An Assessment of Skeena River Chinook Salmon Using Genetic Stock Identification 1984 to 2020

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2024

Canadian Manuscript Report of Fisheries and Aquatic Sciences 3219

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Cat. No. Fs97-4/3219E-PDF ISBN 978-0-660-39499-2 ISSN 1488-5387

Correct citation for this publication:

Winther, I., May, C., Warkentin, L., Greenberg, D. and Wor, C. 2024. An Assessment of Skeena River Chinook Salmon Using Genetic Stock Identification 1984 to 2020. Can. Manuscr. Rep. Fish. Aquat. Sci. 3219: ix + 171 p.

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ABSTRACT

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Chinook salmon returns to the Skeena River were estimated using genetic stock identification techniques for 1984 to 2020. Genetic analyses were completed from fish sampled at the Tyee Test Fishery. The proportions of Kitsumkalum River Chinook salmon identified in the genetic samples were expanded to derive escapement estimates for six conservation units of Skeena River summer run Chinook salmon upstream of Tyee.

Genetic data were used to estimate exploitation rates in freshwater fisheries and coded wire tag (CWT) data were used to estimate exploitation rates in marine fisheries.

Skeena Chinook salmon life histories are presented. Average size of Skeena River Chinook salmon declined from 1984 to 2020, driven by reduced age at maturity and by reduced size at age. Run timing past Tyee was getting progressively later for all CUs.

Spawner-recruitment modeling was explored for the six CUs and for the aggregate. Three stock-recruitment models based upon the classic Ricker (1975) function were evaluated, including a static model, a model with autocorrelated residuals and a model with time-varying productivity. Estimates of the biological reference points of S_{MSY}, S_{MAX}, U_{MSY} and S_{Gen} were reported. Productivity declined by 25-50% in the most recent generations relative to the long-term average.

RESUMÉ

Winther, I., May, C., Warkentin, L., Greenberg, D. and Wor, C. 2024. An Assessment of Skeena River Chinook Salmon Using Genetic Stock Identification 1984 to 2020. Can. Manuscr. Rep. Fish. Aquat. Sci. 3219: ix + 171 p.

Les retours de saumons chinook dans la rivière Skeena ont été estimés à l'aide de techniques d'identification génétique des stocks pour la période 1984 à 2020. Les analyses génétiques ont été réalisées à partir de poissons échantillonnés à la pêche d’essai de Tyee. Les proportions de saumon chinook de la rivière Kitsumkalum identifiées dans les échantillons génétiques ont été élargies pour obtenir des estimations des échappées pour six unités de conservation (UC) du saumon chinook de montaison estivale de la rivière Skeena en montant de Tyee.

Les données génétiques ont été utilisées pour estimer les taux d'exploitation dans les pêcheries d'eau douce et les données des micromarques magnétisées codées ont été utilisées pour estimer les taux d'exploitation dans les pêcheries marines.

Le cycle biologique du saumon chinook de la Skeena est présenté. La taille moyenne du saumon chinook de la rivière Skeena a diminué de 1984 à 2020, en raison de la réduction de l'âge à la maturité et de la taille à l'âge. La période de montaison au-delà de Tyee devenait progressivement plus tardive pour toutes les UC.

La modélisation du recrutement des géniteurs a été explorée pour les six UC ainsi que pour l'ensemble. Trois modèles stock-recrutement basés sur la fonction classique de Ricker (1975) ont été évalués, y compris un modèle statique, un modèle avec des résidus autocorrélés et un modèle avec une productivité variable dans le temps. Les estimations des points de référence biologiques GRMD, GMAX, URDM et GGen ont été communiquées. La productivité a diminué de 25 à 50 % dans les les cohortes de géniteurs les plus récentes par rapport à la moyenne à long terme.

INTRODUCTION

Objectives

The primary objectives of this report are to document advancements in the estimation of Chinook salmon escapements to the Skeena River and to present the population metrics generated from the improved estimates. Biologically based escapement estimates are necessary to assess status, set goals and determine harvest limits. Escapement estimates were produced for six Chinook salmon conservation units (CUs) from 1984 to 2020. Previous estimates and indices of Skeena River Chinook salmon escapement were problematic as they were generated with several different methods employed across different areas in the Skeena watershed over different time periods (Table 1). Escapement estimates produced here have been generated from the same methods and presented for the individual CUs and across the aggregate of populations.

The escapements and population metrics presented here improve our understanding of the biology of Skeena River Chinook salmon. Products included improved information on the life history, size at age, age at maturity and run timing for Skeena River Chinook salmon CUs. We used conventional spawner-recruit approaches to generate population metrics in support of future work to assess stock status and develop management goals. The population metrics were: the spawning abundance that produces maximum sustained yield (S_{MSY}); the exploitation rates associated with S_{MSY} (U_{MSY}); the estimates of spawners that maximize recruitment (capacity, S_{EQ} or S_{MAX}); the spawners that would result in recovery to S_{MSY} in one generation in the absence of fishing (S_{Gen}); the proportions of S_{MSY} and U_{MSY} that are commonly used to inform us about the condition of salmon stocks (85% S_{MSY}, $U_{85\%Smsy}$, and 25% S_{MSY}); and the parameters α and β from the Ricker recruitment curve (Ricker 1975). Metrics were presented for models based on the classic Ricker function and versions with autocorrelated residuals and with time-varying productivity.

Study Area

The Skeena River watershed lies in northwestern British Columbia, Canada, southeast of the Alaskan panhandle (Figure 1). The Skeena River has the second largest watershed in the province and the second largest aggregate of Chinook salmon populations. Only the Fraser River watershed is larger with more Chinook salmon. The Bear, Babine, Bulkley, Kispiox, Zymoetz and Kitsumkalum Rivers are large tributaries to the Skeena River.

The Skeena River supports five species of Pacific salmon: Chinook salmon, Coho (*O. kisutch*), Sockeye (*O. nerka*), Pink (*O. gorbuscha)* and Chum (*O. keta*). Other salmonid fish species encountered included Rainbow/Steelhead Trout (*O. mykiss*), Coastal Cutthroat Trout (*O. clarkii*), Rocky Mountain Whitefish (*Prosopium williamsoni*), Bull Trout (*Salvelinus confluentus*) and Dolly Varden Char (*S. malma*).

Pacific Salmon Treaty and Policy Context

The Pacific Salmon Commission (PSC) is the body formed by the governments of Canada and the United States to implement the Pacific Salmon Treaty (PST, subsequently referred to as the Treaty) for the conservation, rational management and optimum production of Pacific salmon. During Treaty negotiations to amend the chapter on Chinook salmon it became apparent that the accuracy and precision of spawning escapement estimates for important natural stocks of Chinook salmon should be improved to support implementation of the Chinook salmon annex. Reliable estimates of spawning escapements for a large number of natural Chinook salmon stocks over time were critical to assessing the status of the resource throughout the Treaty area and were necessary to assess the long-term conservation and production goals of the Treaty. Recognizing the importance of improved estimates of Chinook salmon spawning escapements, the Commission conceived the Sentinel Stock Program (SSP) and included it as a specific requirement in the revised Chinook salmon regime (PSC 2004, 2019). The SSP was intended to focus on improving spawning escapement estimates for a select subset of natural Chinook salmon populations for which estimates of spawning escapement were critical to fishery management decisions required to implement the Chinook salmon annex. Improving these estimates would strengthen the biological basis of the Chinook salmon regime, increase confidence in management, and better inform the development of future regimes. The Skeena River Chinook salmon population was selected as one of the Sentinel Stocks.

A series of Sentinel Stock projects were conducted to generate preliminary estimates of the Chinook salmon returning to the Skeena River based on genetic stock identification (GSI) of fish caught in the Tyee Test Fishery. The GSI-based approach has been documented with the PSC and reviewed multiple times by the Sentinel Stock Committee and the Northern Boundary and Transboundary Rivers Restoration and Enhancement Fund (the Northern Fund) committee. The projects consisted of annual and retrospective programs designed to complete a time series of escapement estimates from 1984 to 2020. The retrospective projects used archived scale samples collected from Chinook salmon caught in the Tyee Test Fishery to produce stock compositions for 1979 to 2008 (Winther 2012b, 2013b) and annual projects were conducted from 2009 to 2020 (Winther 2009, 2011, 2012a, 2013a, 2014, 2015, 2016, 2017, 2018, 2019, 2020, Winther and Candy 2011).

The Kitsumkalum River Chinook salmon population serves as the exploitation rate indicator stock for the Skeena River and the Skeena River acts as an escapement indicator stock for northern BC. Neither the Kitsumkalum River nor the Skeena River have PSC Chinook salmon Technical Committee (CTC) agreed escapement goals.

The 2019 PST Agreement lists 37 Chinook salmon populations as escapement indicator stocks and reports on 49 stocks or stock aggregates. Of these stocks, 22 have management objectives in the form of escapement goals and 15 are under development. The goals for Skeena River Chinook salmon were described as under development. The interim escapement goal for the Skeena River aggregate (and other stocks without goals) was initially set as double the average escapement from 1979 to 1982, a period when it is believed that abundance was depressed due to high exploitation. Parken et al. (2006) related productive capacity to habitat area to generate escapement goals that were rooted in fish production relationships. The habitat-based model was a further step towards the generation of biologically based escapement goals for Skeena River Chinook stocks. The escapement estimates and population metrics presented here from conventional spawner-recruit methods further inform management goal development. The population metrics could represent goals (e.g. S_{MSY}) when management consultations are completed.

Improvements to the escapement estimates and revision of the population metrics for the exploitation rate indicator stock, the Kitsumkalum River (Winther et al. 2021), provide the basis for the development of escapement estimates and ultimately management goals for Skeena River Chinook salmon. The PSC Chinook salmon model currently uses 45 Chinook salmon stocks as exploitation rate indicators for the annual exploitation rate analyses and model calibrations. The Kitsumkalum stock is the only indicator for the North Coast of British Columbia (NBC).

Skeena Chinook salmon are encountered in the PST Aggregate Abundance Based Management (AABM) fisheries in Southeast Alaska (SEAK all gear) and Northern British Columbia (NBC Troll and Haida Gwaii Sport). They also contribute to the Individual Stock Based Management (ISBM) fisheries in Northern British Columbia including gillnet, tidal sport, non-tidal sport, tidal First Nations' (FN) and non-tidal FN fisheries. Skeena Chinook salmon are north migrating, so they do not contribute to the West Coast Vancouver Island (WCVI) AABM fisheries nor do they contribute appreciably to ISBM fisheries south of the Skeena River.

Canada's domestic management of Skeena River Chinook salmon has occurred without escapement goals or other management targets. Biological benchmarks and evaluations of status were only available for the Kitsumkalum Chinook CU (McNicol 1999, Winther et al. 2021). In the absence of biological benchmarks and management goals with appropriate triggers for action, domestic management was limited to reacting to trends in escapement and catch, trends that were more difficult to interpret due to varying methods of escapement enumeration and catch estimation.

Domestic management was able to respond to trends that elevated concerns for Canadian Chinook salmon stocks. Management was well informed about stock specific harvests of AABM fisheries from GSI sampling that was initiated in troll fisheries in 2002 and later in sport fisheries (Winther and Beacham 2006, 2009). These data were originally collected to develop management actions to protect Chinook salmon from WCVI but were later used to inform management on impacts and options to protect Nass, Skeena, Fraser and Central Coast stocks. Initially Skeena Chinook salmon benefitted from management actions aimed at protecting WCVI and Fraser stocks. Later, management actions were designed specifically to protect Skeena stocks. Alignment of domestic management actions in NBC and SEAK was undertaken in 2018 in response to stock declines in both areas (ADFG DFO, 2018).

Fishery management to protect Skeena Chinook salmon has most often taken the form of time and area closures or fishery reductions. A key aspect of the GSI data was the identification of stock specific run timing. Sampling of AABM fisheries that intercept Skeena stocks on their entry into Canadian waters combined with sampling at Tyee (entry into freshwater) allowed for interpolation of Skeena run timing through marine ISBM fisheries that were not well sampled (ADFG DFO, 2018).

The Skeena River Chinook salmon stocks

Holtby and Ciruna (2007) identified twelve Chinook salmon CUs associated with the Skeena River watershed based on ecotype, habitat, life history, genetics and run timing. The summer run Chinook salmon CUs included: Ecstall, Gitnadoix (later added to the Lower Skeena CU), Lower Skeena, Kitsumkalum-late, Lakelse, Middle Skeena, Middle Skeena mainstem tributaries, Middle Skeena Large Lakes, and Upper Skeena. The Ecstall, the Skeena estuary and the spring timed CUs, Upper Bulkley and Kitsumkalum-early, were outside of the scope of this study. Chinook salmon populations in the Skeena estuary CU lie north of the Skeena River. The Ecstall CU is downstream of the Tyee Test Fishery. The spring run (early timed) Chinook salmon CUs including the Kitsumkalum-early and the Upper Bulkley River CUs pass Tyee on their spawning migrations before the test fishery is initiated.

The DFO Salmon Escapement Data System (nuSEDS) includes records of 102 unique Chinook salmon spawning locations in the Skeena CUs. Four of the sites are in the Skeena estuary CU and four are in the Ecstall CU. The remaining 94 sites are upstream of Tyee. The genetic baseline used in the analyses of Skeena Chinook caught at Tyee included 30 spawning populations (Appendix 1) from nine CUs: Kitsumkalum-early, Upper Bulkley, Ecstall, Lower Skeena, Kitsumkalum-late, Zymoetz-Fiddler, Middle Skeena, Upper Skeena and Middle Skeena-large lakes (hereafter Large Lakes). The Lakelse CU was missing from the baseline due to a lack of samples (Figure 2).

Kitsumkalum Chinook salmon

The Kitsumkalum River hosts one of the largest spawning populations of summer run Chinook salmon in the Skeena River watershed, second only to the Morice River. The estimates of summer run Chinook salmon returning to the Kitsumkalum River form the cornerstone for the GSI-based estimates of the Skeena River escapements (hereafter references to Kitsumkalum River Chinook salmon are for the summer run or late timed CU, unless stated otherwise). Previously, Kitsumkalum Chinook salmon escapements were estimated from mark-recapture studies using the Petersen method, which assumed a closed population over the study period (no immigration, emigration, or deaths). Here, we used revised estimates using open population models (POPAN) which were generally lower and noticeably more precise than those calculated with Petersen closed population estimators (Winther et al. 2021, Vélez-Espino et al. 2016). POPAN estimates make use of more information (individual encounter histories of each fish) compared to the Petersen method, which simply uses the number of individuals marked and recaptured.

Kitsumkalum River Chinook salmon occupy a unique conservation unit within Skeena River Chinook salmon populations. They are genetically distinct with genetic distances (microsatellite DNA FST values > 0.01) that allow for greater than 80% accuracy in identifying them from individuals of nearby populations and much greater accuracy in identifying proportions of larger samples. The average standard error around the microsatellite DNA results for the proportion of Kitsumkalum Chinook salmon in the Skeena River Test fishery sample was 2.0% across 35 years (range 1.3% to 4% for sample sizes between 230 and 1,200 fish).

Simulations of the GSI procedure where Kitsumkalum was the only population in the sample had an average estimate of stock composition at 97.6% Kitsumkalum, indicating the ability to identify the Kitsumkalum stock from mixed samples collected in the Skeena River with high accuracy. The standard deviation of the estimate, based on 100 simulations of a 200-fish sample, was 1.5% (pers. comm., Beacham and Araujo, 2019).

The Kitsumkalum River Chinook salmon program produces Chinook salmon marked with coded wire tags (CWTs) for annual release as fry and yearlings. A mark-recapture program is conducted annually to estimate the escapement of the marked and unmarked fractions of the Chinook salmon returning to the Kitsumkalum River. The data generated by the program contribute internationally as one of the stocks in the PSC Chinook salmon model. Domestically the data contribute to Canada's Key Stream Program and provide the only exploitation rate indicator stock for Chinook salmon in the North Coast. These data are essential to the Chinook salmon run reconstruction calculations, and output from the PSC Chinook salmon model were used in this study.

The Kitsumkalum River Chinook salmon population has a relatively high abundance, precise genetic identification, and a time series of escapement estimates generated using a consistent method with high precision. These attributes make it possible to expand the estimate of Kitsumkalum Chinook salmon to estimate the aggregate abundance of Chinook salmon in the Skeena River. Escapement estimates of the component CUs are also possible, recognizing the diminished precision for small CUs. The expansions require that Chinook salmon from Kitsumkalum be equally vulnerable to the sample collection procedure as other components. We assume the Tyee Test Fishery is an unbiased sampler of the Chinook salmon population entering the Skeena River and that other summer run CUs upstream of Tyee are equally vulnerable to capture.

The Kitsumkalum River Chinook salmon CU is the exploitation rate indicator stock for the Skeena River. We assumed that the brood year and age specific cohorts from the Kitsumkalum River represent other summer run spawning populations in the Skeena River with respect to their ocean distribution and exploitation by ocean fisheries.

Samples and Data

Scale samples archived from the Tyee Test Fishery proved to be a reliable source of Chinook salmon DNA such that stock composition could be identified for the historic time series of Skeena Chinook salmon. This was identified in feasibility studies of samples collected in 2000, 2001 and 2003. Improvements made to the genetic baseline for Skeena Chinook salmon in 2012 and 2013 were incorporated, and four additional genetic markers were included as recommended by the Genetic Analysis of Pacific Salmonids (GAPS) consortium (Seeb et al. 2007).

Hatchery influence

Hatchery production of Chinook salmon in the Skeena watershed has been limited to small-scale assessment and production projects for community development. Hatchery production for the purposes of the exploitation rate indicator have contributed an average of 4.8% to returns of Chinook salmon to the Kitsumkalum River with a range from near zero to 1,471 fish annually (Winther et al. 2021). The average Kitsumkalum hatchery production contributed 1.1% to Skeena River escapements from 1984 to 2020.

Community production projects have been carried out and tag groups have been released from Chinook salmon stocks in the Babine, Kispiox, Morice, Bulkley, Cedar, and Erlandsen River tributaries of the Skeena River. These releases were smaller than those from the Kitsumkalum River and their success rates were unknown. Hatchery releases in the Upper Bulkley River were from an early spring timed stock that were not part of the summer timed stocks estimated by this project.

Straying from other stocks

There is no evidence of Chinook salmon straying from other rivers to the Skeena River to date. No stray coded wire tags have been recovered at the Tyee Test Fishery. The Kitsumkalum River is sampled extensively, and no Chinook salmon tagged in other systems have been recovered since the beginning of the program in 1984. Recovery of CWTs is a relatively weak measure of straying as few populations in northern British Columbia are marked with CWTs. The nearest populations to the Skeena that have been marked with CWTs are the Kincolith River to the north and the Kitimat River to the south. Both had relatively small and sporadic marking programs. Genetic results from 2009 and 2010 (Winther 2009, Winther and Candy 2011) supported the assumption that all Chinook salmon caught at the Tyee Test Fishery were from the Skeena watershed and that any straying was extremely limited (<<1%) and is probably zero in most years.

METHODS

Chinook salmon escapement estimates were produced for Skeena River Chinook salmon upstream of Tyee using the genetic results from samples collected by the Tyee Test Fishery and escapement estimates to the Kitsumkalum River. The component of the Tyee samples identified as originating from the Kitsumkalum River was the basis for the expansions to the estimates of escapement to the aggregate of summer run Chinook in the Skeena River. Chinook salmon runs were reconstructed from the escapements seaward using GSI in freshwater fisheries and CWTs in marine fisheries. Data from the run reconstructions allowed for spawner-recruit analyses to estimate biological reference points.

Data collection

The Tyee Test Fishery site is located on the tidal estuary of the Skeena River, on the north side, upstream of the confluence with the Ecstall River (Figure 1). The Tyee Test Fishery is a standardized fishery that has been conducted in the Skeena River estuary since 1955. Its primary purpose was to provide an in-season indication of Sockeye salmon abundance but was also used to monitor the relative abundance of other salmon species including Chinook salmon (Cox-Rogers and Jantz 1993). Since the test fishery was designed for Sockeye salmon it occurs across the entire Sockeye salmon run but tends to miss the beginning of the Chinook salmon summer run. A gill net was deployed (set) in standard locations relative to tidal flow. Sets were made at high and low water slack tides during daylight hours. Usually three sets were made per day except for some days late in the season when there were only two tidal changes during daylight. An index consisting of modified catch per effort was calculated daily. Typically, more fish were caught during low water sets so the index consisted of the mean of averaged high water and averaged low water catch measured per hour the net was fished. Three tides were available to sample each day through most of the Chinook run and the index procedure (a mean of means) deals with the changes in catch that occur from sampling two low tides and one high tide in a day to the opposite, two high tides and one low tide in a day.

The net used at the Tyee Test Fishery was a multi-panel gill net 366 meters (200 fathoms) in length and 7.6 meters (25 feet) deep constructed of six strand monofilament nylon (described as *Alaska twist* by the manufacturer). The net included ten panels with web sizes ranging from 8.9 cm to 20.3 cm (3.5 inches to 8 inches) increasing in size by 1.3 cm (0.5 inch) increments. Imperial units were included here to match the web size designation by the manufacturer. The different mesh sizes were arranged at random across the length of the net. The web was hung in a 2:1 ratio of webbing to fishing net length. Prior to 1996 and in 1997 and 1998 a multifilament nylon net was used. The nylon net was less efficient and caught fewer Chinook salmon. In 1995, 1996, 1999, 2000 and 2001 both types of net were used to calibrate the Alaska twist net and allow for comparability between net types. After 2001 only the Alaska twist net was used. Catch data have been presented for a single net even though additional catches were available for sampling in the calibration years. A full description of the test fishery was provided by Jantz et al. (1990).

Chinook salmon caught in the Tyee Test Fishery were sampled for nose-fork length, post eye orbit to hypural plate (POH) length and were incised to determine sex. Data were entered into a database developed and maintained by the Management Biology Unit (the Salmon Stock Assessment Unit after 1994) of Fisheries and Oceans Canada in Prince Rupert. Scale samples were collected from each fish on to scale books as described by MacLellan (1999) and forwarded to the Fisheries and Oceans Canada Sclerochronology Laboratory at the Pacific Biological Station for ageing. The process of deriving ages from the scales included making acetate impressions, maintaining a database and archiving the scales and the acetate impressions. Ages were reported using the Gilbert-Rich age format (MacLellan and Gillespie, 2015).

Initially, the primary objective of scale collections was to provide age data for the Chinook salmon caught at Tyee. Ageing was attempted for most of the scale collections but in some years with large numbers of Chinook salmon samples, scale samples were sub-sampled to bring ageing requests within the capacity of the laboratory (e.g. 1999). The scales also proved to be a source of DNA. The scales were preserved by drying them in scale books. The process of making acetate impressions with heat and pressure may have improved the preservation of the DNA by killing any bacteria or fungi associated with the scales. The maximum number of fish sampled for GSI was limited in some years with large numbers of scale samples due to the expense of GSI.

Genetic Stock Identification

Chinook salmon collections were compared with baselines collected from 30 Skeena River populations (Appendix 1). Samples were analyzed for 15 microsatellite loci using methods of DNA extraction, PCR, electrophoresis, and allele scoring described by Candy et al. (2002) and Beacham et al. (2006). The Molecular Genetics Laboratory at the Pacific Biological Station provided the sample analysis. A Bayesian approach as described by Pella and Masuda (2001) and implemented in the program CBayes (Neaves et al. 2005), was used for the analyses. The model output included individual assignments to baseline populations where the posterior distribution gives probabilities for the 30 populations for each sample.

Escapement

Escapement estimates were generated for the individual CUs that make up the aggregate of Skeena River summer run Chinook salmon upstream of Tyee. Two spring or early timed CUs from the Upper Bulkley River and the Cedar River (Kitsumkalum-early CU) were excluded from the analyses as they pass Tyee before the test fishery begins. The CU in the Lakelse River was excluded based on the lack of baseline genetic samples due to its very small size. The Ecstall River supports a Chinook salmon CU but was not included in the study because it enters the Skeena River downstream of Tyee. It is unlikely that Ecstall Chinook salmon are caught in the Tyee Test Fishery relative to their abundance thus violating one of the basic assumptions of the study.

Recent information on timing and genetics from microsatellite DNA and single nucleotide proteins (SNPs) have resulted in revisions to the list of Skeena River Chinook CUs. The changes included adding Gitnadoix to the Lower Skeena CU and combining Middle Skeena and Middle Skeena mainstem tributaries into the Middle Skeena CU. The Zymoetz-Fiddler CU was identified as being separate from Middle Skeena and Lower Skeena CUs, and the Sicintine River was included in the Upper Skeena CU (Beacham et al. 2006, Rondeau 2020, Rondeau 2021).

Ideally, all Chinook salmon encountered at the Tyee Test Fishery would be sampled and analyzed for GSI but that was not possible due to depredation by seals and changes to the sampling protocols through time. To address temporal changes in sample proportions the samples were stratified temporally by week and genetic results from the mixture models of the weekly samples were applied to the weekly catch before being summed into the annual estimates. This dealt with changes in sampling proportion and with minor differences in run timing. The mixture model results were favoured for escapement estimation as they provided improved precision over the GSI assignments for individual fish. Catchability was assumed to be equal for all stocks of Chinook salmon passing Tyee.

A mark-recapture program on the Kitsumkalum River provided estimates of the escapement of large (ages 4_2, 5_2, 6_2 and 7_2) Chinook salmon from 1984 to 2020 (Winther et al. 2021). Fishing effects, including harvests, removals, and incidental mortalities like drop out, drop off and release mortalities, on all stocks of Chinook salmon were assumed to be equal between Tyee and the Kitsumkalum River in Terrace. Thus, the annual estimate of large Skeena

Chinook salmon that escaped to Terrace was the escapement of large Kitsumkalum Chinook salmon divided by the proportion of Kitsumkalum Chinook salmon identified in the Tyee Test Fishery:

$$Skeena\ return\ to\ Terrace = \frac{Kitsumkalum\ escapement}{Proportion\ of\ Kitsumkalum\ at\ Tyee} \quad (1)$$

or

$$z = \frac{y}{x} \quad (2)$$

and the variance was estimated by:

$$v(z) = z^2\left(\frac{v(y)}{y^2} + \frac{v(x)}{x^2}\right) \quad (3)$$

where v is the variance, z is large Skeena Chinook salmon escapement to Terrace, y is large Kitsumkalum Chinook salmon escapement and x is the proportion of Kitsumkalum Chinook salmon in the samples collected by the Tyee Test Fishery (CTC 1999).

Estimates of annual run size to Terrace (*RTT*) for conservation units other than Kitsumkalum were calculated as:

$$RTT_{CU} = Proportion\ at\ Tyee_{CU} \times Skeena\ RTT \quad (4)$$

Escapement for the Skeena aggregate was:

$$Skeena\ Escapement\ =\ Skeena\ RTT\ -\ TMupTerrace \quad (5)$$

Where TMupTerrace were the total mortalities upstream of Terrace.

Escapement for CUs upstream of Terrace was:

$$Escapement_{CU} = RTT_{CU} - \left(TMupTerrace \times \frac{RTT_{CU}}{RTT_{CUs\ upstream\ of\ Terrace}}\right) \quad (6)$$

Where the CUs upstream of Terrace were Upper Skeena, Middle Skeena and Large Lakes CUs.

The Zymoetz-Fiddler CU was treated the same as CUs below Terrace due to its proximity to Terrace and the lack of meaningful Chinook catch data that would allow for separation at such a fine spatial scale.

Estimates of run size to Terrace were presented with variance estimates. The accuracy and precision of catch estimates for fisheries above Terrace were not known so catch estimates were presented without standard errors. Consequently, variances could not be reported for the escapement estimates of Chinook salmon CUs upstream of Terrace nor could they be reported for Skeena River aggregate escapements.

Timing of migration

The Chinook salmon migration up the Skeena River past Tyee was measured from the standardized catch provided by the Tyee Test Fishery. Standardized catch included fish and portions of fish in the net that could not be sampled. Assessment of run timing was confounded in most years by the late (~June 10) start date of the test fishery since a portion of the run had passed Tyee by the time the test fishery began. The fishery typically started on or about June 10 except for eight years from 2009 to 2016 when it began around May 25. Two sets of data were considered, the eight years that sampled the "full" run from May 25 to August 31 and 37 years of "truncated" runs from approximately June 10 to August 31. A common start date was produced for the 1984 to 2020 time series by truncating catch data to June 10 in years when the test fishery started prior to June 10. The full versus truncated data sets from 2009 to 2016 were compared to identify the effects of initiating the test fishery June 10. The truncated runs allowed for comparisons across the full time series.

Assessing CU specific Chinook salmon run timing past Tyee required addressing the truncated front tails of the runs as above. Additionally, CU specific proportions from daily GSI samples were corrected to the standardized daily catch in all years to ensure GSI data were assigned relative to abundance.

Mean run timing was determined from the average of the Julian day of passage for each fish that was sampled in a year. Means across the various time series were the averages of the annual means, thus weighing each year equally. Means were calculated for specific CUs as well as for the aggregate.

Cohort Analyses and Run Reconstruction

Winther et al. (2021) used the results of the CTC cohort analyses published by the PSC in the Calibration and Exploitation rate report (CTC 2021a,b) to reconstruct the runs of Kitsumkalum summer run Chinook salmon. The cohort analyses provided total mortality exploitation rates by fishery for each brood year and age. The brood year and age specific exploitation rates from marine fisheries on Kitsumkalum Chinook salmon were assumed to be the same for the rest of the Skeena summer run CUs. The Kitsumkalum CWT information was used for reconstructions through marine fisheries.

The run reconstructions built the cohorts seaward from escapement to determine the number of recruits. Reconstructions in the freshwater terminal area were modified from the CTC process (CTC 2021a,b) to take advantage of the CU specific information from the GSI data. Individual assignments were made to the CU level based on the most probable CU from the GSI data. The age data were linked to the CU to determine the age proportions present in the annual escapements for each CU. The age proportions were applied to the CU escapement estimates produced from the GSI mixture model results. GSI and age data were also used to estimate the CU specific catches and incidental mortalities in terminal freshwater fisheries by brood year and age (Appendix 2).

Harvests in terminal fisheries were all considered to be mature fish (i.e. excluded from calculations requiring maturation rates, natural mortality rates, adult equivalency rates, etc. that were necessary for fish harvested in AABM fisheries). Additionally, the harvest estimates were all for large (age 4 through 7) fish or were adjusted to large fish to be consistent with the escapement estimates (Appendix 2).

Terminal area total mortality estimates consisted of Chinook salmon harvests plus incidental mortalities. The marine terminal run calculations in Appendix 2 were similar to methods used by Winther et al. (2021) where harvest rates for terminal marine net fisheries and marine sport fisheries were used from the CTC exploitation rate analyses. A different approach was used to estimate freshwater terminal total mortalities upstream of Tyee. Rather than using CWT data from the freshwater sport fishery to determine the harvest rate on Kitsumkalum Chinook salmon, GSI data from Tyee were applied to catches to determine CU specific harvests. The same approach was applied to freshwater First Nations' fisheries. Terminal total mortality estimates were calculated by age and brood year for each CU and for the Skeena aggregate of Chinook salmon upstream of Tyee (details in Appendix 2).

Adjustments were made to the estimates of natural fish from the Kitsumkalum CU and the Skeena aggregate to account for the small-scale hatchery production in Kitsumkalum. Calculations for the Kitsumkalum CU (subscript KLM) and the Skeena aggregate of summer run CUs upstream of Tyee (subscript SKN) estimates differed from other CUs to account for hatchery brood stock removals and hatchery production. Brood stock (*BS*) collections were removed from the POPAN estimates of escapement to determine the number of spawners.

$$Spawners_{KLM} = Escapement_{KLM} - BS_{KLM} \tag{7}$$

$$Spawners_{SKN} = Escapement_{SKN} - BS_{KLM} \tag{8}$$

This modification was not required for the other CUs as the escapement estimates were equal to the estimate of spawners (no brood stock removals). Removals of brood stock occurred from some of the other summer run CUs in some years (e.g. from Morice in the Large Lakes CU and from Zymagotitz in the Lower Skeena CU). These were poorly documented and much smaller than the Kitsumkalum brood stock removals (i.e. << 30 females per year) and were not included in the calculations.

The spawning escapement of natural origin fish for each cohort was estimated by removing the production from the Kitsumkalum hatchery from the estimates of Kitsumkalum (KLM) spawners and Skeena (SKN) spawners. Since the calculations below are specific to the cohort we have not shown the subscripts for age and year (e.g. TTM_{CU} below is equivalent to $TTM_{\mathrm{CU,age,year}}$).

$$NaturalOriginSpawners_{KLM} = Spawners_{KLM} - HatcheryOriginEscapement_{KLM} \tag{9}$$

$$NaturalOriginSpawners_{SKN} = Spawners_{SKN} - HatcheryOriginEscapement_{KLM} \quad (10)$$

The hatchery production of Kitsumkalum fish was only considered for Kitsumkalum and Skeena escapements. Hatchery production was not calculated elsewhere as other hatchery programs on summer run CUs were much smaller than Kitsumkalum and the escapement sampling was not adequate to estimate production. Hatchery production and brood stock removals were not considered significant in the estimates for the remaining five CUs. Thus, escapements were equivalent to spawners and to natural origin spawners.

$$Escapement_{CU} = Spawners_{CU} = NaturalOriginSpawners_{CU} \quad (11)$$

The proportion of natural production (PNP) in the escapement was calculated:

$$\mathrm{PNP}_{\mathrm{KLM}} = \frac{\mathrm{NaturalOriginSpawners}_{\mathrm{KLM}}}{\mathrm{Escapement}_{\mathrm{KLM}}} \quad (12)$$

$$\mathrm{PN}P_{SKN} = \frac{NaturalOriginSpawners_{SKN}}{Escapement_{SKN}} \quad (13)$$

The proportion natural production in the escapement was 1 for the remaining CUs.

Total mortalities in the terminal run (TTM) were calculated for each CU and for the Skeena aggregate by assigning harvests and incidental mortality estimates to the CU as appropriate from the relative proportions observed at Tyee (Appendix 2).

The equations below use the subscript CU to represent any of the six conservation units or the Skeena aggregate of units. The terminal total mortalities of natural origin (*TTMnatural*) were calculated for Skeena and Kitsumkalum as:

$$TTMnatural_{CU} = PNP_{CU} \cdot TTM_{CU} \quad (14)$$

The terminal runs of natural origin (*TRnatural*) were calculated for Skeena and Kitsumkalum as:

$$\mathrm{TRnatura}l_{CU} = \mathrm{TTMnatura}l_{CU} + \mathrm{NaturalOriginSpawner}s_{CU} + \mathrm{BS}_{CU} \quad (15)$$

The terminal runs of natural origin were calculated for the five CUs without hatchery influence:

$$TRnatural_{CU} = TTM_{CU} + Escapement_{CU} \quad (16)$$

The terminal total mortality harvest rate (*TTMHR*) was calculated for all CUs and the Skeena aggregate:

$$TTMHR_{CU} = \frac{TTMnatural_{CU}}{TerminalRunNatural_{CU}} \tag{17}$$

Harvests in the terminal area were considered mature fish. The cohort specific harvest rates calculated in the terminal area were unique for each CU. Outside of the terminal area the calculations were based on the results of the CTC cohort analyses published by the PSC in the Calibration and Exploitation rate report (CTC 2021a,b). CWT recoveries were used from marine harvests of age 4 through 7 Kitsumkalum Chinook salmon from brood years 1983 to 2013.

