observatory						1.000					
SX	SX_L-15-01	Long		5,281	22				0.003	0.364	0.622	0.011	0.000
SX	SX_L-15-02	Owikeno		7,829	22				0.008	0.283	0.701	0.008	0.000
SX	SX_L-17-02	Awun	Area 01			269	2		0.004	0.851	0.138	0.007	0.000
SX	SX_L-17-05	Marian/Eden	Area 01			269	2		0.004	0.851	0.138	0.007	0.000
SX	SX_L-17-06	Mathers	Area 02E	238	1	588	4		0.027	0.611	0.362	0.000	0.000
SX	SX_L-17-07	Mercer	Area 02E			588	4		0.027	0.611	0.362	0.000	0.000
SX	SX_L-17-08	Skidegate		350	3				0.034	0.769	0.197	0.000	0.000
SX	SX_L-17-09	Yakoun		80	1				0.000	0.650	0.325	0.025	0.000
SX	SX_L-18-01	Backland	Area 06			156	4		0.058	0.776	0.167	0.000	0.000
SX	SX_L-18-02	Canoona	Area 06			156	4		0.058	0.776	0.167	0.000	0.000
SX	SX_L-18-04	Evelyn	Area 06			156	4		0.058	0.776	0.167	0.000	0.000
SX	SX_L-18-05	Kainet Creek	Area 07			809	10		0.038	0.648	0.298	0.015	0.001
SX	SX_L-18-08	Kitlope	Area 06			156	4		0.058	0.776	0.167	0.000	0.000
SX	SX_L-19-02	Bloomfield	Area 06	9	1	156	4		0.058	0.776	0.167	0.000	0.000

Species	CU	CU Name	Reference Area/CU	CU Sample Size		Reference Sample Size		Age 2	Age 3	Age 4	Age 5	Age 6	Age 7
				Fish	Years	Fish	Years						
SX	SX_L-19-11	Curtis Inlet	Area 06			156	4		0.058	0.776	0.167	0.000	0.000
SX	SX_L-19-14	Devon	Area 06			156	4		0.058	0.776	0.167	0.000	0.000
SX	SX_L-19-20	Freeda/Brodie	Area 06			156	4		0.058	0.776	0.167	0.000	0.000
SX	SX_L-19-21	Hartley Bay	Area 06			156	4		0.058	0.776	0.167	0.000	0.000
SX	SX_L-19-24	Kadjusdis River	Area 07			809	10		0.038	0.648	0.298	0.015	0.001
SX	SX_L-19-26	Keecha	Area 06			156	4		0.058	0.776	0.167	0.000	0.000
SX	SX_L-19-33	Koeye	Area 08			696	7		0.128	0.609	0.250	0.013	0.000
SX	SX_L-19-34	Kooryet	Area 06			156	4		0.058	0.776	0.167	0.000	0.000
SX	SX_L-19-36	Kwakwa Creek	Area 07	69	2	809	10		0.038	0.648	0.298	0.015	0.001
SX	SX_L-19-39	Lowe/Simpson/Weare	Area 06			156	4		0.058	0.776	0.167	0.000	0.000
SX	SX_L-19-40	Mary Cove Creek	Area 07	30	1	809	10		0.038	0.648	0.298	0.015	0.001
SX	SX_L-19-43	Mikado	Area 06			156	4		0.058	0.776	0.167	0.000	0.000
SX	SX_L-19-45	Namu	Area 08			696	7		0.128	0.609	0.250	0.013	0.000
SX	SX_L-19-46	Port John	Area 08			696	7		0.128	0.609	0.250	0.013	0.000
SX	SX_L-19-49	Prudhomme	Area 04 - Babine						0.010	0.410	0.520	0.060	
SX	SX_L-19-50	Roderick	Area 07	64	3	809	10		0.038	0.648	0.298	0.015	0.001
SX	SX_L-19-54	Shawatlan	Area 04 - Babine						0.010	0.410	0.520	0.060	
SX	SX_L-19-60	Tankeeah River		637	7				0.041	0.722	0.226	0.011	0.000
SX	SX_L-19-62	Tsimtack Lakes	Area 06			156	4		0.058	0.776	0.167	0.000	0.000
SX	SX_L-19-70	Yeo	Area 07			809	10		0.038	0.648	0.298	0.015	0.001
SX	SX_L-20-01	Alastair		151	2				0.007	0.020	0.596	0.377	0.000
SX	SX_L-20-05	Johnston	Area 04 - Babine						0.010	0.410	0.520	0.060	
SX	SX_L-20-06	Kitsumkalum	Area 04 - Babine						0.010	0.410	0.520	0.060	
SX	SX_L-20-07	Lakelse	Area 04 - Babine	194	1				0.010	0.410	0.520	0.060	
SX	SX_L-20-08	Mcdonell	Area 04 - Babine						0.010	0.410	0.520	0.060	
SX	SX_L-21-02	Babine Complex		17,489	21				0.014	0.475	0.508	0.003	0.000
SX	SX_L-21-05	Kitwancool		299	4				0.003	0.532	0.398	0.067	0.000
SX	SX_L-21-07	Morice		98	1				0.000	0.020	0.571	0.408	0.000
SX	SX_L-21-09	Stephens	Area 04 - Babine						0.010	0.410	0.520	0.060	
SX	SX_L-21-10	Stephens	Area 04 - Babine	100	1				0.010	0.410	0.520	0.060	
SX	SX_L-21-11	Tahlo/Morrison	SX_L-21-02			17,489	21		0.014	0.475	0.508	0.003	0.000
SX	SX_L-22-01	Asitika	Area 04 - Babine						0.010	0.410	0.520	0.060	
SX	SX_L-22-02	Azuklotz	Area 04 - Babine						0.010	0.410	0.520	0.060	
SX	SX_L-22-03	Bear	Area 04 - Babine	46	1				0.010	0.410	0.520	0.060	
SX	SX_L-22-04	Damshilgwit	Area 04 - Babine	67	1				0.010	0.410	0.520	0.060	
SX	SX_L-22-08	Motase	Area 04 - Babine						0.010	0.410	0.520	0.060	
SX	SX_L-24-02	Damdochax/Wiminasik		1,414	13				0.000	0.318	0.658	0.023	0.001
SX	SX_L-24-03	Fred Wright		1,780	13				0.002	0.445	0.515	0.038	0.000
SX	SX_L-24-05	Meziadin		28,059	22				0.002	0.269	0.600	0.129	0.000
SX	SX_R16	Northern Coastal Fjords		618	6				0.136	0.594	0.257	0.013	0.000
SX	SX_R19	Skeena River-high interior	Area 04 - Babine						0.010	0.410	0.520	0.060	
SX	SX_R20	Lower Nass-Portland[1]	SX_R21			29	1		0.000	0.759	0.241	0.000	0.000
SX	SX_R21	Upper Nass River		29	1				0.000	0.759	0.241	0.000	0.000

[1] Available data was from a mixture of conservation units.