The last component in the calculation of the total mature run was the preterminal net fishery harvests. The harvest rate associated with preterminal net total mortalities (*PTNetTMHR*) was a product of the CTC cohort analyses from the output files for Kitsumkalum. The total mature run was calculated as:

$$TotalMatureRun_{CU} = \frac{TerminalRunNatural_{CU}}{1 - PTNetTMHR} \tag{18}$$

Calculations below used rates calculated from the CTC Cohort analyses for the remaining marine fisheries on Kitsumkalum (CTC 2021a). They were the maturation rate, the preterminal total mortality exploitation rate (*PTTMER*) in nominal fish, the natural mortality rate and the adult equivalency rate (*AEQrate*). Nominal fish refers to values that were not adjusted to adult equivalents. Preterminal post fishery abundance (*PTPF*) was calculated as:

$$PTPF_{CU} = \frac{TotalMatureRun_{CU}}{MaturationRate_{KLM}} \tag{19}$$

Ocean pre-fishery abundance (*OPF*) was calculated as:

$$OPF_{CU} = \frac{PTPF_{CU}}{1 - PTTMER_{KLM}} \tag{20}$$

The cohort abundance before natural mortality (*CABNM*) was calculated as:

$$CABNM_{CU} = \frac{OPF_{CU}}{1 - NaturalMortalityRate_{KLM}} \tag{21}$$

Where the Natural mortality rate was 0.1 for 6-year-old fish, 0.2 for 5-year-old fish and 0.3 for 4-year-old fish. The model uses a natural mortality rate of 0.4 for 3-year-old fish but they were not included in these calculations. The preterminal fishing mortality in nominal fish (*PTFMnominal*) was calculated:

$$PTFMnominal_{CU} = OPF_{CU} - PTPF_{CU} \tag{22}$$

The preterminal fishing mortality in adult equivalents (*PTFMAEQ*) was calculated:

$$PTFMAEQ_{CU} = PTFMnominal_{CU} \cdot AEQrate_{KLM} \tag{23}$$

Finally, the total recruits for each cohort were calculated:

$$TotalRecruits_{CU} = PTFMAEQ_{CU} + TotalMatureRun_{CU} \tag{24}$$

and the total recruits for each cohort of the Kitsumkalum CU and the Skeena aggregate were calculated as follows:

$$TotalRecruits_{KLM} = PTFMAEQ_{KLM} + TotalMatureRun_{KLM} - HatcheryOriginEscapement_{KLM} \tag{25}$$

$$TotalRecruits_{SKN} = PTFMAEQ_{SKN} + TotalMatureRun_{SKN} - HatcheryOriginEscapement_{KLM} \tag{26}$$

Run reconstruction through non-terminal fisheries

The remaining run reconstructions for marine fisheries in non-terminal areas and terminal areas seaward of Tyee mimicked Winther et al. (2021) and were based on the Kitsumkalum CWT data (Appendix 6) and the CTC (2021a,b) exploitation rate analyses. Additional parameters from the CTC (2021a,b) cohort analyses that were used to generate estimates of recruits were the maturation rates, natural mortality rates and adult equivalency rates. The rates experienced by Kitsumkalum cohorts were applied to the other CUs and the aggregate to generate the cohort specific values for the total mature run, the pre-terminal post-fishery abundance, the non-maturing abundance, the ocean pre-fishery abundance, the cohort abundance before natural mortality, the pre-terminal fishing mortality in nominal fish, the pre-terminal fishing mortality in adult equivalents and the total recruits (Appendix 7).

Rates common to the calculations for all CUs and the aggregate from the CTC (2021a,b) cohort analyses were the terminal total mortality harvest rate for marine sport and marine net fisheries, the pre-terminal total mortality harvest rate on the mature run by net fisheries, the maturation rate, the pre-terminal total mortality exploitation rate in nominal fish, the natural mortality rate, and the adult equivalency rate (Appendix 8).

Spawner-Recruit Analyses

Spawner-recruitment modeling was used for the six Chinook salmon CUs from the Skeena River watershed upstream of Tyee as well as for the aggregate. In addition to the classic static Ricker curve, two alternative models with autocorrelated residual and time-varying productivity were investigated using the data sets for complete broods 1984 to 2013.

1. Static:

$$R_t = \alpha S_t e^{-\beta S_t + \varepsilon_t} \tag{27}$$

$$ln\left(\frac{R_t}{S_t}\right) = ln(\alpha) - \beta \cdot S_t + \varepsilon_t \tag{28}$$

$$\varepsilon_t \sim N(0, \sigma^2) \tag{29}$$

Where R_t was the abundance of adult recruits from the brood cohort in year t, S_t was the abundance of the spawners in that cohort, α was the intrinsic productivity of the stock, β the per capita density-dependent effect, and ε represented annual deviations in residual productivity that scale with the variance term σ^2.

2. Autocorrelated Residual (AR1) Productivity:

$$ln\left(\frac{R_t}{S_t}\right) = ln(\alpha) - \beta S_t + \varepsilon_t \tag{30}$$

$$\varepsilon_t = \rho \cdot \varepsilon_{t-1} + \sqrt{1-\rho^2}\delta_t \tag{31}$$

$$\delta_t \sim N(0, \sigma_{AR}^2) \tag{32}$$

Where ρ represented the correlation between productivity residuals in year t and the next/previous year, while δ_t represents annual uncorrelated deviations in residual productivity that scale with the autocorrelation-adjusted variance term σ_{AR}^2,

3. Time-varying Productivity:

$$ln\left(\frac{R_t}{S_t}\right) = ln(\alpha_t) - \beta \cdot S_t + \varepsilon_t \tag{33}$$

$$ln(\alpha_t) = ln(\alpha_{t-1}) + w_t \tag{34}$$

$$w_t \sim N(0, \sigma_\alpha^2) \tag{35}$$

$$\varepsilon_t \sim N(0, \sigma_i^2) \tag{36}$$

Where α_t was a time-varying parameter that evolved through time to track the temporal signature in productivity (i.e. the temporal trends in the productivity residuals from the average parameter estimates). The year-to-year changes in productivity (w_t) are normally distributed and scale with the estimated variance in productivity (σ_α^2).

By comparing static models (1 and 2) with a time-varying productivity model (3), we assessed whether there was a statistical pattern of long-term changes in stock productivity and estimated how the parameters may have changed over time.

All model forms were fit individually to each CU spawner-recruit series using Stan implemented in *cmdstanr* (Gabry et al. 2024) in R v4.3.1 (R Core Team 2021). Each model was run for 12,000 iterations across six chains with 2,000 iterations of burn-in. To diagnose model fitting issues we ensured that all posterior parameter estimates had $\widehat{R}$ estimates (a measure of chain divergence) less than 1.05.

Relative support for a given model was assessed for each CU based on a predictive check. We used 'leave-future-out cross-validation' (LFO-CV), an iterative process of estimating the one-step ahead, out-of-sample predictive accuracy for each observation beyond a minimum sample to parameterize each model L, which we set as 10 years (Burkner et al. 2020). For each observation in year L+1:N, we calculated the normal probability density of observing the next year's future productivity, $y_{i+1} = \log(R_{i+1}/S_{i+1})$, given the expectation in that year, μ_{i+1}, based on model parameters $\theta_{1:i}$ fit to observations 1:i. The sum of these probabilities constituted our measure of model likelihood:

$$elpd_{lfo} = \sum_{i=L}^{N} log\, p(y_{i+1}|\theta_{1:i}) \tag{37}$$

These likelihood estimates for each model m were subsequently turned into a measure of model weight (w_m) representing relative support based on the data (elpd_lfo) weighed against the variance in its predictions ($se\left(elpd_{lfo}^{m}\right)$):

$$w_m = \frac{e^{elpd_{lfo}^{m} - 0.5 \cdot se\left(elpd_{lfo}^{m}\right)}}{\sum_{m=1}^{M} e^{elpd_{lfo}^{m} - 0.5 \cdot se\left(elpd_{lfo}^{m}\right)}} \tag{38}$$

$$se\left(elpd_{lfo}^{m}\right) = \sqrt{\sum_{i=1}^{N} \left(elpd_{lfo,i}^{m} - \frac{elpd_{lfo}^{m}}{N}\right)^2} \tag{39}$$

In a simulation-evaluation study, this technique was found to perform poorly when discriminating between alternate types of time-varying dynamics but it was found to be helpful in distinguishing between autocorrelation versus longer-term changes in population parameters (Wor et al. in prep.).

The estimates for S_{MSY}, the spawning abundance that produces maximum sustained yield, were calculated using the Lambert W function (W) following Scheuerell (2016) (eq. 12) based on estimates of stock productivity (ln (α)) and per capita density-dependence (β):

$$S_{MSY} = \frac{1 - W(e^{1-\ln(\alpha)})}{\beta} \quad (40)$$

Point estimates of U_{MSY}, the exploitation rates associated with S_{MSY}, were calculated following Scheuerell (2016) where:

$$U_{MSY} = 1 - W(e^{1-\ln(\alpha)}) \quad (41)$$

Estimates of capacity, S_{MAX}, were calculated as:

$$S_{MAX} = \frac{1}{\beta} \quad (42)$$

The point estimates for S_{Gen} , defined as spawners that would result in recovery to S_{MSY} in one generation in the absence of fishing, were calculated by solving the following function for S_{Gen}:

$$S_{MSY} = \alpha \cdot S_{Gen} \cdot e^{-\beta \cdot S_{Gen}} \quad (43)$$

RESULTS

The results represent genetic analyses of 24,851 Chinook salmon scale and tissue samples collected from the Tyee Test Fishery over 37 years (1984 to 2020). An additional 1,085 samples were collected with 1,059 analyzed from 1979 to 1983 (Figure 3). Genetic samples used in the analyses ranged from 227 fish in 2017 to 1,285 fish in 2002. Mark-recapture escapement estimates of Kitsumkalum Chinook salmon exist for 1984 to 2020 (Winther et al. 2021, Table 2) and were combined with the genetic analyses from Tyee to produce estimates for the aggregate of Skeena River summer run Chinook salmon upstream of Tyee and for the component CUs that make up the aggregate.

Tyee Test Fishery Catch and Sample Collection

Genetic material was extracted from scale samples collected from Chinook salmon caught at the Tyee Test Fishery. Not all fish were sampled. Some fish were so mutilated by seals that they could not be sampled. In some years the sampling protocol did not include every Chinook salmon and the protocol changed mid-season in some years. For example, in 1987 a maximum of ten Chinook salmon were sampled each day until 7 July, after which a maximum of five Chinook salmon were sampled each day. Sampling protocols with designated maxima were evident as flat-topped sampling distributions from 1987 to 1993 (Figure 3). Further, not all samples could be amplified during the genetic extraction process so the values (N) in Table **2** represent fish with genetic results and are a sub-set of the fish caught and sampled each year in Figure 3.

In the most recent decade, the sampling frequencies look similar to the catch frequencies (Figure 3) as the sampling protocol was to sample all intact Chinook salmon caught and landed. Differences in sampling protocols, depredation rates and catchability were dealt with by applying the weekly GSI results to the standardized weekly catch before assembling the weekly GSI proportions into the annual estimates.

Escapement Estimates

A primary product of this work was a revised series of escapement estimates for the Skeena River aggregate of large (ages 4_2, 5_2, 6_2 and 7_2) Chinook salmon and for the component CUs from 1984 to 2020 using a method that was consistent across the time series. The cornerstones of the escapement estimates were the estimates of Kitsumkalum Chinook salmon escapement derived from open population models of mark-recapture studies (Table 2, Figure 4). The analyses provided estimates of escapement for CUs near or downstream of Terrace (Lower Skeena and Zymoetz-Fiddler CUs) and estimates of run size to Terrace for CUs upstream of Terrace (Middle Skeena, Upper Skeena and Large Lakes CUs). Escapements for CUs upstream of Terrace were estimated by subtracting estimates of catch and incidental mortalities in fisheries upstream of Terrace from the estimated return to Terrace. Estimates of the Skeena River run size to Terrace for the time series ranged from a maximum of 121,271 in 1993 to a minimum of 19,189 in 2017 with a mean of 62,680 fish (Table 3). The patterns of run size to Terrace and escapement show oscillations of significant amplitude about the mean from 1984 to 2004 with escapements ranging between 23,987 and 111,702 Chinook salmon. Abundant escapements in excess of 100,000 Chinook salmon were observed in 1993, 1996, 2001, and 2004. The period from 2005 to 2010 was relatively stable with escapements between 55,156 and 63,977. After 2010 escapements oscillated again between the low of 14,715 in 2017 and a peak of 55,428 in 2014 (Table 3, Figure 5).

We assumed the Lower Skeena River CU and the Zymoetz-Fiddler CU had similar in-river exploitation to the Kitsumkalum River which allowed for escapement estimates to be presented with standard errors. Escapement estimates for the Lower Skeena River CU were presented in Table 4 and Figure 6 and escapement estimates for the Zymoetz-Fiddler CU were presented in Table 5 and Figure 7. Conservation units upstream of Terrace were influenced by additional in-river fisheries upstream of Terrace. Estimates of standard error are presented around the return to Terrace but not around the escapement estimates for the Middle Skeena River CU (Table 6, Figure 8), the Upper Skeena River CU (Table 7, Figure 9), or the Skeena River Large Lakes CU (Table 8, Figure 10). The Skeena River aggregate of summer run stocks upstream of Tyee represents the sum of the component CUs so standard errors were known for the return to Terrace but were not available for harvests and incidental mortalities upstream of Terrace and therefore not available for the escapement estimates (Table 3, Figure 10).

Stock Composition

Escapement estimates and population metrics were generated for six CUs in the Skeena River watershed upstream of Tyee. In increasing order of average abundance, they were: Zymoetz-Fiddler (3.6%), Lower Skeena (5.1%), Upper Skeena (9.2%), Middle Skeena (16.7%), Kitsumkalum (19.4%), and Skeena Large Lakes (46.0%) CUs.

The Kitsumkalum CU made up an average of 18.2% of Chinook salmon catch at Tyee from 1984 to 2020. The relative proportion ranged from a low of 8.0% in 1996 to 30.0% in 2016. The proportion of Kitsumkalum fish in the catch was lowest from 1992 to 2001 with an average of 11.9% but increased to an average of 24.5% over the last decade of the time series (Table 2).

The Lower Skeena CU was the second least abundant CU with proportions in the catch at Tyee that averaged 4.9%. The range was from 2.1% to 7.6% (Table 4). The Zymoetz-Fiddler CU averaged 3.9% of the catch at Tyee and was the least abundant CU measured in the catch at Tyee with a range from 0.3% to 6.7% of the catch (Table 5). The Middle Skeena CU contributed 16.8% to the catch at Tyee on average with a range from 6.7% to 24.2% (Table 6). The Upper Skeena CU averaged 9.3% of the catch at Tyee with a range from 3.8% to 20.5% (Table **7**).

The Large Lakes CU was the most abundant Chinook salmon CU in the Skeena watershed in all years 1984 to 2020 and made up the largest proportion of the catch at Tyee. The average proportion of the catch at Tyee was 43.5%, ranging from a maximum of 58.8% in 1984 to a minimum of 26.7% in 2013 (Table 8).

Annual stock-specific compositions of Skeena River Chinook salmon measured from the samples collected at Tyee were presented by GSI baseline populations in Table 9. The baseline populations that make up each CU and the three letter codes for each CU appear in Table 1. For example, the baseline populations of the Bear, Babine and Morice Rivers make up the Large Lakes CU (LLK) whereas the Kitsumkalum (late) CU (KLM) is represented by a single population in the baseline.

Life History

Skeena River Chinook salmon were predominantly stream type with a single freshwater annulus. We examined 21,948 fish with complete ages from scale samples and 445 (2.0%) were found to be ocean type. Of the 21,503 stream type fish, 322 (1.5%) had two freshwater annuli (Table 10). The proportions of ocean type fish and stream type fish with one and two freshwater annuli were the same for males and females. Observed age components included males returning from 2 to 7 years from brood and females returning from 4 to 8 years from brood. Only eight 2-year-old ocean type males were observed and only one 8-year-old stream type female was observed in the data set of 21,948 fish with complete ages. The predominant ages at return for male Chinook salmon at Tyee were ages 4_2, 5_2 and 6_2, making up 38%, 41% and 12%, respectively, of the samples with complete ages and known gender (Table 11). Female Chinook salmon ages at return were predominantly age 5_2 and 6_2 making up 63% and 30% of the samples, respectively (Table 12).

The total number of fish sampled with complete ages, known gender, POH lengths and GSI data was 16,526 fish from the aggregate of the six CUs upstream of Tyee with brood years from 1980 to 2013. These brood years had complete samples of age 4 to 7 fish from the escapements sampled between 1984 to 2020. Males were more common in the samples than females. The samples included 9,477 males and 7,049 females from brood years 1980 to 2013. Sample sizes by brood year, gender and CU were presented in Table 13. The average sex ratio in the samples by brood year was 1.34 males per female.

Size at Age

Chinook salmon are sexually dimorphic as adults with gender specific traits that become more evident as they mature and approach spawning. Young, immature fish of different genders are indistinguishable externally. The sizes of Skeena River Chinook salmon caught in the Tyee Test Fishery were compared using post-orbital to hypural plate (POH) length as this measurement does not change appreciably between re-entry into fresh water and spawning when most of the dimorphic changes occur.

Chinook salmon size increased with age but there was considerable overlap in POH length distributions, especially for older fish. We compared 17,935 stream type fish with a single freshwater annulus (avoiding the confounding life history differences from the small contributions by ocean type fish and fish with two freshwater annuli). The smallest Chinook salmon caught at the Tyee Test Fishery in the data set were two age 3_2 males at 240 mm POH length. The largest Chinook salmon caught was a 1,050 mm POH length, age 6_2 male. Only two age 3_2 females were identified in the data set, and they were 385 and 601 mm POH length, respectively. Age 3_2 males were uncommon and formed 3.3% of the samples. The average size of age 3_2 males was 369 mm with a standard deviation (SD) of 49 mm. Age 4_2 females were rare in the samples (1.3%) while age 4_2 males were common (22%). Age 4_2 females were larger on average than age 4_2 males at 638 mm and 579 mm, respectively (SD 58 mm and 53 mm, respectively). Age 5_2 fish made the largest contributions to both males and females sampled at 25% and 28%, respectively. They were also similar in size with average POH lengths of 720 mm (SD 64 mm) for males and 727 mm (SD 43) for females. Age 6_2 males were less common (7.1%) than age 6_2 females (13.2%). Age 6_2 males were larger (829 mm POH, SD 86 mm) on average than age 6_2 females (801 mm POH, SD 52 mm). Age 7_2 fish were rare, contributing 0.1% to the male samples and 0.2% to female samples. Age 7_2 males were larger than females at 893 mm (SD 86 mm) and 842 mm (SD 58 mm) respectively (Table **14**).

Mean POH length at age was compared between CUs. A total of 17,393 Chinook salmon sampled with complete ages had GSI data that allowed them to be assigned to one of the six summer run CUs. Sample sizes reflected the relative abundance of the CUs. The gender and age specific average POH lengths were not appreciably different between CUs. The standard deviations overlapped in all comparisons of POH length between CUs of the same age and gender (Table 15).

Kitsumkalum Chinook salmon had the largest average sizes. Although not statistically significant, the mean average POH length of Kitsumkalum Chinook salmon was greater than that of other CUs for most gender and age combinations. Two exceptions for males are noted below. Female Kitsumkalum Chinook salmon had the largest average POH lengths across the ages sampled (ages 4_2, 5_2, 6_2 and 7_2; no age 3_2 females from Kitsumkalum were sampled). Male Kitsumkalum Chinook salmon had the largest average POH lengths for age 3_2, age 6_2 and age 7_2 fish. The average POH length of age 5_2 fish from Kitsumkalum and Zymoetz-Fiddler was the same at 733 mm. Male age 4_2 fish from Zymoetz-Fiddler were 2 mm longer at 588 mm POH length than age 4_2 Kitsumkalum fish at 586 mm POH length. Age 4_2 and age 5_2 females had average POH lengths at age that were consistently larger than their male counterparts from the same age and CU. Age 6_2 and 7_2 males were consistently larger than their female counterparts from the same age and CU. The oldest age classes of male Kitsumkalum Chinook were the largest fish in the samples on average (Table 15).

The mean size of Skeena River Chinook salmon caught in the Tyee Test Fishery has declined over time. The average POH length across all ages of males was 689 mm in the first decade of samples (1984 to 1993) and 600 mm in the last decade of samples (2011 to 2020). When averaged across all ages, female POH length showed similar declines from 771 mm for the first decade to 715 mm for the last decade of the time series (1984 to 2020) (Table 16, Figure 11).

Changes in average Chinook salmon size over time were driven primarily by the declines in average sizes of age 5_2 and 6_2 females and in age 6_2 males. Sample sizes of age 7_2 fish and age 4_2 females were too low to exhibit any trends. The size of age 4_2 and 5_2 males has remained relatively steady through time. The average sizes of the age 3_2 males tended to increase over time (Table 17, Table 18 and Figure 12). These trends were common across all CUs and were compared in Figure 13 for males and Figure 14 for females. The smaller CUs and the least common age components were difficult to interpret due to the small sample sizes (Table 13).

Age at Maturity

The average age at maturity estimates were presented for fish older than age 3. They were prepared using the contributions to the escapements from ages 4_2, 5_2, 6_2 and 7_2 Chinook salmon. Escapement estimates were not possible for age 3_2 Chinook salmon, so they have been excluded from the age at maturity estimates presented herein.

The average age at maturity across all complete brood years sampled (1980 to 2013) was 5.03 years (SD = 0.24 years) for the aggregate of Skeena Chinook salmon upstream of Tyee (Table 19). Differences in average age at maturity between CUs were small when comparing the average across the 1980 to 2013 broods: Estimates were 5.04 (SD = 0.29 years) for Lower Skeena CU, 5.06 (SD = 0.31 years) for Zymoetz-Fiddler CU, 5.11 (SD = 0.28 years) for Middle Skeena CU, 5.12 (SD = 0.31 years) for Upper Skeena CU, 4.96 years (SD = 0.26 years) for Large Lakes CU, and 5.11 (SD = 0.29 years) for Kitsumkalum CU (Table 20 through Table 25 inclusive).

Age at maturity was considered by brood year to match the freshwater and marine environments experienced by each cohort. The Kitsumkalum estimates in Table 25 were calculated from the GSI estimates at Tyee for comparison with other CUs. They also allowed for comparisons with the independent estimates produced by Winther et al. (2021) from scales collected during escapement studies on the Kitsumkalum River (Appendix 4). The data from the Kitsumkalum mark-recapture program were used in the run reconstructions rather than the estimates in Table 25.

Mean age at maturity has declined in Skeena River Chinook salmon. Average age at maturity ranged from 5.7 years from the 1981 brood to 4.6 years from the 2006 and 2011 broods. Age at maturity for the first decade in the time series, brood years 1980 to 1989, averaged 5.3 years compared to 4.8 years for the last decade, brood years 2004 to 2013 (Table 19, Figure 15). Changes in age at maturity were more pronounced when the proportions at age were examined for escapements produced by each brood (Figure 16). The tendency for fewer age 6 fish and more age 4 and age 5 fish was common to all CUs.

Declines in age a maturity over time masked some of the differences in age structure between CUs. Comparing the largest CUs, Large Lakes and Kitsumkalum, the average age at maturity was older for Kitsumkalum fish in 29 of 34 brood years with complete estimates. These differences in age were greater near the beginning of the time series than at the end. The average difference in age of Kitsumkalum versus Large Lakes CUs in the first decade of samples was 0.20 years (SD = 0.17 years) whereas the average difference in age for the last decade of samples was 0.05 years (SD = 0.16 years). Average age at maturity estimates for the smaller CUs varied more from year to year and there were no specific trends comparatively to the aforementioned CUs (Figure 15).

Timing of migration

The standardized daily catch of Chinook salmon in the Tyee Test Fishery provided estimates of run timing for the Skeena aggregate. There were significant differences in the patterns of catch of Chinook salmon past Tyee (Figure 3). Often the Chinook salmon run was well underway by the start of the test fishery, evidenced by large initial catches. Years with relatively high catches at the beginning of the fishery included 1996, 1998, 2000, 2001, 2005, 2007 and 2008. The test fishery was started earlier (approximately May 25) from 2009 to 2016 inclusive to identify the front tail of the summer run timing curve (Figure 3 and Figure 17).

Assessment of mean run time was confounded in most years by the late (~June 10) start date of the test fishery since a portion of the run had passed Tyee by the time the test fishery began. Years with early start dates, 2009 to 2016, were identified as full data sets as the initial catches were near zero (Figure 3). Run timing was compared across the time series by truncating the annual start dates to June 10 in years when the test fishery started prior to June 10. The truncating procedure overestimated mean run timing (in Julian days) but allowed for comparisons between years with shorter data sets which made up 29 of 37 years in the time series. Mean annual run timings were compared between the truncated data sets and the full data sets for years 2009 to 2016 in Figure 18 and Appendix 5.

The mean run timing for the aggregate of Skeena Chinook salmon past Tyee from full data sets, 2009 to 2016, was July 7 or Julian day (JD) 188. The range was 13.9 days from July 1 in 2010 (JD 182.2) to July 15 in 2015 (JD 196.1). Fluctuations between adjacent years included changes in mean timing up to 7.6 days. The truncated data sets starting June 10 had a mean run timing of July 9 (JD 190.3) that ranged between July 4 and July 17 (JD 185.2 and 197.7). The difference between complete and truncated data sets averaged 2.2 days with a range from 1.1 to 4.4 days (Figure 22). The means from the truncated data sets tracked the means from the full data sets well enough to show trends in average run timing.

The run timing for the Skeena aggregate of Chinook salmon from the truncated data sets for all years averaged July 6 (JD 187) and ranged from June 30 (JD 181) to July 16 (JD 197). Chinook salmon returning in years near the end of the time series (2020) returned later than those near the beginning of the time series (1984) with much of the difference occurring in the last decade. Average truncated run timing over the first 27 years of the time series, 1984 to 2010, was July 4 (JD 185) while it was July 11 (JD 192) for the last decade of the time series. All the run timing curves from 2011 to 2020 were later than average except for 2013 which was near average (Appendix 5, Figure 2). The curve for 2015 stands out as the latest run timing with a protracted run well into August. This unusually late timing curve was driven by the Large Lakes and Kitsumkalum CUs as timing curves for the other CUs in 2015 were not the latest observed (Appendix 5).

The period from 1994 to 2010 had the largest annual fluctuations in average Skeena run timings with changes up to 7 days in adjacent years. The earliest mean truncated run timings were June 30 (JD 181) and occurred in 1996, 1997 and 2000. The latest mean truncated run timing was July 15 (JD 196) in 2015 (Figure 22).

When CU specific timing data were examined, the migration of Skeena River Chinook salmon past Tyee was a composite of four overlapping run timing curves. The earliest timed part of the summer run (1) was made up of the Zymoetz-Fiddler, Upper Skeena, and Middle Skeena CUs. These CUs had fully superimposed average run timing curves which were maintained through the data manipulations (Figure 21). When comparing timing curves from complete data (2009 to 2016), the mid-point of the curve for the Zymoetz-Fiddler, Upper Skeena, and Middle Skeena CUs was June 26 (JD 177). The Lower Skeena CU (2) was 3.8 days later on June 30 (JD 181). The Large Lakes CU (3) was 14.8 days later than the earliest part of the summer run on July 11 (JD 192). The Kitsumkalum CU (4) was 21.8 days later than the earliest part of the summer run on July 18 (JD 199; Appendix 5). The Lower Skeena and Zymoetz-Fiddler CUs showed more annual variation than Middle and Upper Skeena CUs, probably due to smaller sample sizes (Figure 19 to Figure 21 inclusive).

Starting the test fishery on June 10 rather than May 25 tended to overestimate mean run timing for the 4 earliest timed CUs. Comparisons of the full and truncated run timings from 2009 to 2016 revealed that starting the test fishery on June 10 had little effect on later timed CUs and more effect on the early timed CUs. The average full run timing for the Kitsumkalum CU from 2009 to 2016 was July 18 (JD 199). Truncating the run to June 10 influenced 0.8% of the Kitsumkalum run and changed the mean run timing by 0.3 days. Average full run timing for the Large Lakes CU was July 11 (JD 192). Truncating the run to June 10 influenced 1.8% of the Large Lakes run and changed the mean run timing by 0.7 days. Average full run timing for the Lower Skeena CU was 30 June (JD 181) and truncating the run to June 10 influenced 6.4% of the run, changing the estimated mean run timing by 1.9 days. Mean full run timing for Middle Skeena and Upper Skeena CUs was June 26 (JD 177). Truncating the run to June 10 influenced 12.6% and 9.9% of the runs, respectively, changing the mean run timing by 3.1 days for Middle Skeena CU and by 2.4 days for Upper Skeena CU (Table 26 and Figure 21).

Starting the test fishery on June 10 had the effect of underestimating the duration of passage, an effect that was largest on earlier timed stocks. Comparing the duration between the dates of passage for 10% and 90% of the average runs revealed no change for the Kitsumkalum CU and differences of 1 day for the Large Lakes and Lower Skeena CUs; 4 days for the Upper Skeena and Zymoetz-Fiddler CUs; and 5 days for the Middle Skeena CU (Table 26).

The Kitsumkalum CU and Large Lakes CU shared a common trend for later annual run timing through the 1984 to 2020 time series. The average annual truncated run timings of Kitsumkalum and Large Lakes CUs past Tyee were progressively later with annual variations. The Kitsumkalum CU began the time series with a mean run timing of July 6 (JD 187) and ended the series with a mean run timing of July 19 (JD 200). The Large Lakes CU began the time series with a mean run timing of July 5 (JD 186) and ended the series with a mean run timing of July 17 (JD 198). The annual mean run timings of the Large Lakes and Kitsumkalum CUs tended to covary ($R^2 = 0.68$) and maintain a separation of 5.3 days on average with a range from 1 to 11 days (Figure 19 and Figure 20). Parallel trajectories were observed from trend lines (linear regression) of the average annual run timing points for the Kitsumkalum CU and the Large Lakes CU. Both CUs had a slope of +0.30 days per year and the trend lines were 5.3 days apart (KLM: $y = 0.30x + 189.5$, $R^2 = 0.566$, LLK: $y = 0.30x + 184.2$, $R^2 = 0.647$, where y was average run timing in Julian day and x was the year).

Trends in average annual run timing for the earlier timed CUs, Upper Skeena (USK), Middle Skeena (MSK), Lower Skeena (LSK) and Zymoetz-Fiddler (ZYF), were not evident prior to 2014. These CUs consistently had earlier annual mean run timings than the Kitsumkalum and Large Lakes CUs. Average annual truncated run timings for the early CUs shared a common tendency toward later average run timings after 2014 (Figure 19). Trend lines through the average annual run timing points were essentially flat until 2014. Trend lines using the full suite of years show positive slopes with low significance (USK: $y = 0.159x + 175.1$ $R^2 = 0.191$, MSK: $y = 0.185x + 174.6$, $R^2 = 0.264$, LSK: $y = 0.126x + 179.0$ $R^2 = 0.147$, ZYF: $y = 0.194x + 173.8$ $R^2 = 0.173$). It was recognized that trends for these CUs may be masked by small sample sizes.

Mean annual run timing of individual CUs was compared for the truncated data sets (June 10 to August 31) and the full data sets (May 25 to August 31). The mean run timing estimates from the truncated data sets tracked the means from full data sets for all the CUs (Figure 20). The separation between the estimates of mean run timing from the full and truncated data sets was greater for the earlier timed CUs. This finding was also apparent from the cumulative run timing curves from the truncated data (Figure 21, Appendix 5) where the front tails of curves for the Kitsumkalum and Large Lakes CUs approach zero gradually whereas the curves for the other CUs end abruptly into the x axis. The cumulative curves of all CUs gradually approach zero from the full data sets. Starting the Tyee Test Fishery on June 10 has the greatest effect on the data for the earliest timed CUs (Lower Skeena, Upper Skeena, Middle Skeena and Zymoetz-Fiddler).

Individual cumulative run timing curves for the aggregate of Skeena River Chinook salmon CUs upstream of Tyee and for the component CUs appear in Appendix 5.

Age specific contributions to escapement

A critical component of the cohort analyses involved understanding annual escapement by age for the aggregate of Chinook salmon upstream of Tyee and for the six component CUs. The run reconstructions were assembled seaward from the escapement estimates by brood year and age. Escapement estimates and age data from return years 1984 to 2020 provided 30 brood years of data from 1984 to 2013 with complete data for ages 4 through 7. These 120 cohorts were estimated for each of the six CUs and for the aggregate to produce 840 brood year and age specific escapement estimates. Age specific escapements and the relative proportions contributed to total escapement were presented by brood year for the Skeena River aggregate and the six component CUs in Table 19 through Table 24 inclusive and in Appendix 4.

Two data sets existed for the Kitsumkalum Chinook salmon population age structure, one from Tyee (Table 25) and another from escapement samples (Winther et al. 2021). Age proportions from GSI sampled fish at Tyee were used for the calculations here which allowed the sums of the CU specific estimates to equal the estimates for the Skeena aggregate. Using the escapement-based age proportions for the Kitsumkalum CU would have resulted in a data mismatch for the aggregate. Additional age data were also available from fish that were not GSI sampled at Tyee. These additional data show very small differences in age proportions for the Skeena aggregate estimates due to large sample sizes (Appendix 3).

Production

Production was measured by the number of recruits aged 4 through 7 produced per Chinook salmon spawner from each brood year. The aggregate of Skeena Chinook salmon CUs upstream of Tyee averaged 2.2 recruits per spawner (R/S) from brood years 1984 to 2013. Values ranged from 0.5 R/S from the 2001 brood to 6.0 R/S from the 1986 brood (Table 27). The average recruits per spawner for the Large Lakes CU was 2.6 with a range from 0.5 to 8.3 R/S (Table 28). Average recruits per spawner for the Middle Skeena CU was 2.8 with a range from 0.5 to 12.3 (Table 29). The Upper Skeena CU averaged 3.4 recruits per spawner with a range from 0.4 to 20.5 R/S (Table 30). The Lower Skeena CU averaged 2.1 recruits per spawner and ranged from 0.4 to 7.4 R/S (Table 31). Average recruits per spawner for the Zymoetz-Fiddler CU was 2.4 with a range from 0.3 to 16.4 R/S (Table 32). The average recruits per spawner was lowest for the Kitsumkalum CU at 1.8 R/S with a range from 0.3 to 6.7 R/S (Table 33), the result of persistently lower values than other Skeena CUs across the first decade of data. This attribute influenced the selection of a static model for the Kitsumkalum CU over models with time-varying productivity that were favoured for other CUs and for the Skeena aggregate (below).

Adult recruits per spawner showed a high degree of covariance between the six CUs. A notable exception was the Kitsumkalum CU in the early part of the time series (1984 to 1992). Large Lakes, Middle Skeena, Upper Skeena and Lower Skeena CUs shared a common pattern of large fluctuations in R/S with peaks in 1984, 1986, 1988 and 1992. The value of 12.3 R/S in 1984 was the largest for the Middle Skeena CU. Values in 1986 were the largest R/S values from the Large Lakes CU at 8.3 R/S, the Lower Skeena CU at 7.4 R/S and from the Upper Skeena CU at 20.5 R/S. Low R/S values were experienced by all CUs in 1985, 1987 and 1989 except the Zymoetz-Fiddler CU that reached its maximum of 16.4 R/S in 1989. In contrast, the Kitsumkalum showed a relatively steady decline in R/S from 2.2 in 1984 to 0.6 in 1994. Following the low in 1994, a series of odd year low points and even year high points in R/S was common to all CUs from 1997 to 2003. After 2003 all CUs exhibited modest fluctuations while remaining below 3 R/S and above 0.25 R/S (Figure 22).

Total production from recent brood years have included the lowest records in the 1984 to 2013 time series. The lowest production from the Zymoetz-Fiddler CU was from 2011, from the Middle Skeena and Lower Skeena CUs was from 2007, from the Upper Skeena CU was from 2001, and the lowest production from the Kitsumkalum and Large Lakes CUs was from 2003.

Spawner-Recruit Results

The sum of the predictive scores from the 'leave-future-out cross-validation' (LFO-CV) were converted into model weights for each respective model (1. static, 2. autocorrelated, and 3. time-varying productivity) for the six Skeena Chinook salmon CUs and the aggregate (Table 34). The LFO-CV test suggested there was some evidence for long-term changes in maximum productivity in every CU except Kitsumkalum, where the model with stationary α was favoured based on model weights.

To examine how productivity has changed for the CUs, estimates of mean productivity α were compared in the last six brood cohorts (~one generation) based on the time-varying productivity model (3) to long-term average productivity from the autocorrelated model (2) in each series. Table 35 and Figure 23 include the median posterior estimates for the long-term productivity (ln(α), from model 2 or static model 1 for Kitsumkalum) versus recent average productivity (recent ln(α), from model 3) and their 90% credible intervals. The data suggest that estimates of intrinsic productivity have declined by 25-50% in the most recent brood cohorts relative to the long-term average for the spawner-recruit series for the aggregate and five of the CUs, with the exception of Kitsumkalum where productivity has been more stable and the static model was favoured. Figure 24 through Figure **28** inclusive and Figure 30 show the model fits for the autocorrelated static model (top-left) and the residual productivity estimates from the autocorrelated static model (top-right). Figure **29** shows the model fit for the static model (top-left) and the residual productivity estimates from the static model (top-right) for Kitsumkalum. Figure 24 through Figure 30 inclusive show the evolution of the spawner-recruit relationship from the time-varying productivity model through time (bottom-left), and the estimated trajectory in maximum productivity from the time-varying productivity model (note this model should follow the trajectory in the productivity residuals). All stocks exhibited variations of essentially the same trajectory of a downward trend in productivity beginning in brood cohorts from the year 2000 and onwards.

When estimates of S_{MSY} from the static model for the Kitsumkalum CU or the autocorrelated static model for other CUs were compared with recent S_{MSY} from the last six brood cohorts estimated from the time-varying productivity model, declines were observed in all

CUs (Table **36**). These declines were substantial. Estimates of S_{MSY} for the aggregate of Skeena summer run CUs from the full time series (30 brood years with complete data from 1984 to 2013 from the autocorrelated static model) was 42.540 fish whereas the estimate for the most recent generation (the six brood years with complete data from 2008 to 2013 calculated from the time time-varying productivity model) was 27,793 fish, a difference of 14,797 fish or 35%.

The exploitation rates associated with S_{MSY} (U_{MSY}) showed similar declines. Values for U_{MSY} from the static models representing the full time series were all larger than those for the time-varying productivity model for the most recent generation. Estimates of U_{MSY} for the aggregate declined 24% from 0.54 to 0.41 (Table **37**).

The estimates of spawners that maximize recruitment (S_{MAX}) also showed declines for every CU and for the aggregate in comparisons of estimates from the static models representing the full time series with estimates from the time-varying productivity model of the most recent generation. The relative differences were not as great as for S_{MSY} (Table **38**).

The estimates of the spawners required to result in recovery to S_{MSY} in one generation in the absence of fishing (S_{Gen}) also declined between estimates from the static models representing the full time series and estimates from the time-varying productivity model of the most recent generation. The relative differences were greater than for S_{MSY} (Table **39**).

DISCUSSION

Documenting the biology of Skeena River Chinook salmon represents an important step toward the development of biologically based benchmarks, assessment of CU status, and evaluation of ability of alternative management strategies to meet management goals. In preparing these data we observed that physical changes in size, age and timing were coincident with changes to productivity evident in the model with time-varied productivity (model 3). The evidence for non-stationarity in productivity should be considered in future refinements of biological metrics and setting management goals. The rapid pace of biological changes also warrants more frequent assessments.

The GSI-based escapement estimates for Skeena River Chinook salmon CUs represented the first estimates of escapements for several CUs prepared with a common method across the watershed. Estimates first reported as preliminary in Sentinel Stock Reports and Northern Fund reports were refined to use revised escapement estimates from the Kitsumkalum River. The methods created a common currency for the comparison of escapements between CUs and with other approaches, such as the habitat-based estimator by Parken et al. (2006). In most cases the samples from Tyee were from scales which provided a physical link between the GSI stock data and the age data for each fish. CU specific abundance data and age data informed run reconstructions and cohort analyses in the terminal area.

Data Sources and Gaps

The approach to estimating escapement relied on two programs, the Kitsumkalum Chinook salmon program and the Tyee Test Fishery. Reliance on these programs makes future assessment vulnerable to disruptions to either program. Vulnerability to disruptions was revealed in 2020 when the COVID pandemic did not allow fish from the 2019 brood to be tagged with CWTs. This lack of tagged releases of Chinook salmon will affect future assessments.

The escapement estimation procedure used proportions from GSI using the existing genetic baseline (Appendix 1). The Lakelse CU is not represented in the baseline. The Chinook salmon population in the Lakelse system was so small that collection attempts failed to capture enough fish for the baseline. Any Lakelse Chinook salmon encountered and sampled at Tyee would have been assigned by the genetic analyses to a near neighbor like the Lower Skeena CU or the Kitsumkalum CU.

The genetic baseline for Skeena Chinook salmon requires maintenance. There is a broader need to incorporate a more continuous DNA sampling regime for the watershed.

First Nations' fisheries in freshwater were significant to understanding the exploitation of Skeena River Chinook salmon. These fisheries have not been sampled for CWTs so were invisible to the CWT-based exploitation rate analyses for the Kitsumkalum CU. Fortunately for the CWT-based analyses, most of the freshwater harvest by First Nations in the Skeena River occurred upstream of Terrace (the confluence of the Skeena and Kitsumkalum Rivers). Historic catch data existed for freshwater First Nations' fisheries which allowed for the use of the GSI data to inform the CU specific harvest information required for run reconstructions (Appendix 2).

The GSI approach was also applied to freshwater sport fisheries. The GSI data from Tyee provided a much richer data set than the CWT recoveries. Annual CWT recoveries by freshwater sport fisheries in the Skeena watershed ranged between 0 and 22 fish for fry and yearling CWT releases combined (Appendix 6). The number of fish identified annually as being from the Kitsumkalum River from the Tyee GSI samples averaged 122 fish and ranged between 34 and 330 fish. In addition to the rare voluntary head submissions, unknown angler awareness factors resulted in increased uncertainty in the exploitation rate estimates from the freshwater sport fisheries. Angler awareness factors for CWT head submissions were borrowed from other areas. Importantly, the GSI data included contributions from CUs other than Kitsumkalum.

Catch data from sport fisheries in the Skeena River were problematic, with creel surveys only occurring in part of the fishing area in 9 of 37 years. Fishery Officer records were available from 1984 to 1996. Some values from 1997 to 2010 had to be interpolated from adjacent years due to lack of data (Appendix 2). Future work could explore sensitivity analyses around the effect of unknown precision around estimates of in-river catch.

Harvest data were not available for marine First Nations' fisheries, nor had they been sampled for CWTs. The significance of marine First Nations' fisheries to the run reconstructions of Skeena River Chinook salmon was unknown. Future sensitivity analyses on the effects of missing catch could be explored but may require additional programs to examine marine fisheries.

Life history

Average age at maturity was slightly older for Kitsumkalum fish but did not appear appreciably different among other CUs sampled at Tyee.

The prevalence of males in the Chinook salmon caught at Tyee was probably due to sample bias associated with the gillnet capture method. The average sex ratio of Chinook salmon sampled at Tyee was 1.34 males per female. Kitsumkalum Chinook salmon sampled at Tyee averaged 1.55 males per female. Winther et al. (2021) produced gender specific escapements for Kitsumkalum Chinook salmon and found the average sex ratio by brood year was 1.04 males per female. They also found gender bias in their sample collection methods with tangle netting biased to males and dead pitch (carcass recovery) biased towards females. The differences in the Tyee Test Fishery gillnets and the Kitsumkalum tangle nets were mesh size and hang ratio. The Tyee nets had multiple mesh sizes and were hung with a ratio of 2:1 (length of flat web to length of cork line) while the Kitsumkalum nets had a single mesh size hung on a ratio of approximately 4:1. Both nets exhibited bias towards catching more males than females.

Gillnet sample bias was attributed to morphological and behavioral differences between males and female Chinook salmon. Morphologically males tended to be more angular in shape with larger heads, fins, teeth and kypes while females tended to be more fusiform and sleeker. Behaviorally males were more aggressive, even belligerent in the face of oncoming nets, whereas females were less aggressive and tended to avoid the nets. This was most evident in escapement sampling (Winther et al. 2021) where morphological and behavioral differences were greatest, but would also apply to early freshwater entry situations like the Tyee Test Fishery.

Future work could explore maintaining separate estimates of escapement for males and females to eliminate gender bias in abundance estimates due to gillnet selectivity at Tyee.

Size at age

We observed declines in size at age, especially for 5 and 6-year-old females and 6-year-old males (Figure 12). This trend has been observed for other populations of Chinook throughout their range (Ohlberger et al. 2018). Reductions in size are associated with reduced fecundity and reproductive potential for Chinook salmon (Malick et al. 2022, Ohlberger et al. 2020). If the number of eggs produced by female Chinook in the Skeena River is declining due to a reduction in average size, this could have implications on overall productivity. Future research should consider trends in size and fecundity of females, especially in relation to biological benchmarks (with the understanding that benchmarks calculated with recent observations already account for these size-based differences).

It is unlikely that observed reductions in size at age and in age at maturity could have been influenced by sampling protocols. Efforts were made to examine all information related to sampling at Tyee from 1984 to 2020. Procedural differences in sampling may have existed for some of the data collections prior to 1996 but data collections since 1996 followed known protocols. In some instances, records of subsampling methods could not be found (e.g. subsampling Chinook salmon scale samples in 1987 and 1989 to 1993). We assumed that standard biological practices of random sampling occurred at Tyee when catches were subsampled.

Chinook salmon from the Kitsumkalum CU were larger at age than fish from other Skeena CU's and tended to be older on average.

Age at maturity

Age at maturity declined across all the CUs (Figure 15, Figure 16). Age compositions had a significant influence on average size. The drop in abundance of older fish likely represents a decrease in the potential productivity of the population. Typically older age classes are larger with more eggs (Healey and Heard 1984, Malick et al. 2023) and/or larger eggs (Quinn et al. 2011). More eggs means more offspring, and larger eggs may be linked to improved fitness. The combination of reduced size at age and reduced age at maturity have led to smaller fish in the returns of Skeena River Chinook salmon in all CUs examined.

Small differences in age at maturity were observed between Skeena River Chinook salmon CUs with the Middle Skeena and Kitsumkalum CUs being the oldest at 5.11 years and the Large Lakes CU being the youngest at 4.96 years. It is unlikely that differences in age of Kitsumkalum Chinook salmon would have biased CWT-based marine exploitation rate estimates for other Skeena CUs. Stratification by age essentially eliminated age bias from influencing exploitation rate estimates. However, low numbers of CWT recoveries from less common ages would have influenced the precision of marine exploitation rate estimates.

The average age at maturity of the Kitsumkalum CU estimated from escapement samples was older than that observed at Tyee. Average age at maturity from escapement samples was 5.35 years (Winther et al. 2021) whereas average age from samples at Tyee was 5.11 years. This was probably due to the gillnet capture method at Tyee. The tangle nets used for escapement sampling may have retained larger Chinook salmon and carcass sampling (dead pitch) may sample larger fish. Further research could test how sensitive results are to this potential bias in age structure sampling due to gear type.

Timing of migration

Attributes of the data collection and fish behavior influenced assessments of Chinook salmon summer run timing. Data collection issues included the start date of the test fishery, small sample sizes and data subsampling in the early part of the time series. Changes in fish behavior that complicated assessments were the progressively later run timings through the time series and CU specific differences to changes to run timing. However, the data do present strong signals for later run timing for all CUs in the late part of the time series and for a relatively continuous progression in timing for the two largest CUs, Kitsumkalum and Large Lakes through the entire time series.

The Tyee Test fishery was originally designed for Sockeye salmon and while starting the Tyee Test Fishery on approximately June 10 covered all of the Sockeye salmon run it missed portions of the front tails of the summer runs of Chinook salmon for some CUs. The rear tails of the runs were fully sampled. Our investigation into the run timing data showed that starting the test fishery on June 10 had almost no effect on the timing estimates for the Kitsumkalum CU and little effect on timing estimates for the Large Lakes CU. The latest timed CU, Kitsumkalum, was influenced the least with an average of 0.8% of the run missed by June 10 starts as measured during the 2009 to 2016 period. The Large Lakes CU had the second latest run timing with an average of 1.8% of the run missed by June 10 start dates. These CUs both showed progressively later run times through the time series that averaged 0.3 days later per year. Run timing for both CUs in 1984 would have been approximately 8 days earlier and would have missed 2.2% of the Kitsumkalum run and 6.0% of the Large Lakes run. These two later CUs made up 64% of the Skeena summer run passing Tyee on average (range 51% to 84%).

The three earliest timed summer run CUs had very similar run timing; they were the Zymoetz-Fiddler, Upper Skeena and Middle Skeena. Starting the test fishery June 10 missed an average of 11.3% of these CUs in aggregate from 2009 to 2016. The second earliest run timing was by the Lower Skeena CU. Starting the test fishery June 10 missed an average of 6.4% of the run of the Lower Skeena CU from 2009 to 2016. Timing corrections were not necessary for the beginning of the time series as there was no trend in annual mean timing for these CUs prior to 2014. These four earliest CUs made up an average of 36% of the Skeena summer run passing Tyee (range 16% to 49%). It is possible that there were timing differences in this group but the small sample sizes did not allow for differentiation.

High catches at the beginning of the test fishery were most common in years when the early timed CUs made up a larger proportion of the Skeena run than normal. Years with large catches on initiation of the test fishery included 1996, 1998, 2000, 2001, 2005, 2007 and 2008. Early timed stocks made up over 40% of the returns past Tyee in all these years except 2005. The contribution by returns of early timed CUs in 2005 were below average at 33%, indicating that the relatively high catches at the beginning of the test fishery could also be the result of earlier run timing overall.

The effects of starting the test fishery after the summer run of Chinook salmon began to pass Tyee were small but specific to the CUs. On average, starting the test fishery around June 10 had the effect of missing 11.3% of the early timed CUs or approximately 4.1% of the Skeena aggregate of summer run Chinook salmon upstream of Tyee. The test fishery sampled full runs for the Kitsumkalum CU and near full runs for the Large Lake CU. These two largest CUs made up over 64% of the total return on average and have contributed up to 84% of returns. New findings were that smaller CUs had earlier run times and that run times were getting progressively later for all CUs. As run times get later the test fishery data become more complete. Evidence of later run timing is apparent in Figure **18** to Figure **20** and from catch data. High catches at the beginning of the test fishery weren't observed after 2016 (Figure **3**). The result of not sampling the front portions of runs to the escapement estimates were not fully explored. However, errors in escapement estimates associated with missing data from the front tails of runs are expected to be small, affect the smallest CUs the most, and be greatest early in the time series. Other methods of estimating escapement could be explored in the future to deal with the data missed by not sampling the front tail of the runs. The model outputs identified critical differences in benchmarks during the most recent generation. Given that changes in productivity were greatest toward the end of the time series, it would be most beneficial to examine the effects of timing differences on escapement estimates after 2009 and to add results for 2021 to 2023 to the analyses.

Annual run times for individual CUs were much narrower than the means suggested. Long term averages within a CU tended to spread out the run timing estimates due to timing changes from year to year. Aggregating data across CUs also had the effect of broadening the run timing curves. Mean duration for the passage of 80% of the Skeena Chinook salmon past Tyee (i.e. the duration between passing 10% of the run and 90% of the run) was 45 days from the 2009 to 2016 samples. Individually the CUs exhibit narrower run timings with passage of 80% of the runs occurring over a duration of 27 to 37 days (Table **26**). The Large Lakes CU took the longest time with 80% of the run past Tyee in 37 days. Passage of 80% of the run over 30 days was most common for the other CUs. Consideration of the most probable run timings according to recent trends as opposed to long term averages could improve forecasts.

Based on differences in run timing between CUs, in-season forecasting could benefit from knowing CU specific data in-season. Such programs are possible as GSI data have been used in-season to manage Northern British Columbia Troll fisheries (Beacham et al. 2008, Winther and Beacham 2006 and 2009). The fixed nature of the Tyee Test Fishery and known periods of prime importance to management could focus the program to minimize the GSI analyses required in-season. Appropriate stock composition data to inform in-season forecasting could be available at a modest expense over the existing GSI sampling program. The benefit of CU specific data to in-season Chinook salmon forecasts could be tested through retrospective analyses of existing data.

Understanding run timing for the aggregate of Skeena River Chinook salmon stocks will allow for the adjustment of management actions to better fit the timing of Skeena stocks through Canadian fisheries. Management actions should be centered over recent (one generation or less) average run timings rather than across broader ranges as timings from earlier periods are no longer appropriate.

The marine distribution of the earliest portion of the summer run may not be well represented by Kitsumkalum CWT recoveries due to differences in timing. The early part of the summer run could experience lower marine exploitation than Kitsumkalum and Large Lakes CUs. The timing of Skeena River Chinook past the sport fishery on Langara Island was essentially the same width as the timing curve past Tyee (ADFG DFO 2018). It is not clear whether the CU specific contributions to the Skeena aggregate past Langara are the same as at Tyee, but examination of the Kitsumkalum CU's contribution appears to have the same position in the aggregate. Future work could explore using the GSI and CWT information to customize marine exploitation rates for the summer run CUs.

Differences in run timing between CUs appeared to be related to spawning habitat. CUs with primary spawning locations associated with larger rivers at the outlets of large lakes had later run timings than CUs from smaller systems or systems that were not lake stabilized. The

Kitsumkalum, Bear, Babine and Morice River and lake systems comprise the two largest CUs in the Skeena watershed with the biggest spawning areas, mostly associated with lake outlets. They were also the latest timed. Earlier summer timed CUs could require the high water levels associated with the freshet to access spawning grounds.

Spawner-Recruit Relationship

The time-varying productivity model (3) was supported as the best model for all CUs except for the Kitsumkalum CU, where the static model had most support based on model weights. Lower and more stable estimates of recruits per spawner were observed for the Kitsumkalum CU time series than for other CUs and for the aggregate, especially early in the time series.

All Skeena Chinook CUs exhibited spawner-recruitment estimates and benchmarks that were lower for the recent generation than for the full time series when comparing models with and without time-varying productivity. This was the case even for the Kitsumkalum CU where the static model was preferred.

We estimated common population parameters such as S_{MSY} and S_{Gen}, which are often used as biological benchmarks for salmon (Holt et al. 2009). However, we advise caution related to the parameter S_{Gen} because of the relatively low values of productivity α for most of the CUs in recent years (Table 36). All CUs except for Kitsumkalum showed evidence of 25-50% declines in ln(α) (Figure 23). We estimated that recent α for all CUs except Kitsumkalum and Large Lakes were <2.5 using time-varying model 3. Note that values in Table 36 are ln(α); values of α from the last 6 brood cohorts from model 3 ranged from a low of 1.77 for Zymoetz-Fiddler, 1.97 for Upper Skeena, 2.1 for Lower Skeena, 2.34 for Middle Skeena, 2.61 for Large Lakes, and 3.71 for Kitsumkalum, with the Skeena aggregate α at 2.56. When β is stationary and α decreases below 2.5, S_{Gen} falls rapidly. This could be problematic if S_{Gen} is used as a lower benchmark, because both the benchmark and productivity would decrease together, potentially setting up a shifting baseline at low population abundance and low productivity. Holt et al. (2018) also advised caution when using percentile benchmarks when α is below 2.5, as it can be lead to status assessments that are overly optimistic. We recommend precaution and further research on appropriate and robust benchmarks for CUs with low and declining productivity so as to avoid shifting baselines.

Reductions in productivity have occurred during a period of declining fisheries exploitations. Exploitation rates have declined since the early 1990s. Brood year exploitation rates peaked at 69% for the 1989 brood year (caught in fisheries from 1993 to 1996) and continued to decline following successive fishery reductions to 22% for the 2016 brood year (CTC 2023). Reductions to outer marine fisheries occurred first but more recently have involved terminal fisheries. Canadian sport and commercial fishery management actions and closures reduced terminal harvest impacts to near zero after 2018. Brood years after 2016 are expected to experience even lower exploitation rates.

The fisheries environment experienced by Chinook salmon in northern BC through the time series 1984 to 2020 was one of significant change. Marine sport fisheries grew in the late

1980s and 1990s, especially in the outer areas around Graham and Langara Islands. The NBC Troll fisheries were substantial in the 1980s but were starting to be limited by the PST and licensing changes. Canadian fishery reductions further influencing exploitation of Skeena Chinook salmon began with a full closure of the Chinook salmon fishery in the North Coast in 1996 to protect WCVI Chinook salmon. This closure was followed by the Coho crisis in 1998 where troll fisheries were reduced. Management actions to the sport fishery in 1998 to protect Coho had minimal effects on north coast Chinook fisheries. Troll fishery reductions aimed at weak stock management of WCVI Chinook salmon have continued since 1996. Weak stock approaches to troll fisheries included additional restrictions to protect early timed Fraser stocks. More recently there were restrictions on both troll and sport fisheries to protect Skeena stocks and Fraser Summer stream-type age 5_2 Chinook salmon.

Terminal harvest estimates presented here represent the first CU specific harvest estimates for the Skeena Chinook CUs other than Kitsumkalum (Appendix 2). The GSI-based method allowed for the incorporation of data from First Nations' fisheries in freshwater that were not sampled for CWTs. GSI-based estimates of terminal harvests for Kitsumkalum Chinook salmon could be more precise than CWT-based estimates as every fish sampled carried their genetic mark and assignments to Kitsumkalum were 97.6% correct (provided the same catch and escapement data were used).

Implications and future work

This was the first attempt at developing CU specific population metrics for a group of CUs in the Skeena watershed. The work supports the development of management goals and benchmarks for Skeena River Chinook salmon. While the work revealed several possibilities for improved estimates, there is value in presenting the results to a broader audience without delay.

Proposed improvements will take advantage of more recent data by incorporating data collected after 2020 and the latest CTC exploitation rate analyses (or separate exploitation rate analyses) into the work supporting management benchmarks. This is expected to be an iterative process with periodic updates supported by modelling and code to make the analyses less onerous.

Our estimates of population parameters and future work on biological benchmarks will be relevant to work on in-season forecasting of Chinook past Tyee, which is currently underway. Practical use of in-season forecasts will depend on management triggers linked to appropriate benchmarks. The changes in timing observed here can support the development of improved in-season forecasts. The production characteristics will be most relevant to the development of benchmarks.

Estimates provided here do not include variance estimates around catches at Tyee (e.g., if the test fishery could be repeated for each set, how would it vary in abundance and composition?). We expect future models could explore other techniques to estimate variance in Tyee catch based on improved methods of estimating variance in genetic stock identification analysis (Hankin 2022).

Small sample sizes were problematic when attempting to apply age structure to the escapement and recruit estimates for the least abundant CUs (Figure 31). In some years, there were few representative ages for a cohort, which likely biased the estimation of spawners and recruits by brood year. A method like hierarchical modelling could reduce this bias, by using age data from CUs and years with more samples to inform the age proportion for CUs and years with few samples. Another approach would be to use a Bayesian model to differentiate 'true' age proportion from observed proportion (Høst et al. 2002, Fleischman et al. 2013). We observed some covariance in mean age at maturity across CUs, suggesting that such approaches are worth testing (Figure 15). While the analytical approaches allow for improvements to age information in the short term, more escapement sampling to better understand the age structure of these smaller CUs is suggested for the long term. The age sampling could be done as part of the DNA baseline maintenance.

Lastly, we note that the spawner-recruitment analyses presented in this report do not take uncertainty in estimates of spawner abundance, harvest or age structure into account. These well-known sources of uncertainty can lead to biased inference about key population characteristics like intrinsic productivity and strength of density dependence by failing to separate observation error from true underlying process variation (e.g., due to errors-in-variables and time-series biases; Korman et al. 1995; Walters and Ludwig 1981). For these reasons state-space spawner recruitment models, which allow for separation of observation error from process variation, are increasingly used to characterize single and multi-stock dynamics (e.g., Su and Peterman 2012; Staton et al. 2020) and could be considered in the future.

ACKNOWLEDGEMENTS

A portion of the funding for this project was provided by the Pacific Salmon Commission through the Sentinel Stocks Program and the Northern Boundary and Transboundary Rivers Restoration and Enhancement Fund. The PSC funded portions of genetic analyses of the Chinook salmon samples. Other portions of the project were funded by Fisheries & Oceans Canada in existing programs.

The authors thank the committee members and participants of the Pacific Salmon Commission's Sentinel Stocks Program (SSP) and the Northern Fund for their reviews of the proposals and source papers that were the basis for this document. Their many contributions and sage advice were greatly appreciated.

Thanks to the test fishery technicians that prepared the fishing contracts, maintained the test fishing site, sampled the fish, and collected, entered, and disseminated the data. Michael Jakubowski was the senior technician for most of the project. He and his staff implemented changes to accommodate genetic sampling and changes to the duration of the test fishery. The technicians provided the essential link between the fish and the biologists.

The Schlerochronology Lab at the Pacific Biological Station did the scale ageing and maintenance of the scale sample archive. Thanks for the attention to detail and the maintenance of the scale sampling archive. The archived scales provided the genetic material that allowed for retrospective sampling of fish before 2009. Thanks to Shane McClellan, Darlene Gillespie, Joanne Groot and others for ageing the Chinook salmon scales. Thanks to Nora Crosby and others for handling the scale books and moving the samples back and forth from the archives to the genetics lab.

Thanks to the Molecular Genetics Lab for the analyses of samples, the maintenance of the baselines, and running and re-running samples to test baselines and estimate abundance. Thanks to Terry Beacham, John Candy and Andres Araujo for their assistance and many discussions involving the baselines, data, and analyses.

Thanks to Meagan Kindree and Brendan Connors for their thorough and thoughtful reviews of the manuscript. Their comments and additions improved the paper.

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FIGURES

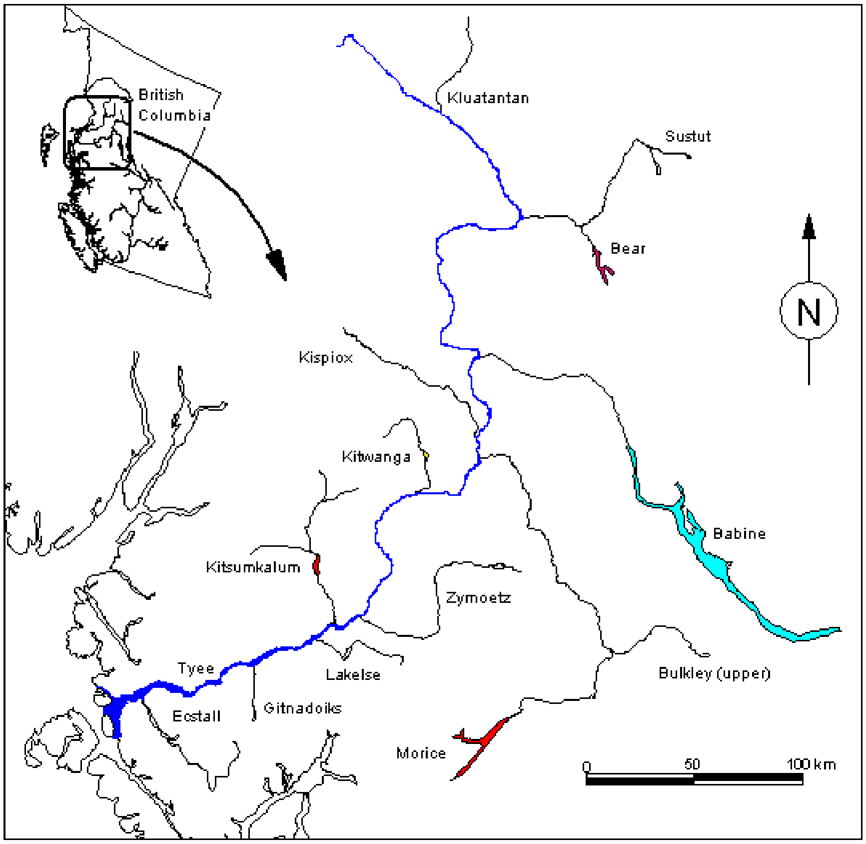


Figure 1. The Skeena River watershed in northern British Columbia showing the largest Skeena tributaries and the location of Tyee.

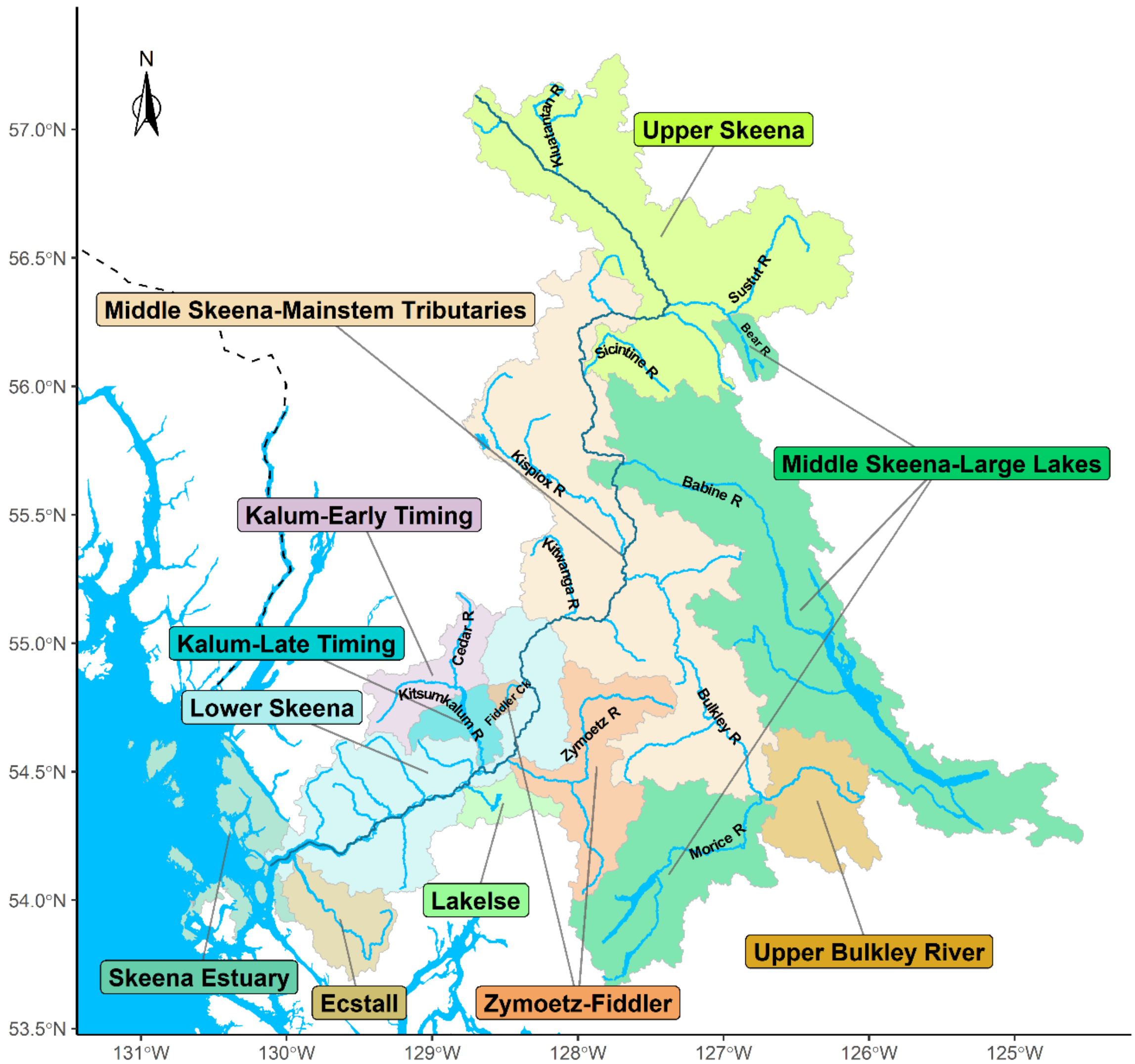


Figure 2. Chinook Conservation Units in the Skeena River watershed.

Note that the Large Lakes CU is made up of three discontinuous watersheds: the Bear River, the Babine River, and the Morice River.

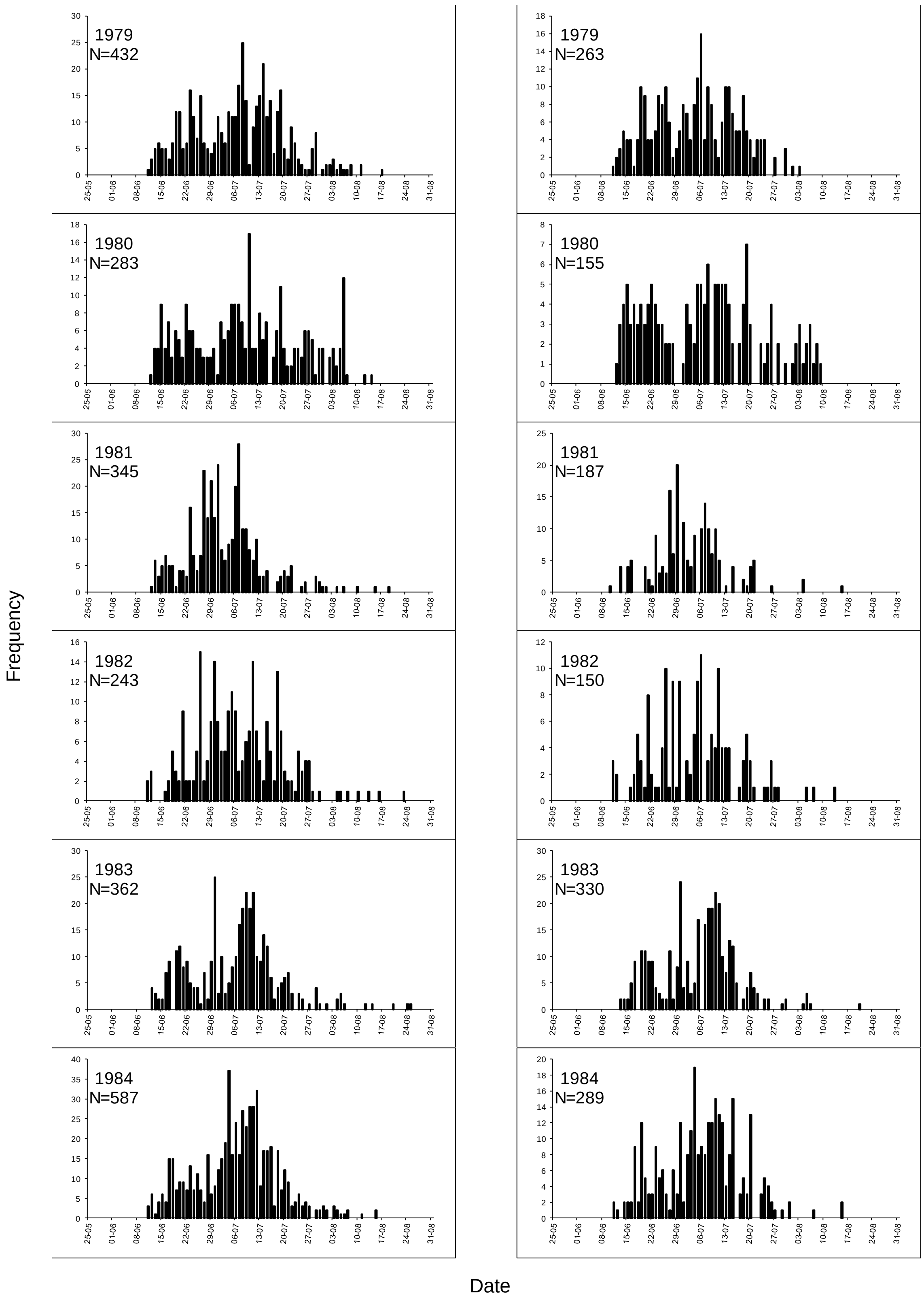


Figure 3. Chinook salmon catch (left) and sample frequency (right) by day from the Tyee Test Fishery, 1979 to 2020.

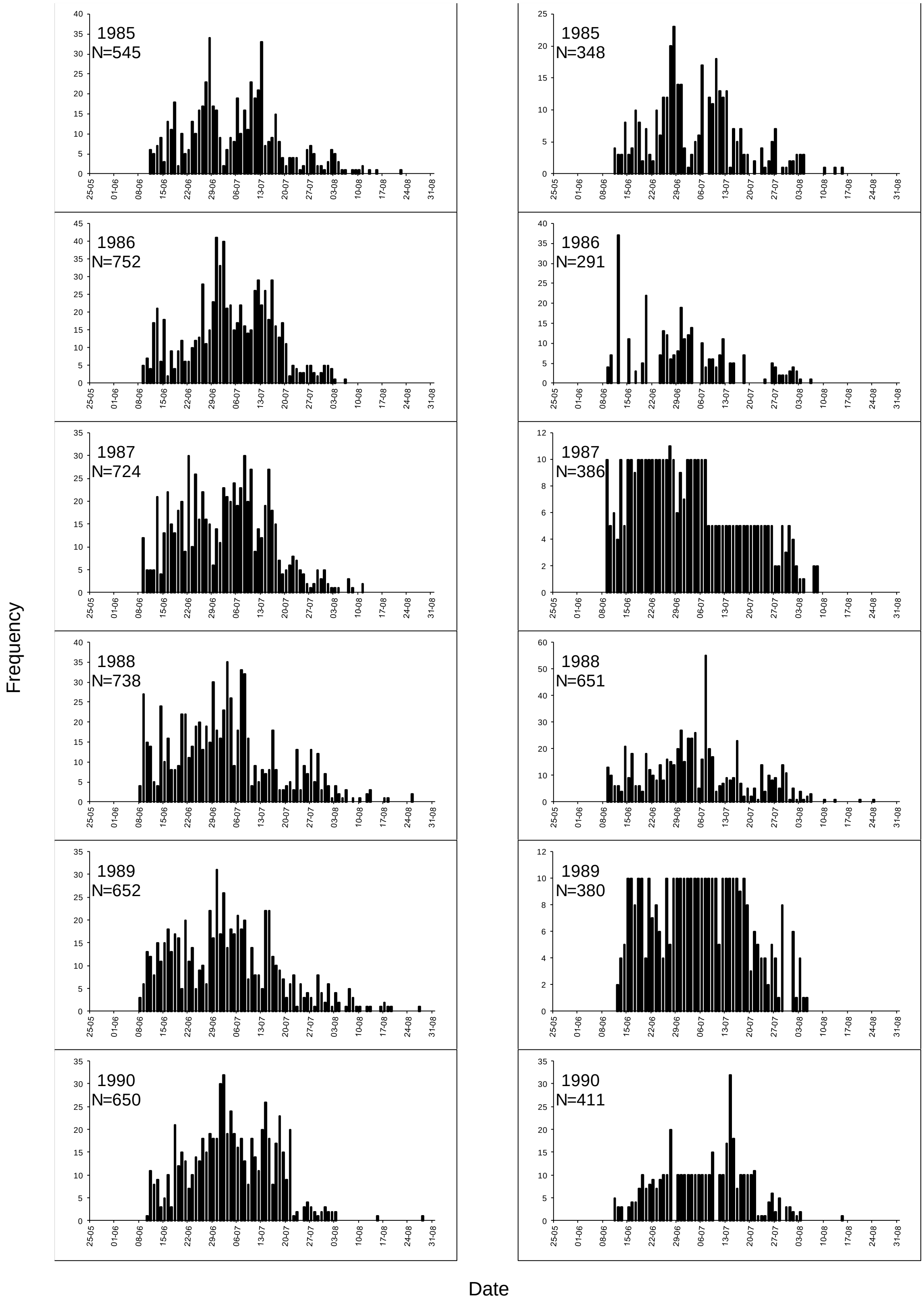


Figure 3 continued. Chinook salmon catch (left) and sample (right) frequency by day from the Tyee Test Fishery, 1979 to 2020.

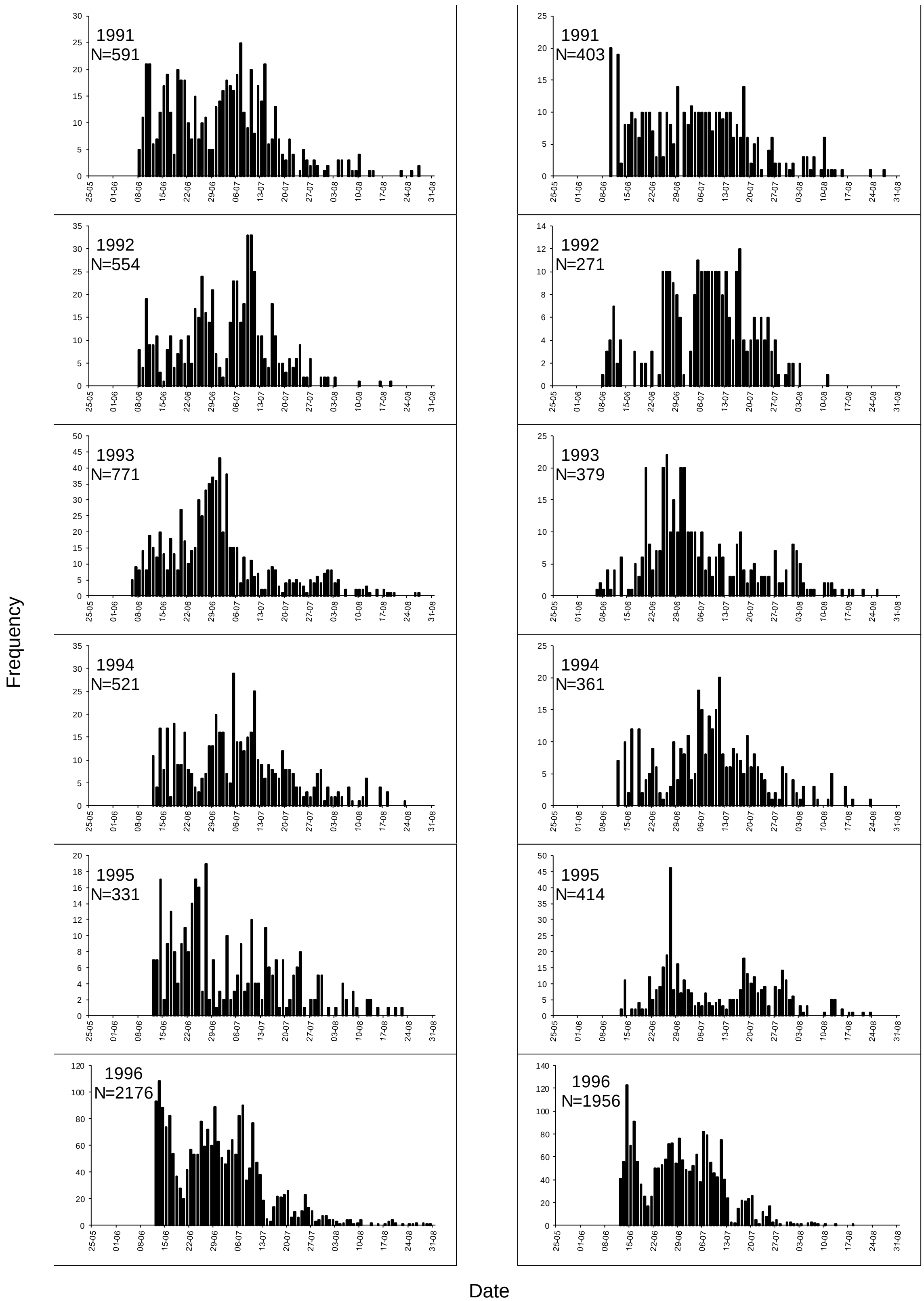
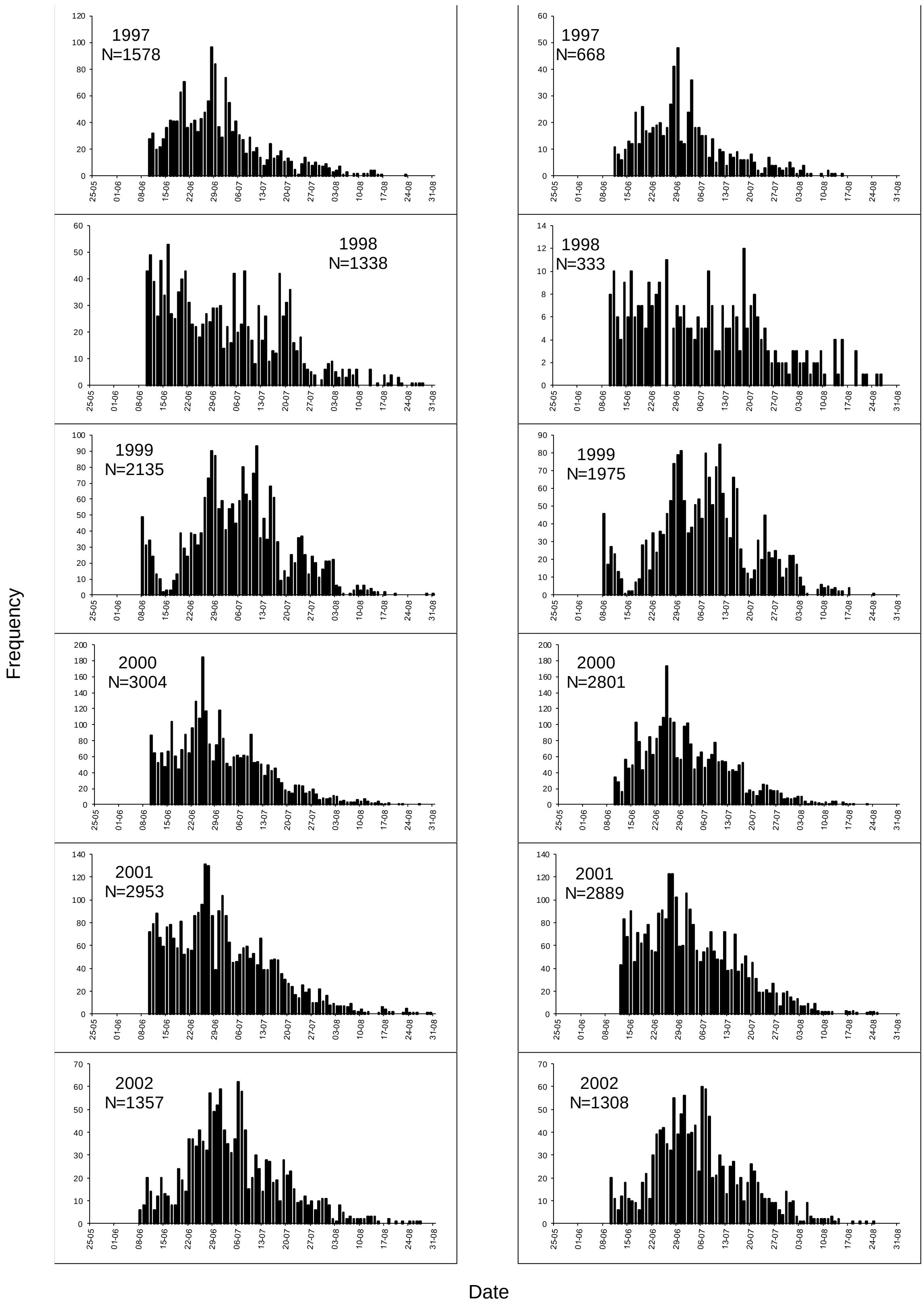


Figure 3 continued. Chinook salmon catch (left) and sample (right) frequency by day from the Tyee Test Fishery, 1979 to 2020.



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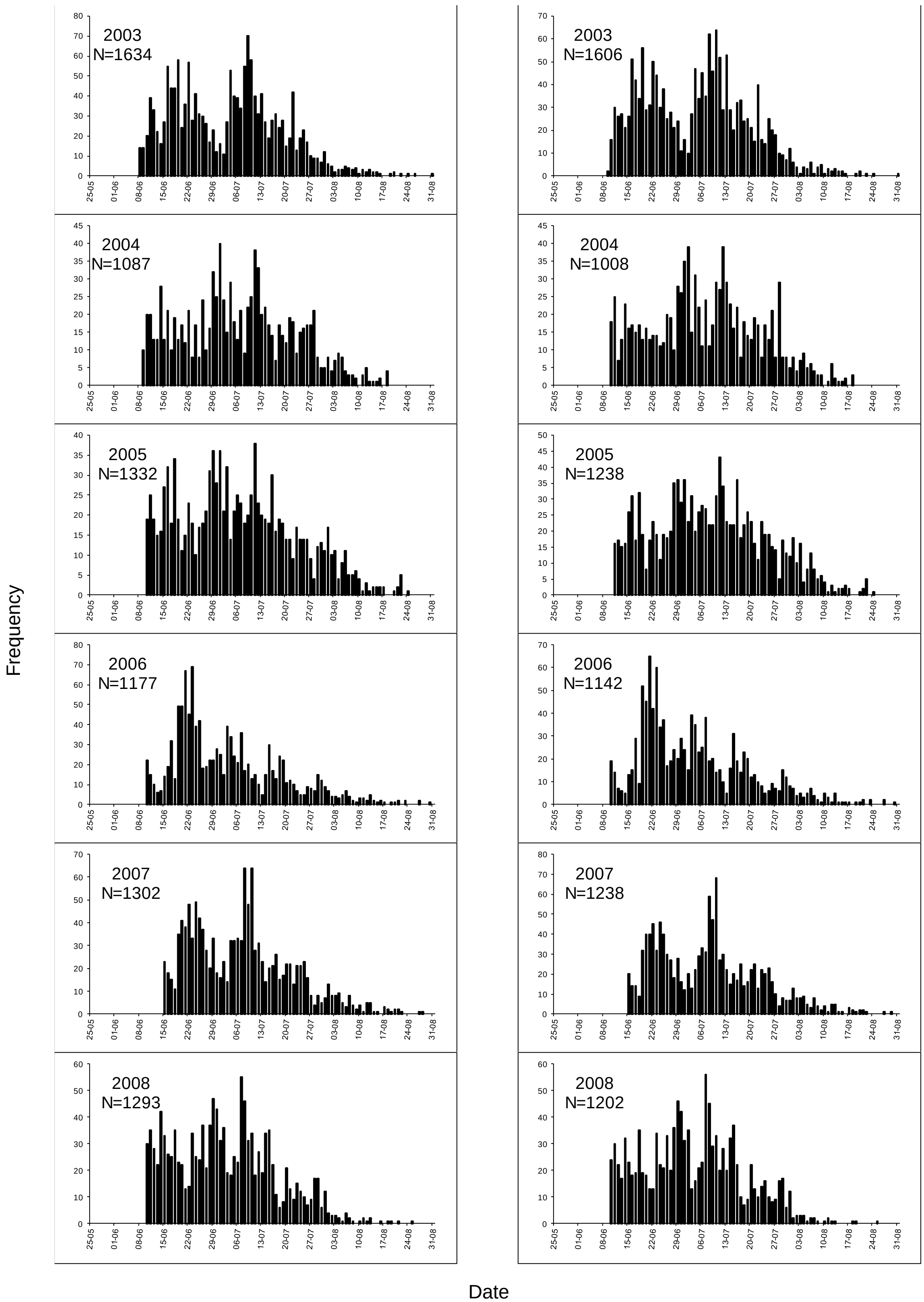


Figure 3 continued. Chinook salmon catch (left) and sample (right) frequency by day from the Tyee Test Fishery, 1979 to 2020.

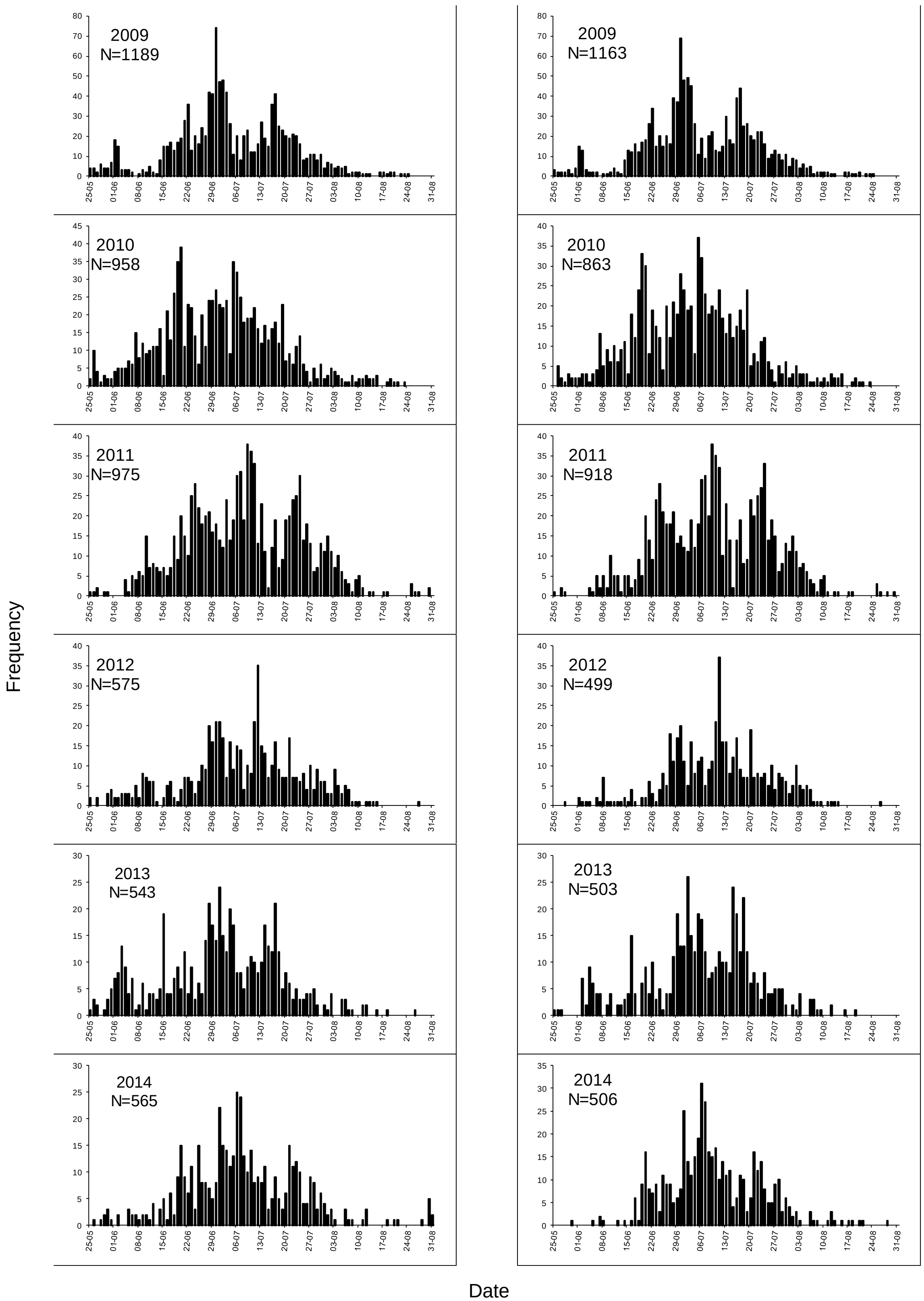


Figure 3 continued. Chinook salmon catch (left) and sample (right) frequency by day from the Tyee Test Fishery, 1979 to 2020.

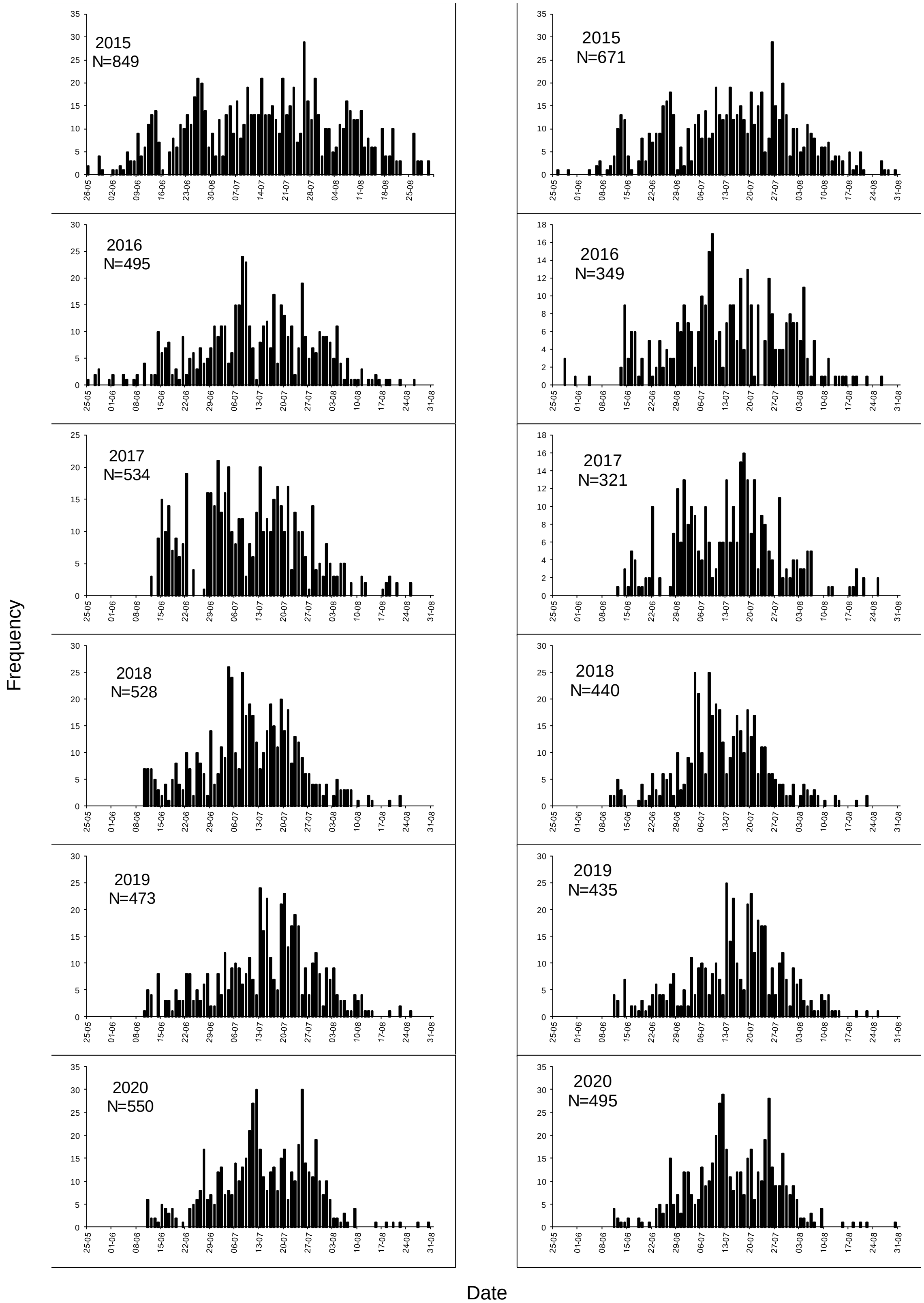


Figure 3 continued. Chinook salmon catch (left) and sample (right) frequency by day from the Tyee Test Fishery, 1979 to 2020.

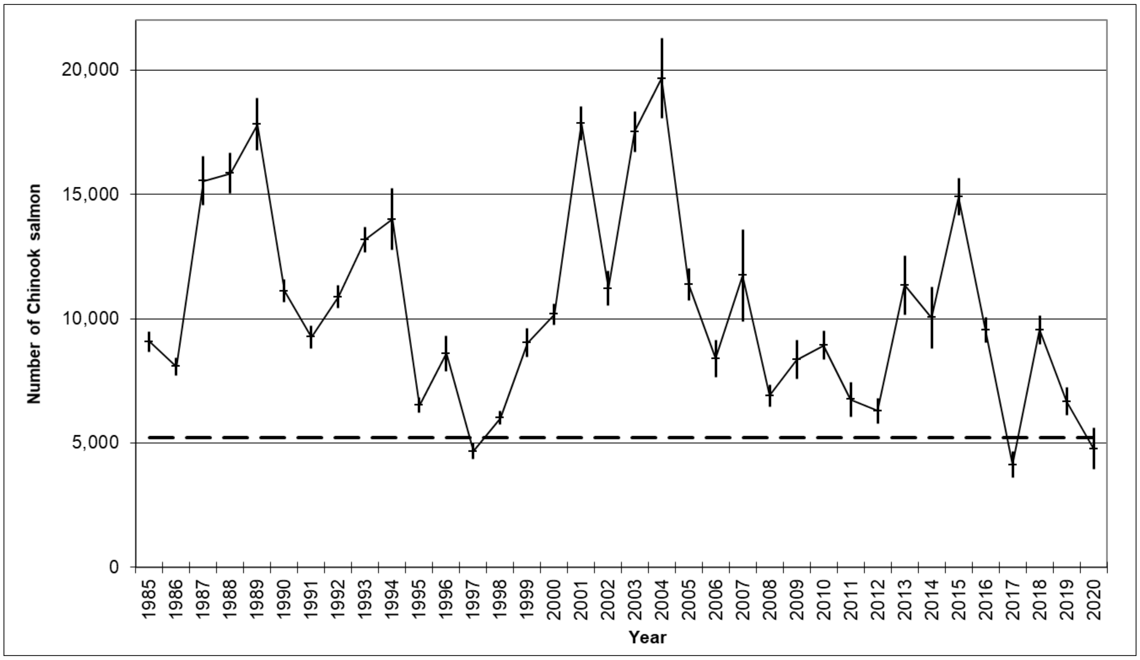


Figure 4. Escapement estimates for large Kitsumkalum River Chinook salmon 1984 to 2020.

Vertical lines represent ± one standard error. Points were connected by lines to guide the eye. The dashed line is the S_{MSY} estimate of 5,214 large Chinook salmon (Winther et al. 2021).

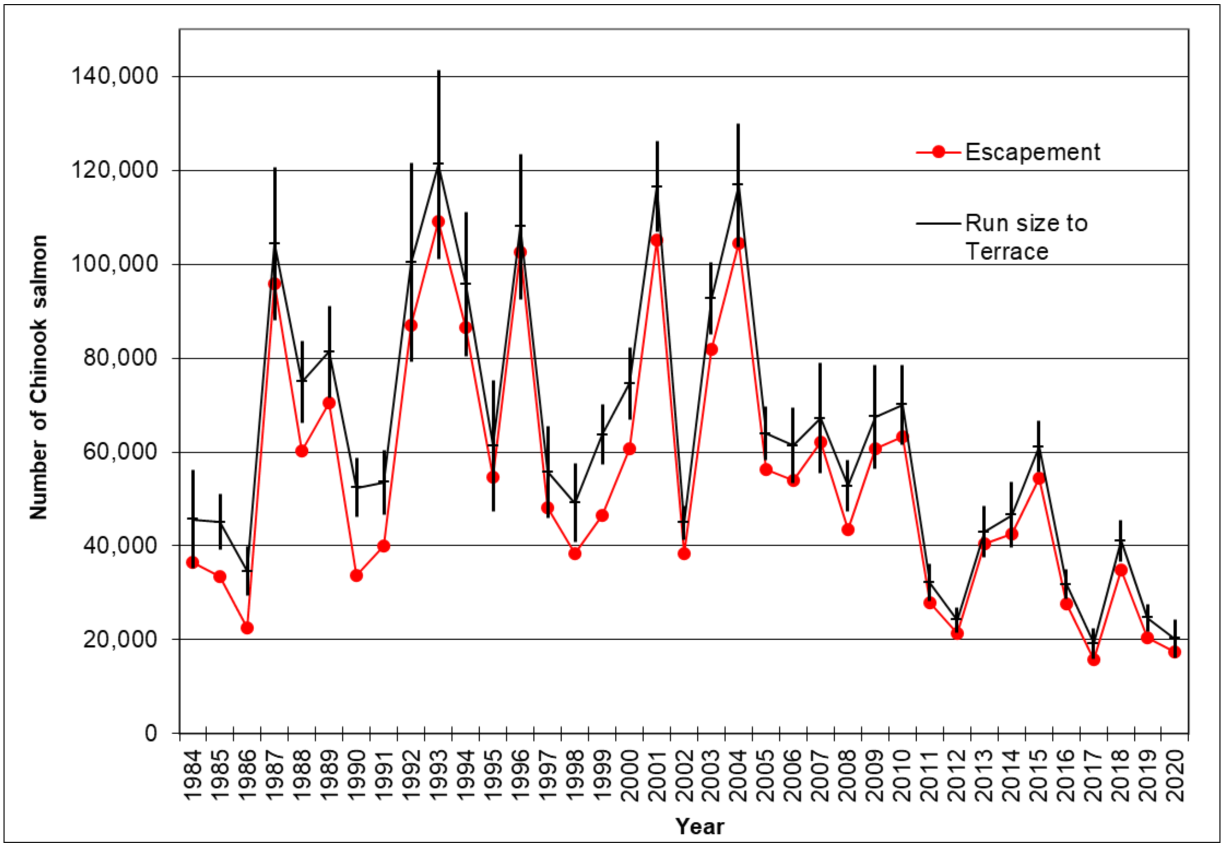


Figure 5. Estimates of large Skeena River Chinook salmon escapements and returns to Terrace 1984 to 2020.

Black line represents estimated run size to Terrace with vertical lines of ± one standard error. Red line represents estimated escapement. Points were connected by lines to guide the eye.

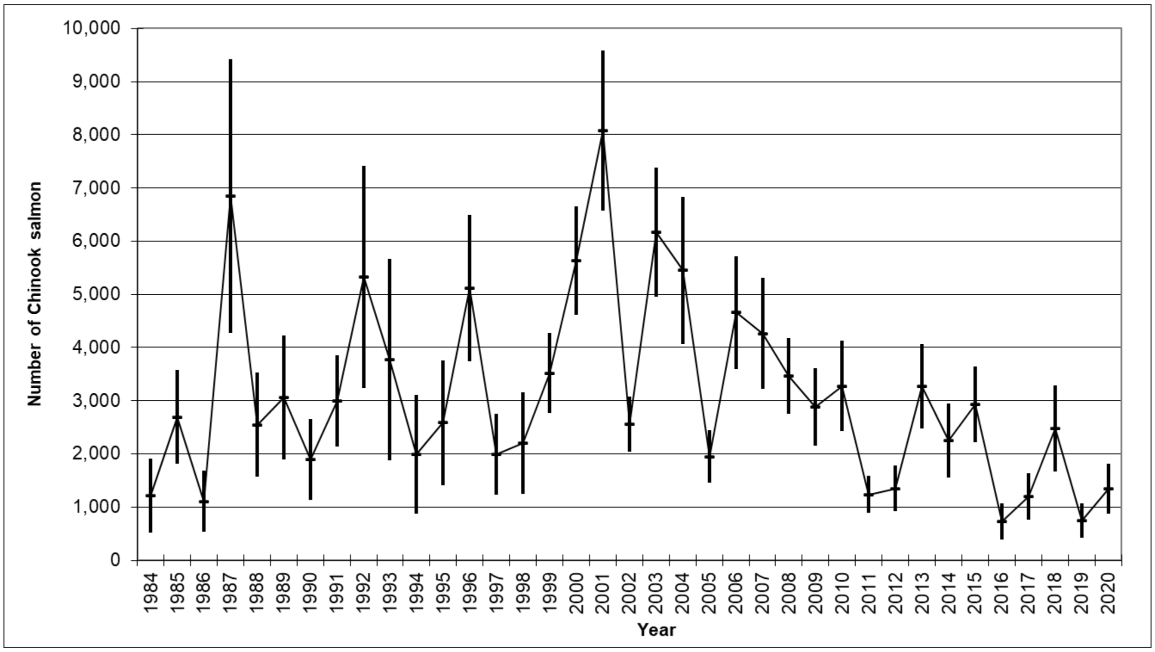


Figure 6. Escapement of large Lower Skeena River Conservation Unit Chinook salmon by year 1984 to 2020.

Vertical lines represent ± one standard error. Points were connected by lines to guide the eye.

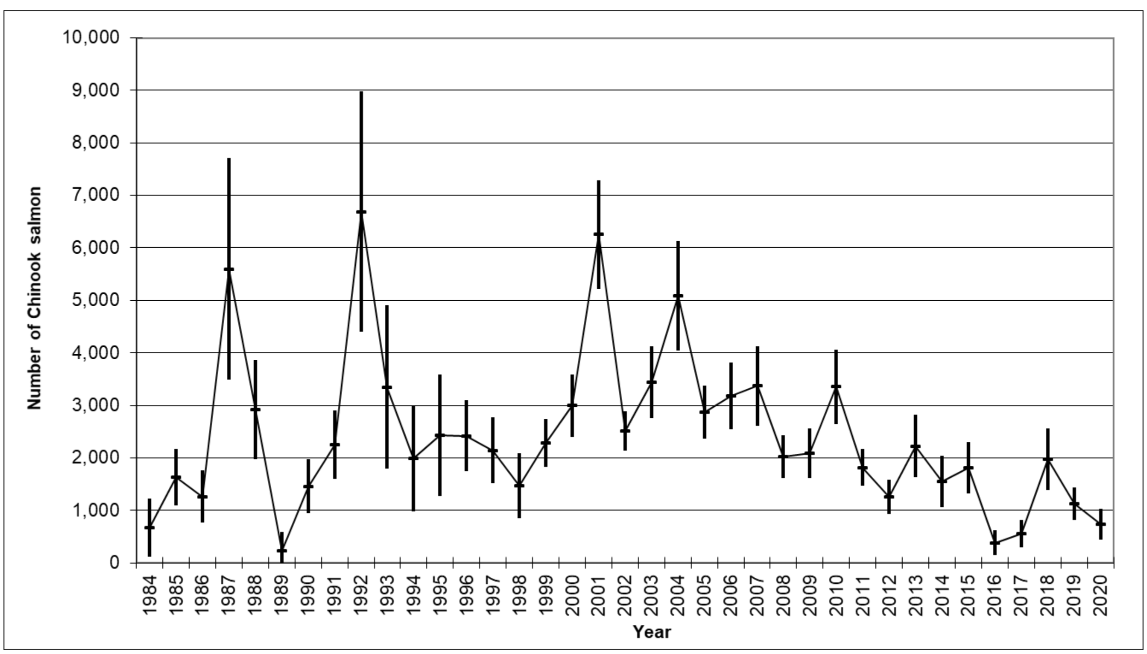


Figure 7. Escapement of large Zymoetz-Fiddler Conservation Unit Chinook salmon by year 1984 to 2020.

Vertical lines represent ± one standard error. Points were connected by lines to guide the eye.

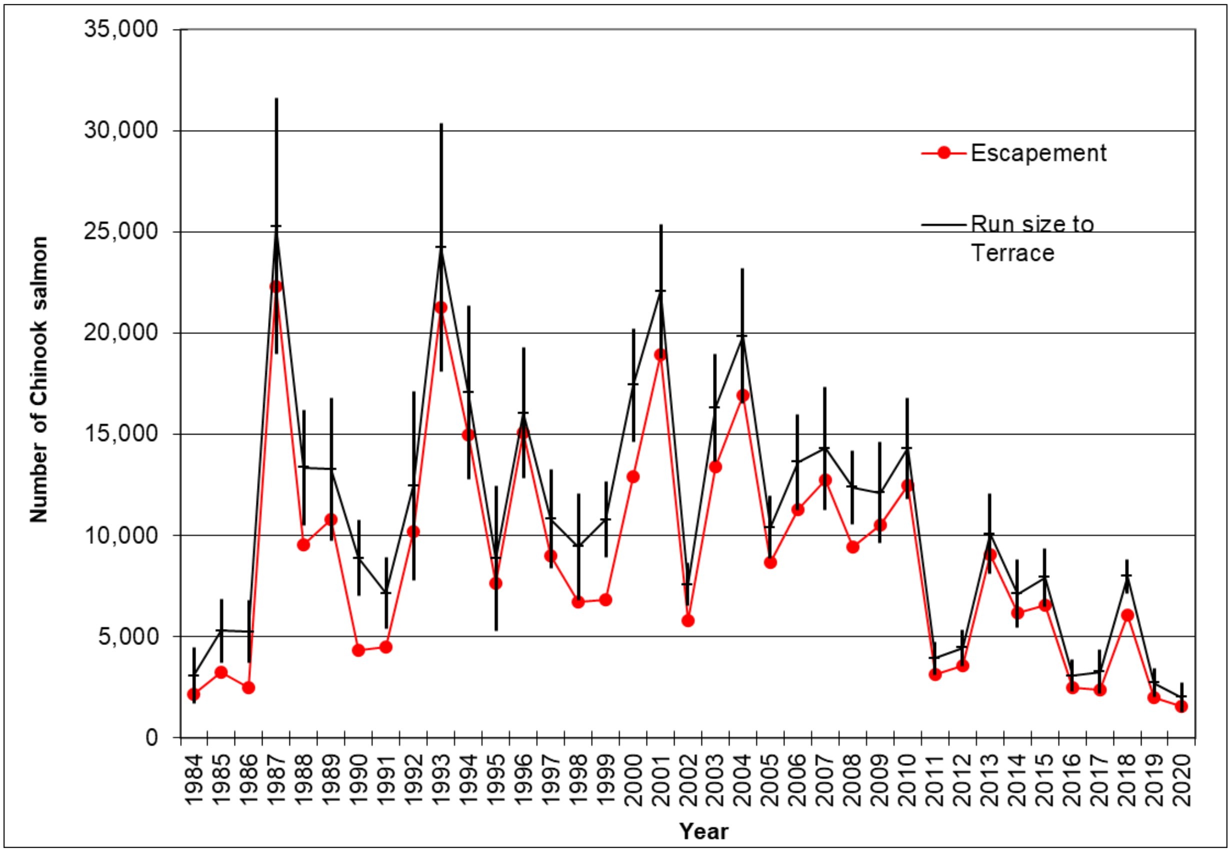


Figure 8. Run size to Terrace and escapement of large Middle Skeena Conservation Unit Chinook salmon by year 1984 to 2020.

Black line represents estimated run size to Terrace with vertical lines of ± one standard error. Red line represents estimated escapement. Points were connected by lines to guide the eye.

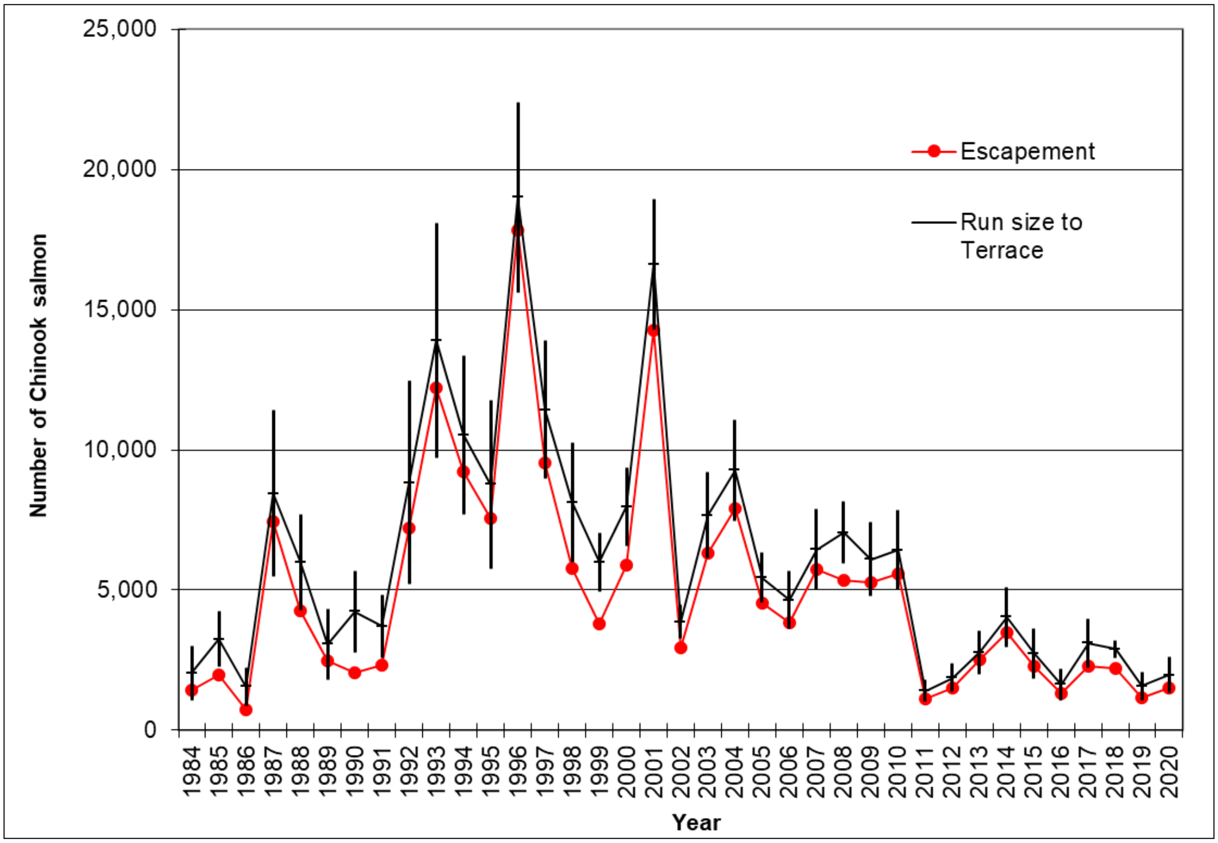


Figure 9. Run size to Terrace and escapement of large Upper Skeena Conservation Unit Chinook salmon by year 1984 to 2020.

Black line represents estimated run size to Terrace with vertical lines of ± one standard error. Red line represents estimated escapement. Points were connected by lines to guide the eye.

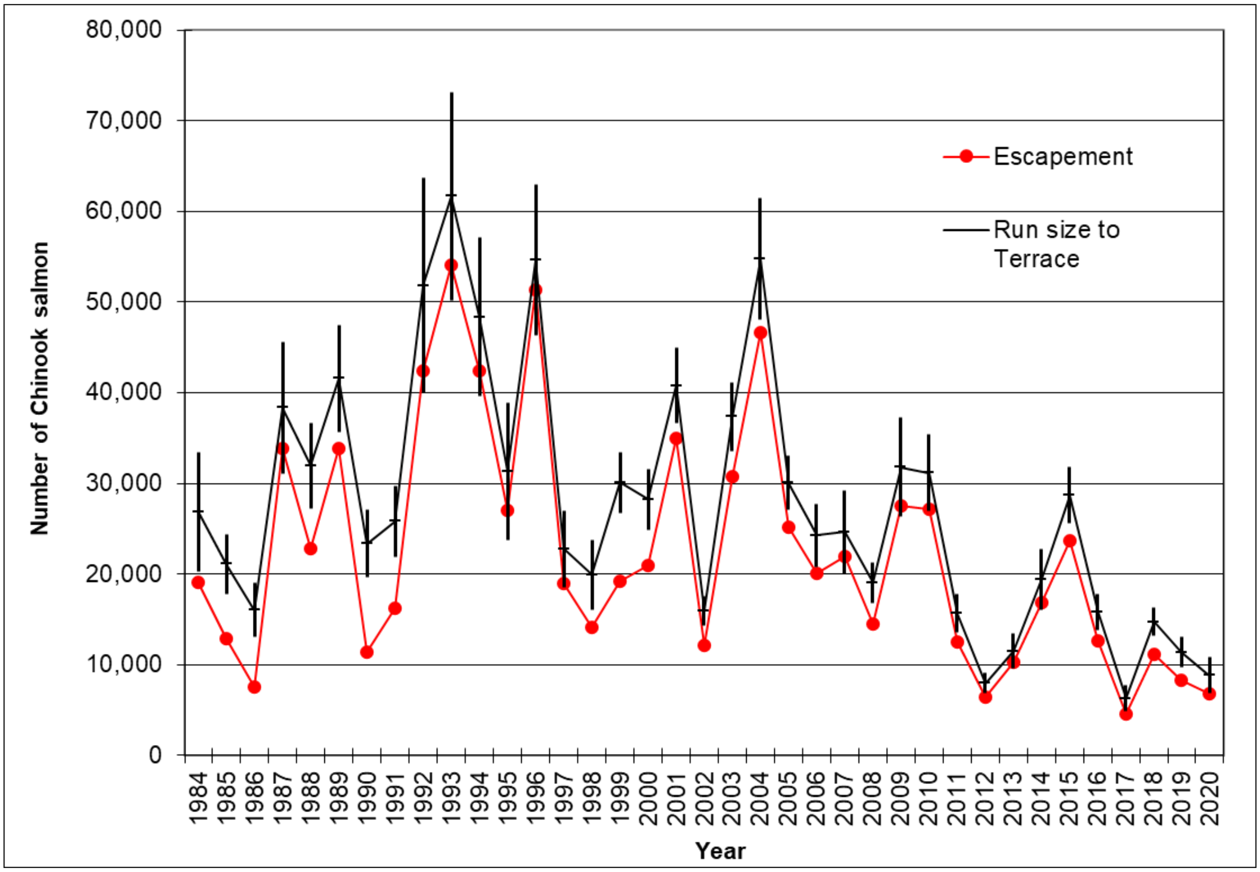


Figure 10. Run size to Terrace and escapement of large Chinook salmon to the Large Lakes Conservation Unit Chinook salmon by year 1984 to 2020.

Black line represents estimated run size to Terrace with vertical lines of ± one standard error. Red line represents estimated escapement. Points were connected by lines to guide the eye.

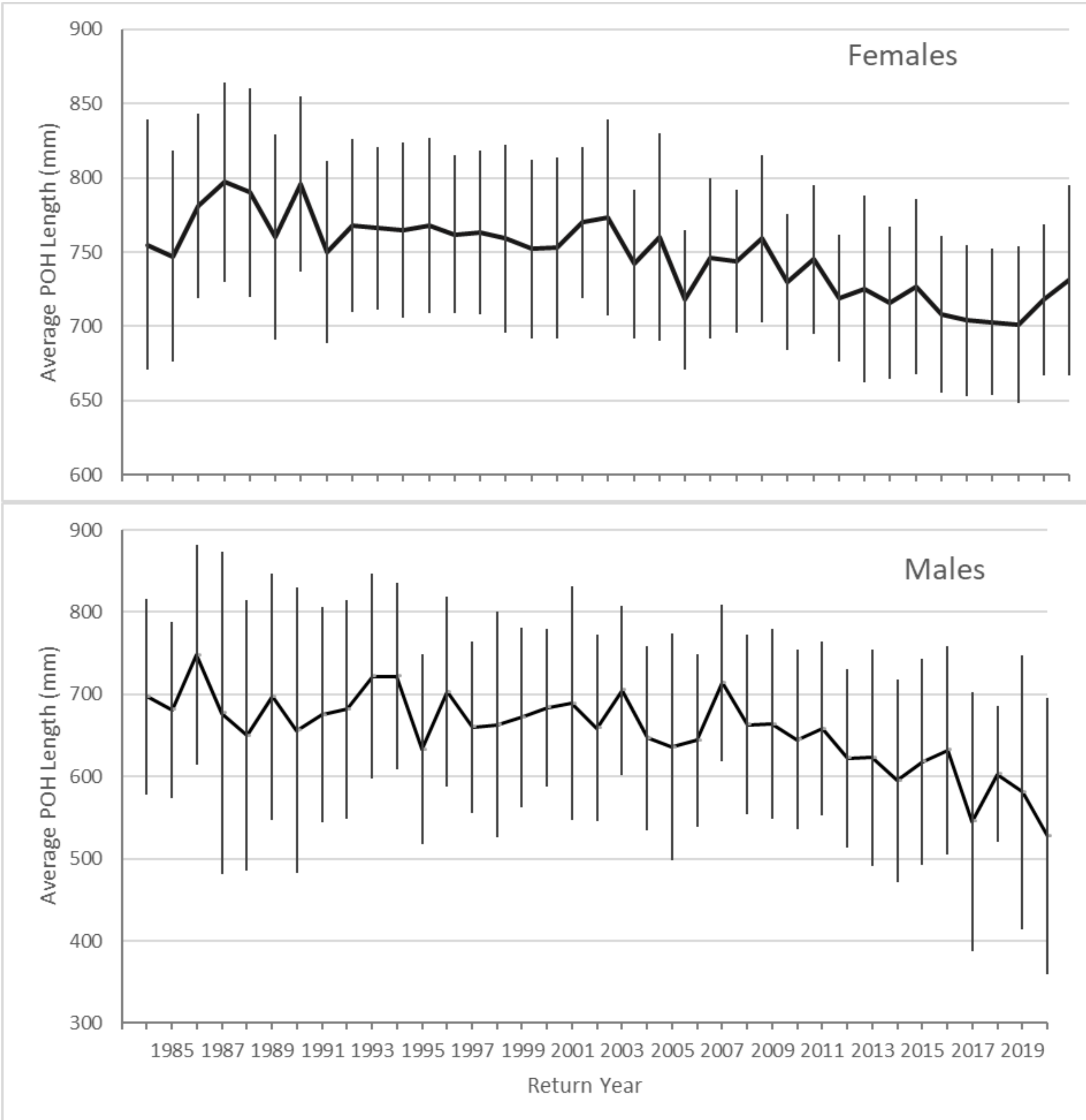


Figure 11. Average POH length (mm) of male and female Chinook salmon caught at Tyee by return year.

Ages 4 through 7 combined. Vertical lines are ± 1 standard deviation. POH length was post eye orbit to hypural plate length. Note the different scales for the vertical axes. Points were connected by lines to guide the eye.

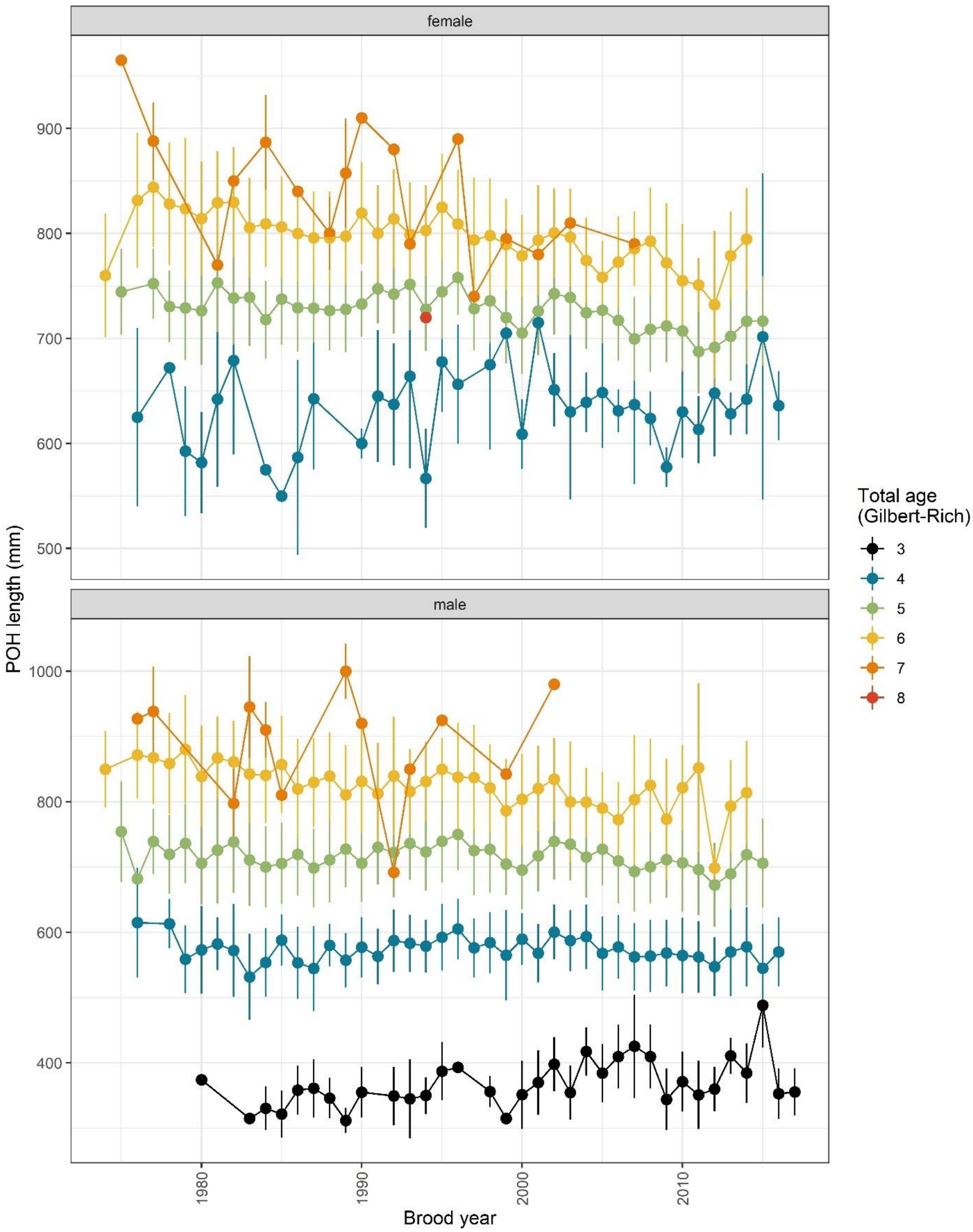


Figure 12. Average POH length (mm) at age of male and female Chinook salmon caught at Tyee by brood year.

Vertical lines are ± 1 standard deviation. Abbreviations for CUs appear in Table 1.

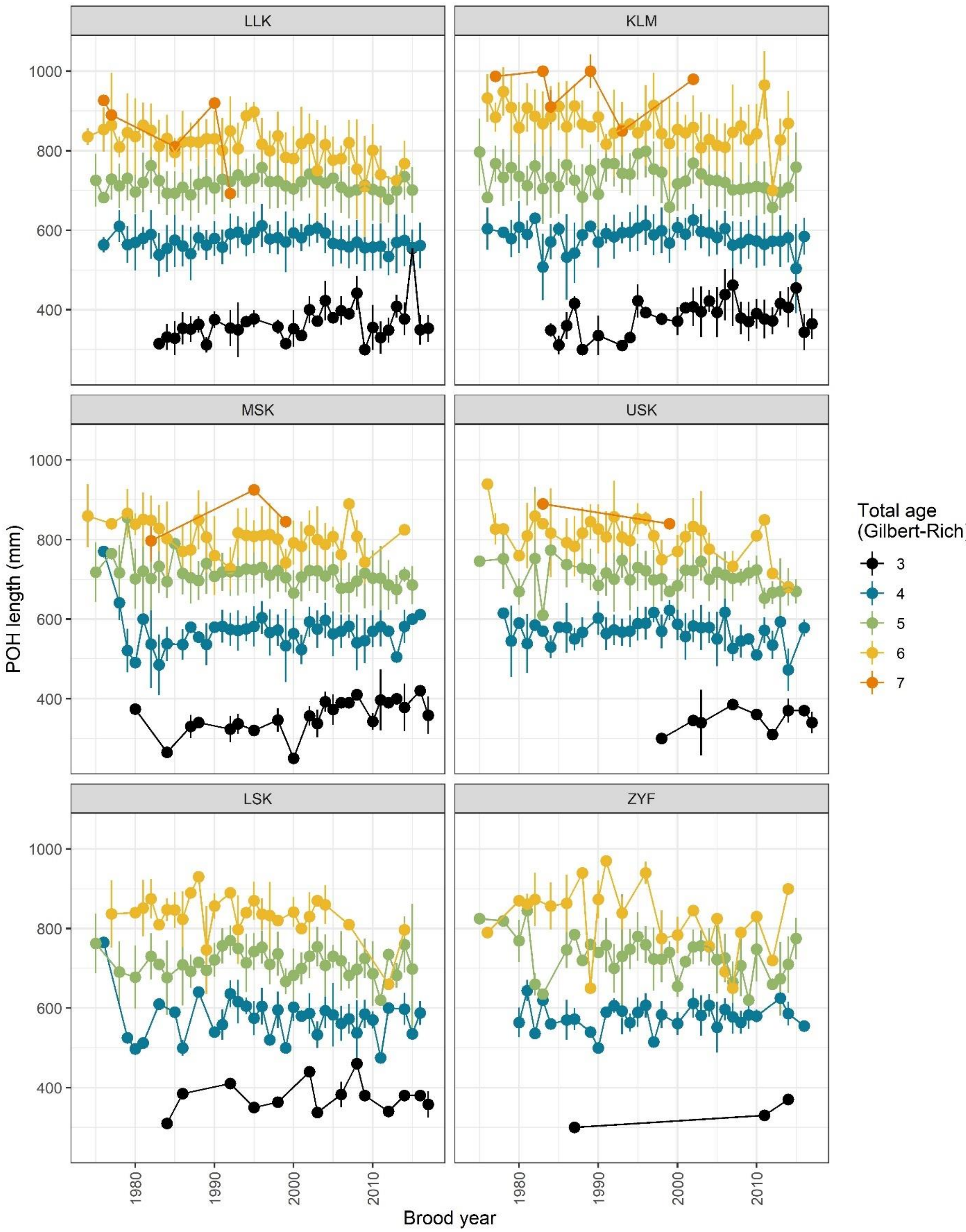


Figure 13. Mean POH length by brood year, age and CU for males from the six summer run Chinook salmon CUs upstream of Tyee.

Vertical lines are ± 1 standard deviation. Abbreviations for CUs from Table 1.

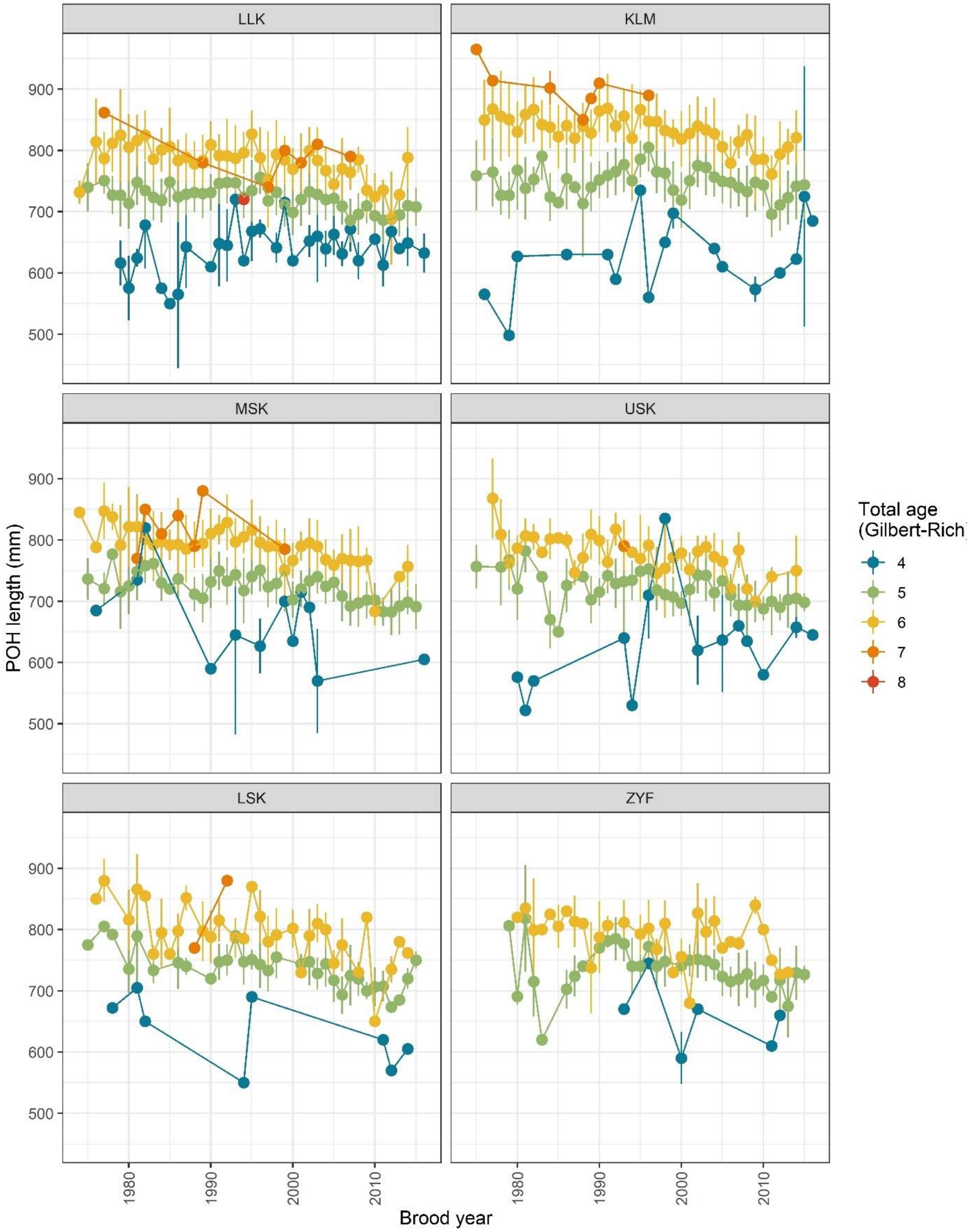


Figure 14. Mean POH length by brood year, age and CU for females from the six summer run Chinook salmon CUs upstream of Tyee.

Vertical lines are ± 1 standard deviation. Abbreviations for CUs from Table 1.

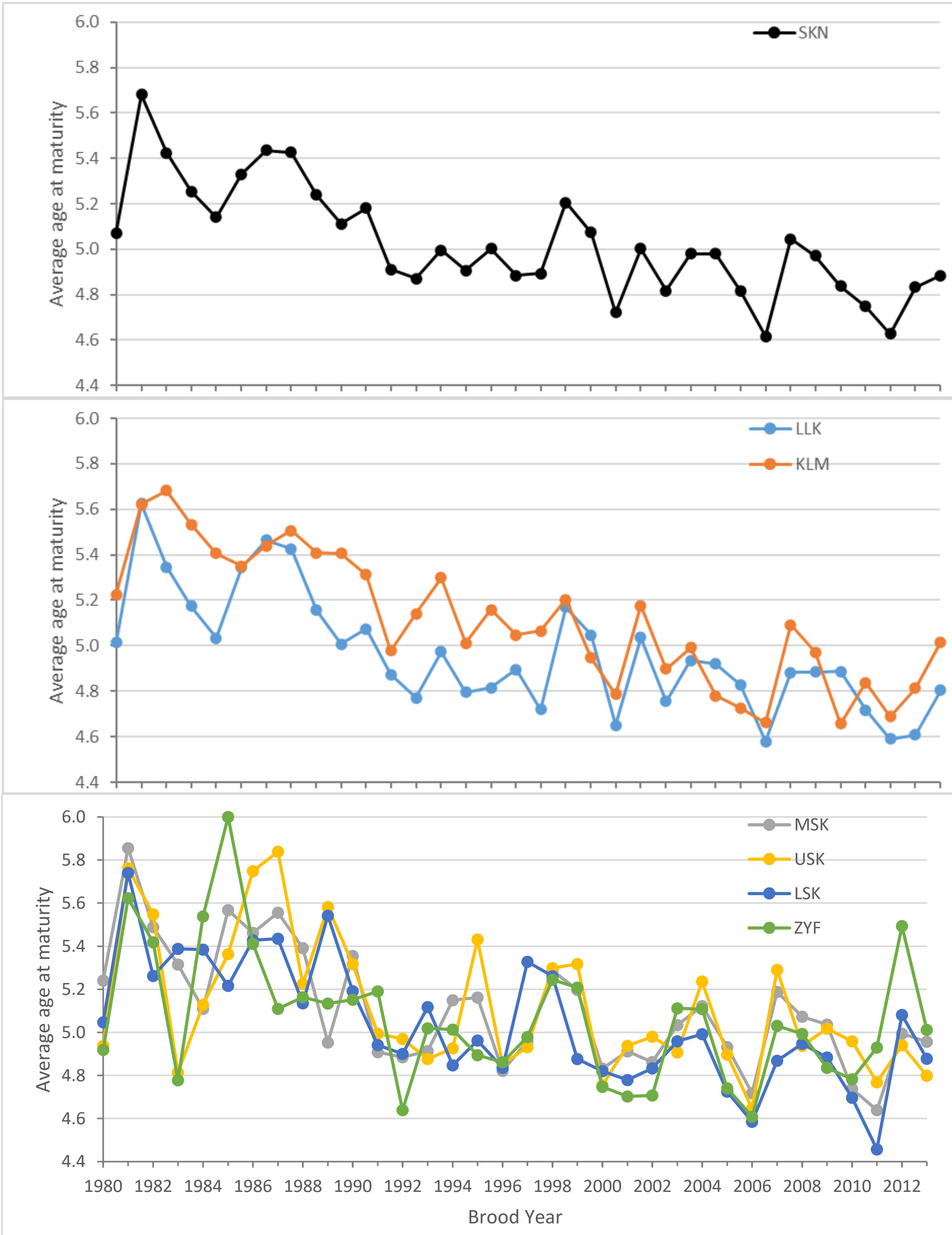


Figure 15. Average age at maturity by brood year for the Skeena aggregate and the component CU's of the summer run of Skeena Chinook salmon upstream of Tyee.

Note this does not include age 3 fish. Abbreviations for CUs appear in Table 1.

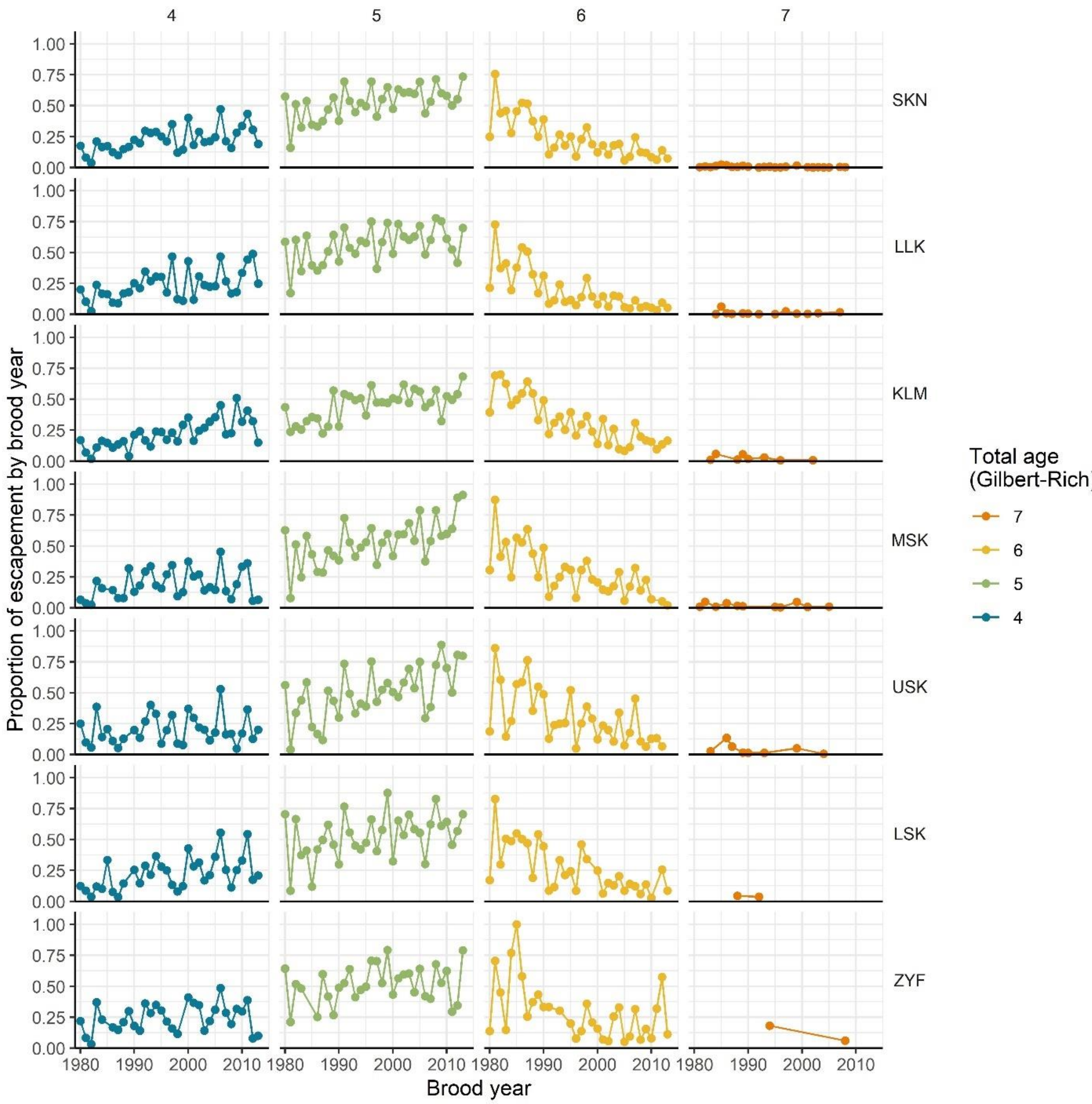


Figure 16. Proportions at age for escapements produced by brood years 1980 to 2013 for ages 4 through 7 Skeena River Chinook salmon, presented for the aggregate and by CU.

Abbreviations for CUs from Table 1.

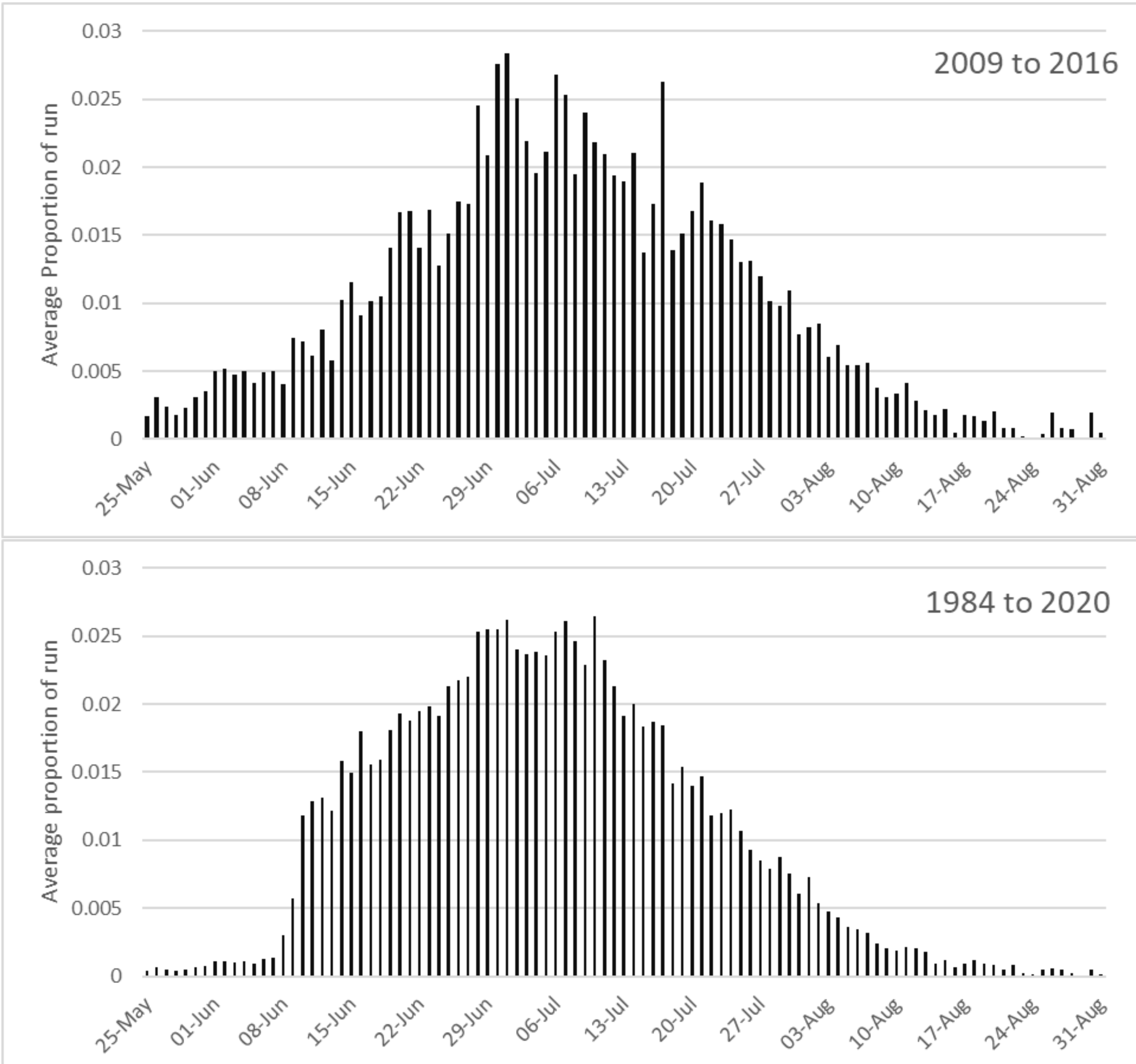


Figure 17. Average proportion of catch at the Tyee Test Fishery by day for 2009 to 2016 and for 1984 to 2020.

The Tyee Test Fishery started approximately June 10 from 1984 to 2020 except for the period from 2009 to 2016 when the fishery began approximately May 25.

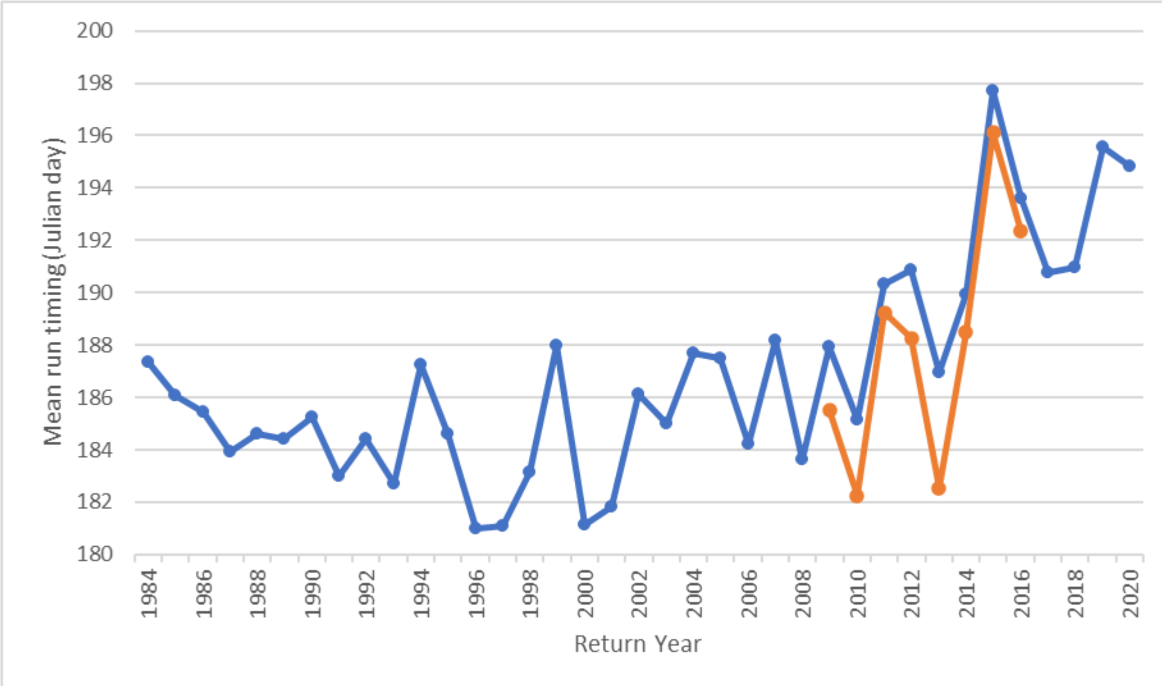


Figure 18. Mean run timing past Tyee (Julian day) by year for the aggregate of Skeena Chinook salmon CUs 1984 to 2020 comparing truncated and full data sets.

The blue line is mean run timing past Tyee using data from the truncated data set June 10 to August 31. The orange line used data from May 25 to August 31 from years 2009 to 2016.

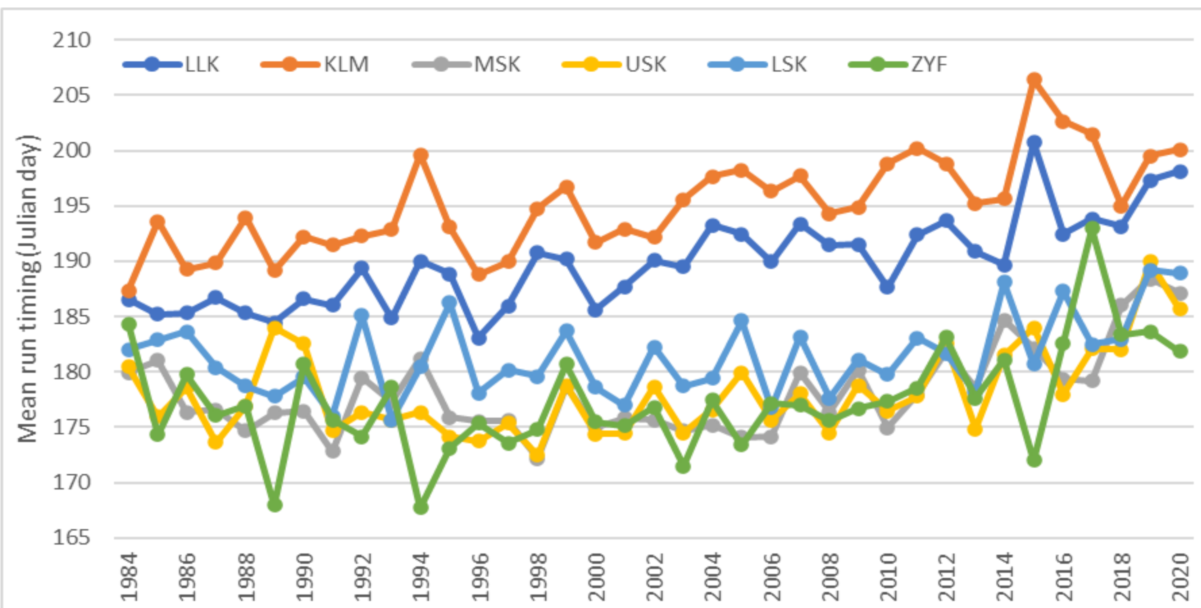


Figure 19. Mean truncated run timing past Tyee (Julian day) by year for Skeena River Chinook salmon CU's 1984 to 2020.

Mean run timing from the truncated data sets from June 10 to August 31. Abbreviations for CUs from Table 1.

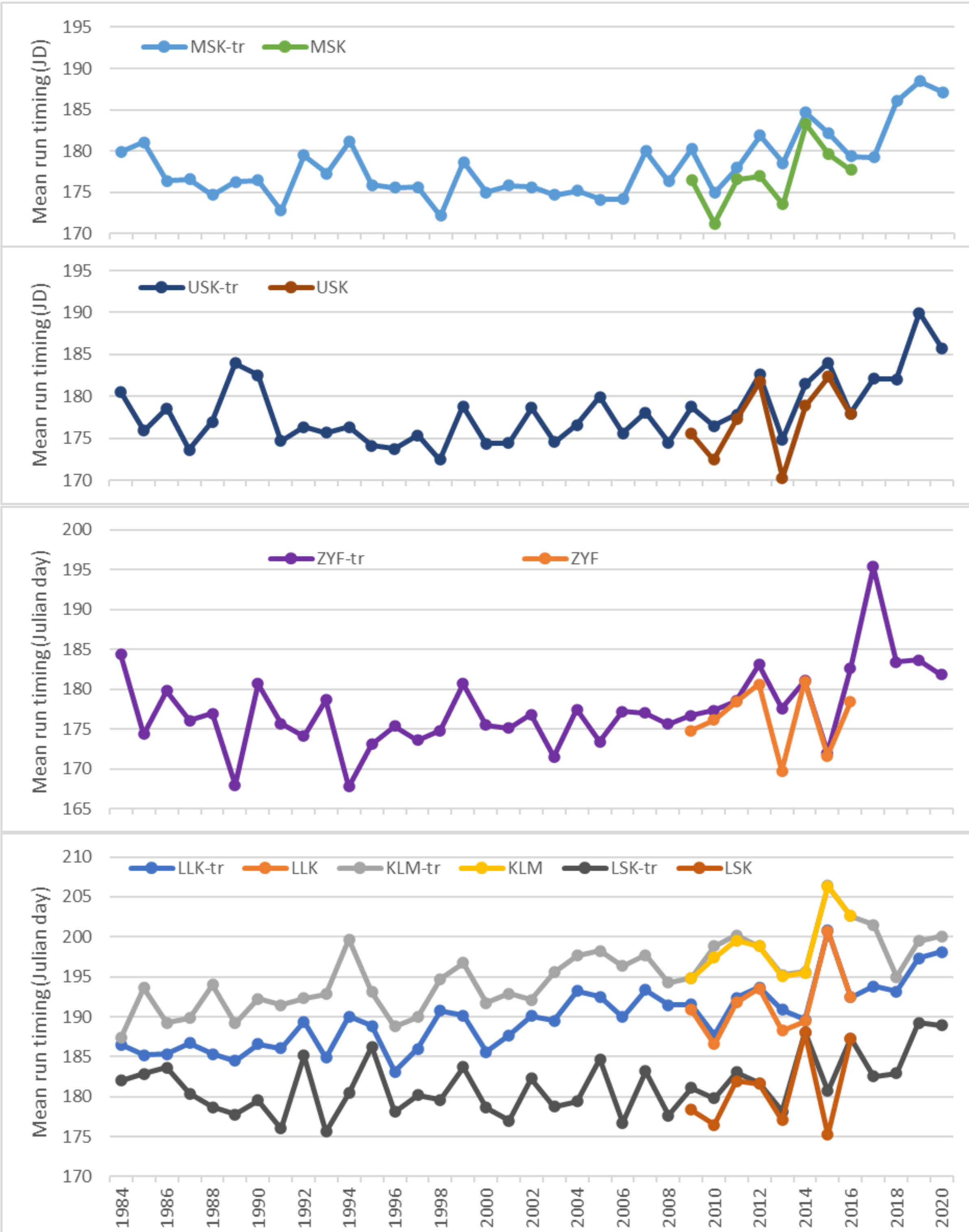


Figure 20. Mean run timing past Tyee (Julian day) by year for the CU specific returns of Skeena Chinook salmon 1984 to 2020 comparing truncated (-tr) and complete data sets.

Abbreviations for CUs from Table 1.The Lower Skeena (LSK), Upper Skeena (USK) and Zymoetz-Fiddler (ZYF) CUs are presented separately because of overlap.

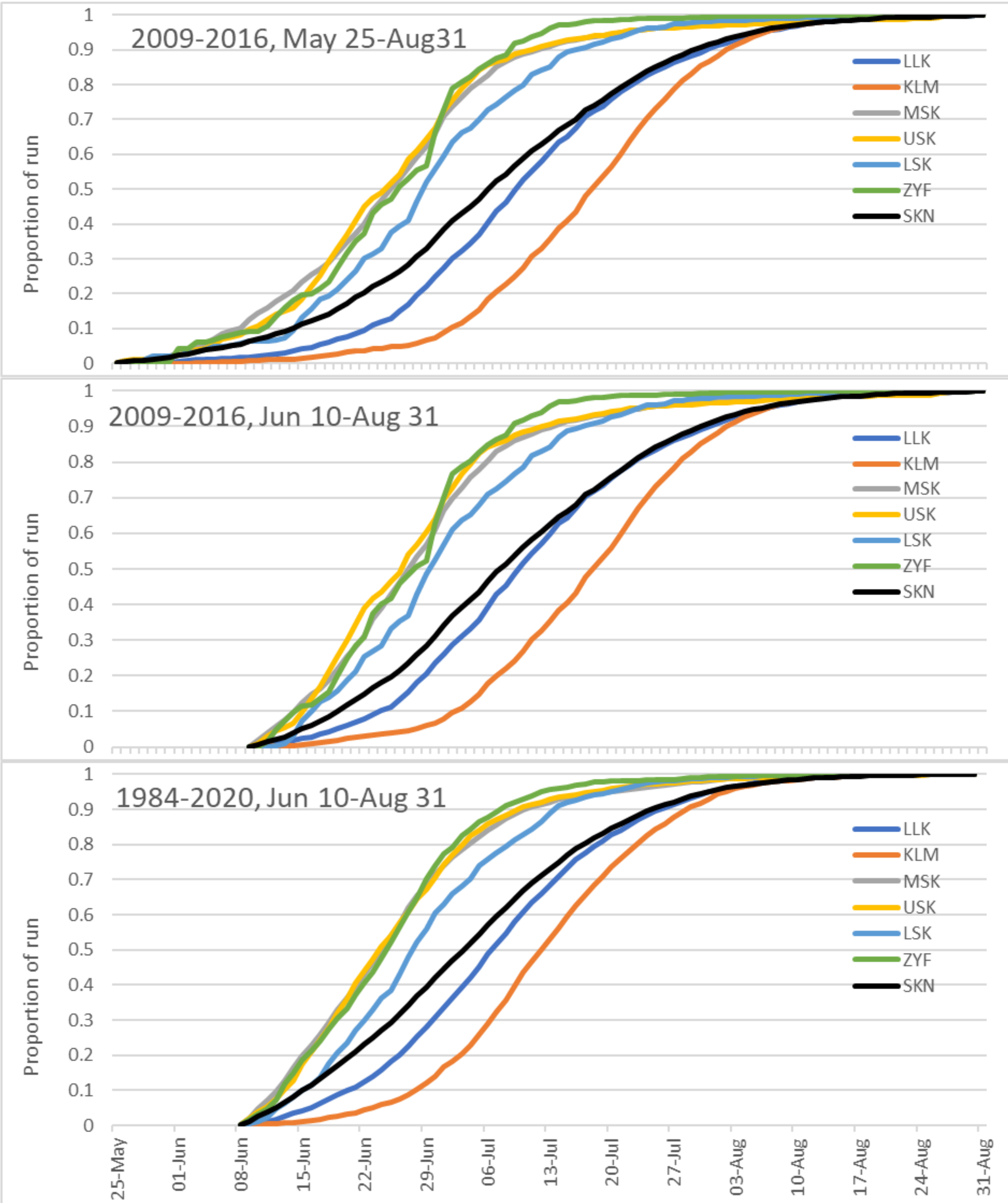


Figure 21. Cumulative run timing curves for the Skeena aggregate of Chinook salmon passing Tyee and for the six component CUs for the full data set 2009 to 2016 (top), the truncated data set 2009 to 2016 (middle) and the truncated data set for the full time series, 1984 to 2020 (bottom).

Abbreviations for CUs from Table 1.

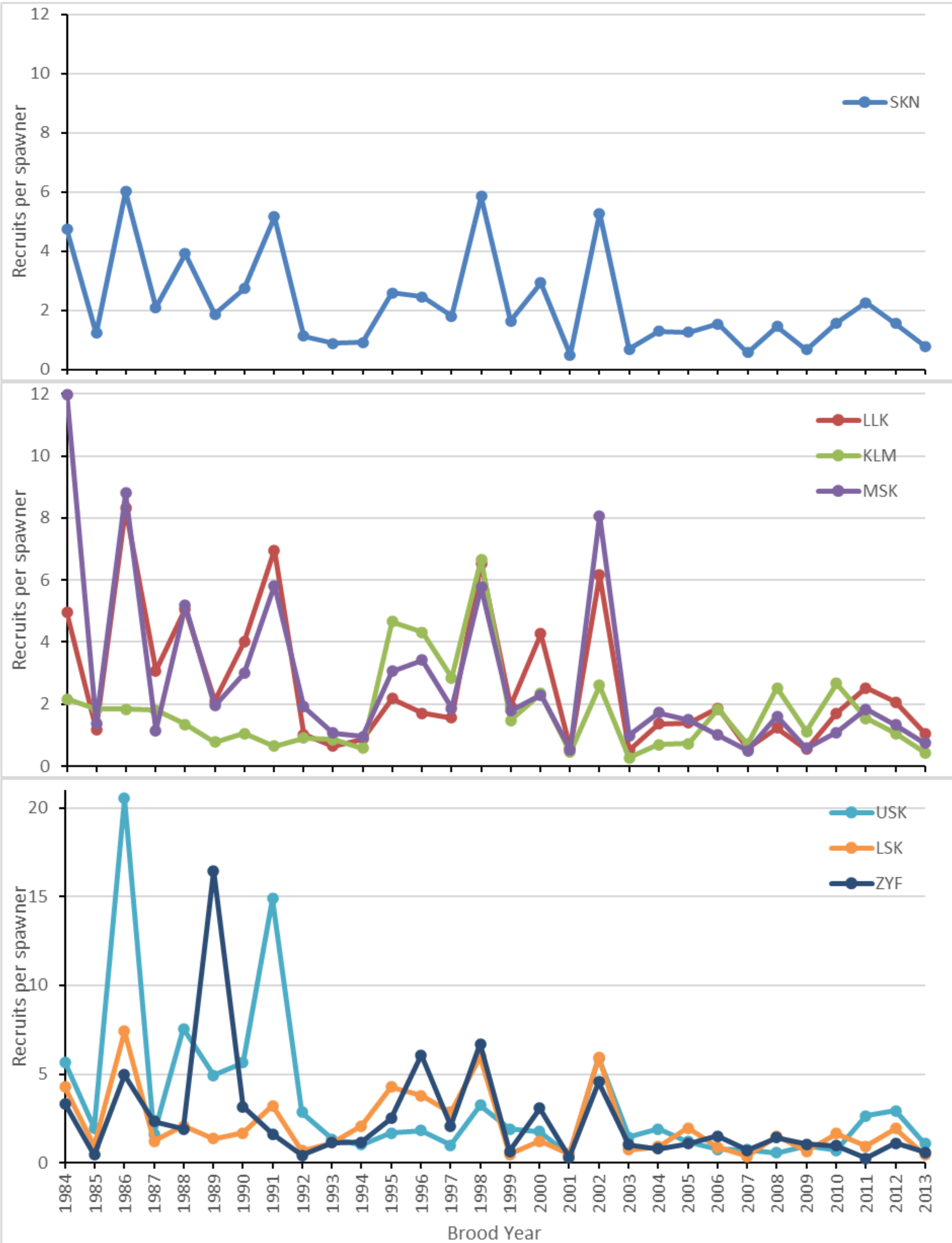


Figure 22. Recruits per spawners by brood year (1984 to 2013) for the aggregate of summer run Chinook salmon upstream of Tyee and the six component CUs.

Note the different scale for the vertical axis of the lowest graph. Abbreviations for CUs from Table 1.

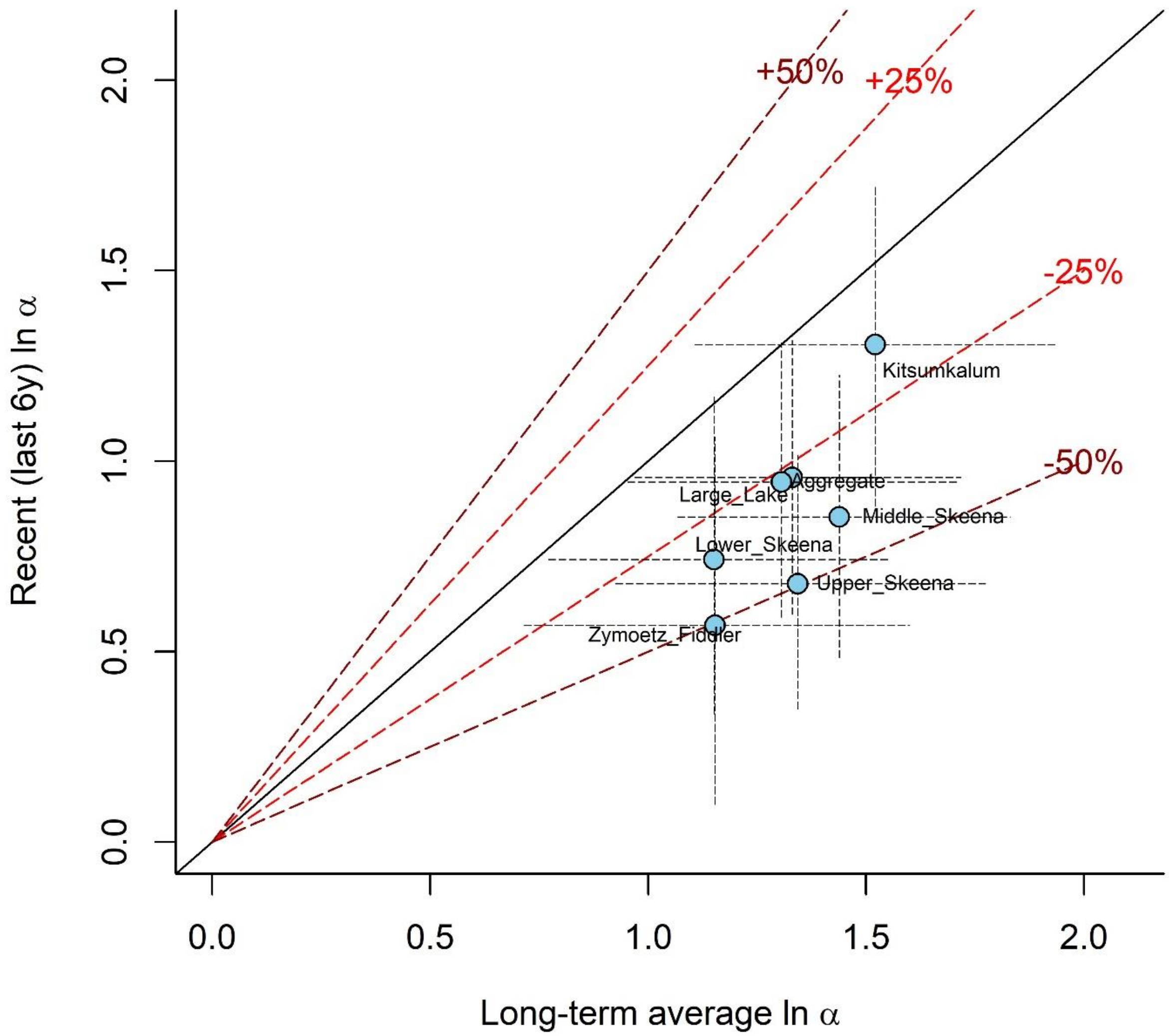


Figure 23. Comparisons of estimates of mean productivity ln(α) from the last 6 brood cohorts (~1 generation) based on the time-varying productivity model (3; y axis) to long-term average productivity from the autocorrelated model (2; x axis) in each CU and for the aggregate.

The dashed whiskers on each point indicate the 90% credible intervals calculated from the posterior for each estimate. The solid and coloured lines represent 1:1 agreement, or ± 25/50% differences.

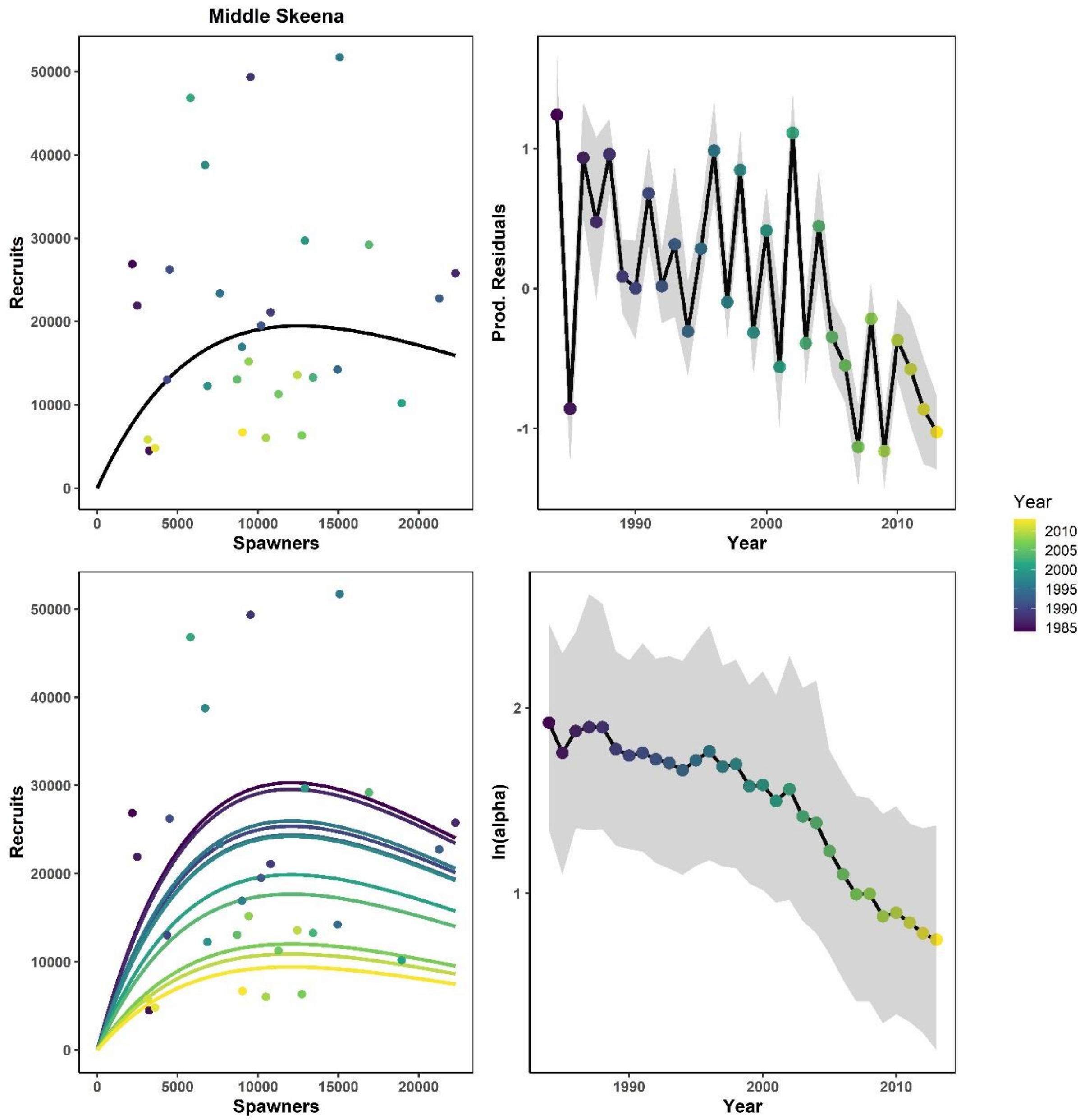


Figure 24. Model fits for the Middle Skeena Chinook salmon CU.

Model fits are for the autocorrelated static model (top-left), the residual productivity estimates from the autocorrelated static model (top-right), the evolution of the spawner-recruit relationship from the time-varying productivity model through time (bottom-left), and the estimated trajectory in maximum productivity from the time-varying productivity model (note this model should follow the trajectory in the productivity residuals).

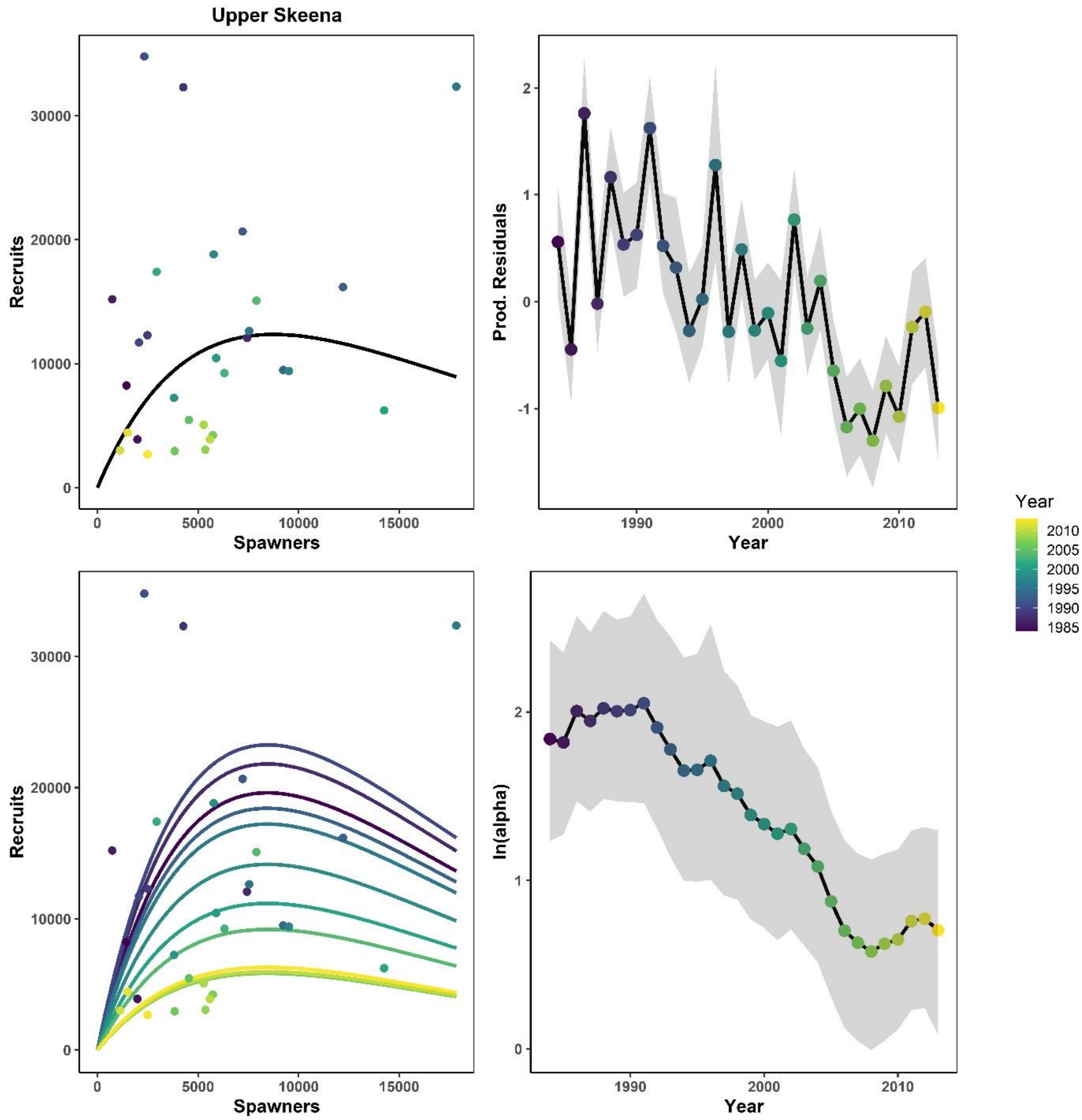


Figure 25. Model fits for the Upper Skeena Chinook salmon CU.

Model fits are for the autocorrelated static model (top-left), the residual productivity estimates from the autocorrelated static model (top-right), the evolution of the spawner-recruit relationship from the time-varying productivity model through time (bottom-left), and the estimated trajectory in maximum productivity from the time-varying productivity model (note this model should follow the trajectory in the productivity residuals).

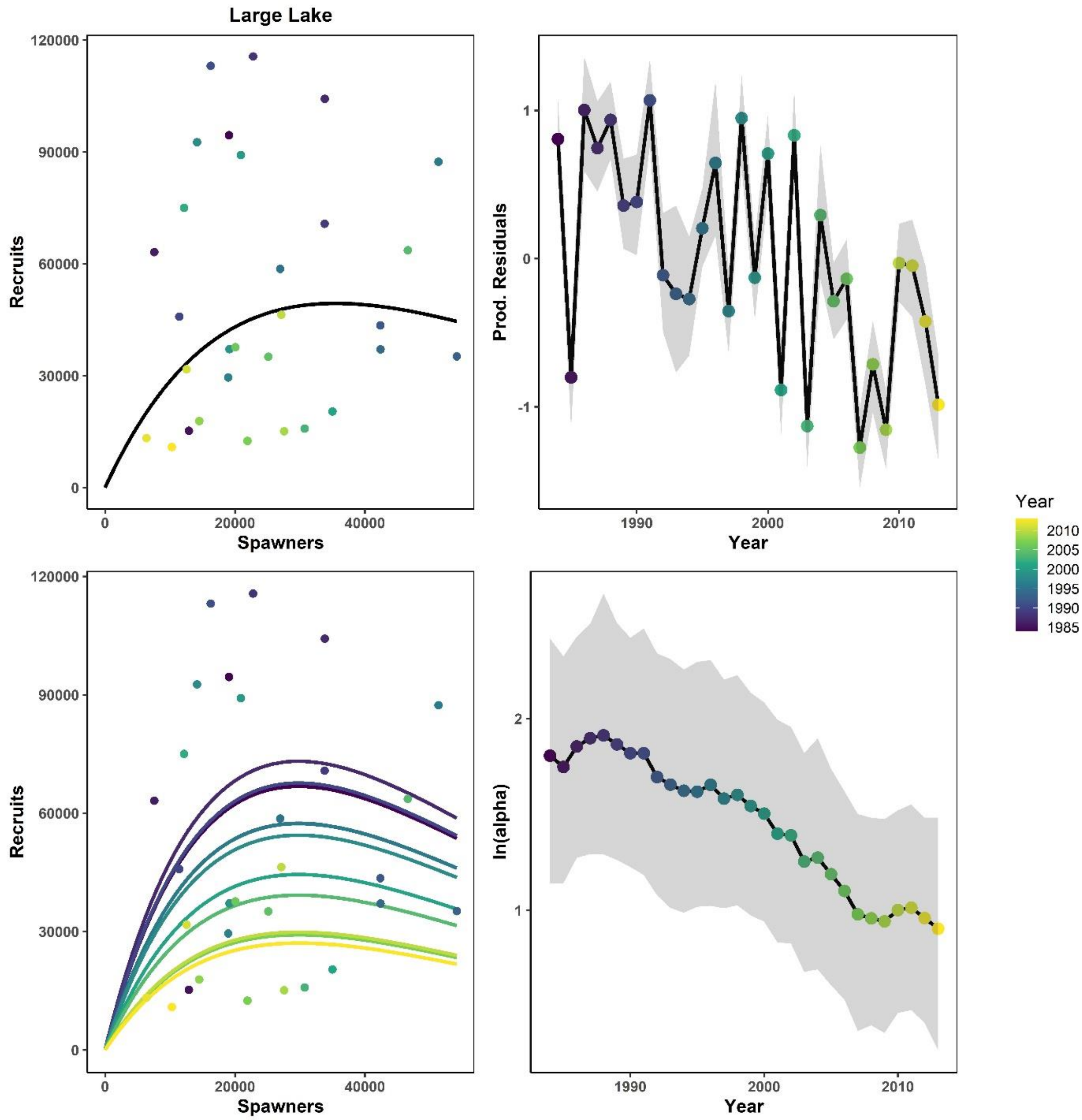


Figure 26. Model fits for the Large Lakes Chinook salmon CU.

Model fits are for the autocorrelated static model (top-left), the residual productivity estimates from the autocorrelated static model (top-right), the evolution of the spawner-recruit relationship from the time-varying productivity model through time (bottom-left), and the estimated trajectory in maximum productivity from the time-varying productivity model (note this model should follow the trajectory in the productivity residuals).

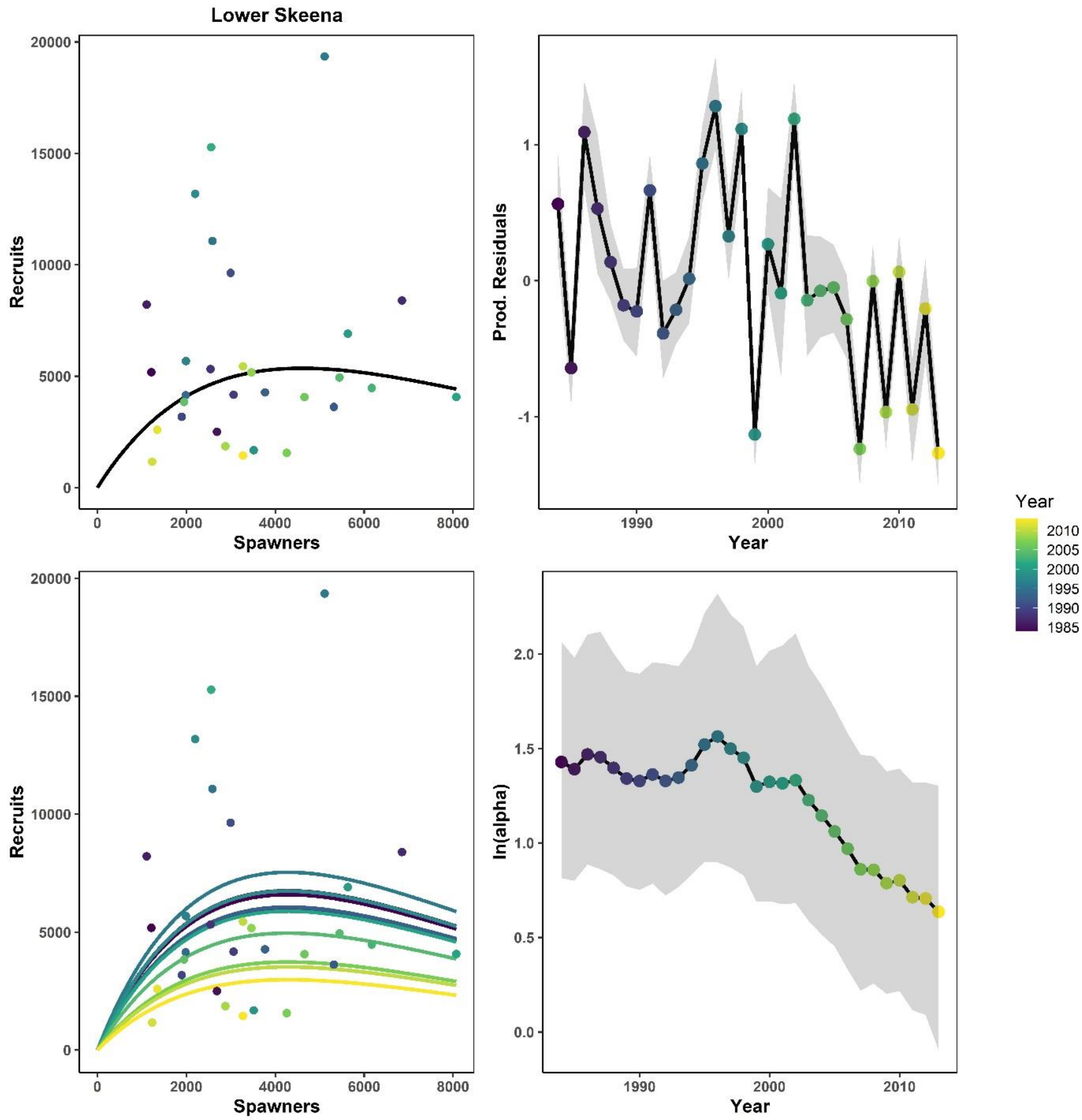


Figure 27. Model fits for the Lower Skeena Chinook salmon CU.

Model fits are for the autocorrelated static model (top-left), the residual productivity estimates from the autocorrelated static model (top-right), the evolution of the spawner-recruit relationship from the time-varying productivity model through time (bottom-left), and the estimated trajectory in maximum productivity from the time-varying productivity model (note this model should follow the trajectory in the productivity residuals).

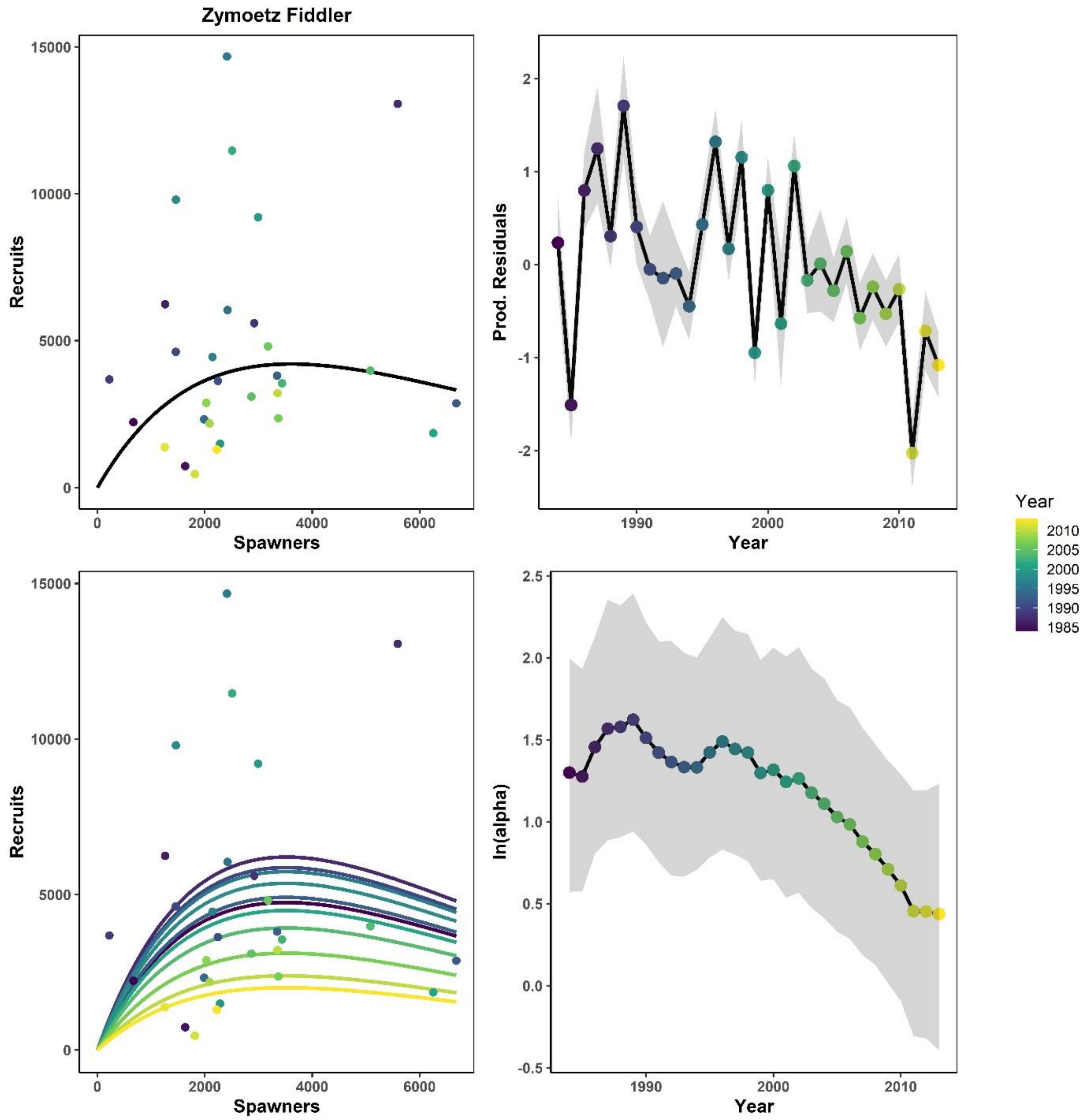


Figure 28. Model fits for the Zymoetz-Fiddler Chinook salmon CU.

Model fits are for the autocorrelated static model (top-left), the residual productivity estimates from the autocorrelated static model (top-right), the evolution of the spawner-recruit relationship from the time-varying productivity model through time (bottom-left), and the estimated trajectory in maximum productivity from the time-varying productivity model (note this model should follow the trajectory in the productivity residuals).

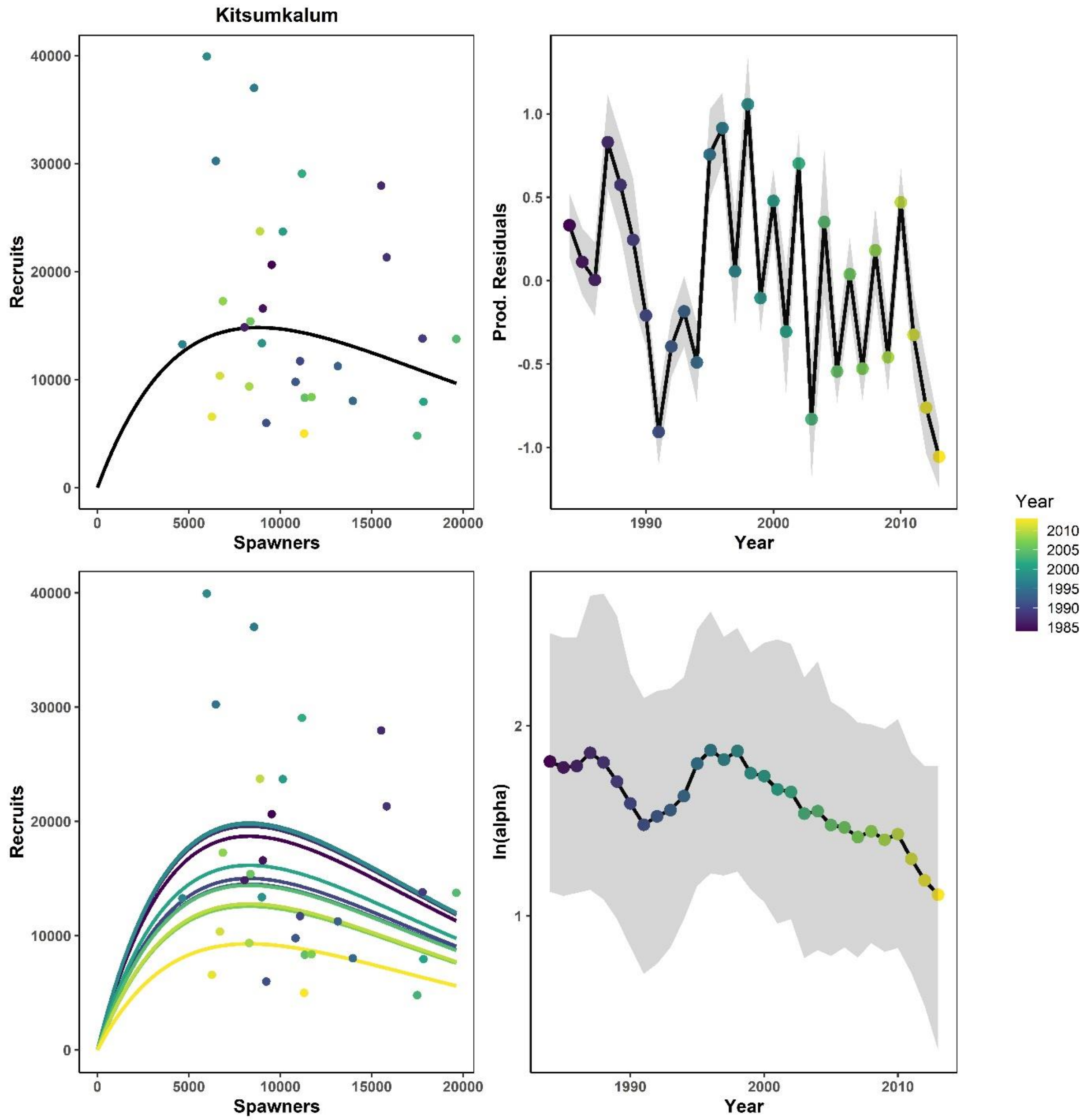


Figure 29. Model fits for the Kitsumkalum Chinook salmon CU.

Model fits are for the static model (top-left), the residual productivity estimates from the static model (top-right), the evolution of the spawner-recruit relationship from the time-varying productivity model through time (bottom-left), and the estimated trajectory in maximum productivity from the time-varying productivity model (note this model should follow the trajectory in the productivity residuals).

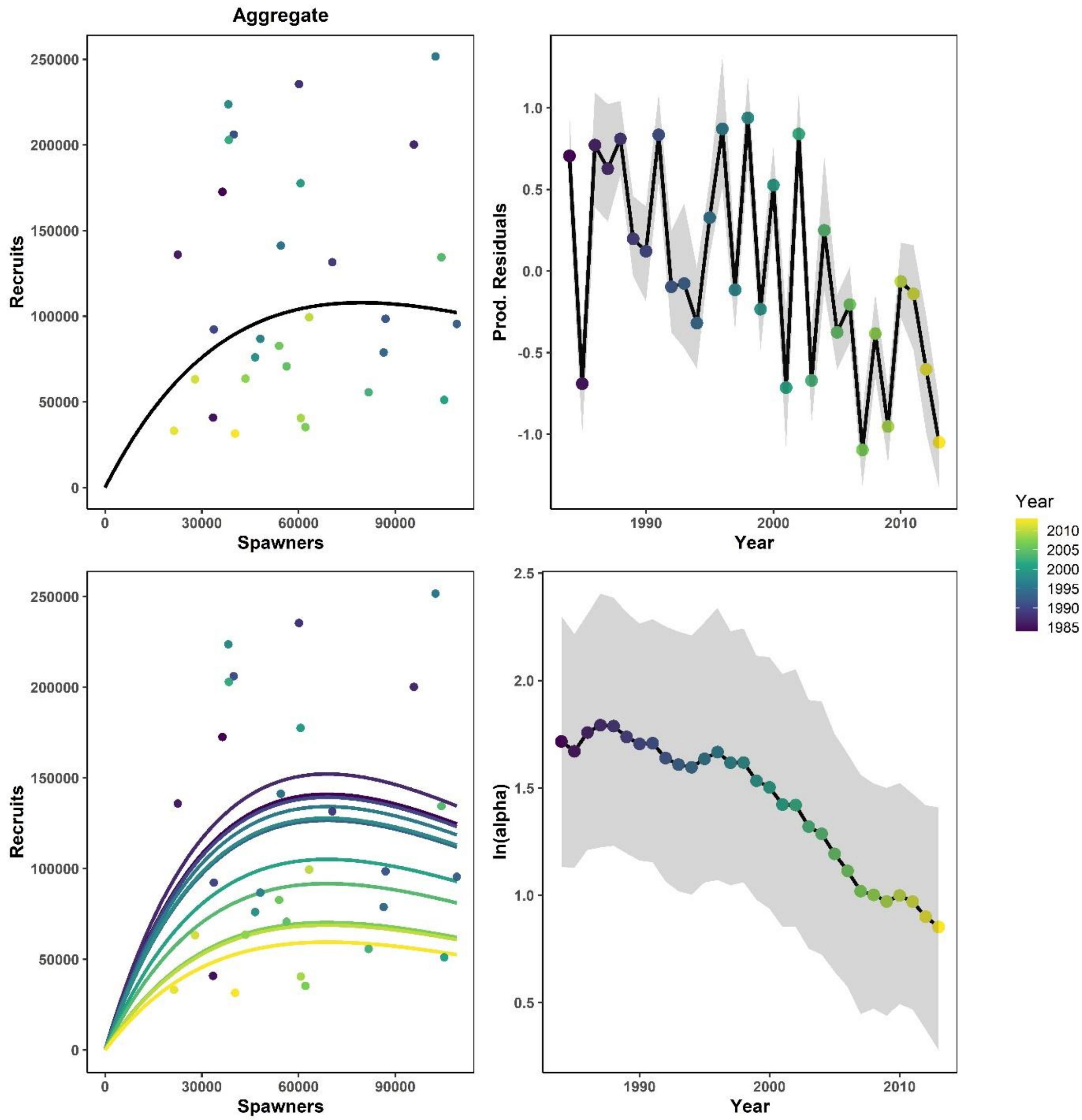


Figure 30. Model fits for the Skeena aggregate of summer run Chinook salmon upstream of Tyee.

Model fits are for the autocorrelated static model (top-left), the residual productivity estimates from the autocorrelated static model (top-right), the evolution of the spawner-recruit relationship from the time-varying productivity model through time (bottom-left), and the estimated trajectory in maximum productivity from the time-varying productivity model (note this model should follow the trajectory in the productivity residuals).

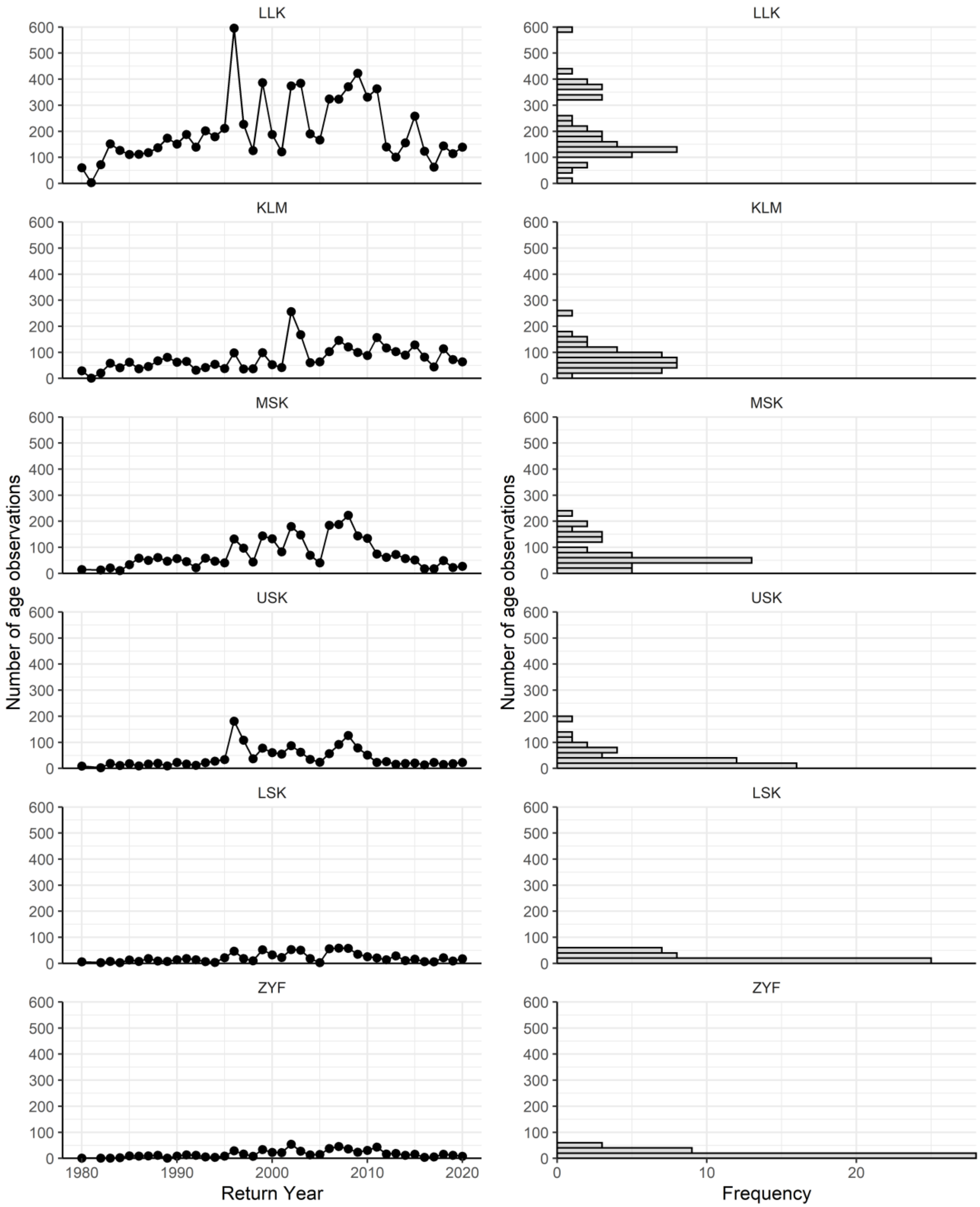


Figure 31. The number of Chinook caught at Tyee Test Fishery with both age observations and genetic assignments to CU in each return year (left column), and histograms of these counts (right column), for the six summer run Skeena Chinook CUs upstream of Tyee.

Abbreviations for CUs appear in Table 1.

TABLES

Table 1. Chinook salmon Conservation Units in the Skeena River watershed.

Conservation Unit	Code	Escapement estimated from Tyee genetics?	Alternate method of estimating escapement	Microsatellite (msat) populations in Conservation Unit
Skeena Estuary	EST	No, downstream of Tyee	Visual counts	Kloiya[1]
Ecstall	ECS	No, downstream of Tyee	Visual counts	Ecstall
Lower Skeena	LSK	Yes	Visual counts	Exchamsiks, Exstew, Gitnadoix, Kasiks, Khyex, Zymagotitz (also known as Zymachord)
Kalum-Early Timing	CED	No, arrive too early	Visual counts	Cedar
Kitsumkalum (Kalum-Late Timing)	KLM	No, was the cornerstone for the GSI expansions	Mark-recapture	Kitsumkalum
Lakelse	LEL	No, insufficient baseline	Visual counts	Lakelse
Zymoetz / Fiddler	ZYF	Yes	Visual counts	Thomas (Zymoetz tributary), Fiddler
Large Lakes	LLK	Yes	Babine River fence, visual counts	Babine, Bear, Morice
Middle Skeena	MSK	Yes	Kitwanga River fence, visual counts	Kispiox, Kitseguecla, Kitwanga, Nangeese, Shegunia, Slamgeesh, Suskwa, Sweetin
Upper Bulkley River	BLK	No, arrive too early	Visual counts	Bulkley (upper)
Upper Skeena	USK	Yes	Sustut River fence, visual counts	Kluatantan, Kluayaz, Kuldo, Otsi, Sictintine, Squingula, Sustut

[1] Kloiya was not included in the baseline populations used for the GSI analyses (see Appendix 1).

Table 2. Escapement estimates for large Kitsumkalum Chinook salmon and the proportions of Kitsumkalum Chinook salmon identified in genetic samples collected at the Tyee Test Fishery, 1984 to 2020.

Year	KLM Esc. Est.*	SE of KLM Esc. Est.*	CV of KLM Esc. Est.*	Tyee Samples Analyzed	Proportion of KLM in Tyee samples	SE of KLM proportion	CV of KLM Proportion
1984	9,569	1,644	17.2%	255	20.9%	3.2%	15.1%
1985	9,081	409	4.5%	145	20.2%	2.5%	12.4%
1986	8,080	354	4.4%	184	23.3%	3.4%	14.7%
1987	15,549	991	6.4%	148	14.9%	2.1%	14.3%
1988	15,853	804	5.1%	324	21.2%	2.2%	10.5%
1989	17,823	1,046	5.9%	246	21.9%	2.3%	10.5%
1990	11,119	452	4.1%	318	21.2%	2.4%	11.3%
1991	9,267	456	4.9%	293	17.3%	2.0%	11.7%
1992	10,880	447	4.1%	386	10.8%	2.2%	20.7%
1993	13,181	518	3.9%	422	10.9%	1.8%	16.1%
1994	14,004	1,245	8.9%	378	14.6%	2.0%	13.4%
1995	6,514	309	4.7%	382	10.6%	2.4%	22.3%
1996	8,595	704	8.2%	396	8.0%	0.9%	11.8%
1997	4,675	328	7.0%	270	8.4%	1.3%	15.9%
1998	6,009	262	4.4%	370	12.2%	2.0%	16.6%
1999	9,035	561	6.2%	351	14.2%	1.1%	7.9%
2000	10,179	418	4.1%	408	13.6%	1.3%	9.5%
2001	17,866	677	3.8%	1,276	15.3%	1.1%	7.4%
2002	11,220	685	6.1%	617	25.0%	1.3%	5.3%
2003	17,525	809	4.6%	323	18.9%	1.3%	6.9%
2004	19,664	1,607	8.2%	1,186	16.8%	1.3%	7.8%
2005	11,382	637	5.6%	1,091	17.8%	1.2%	7.0%
2006	8,396	751	8.9%	1,070	13.7%	1.3%	9.3%
2007	11,739	1,849	15.8%	1,285	17.5%	1.3%	7.5%
2008	6,903	437	6.3%	1,067	13.1%	1.1%	8.2%
2009	8,350	781	9.4%	999	12.4%	1.7%	13.3%
2010	8,932	585	6.5%	1,221	12.7%	1.3%	10.2%
2011	6,756	693	10.3%	1,071	21.0%	1.4%	6.8%
2012	6,291	520	8.3%	1,122	26.0%	2.0%	7.8%
2013	11,356	1,189	10.5%	1,198	26.5%	1.9%	7.2%
2014	10,042	1,238	12.3%	1,155	21.6%	1.8%	8.5%
2015	14,904	753	5.1%	847	24.4%	1.8%	7.3%
2016	9,537	512	5.4%	907	30.0%	2.5%	8.4%
2017	4,132	512	12.4%	497	21.5%	2.6%	12.1%
2018	9,550	571	6.0%	503	23.3%	2.1%	8.8%
2019	6,673	562	8.4%	506	27.1%	2.3%	8.6%
2020	4,777	843	17.6%	663	23.6%	2.3%	9.6%

*From Winther et al. (2021).
KLM = large Kitsumkalum Chinook salmon, Esc. = escapement, Est. = estimate, SE = standard error, CV = coefficient of variation.

Table 3. Skeena River large Chinook salmon escapement estimates to Terrace and escapement estimates for the aggregate of stocks after removals upstream of Terrace.

Year	Skeena Chinook run size to Terrace	SE of Skeena Chinook run size to Terrace	CV of Skeena Chinook run size to Terrace	Removals of Skeena Chinook above Terrace	Skeena Chinook Escapement Estimate
1984	45,692	10,448	22.9%	9,233	36,459
1985	45,028	5,943	13.2%	11,495	33,532
1986	34,640	5,329	15.4%	12,019	22,621
1987	104,357	16,323	15.6%	8,511	95,846
1988	74,899	8,722	11.6%	14,708	60,187
1989	81,357	9,805	12.1%	10,822	70,535
1990	52,409	6,280	12.0%	18,614	33,795
1991	53,518	6,787	12.7%	13,596	39,922
1992	100,363	21,221	21.1%	13,345	87,018
1993	121,271	20,151	16.6%	12,159	109,112
1994	95,771	15,377	16.1%	9,298	86,473
1995	61,339	13,966	22.8%	6,796	54,543
1996	107,952	15,498	14.4%	5,417	102,535
1997	55,709	9,696	17.4%	7,516	48,193
1998	49,126	8,416	17.1%	10,821	38,304
1999	63,635	6,396	10.1%	17,057	46,578
2000	74,575	7,712	10.3%	13,903	60,672
2001	116,519	9,647	8.3%	11,278	105,241
2002	44,902	3,617	8.1%	6,455	38,447
2003	92,656	7,702	8.3%	10,855	81,802
2004	116,811	13,171	11.3%	12,433	104,378
2005	63,900	5,735	9.0%	7,527	56,372
2006	61,391	7,935	12.9%	7,349	54,042
2007	67,136	11,723	17.5%	4,965	62,172
2008	52,788	5,477	10.4%	9,195	43,594
2009	67,464	10,996	16.3%	6,672	60,792
2010	70,092	8,480	12.1%	6,722	63,370
2011	32,184	3,969	12.3%	4,205	27,979
2012	24,193	2,745	11.3%	2,758	21,434
2013	42,914	5,462	12.7%	2,523	40,392
2014	46,529	6,980	15.0%	4,054	42,475
2015	61,134	5,448	8.9%	6,795	54,339
2016	31,770	3,165	10.0%	4,092	27,679
2017	19,189	3,330	17.4%	3,406	15,783
2018	41,042	4,372	10.7%	6,158	34,884
2019	24,653	2,968	12.0%	4,143	20,510
2020	20,258	4,073	20.1%	2,946	17,312

Skeena Chinook = Large Skeena River Chinook salmon, Esc. = escapement, Est. = estimate, SE = standard error, CV = coefficient of variation.

Table 4. Catch proportions at Tyee of Lower Skeena River Conservation Unit Chinook salmon (LSK) with escapement estimates for 1984-2020.

Year	Proportion of LSK in Tyee samples	SE of LSK proportion at Tyee	Estimate of LSK Escapement	SE of LSK Escapement	CV of LSK Escapement
1984	2.7%	1.4%	1,213	697	57.5%
1985	6.0%	1.8%	2,692	884	32.9%
1986	3.2%	1.6%	1,109	569	51.4%
1987	6.6%	2.2%	6,852	2,574	37.6%
1988	3.4%	1.2%	2,545	981	38.6%
1989	3.8%	1.4%	3,065	1,166	38.0%
1990	3.6%	1.4%	1,898	756	39.9%
1991	5.6%	1.4%	2,998	862	28.8%
1992	5.3%	1.8%	5,323	2,087	39.2%
1993	3.1%	1.5%	3,772	1,900	50.4%
1994	2.1%	1.1%	1,986	1,119	56.3%
1995	4.2%	1.7%	2,587	1,173	45.3%
1996	4.7%	1.1%	5,113	1,373	26.8%
1997	3.6%	1.2%	1,994	764	38.3%
1998	4.5%	1.8%	2,200	957	43.5%
1999	5.5%	1.0%	3,518	752	21.4%
2000	7.6%	1.1%	5,635	1,021	18.1%
2001	6.9%	1.2%	8,077	1,508	18.7%
2002	5.7%	1.1%	2,561	522	20.4%
2003	6.7%	1.2%	6,173	1,212	19.6%
2004	4.7%	1.1%	5,449	1,377	25.3%
2005	3.1%	0.7%	1,951	495	25.4%
2006	7.6%	1.4%	4,659	1,060	22.8%
2007	6.3%	1.1%	4,262	1,043	24.5%
2008	6.6%	1.2%	3,464	707	20.4%
2009	4.3%	0.9%	2,880	780	27.1%
2010	4.7%	1.1%	3,276	849	25.9%
2011	3.8%	1.0%	1,233	346	28.1%
2012	5.6%	1.7%	1,347	428	31.8%
2013	7.6%	1.6%	3,274	788	24.1%
2014	4.8%	1.3%	2,248	700	31.1%
2015	4.8%	1.1%	2,932	710	24.2%
2016	2.3%	1.0%	720	337	46.9%
2017	6.3%	2.0%	1,201	442	36.8%
2018	6.0%	1.9%	2,483	808	32.6%
2019	3.0%	1.3%	746	331	44.3%
2020	6.6%	1.9%	1,341	469	34.9%

LSK = Large Lower Skeena River Chinook salmon, SE = standard error, CV = coefficient of variation.

Table 5. Catch proportions at Tyee of Zymoetz-Fiddler Conservation Unit Chinook salmon (ZYF) with escapement estimates for 1984-2020.

Year	Proportion of ZYF in Tyee samples	SE of ZYF proportion at Tyee	Estimate of ZYF Escapement	SE of ZYF Escapement	CV of ZYF Escapement
1984	1.5%	1.2%	669	553	82.6%
1985	3.6%	1.1%	1,637	540	33.0%
1986	3.6%	1.3%	1,262	494	39.1%
1987	5.4%	1.8%	5,597	2,114	37.8%
1988	3.9%	1.2%	2,922	946	32.4%
1989	0.3%	0.4%	224	360	161.0%
1990	2.8%	0.9%	1,460	507	34.7%
1991	4.2%	1.1%	2,246	655	29.2%
1992	6.7%	1.8%	6,688	2,290	34.2%
1993	2.8%	1.2%	3,348	1,555	46.4%
1994	2.1%	1.0%	1,988	1,009	50.8%
1995	4.0%	1.7%	2,425	1,158	47.7%
1996	2.2%	0.5%	2,415	676	28.0%
1997	3.8%	0.9%	2,144	624	29.1%
1998	3.0%	1.2%	1,465	623	42.5%
1999	3.6%	0.6%	2,287	456	20.0%
2000	4.0%	0.7%	2,994	597	19.9%
2001	5.4%	0.8%	6,257	1,034	16.5%
2002	5.6%	0.7%	2,512	375	14.9%
2003	3.7%	0.7%	3,440	684	19.9%
2004	4.4%	0.7%	5,087	1,041	20.5%
2005	4.5%	0.7%	2,869	504	17.6%
2006	5.2%	0.8%	3,178	634	19.9%
2007	5.0%	0.7%	3,371	761	22.6%
2008	3.8%	0.7%	2,028	409	20.2%
2009	3.1%	0.6%	2,090	515	24.7%
2010	4.8%	0.8%	3,356	708	21.1%
2011	5.6%	0.9%	1,817	354	19.5%
2012	5.2%	1.2%	1,256	329	26.2%
2013	5.2%	1.2%	2,226	596	26.8%
2014	3.3%	0.9%	1,555	486	31.3%
2015	3.0%	0.7%	1,812	485	26.8%
2016	1.1%	0.7%	346	224	64.8%
2017	2.9%	1.3%	557	267	48.0%
2018	4.8%	0.0%	1,977	211	10.7%
2019	5.1%	1.2%	1,245	335	26.9%
2020	3.6%	1.2%	738	289	39.2%

ZYF = Large Zymoetz-Fiddler CU Chinook salmon, SE = standard error, CV = coefficient of variation.

Table 6. Catch proportions at Tyee of large Middle Skeena River Conservation Unit Chinook salmon (MSK) with run size to Terrace and escapement estimates for 1984-2020.

Year	Proportion of MSK in Tyee samples	SE of MSK proportion at Tyee	Estimate of MSK Run size to Terrace	SE of MSK Run size to Terrace	CV of MSK Run size to Terrace	Estimated removals above Terrace	Estimated MSK Escapement
1984	6.7%	2.6%	3,080	1,369	44.5%	889	2,190
1985	11.8%	3.1%	5,291	1,564	29.6%	2,051	3,240
1986	15.2%	3.8%	5,254	1,530	29.1%	2,764	2,490
1987	24.2%	4.7%	25,283	6,308	25.0%	2,985	22,297
1988	17.8%	3.2%	13,360	2,857	21.4%	3,830	9,532
1989	16.3%	3.8%	13,269	3,516	26.5%	2,479	10,789
1990	17.0%	3.0%	8,890	1,880	21.2%	4,537	4,353
1991	13.4%	2.8%	7,154	1,757	24.6%	2,651	4,503
1992	12.4%	3.8%	12,471	4,675	37.5%	2,275	10,196
1993	20.0%	3.8%	24,233	6,119	25.3%	2,953	21,280
1994	17.8%	3.4%	17,054	4,279	25.1%	2,088	14,965
1995	14.5%	4.8%	8,864	3,581	40.4%	1,230	7,633
1996	14.9%	2.1%	16,056	3,244	20.2%	970	15,086
1997	19.4%	2.8%	10,821	2,439	22.5%	1,806	9,015
1998	19.2%	4.3%	9,446	2,643	28.0%	2,726	6,720
1999	16.9%	2.4%	10,782	1,871	17.4%	3,922	6,860
2000	23.4%	2.8%	17,435	2,785	16.0%	4,519	12,917
2001	18.9%	2.4%	22,066	3,326	15.1%	3,131	18,935
2002	16.9%	1.9%	7,593	1,060	14.0%	1,790	5,804
2003	17.6%	2.5%	16,307	2,659	16.3%	2,887	13,421
2004	17.0%	2.1%	19,854	3,329	16.8%	2,943	16,911
2005	16.3%	1.9%	10,415	1,525	14.6%	1,708	8,707
2006	22.2%	2.6%	13,635	2,365	17.3%	2,355	11,280
2007	21.3%	2.6%	14,300	3,058	21.4%	1,564	12,736
2008	23.5%	2.4%	12,385	1,823	14.7%	2,958	9,426
2009	18.0%	2.3%	12,119	2,504	20.7%	1,616	10,503
2010	20.4%	2.6%	14,309	2,492	17.4%	1,853	12,456
2011	12.2%	2.0%	3,937	817	20.7%	787	3,150
2012	18.4%	3.1%	4,461	905	20.3%	862	3,598
2013	23.5%	3.5%	10,083	1,979	19.6%	1,045	9,038
2014	15.3%	2.8%	7,118	1,673	23.5%	944	6,174
2015	13.0%	2.1%	7,928	1,450	18.3%	1,368	6,560
2016	9.7%	2.3%	3,085	786	25.5%	614	2,471
2017	17.0%	4.8%	3,270	1,085	33.2%	880	2,390
2018	19.4%	0.0%	7,982	850	10.7%	1,919	6,063
2019	11.1%	2.4%	2,732	686	25.1%	722	2,010
2020	9.9%	2.9%	2,005	709	35.3%	461	1,544

MSK = large Middle Skeena River CU Chinook salmon, SE = standard error, CV = coefficient of variation.

Table 7. Catch proportions at Tyee of large Upper Skeena River Conservation Unit Chinook salmon (USK) with run size to Terrace and escapement estimates for 1984-2020.

Year	Proportion of USK in Tyee samples	SE of USK proportion at Tyee	Estimate of USK Run size to Terrace	SE of USK Run size to Terrace	CV of USK Run size to Terrace	Estimated removals above Terrace	Estimated USK Escapement
1984	4.5%	1.8%	2,036	956	47.0%	588	1,448
1985	7.2%	2.0%	3,253	980	30.1%	1,261	1,992
1986	4.5%	1.8%	1,561	677	43.4%	821	740
1987	8.1%	2.5%	8,436	2,961	35.1%	996	7,440
1988	8.0%	2.1%	5,988	1,720	28.7%	1,716	4,272
1989	3.8%	1.5%	3,065	1,255	40.9%	573	2,493
1990	8.1%	2.6%	4,227	1,445	34.2%	2,157	2,070
1991	6.9%	1.9%	3,712	1,118	30.1%	1,375	2,336
1992	8.8%	3.1%	8,833	3,629	41.1%	1,611	7,222
1993	11.5%	2.9%	13,902	4,186	30.1%	1,694	12,208
1994	11.0%	2.4%	10,527	2,834	26.9%	1,289	9,238
1995	14.3%	3.7%	8,768	3,010	34.3%	1,217	7,551
1996	17.6%	1.9%	18,997	3,389	17.8%	1,148	17,849
1997	20.5%	2.6%	11,434	2,467	21.6%	1,908	9,526
1998	16.5%	3.3%	8,128	2,125	26.1%	2,346	5,782
1999	9.4%	1.4%	5,991	1,053	17.6%	2,179	3,812
2000	10.7%	1.5%	7,976	1,402	17.6%	2,067	5,909
2001	14.3%	1.6%	16,611	2,329	14.0%	2,357	14,254
2002	8.6%	1.1%	3,857	600	15.6%	909	2,948
2003	8.3%	1.5%	7,673	1,524	19.9%	1,358	6,315
2004	7.9%	1.3%	9,280	1,804	19.4%	1,376	7,904
2005	8.5%	1.2%	5,444	885	16.3%	893	4,552
2006	7.6%	1.3%	4,642	1,017	21.9%	802	3,840
2007	9.6%	1.3%	6,451	1,429	22.2%	706	5,745
2008	13.4%	1.6%	7,050	1,106	15.7%	1,684	5,366
2009	9.0%	1.3%	6,097	1,318	21.6%	813	5,284
2010	9.2%	1.7%	6,428	1,414	22.0%	832	5,596
2011	4.4%	1.1%	1,410	399	28.3%	282	1,128
2012	7.7%	1.9%	1,873	501	26.7%	362	1,511
2013	6.5%	1.6%	2,787	775	27.8%	289	2,499
2014	8.7%	1.9%	4,032	1,073	26.6%	535	3,498
2015	4.5%	1.4%	2,744	894	32.6%	474	2,271
2016	5.1%	1.6%	1,626	544	33.5%	324	1,302
2017	16.2%	3.5%	3,103	858	27.7%	835	2,268
2018	7.0%	0.0%	2,893	308	10.7%	696	2,197
2019	6.4%	1.9%	1,578	498	31.6%	417	1,161
2020	9.7%	2.4%	1,971	634	32.1%	453	1,518

USK = large Upper Skeena River CU Chinook salmon, SE = standard error, CV = coefficient of variation.

Table 8. Catch proportions at Tyee of large Skeena River Large Lakes Conservation Unit Chinook salmon (LLK) with run size to Terrace and escapement estimates for 1984-2020.

Year	Proportion of LLK in Tyee samples	SE of LLK proportion at Tyee	Estimate of LLK Run size to Terrace	SE of LLK Run size to Terrace	CV of LLK Run size to Terrace	Estimated removals above Terrace	Estimated LLK Escapement
1984	58.8%	5.4%	26,853	6,615	24.6%	7,756	19,097
1985	46.9%	3.8%	21,113	3,269	15.5%	8,183	12,930
1986	46.3%	4.9%	16,030	2,995	18.7%	8,434	7,596
1987	36.8%	3.9%	38,360	7,274	19.0%	4,530	33,831
1988	42.7%	3.8%	31,962	4,702	14.7%	9,162	22,802
1989	51.1%	3.8%	41,589	5,893	14.2%	7,770	33,819
1990	44.6%	4.6%	23,357	3,702	15.8%	11,920	11,437
1991	48.3%	3.9%	25,829	3,882	15.0%	9,570	16,259
1992	51.7%	4.5%	51,852	11,871	22.9%	9,459	42,393
1993	50.8%	4.2%	61,655	11,465	18.6%	7,512	54,143
1994	50.5%	4.3%	48,344	8,774	18.1%	5,920	42,423
1995	51.1%	4.3%	31,327	7,599	24.3%	4,349	26,979
1996	50.6%	2.5%	54,621	8,276	15.2%	3,300	51,321
1997	40.9%	2.8%	22,778	4,254	18.7%	3,802	18,976
1998	40.6%	3.6%	19,921	3,854	19.3%	5,749	14,172
1999	47.3%	2.3%	30,122	3,356	11.1%	10,956	19,165
2000	37.9%	2.2%	28,236	3,344	11.8%	7,318	20,918
2001	35.0%	2.0%	40,806	4,107	10.1%	5,790	35,016
2002	35.5%	2.0%	15,937	1,562	9.8%	3,756	12,180
2003	40.3%	2.3%	37,341	3,742	10.0%	6,610	30,731
2004	46.9%	2.3%	54,731	6,718	12.3%	8,114	46,617
2005	47.0%	2.1%	30,053	3,000	10.0%	4,927	25,126
2006	39.5%	2.3%	24,273	3,442	14.2%	4,192	20,080
2007	36.7%	2.2%	24,637	4,550	18.5%	2,695	21,942
2008	36.1%	2.1%	19,060	2,263	11.9%	4,553	14,507
2009	47.1%	2.3%	31,806	5,418	17.0%	4,242	27,563
2010	44.5%	2.6%	31,167	4,189	13.4%	4,036	27,131
2011	48.7%	2.3%	15,684	2,073	13.2%	3,136	12,548
2012	32.8%	2.7%	7,933	1,119	14.1%	1,534	6,399
2013	26.7%	2.9%	11,475	1,923	16.8%	1,189	10,286
2014	41.8%	3.4%	19,433	3,317	17.1%	2,576	16,857
2015	46.9%	2.9%	28,697	3,124	10.9%	4,953	23,745
2016	49.9%	3.7%	15,838	1,959	12.4%	3,154	12,685
2017	32.8%	4.6%	6,287	1,398	22.2%	1,691	4,595
2018	35.9%	0.0%	14,735	1,570	10.7%	3,543	11,192
2019	46.1%	3.8%	11,364	1,660	14.6%	3,004	8,360
2020	43.6%	4.2%	8,841	1,968	22.3%	2,032	6,809

LLK = large Skeena River Large Lakes CU Chinook salmon, SE = standard error, CV = coefficient of variation.

Table 9. Mixture model analyses of Chinook salmon caught at the Tyee Test Fishery using the 30 stock Skeena baseline by year, 1984 to 2020.

Data are presented as a percentage of the annual catch at Tyee by stock. Est. = estimate, SE = Standard Error. The bold Kitsumkalum data were the basis for escapements estimates in the other populations.

Year	1984		1985		1986		1987		1988		1989		1990		1991		1992	
Sample size	246		318		293		386		422		378		382		396		270	
Stock	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE
Babine	15.1	(3.0)	4.3	(1.6)	6.7	(2.1)	2.6	(1.7)	5.9	(1.8)	6.8	(2.0)	7.4	(2.3)	4.5	(2.1)	8.6	(2.4)
Bear	7.8	(2.9)	5.9	(1.9)	7.0	(3.0)	7.6	(2.5)	8.4	(2.4)	6.7	(1.8)	8.7	(3.0)	9.1	(2.0)	5.8	(1.9)
Bulkley_Early	0.8	(0.7)	2.4	(0.9)	0.8	(0.4)	2.5	(1.0)	1.7	(0.7)	0.9	(0.6)	0.7	(0.4)	2.4	(0.8)	2.3	(0.9)
Cedar_Early	0.0	(0.2)	0.3	(0.3)	0.2	(0.3)	0.8	(0.7)	0.5	(0.4)	0.0	(0.2)	0.0	(0.2)	0.2	(0.3)	1.1	(0.7)
Ecstall	4.0	(1.3)	1.7	(0.7)	2.9	(1.3)	0.8	(0.6)	0.8	(0.4)	1.9	(0.7)	2.0	(0.6)	1.7	(0.7)	0.9	(0.5)
Exchamsiks	1.6	(1.0)	0.0	(0.2)	0.8	(0.5)	0.6	(0.8)	0.5	(0.5)	0.3	(0.5)	0.1	(0.3)	0.4	(0.5)	0.1	(0.5)
Exstew_R	0.1	(0.4)	0.8	(0.6)	0.3	(0.5)	1.0	(0.9)	0.4	(0.6)	0.8	(0.7)	1.5	(0.8)	0.2	(0.4)	0.1	(0.3)
Fiddler_Cr	0.4	(0.7)	0.6	(0.6)	1.5	(0.9)	0.3	(0.7)	0.4	(0.4)	0.0	(0.2)	0.1	(0.3)	0.0	(0.2)	0.1	(0.5)
Gitnadoix	0.3	(0.5)	2.3	(1.2)	1.8	(1.2)	2.8	(1.3)	1.7	(0.8)	0.6	(0.6)	0.8	(0.8)	2.9	(1.0)	2.2	(1.1)
Kasiks_R	0.4	(0.6)	0.9	(0.8)	0.1	(0.4)	0.3	(0.7)	0.1	(0.3)	0.1	(0.3)	0.6	(0.6)	0.2	(0.3)	0.9	(0.7)
Khyex_R	0.2	(0.5)	1.8	(0.9)	0.0	(0.3)	1.6	(1.0)	0.4	(0.5)	1.5	(0.7)	0.6	(0.5)	1.6	(0.7)	1.1	(0.7)
Kispiox	1.4	(1.3)	5.1	(2.1)	3.6	(1.5)	5.1	(2.4)	5.5	(2.0)	5.8	(2.2)	2.6	(1.4)	5.7	(1.8)	1.4	(1.4)
Kitseguecla_R	0.5	(0.6)	0.5	(0.6)	0.6	(0.6)	7.3	(2.4)	0.2	(0.4)	0.3	(0.6)	0.3	(0.5)	0.6	(0.5)	0.3	(0.6)
Kitwanga	1.8	(0.9)	3.0	(1.6)	4.1	(2.0)	3.3	(1.6)	6.4	(1.7)	2.2	(2.0)	5.9	(1.5)	1.6	(1.2)	0.8	(1.1)
Kluatantan	0.2	(0.4)	1.0	(0.7)	0.6	(0.9)	0.1	(0.6)	1.7	(1.0)	0.1	(0.3)	0.4	(0.5)	0.4	(0.6)	0.4	(0.7)
Kluayaz_Cr	0.8	(1.0)	2.0	(1.2)	1.1	(0.9)	1.9	(1.1)	0.9	(0.8)	0.5	(0.7)	1.5	(0.9)	0.8	(0.8)	1.9	(1.4)
Kuldo_C	0.2	(0.6)	0.5	(0.7)	0.7	(0.7)	1.4	(1.0)	0.9	(0.7)	0.6	(0.5)	0.4	(0.6)	0.6	(0.5)	1.5	(1.3)
Kitsumkalum	**20.9**	**(3.2)**	**20.2**	**(2.5)**	**23.3**	**(3.4)**	**14.9**	**(2.1)**	**21.2**	**(2.2)**	**21.9**	**(2.3)**	**21.2**	**(2.4)**	**17.3**	**(2.0)**	**10.8**	**(2.2)**
Morice	35.9	(3.4)	36.7	(2.9)	32.6	(3.3)	26.6	(2.5)	28.3	(2.4)	37.6	(2.7)	28.4	(2.6)	34.7	(2.6)	37.3	(3.3)
Nangeese_R	0.1	(0.3)	0.2	(0.4)	1.0	(1.2)	0.6	(0.9)	1.1	(0.9)	0.1	(0.2)	0.0	(0.2)	0.2	(0.3)	1.8	(1.2)
Otsi_Cr	0.3	(0.7)	1.2	(0.7)	0.1	(0.3)	1.3	(1.2)	0.3	(0.5)	0.2	(0.4)	1.5	(1.3)	1.0	(0.7)	2.1	(1.4)
Shegunia_R	0.9	(0.9)	0.6	(0.6)	0.3	(0.5)	1.2	(1.1)	0.1	(0.3)	0.2	(0.5)	1.2	(0.7)	0.3	(0.5)	0.5	(0.7)
Sicintine_R	0.2	(0.4)	0.0	(0.2)	0.0	(0.2)	0.0	(0.6)	0.0	(0.2)	0.0	(0.2)	0.0	(0.2)	0.0	(0.2)	0.1	(0.3)
Slamgeesh	1.6	(1.5)	1.1	(1.1)	3.7	(2.2)	3.0	(1.6)	1.9	(1.1)	4.9	(1.9)	3.6	(1.4)	0.7	(0.8)	6.8	(2.8)
Squingula_R	2.5	(1.1)	0.6	(0.6)	1.5	(1.0)	2.1	(1.3)	2.3	(1.2)	2.1	(1.0)	3.7	(1.9)	2.7	(1.2)	1.9	(1.7)
Suskwa	0.2	(0.4)	0.3	(0.4)	0.0	(0.3)	0.1	(0.5)	0.0	(0.2)	0.4	(0.6)	0.1	(0.3)	0.6	(0.5)	0.1	(0.4)
Sustut	0.3	(0.4)	1.9	(0.8)	0.6	(0.5)	1.3	(0.8)	1.8	(0.7)	0.3	(0.4)	0.6	(0.5)	1.4	(0.7)	1.0	(0.8)
Sweetin	0.3	(0.6)	0.8	(0.8)	1.9	(1.1)	3.6	(1.7)	2.6	(1.0)	2.4	(1.1)	3.2	(1.4)	3.6	(1.4)	0.9	(1.2)
Thomas_Cr	1.1	(1.0)	3.0	(0.9)	2.1	(1.0)	5.0	(1.7)	3.5	(1.1)	0.2	(0.4)	2.7	(0.9)	4.2	(1.1)	6.5	(1.7)
Zymogotitz_R	0.0	(0.3)	0.2	(0.3)	0.1	(0.5)	0.3	(0.6)	0.3	(0.3)	0.5	(0.4)	0.0	(0.2)	0.3	(0.3)	1.0	(0.7)

Table 9 continued. Mixture model analyses of Chinook salmon caught at the Tyee Test Fishery using the 30 stock Skeena baseline by year, 1984 to 2020.

Data are presented as percent of the annual catch at Tyee by stock. Est. = estimate, SE = Standard Error. The bold Kitsumkalum data were the basis for escapements estimates in the other populations.

Year	1993		1994		1995		1996		1997		1998		1999		2000		2001	
Sample size	370		351		408		1276		617		323		1186		1091		1070	
Stock	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE
Babine	4.5	(2.1)	4.6	(2.2)	2.0	(1.3)	7.4	(1.3)	5.1	(1.4)	6.9	(1.7)	8.4	(1.2)	5.6	(1.0)	6.7	(1.1)
Bear	6.1	(2.3)	16.0	(2.6)	12.2	(2.7)	6.1	(1.3)	7.5	(1.4)	8.9	(1.9)	8.6	(1.3)	7.0	(1.3)	4.8	(1.0)
Bulkley_Early	0.8	(0.4)	0.4	(0.5)	0.4	(0.3)	1.4	(0.4)	2.9	(0.7)	2.9	(1.0)	1.0	(0.3)	2.0	(0.5)	3.3	(0.6)
Cedar_Early	0.1	(0.3)	0.0	(0.2)	0.0	(0.2)	0.3	(0.3)	0.2	(0.2)	0.0	(0.2)	0.0	(0.1)	0.1	(0.1)	0.0	(0.1)
Ecstall	0.0	(0.2)	1.0	(0.6)	0.9	(0.6)	0.2	(0.2)	0.1	(0.2)	0.9	(0.5)	1.7	(0.4)	0.6	(0.2)	0.8	(0.3)
Exchamsiks	0.9	(0.8)	0.3	(0.4)	0.3	(0.6)	1.5	(0.6)	1.1	(0.7)	0.4	(0.6)	1.9	(0.5)	1.3	(0.5)	0.3	(0.4)
Exstew_R	1.1	(0.8)	0.1	(0.4)	1.0	(0.6)	0.4	(0.3)	0.1	(0.2)	2.4	(1.2)	1.9	(0.6)	1.3	(0.5)	1.2	(0.6)
Fiddler_Cr	0.4	(0.4)	0.1	(0.4)	1.2	(1.2)	0.1	(0.2)	0.6	(0.4)	0.4	(0.6)	0.2	(0.2)	0.1	(0.1)	0.2	(0.2)
Gitnadoix	0.6	(0.6)	1.3	(0.8)	0.8	(0.7)	1.4	(0.7)	0.7	(0.6)	0.8	(0.9)	0.8	(0.5)	3.9	(0.8)	3.8	(0.8)
Kasiks_R	0.0	(0.3)	0.2	(0.4)	0.3	(0.5)	0.5	(0.3)	0.9	(0.6)	0.2	(0.4)	0.3	(0.4)	0.2	(0.2)	0.1	(0.2)
Khyex_R	0.5	(0.7)	0.0	(0.2)	1.6	(1.1)	0.4	(0.2)	0.3	(0.3)	0.0	(0.2)	0.6	(0.3)	0.4	(0.3)	0.3	(0.2)
Kispiox	0.8	(1.1)	3.8	(1.8)	1.5	(1.6)	5.1	(1.2)	8.0	(1.7)	2.1	(1.9)	3.3	(1.4)	2.5	(1.3)	4.5	(1.3)
Kitseguecla_R	0.7	(0.7)	1.0	(0.7)	0.2	(0.6)	0.1	(0.1)	0.0	(0.2)	1.4	(1.0)	0.8	(0.4)	0.4	(0.4)	1.0	(0.4)
Kitwanga	4.2	(1.9)	3.1	(1.4)	3.2	(2.7)	3.4	(0.9)	3.4	(1.2)	4.9	(2.4)	4.2	(1.2)	7.5	(1.6)	2.6	(1.0)
Kluatantan	1.2	(0.9)	0.8	(0.9)	1.2	(1.1)	0.7	(0.5)	2.3	(1.1)	0.6	(0.7)	0.6	(0.4)	0.7	(0.5)	0.5	(0.4)
Kluayaz_Cr	2.7	(1.3)	1.7	(1.0)	1.6	(1.3)	2.0	(0.8)	4.4	(1.3)	3.7	(1.7)	0.7	(0.4)	1.5	(0.7)	1.6	(0.6)
Kuldo_C	2.9	(1.5)	3.5	(1.3)	0.5	(1.0)	1.6	(0.6)	4.0	(1.0)	2.2	(1.4)	2.3	(0.7)	1.8	(0.6)	3.7	(0.9)
Kitsumkalum	**10.9**	**(1.8)**	**14.6**	**(2.0)**	**10.6**	**(2.4)**	**8.0**	**(0.9)**	**8.4**	**(1.3)**	**12.2**	**(2.0)**	**14.2**	**(1.1)**	**13.6**	**(1.3)**	**15.3**	**(1.1)**
Morice	40.3	(2.9)	29.9	(2.6)	36.9	(3.1)	37.1	(1.6)	28.3	(2.0)	24.7	(2.6)	30.3	(1.4)	25.2	(1.4)	23.5	(1.4)
Nangeese_R	0.8	(0.8)	0.2	(0.4)	0.7	(0.8)	0.1	(0.2)	0.5	(0.6)	0.5	(0.7)	0.2	(0.2)	0.8	(0.6)	0.1	(0.2)
Otsi_Cr	1.0	(0.9)	0.2	(0.4)	1.0	(1.6)	2.0	(0.7)	2.6	(1.1)	2.5	(1.2)	1.1	(0.5)	1.0	(0.5)	1.7	(0.6)
Shegunia_R	2.2	(1.3)	0.1	(0.3)	2.3	(1.3)	0.1	(0.2)	1.5	(0.8)	1.0	(1.0)	0.0	(0.1)	0.4	(0.3)	0.2	(0.3)
Sicintine_R	0.1	(0.2)	0.5	(0.5)	0.1	(0.4)	0.0	(0.1)	0.1	(0.2)	0.1	(0.3)	0.2	(0.2)	0.2	(0.2)	0.1	(0.2)
Slamgeesh	3.4	(1.3)	8.7	(2.2)	2.1	(1.3)	3.2	(1.1)	4.8	(1.3)	6.8	(2.0)	2.7	(0.9)	5.8	(1.4)	6.8	(1.3)
Squingula_R	0.8	(1.0)	2.9	(1.1)	4.8	(2.1)	7.3	(1.1)	3.7	(1.0)	4.9	(1.7)	3.2	(0.8)	3.1	(0.8)	3.0	(0.8)
Suskwa	0.4	(0.4)	0.0	(0.2)	0.2	(0.5)	0.6	(0.4)	0.2	(0.3)	1.2	(0.8)	0.7	(0.3)	1.1	(0.4)	1.4	(0.5)
Sustut	2.8	(1.3)	1.9	(0.8)	5.1	(1.7)	4.0	(0.7)	3.5	(0.8)	2.6	(1.0)	1.6	(0.4)	2.7	(0.5)	3.8	(0.6)
Sweetin	7.4	(2.3)	0.9	(0.8)	4.2	(3.0)	2.2	(0.8)	0.9	(0.9)	1.3	(1.3)	5.0	(1.1)	4.9	(1.2)	2.3	(0.9)
Thomas_Cr	2.4	(1.1)	2.0	(0.9)	2.7	(1.1)	2.2	(0.5)	3.2	(0.8)	2.5	(1.0)	3.4	(0.6)	3.9	(0.7)	5.1	(0.7)
Zymogotitz_R	0.0	(0.2)	0.1	(0.3)	0.1	(0.3)	0.4	(0.3)	0.5	(0.4)	0.7	(0.6)	0.0	(0.1)	0.5	(0.2)	1.2	(0.4)

Table 9 continued. Mixture model analyses of Chinook salmon caught at the Tyee Test Fishery using the 30 stock Skeena baseline by year, 1984 to 2020.

Data are presented as percent of the annual catch at Tyee by stock. Est. = estimate, SE = Standard Error. The bold Kitsumkalum data were the basis for escapements estimates in the other populations.

Year	2002		2003		2004		2005		2006		2007		2008		2009		2010	
Sample size	1285		1067		999		1221		1071		1122		1198		1155		847	
Stock	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE
Babine	7.6	(1.2)	7.2	(1.2)	10.2	(1.3)	8.1	(1.0)	8.9	(1.3)	10.8	(1.4)	8.9	(1.2)	7.1	(1.2)	7.6	(1.4)
Bear	3.3	(1.0)	4.6	(1.2)	4.3	(1.1)	5.7	(1.0)	2.9	(1.1)	2.4	(1.0)	5.3	(1.1)	9.7	(1.4)	7.1	(1.4)
Bulkley_Early	0.6	(0.2)	3.2	(0.6)	1.2	(0.4)	1.3	(0.4)	2.3	(0.5)	1.0	(0.3)	0.9	(0.3)	1.1	(0.3)	1.3	(0.5)
Cedar_Early	0.0	(0.1)	0.3	(0.3)	0.1	(0.1)	0.3	(0.3)	0.1	(0.2)	0.0	(0.1)	0.4	(0.2)	1.1	(0.3)	0.4	(0.3)
Ecstall	1.8	(0.4)	0.7	(0.3)	0.9	(0.3)	1.0	(0.3)	1.7	(0.4)	2.4	(0.5)	1.8	(0.4)	2.7	(0.5)	1.8	(0.4)
Exchamsiks	1.2	(0.5)	1.6	(0.5)	1.1	(0.5)	0.6	(0.4)	1.9	(0.6)	0.5	(0.5)	0.7	(0.4)	1.4	(0.5)	0.9	(0.5)
Exstew_R	2.1	(0.6)	1.3	(0.6)	1.0	(0.5)	0.9	(0.4)	2.5	(0.8)	2.0	(0.5)	1.7	(0.7)	1.2	(0.4)	1.6	(0.6)
Fiddler_Cr	0.1	(0.1)	0.2	(0.2)	0.6	(0.4)	0.4	(0.3)	0.2	(0.2)	0.4	(0.3)	0.3	(0.3)	0.1	(0.2)	0.1	(0.2)
Gitnadoix	1.8	(0.6)	1.8	(0.6)	1.9	(0.6)	0.3	(0.3)	0.6	(0.7)	2.0	(0.6)	2.9	(0.7)	1.2	(0.5)	0.8	(0.5)
Kasiks_R	0.3	(0.3)	0.6	(0.4)	0.4	(0.3)	0.7	(0.3)	0.9	(0.6)	0.2	(0.2)	0.3	(0.3)	0.4	(0.4)	0.2	(0.3)
Khyex_R	0.1	(0.1)	0.6	(0.3)	0.1	(0.1)	0.5	(0.2)	0.8	(0.3)	1.5	(0.4)	0.3	(0.2)	0.1	(0.1)	0.8	(0.3)
Kispiox	5.7	(1.1)	4.5	(1.3)	1.8	(0.8)	3.4	(1.0)	4.2	(1.4)	4.9	(1.4)	3.9	(1.2)	6.7	(1.4)	2.8	(1.2)
Kitseguecla_R	0.5	(0.3)	0.9	(0.4)	0.5	(0.3)	0.8	(0.5)	0.1	(0.2)	1.9	(0.5)	0.8	(0.4)	0.6	(0.4)	1.1	(0.5)
Kitwanga	3.9	(1.0)	4.2	(1.2)	6.3	(1.2)	5.4	(1.0)	7.4	(1.4)	4.5	(1.1)	7.8	(1.3)	3.1	(1.0)	4.1	(1.1)
Kluatantan	0.2	(0.2)	0.2	(0.3)	0.2	(0.3)	0.5	(0.4)	0.2	(0.3)	1.6	(0.6)	0.9	(0.6)	0.1	(0.2)	0.7	(0.4)
Kluayaz_Cr	2.1	(0.5)	1.4	(0.7)	2.0	(0.6)	0.9	(0.4)	1.8	(0.7)	0.7	(0.4)	0.7	(0.5)	0.7	(0.5)	1.0	(0.7)
Kuldo_C	1.6	(0.5)	0.7	(0.5)	0.6	(0.4)	0.7	(0.4)	0.8	(0.5)	2.7	(0.7)	2.1	(0.7)	0.8	(0.4)	0.5	(0.4)
Kitsumkalum	**25.0**	**(1.3)**	**18.9**	**(1.3)**	**16.8**	**(1.3)**	**17.8**	**(1.2)**	**13.7**	**(1.3)**	**17.5**	**(1.3)**	**13.1**	**(1.1)**	**12.4**	**(1.1)**	**12.7**	**(1.3)**
Morice	24.6	(1.3)	28.5	(1.5)	32.4	(1.5)	33.2	(1.5)	27.7	(1.5)	23.5	(1.4)	21.9	(1.3)	30.3	(1.4)	29.7	(1.7)
Nangeese_R	0.2	(0.3)	0.3	(0.4)	0.2	(0.2)	0.1	(0.2)	0.1	(0.2)	0.2	(0.3)	0.1	(0.2)	0.2	(0.2)	0.7	(0.5)
Otsi_Cr	0.5	(0.4)	1.9	(0.8)	1.0	(0.5)	0.2	(0.2)	0.2	(0.3)	0.3	(0.4)	2.4	(0.7)	1.7	(0.6)	3.0	(1.0)
Shegunia_R	0.7	(0.3)	0.3	(0.3)	0.4	(0.3)	0.3	(0.4)	0.7	(0.4)	0.6	(0.4)	0.5	(0.4)	0.2	(0.2)	0.7	(0.5)
Sicintine_R	0.3	(0.2)	0.3	(0.2)	0.2	(0.2)	0.1	(0.2)	0.1	(0.1)	0.1	(0.2)	0.6	(0.4)	1.3	(0.4)	0.3	(0.3)
Slamgeesh	2.7	(0.8)	2.7	(1.2)	3.6	(1.0)	1.5	(0.6)	4.6	(1.1)	4.3	(1.2)	5.2	(1.2)	3.0	(0.9)	4.8	(1.3)
Squingula_R	2.6	(0.7)	1.9	(0.8)	2.1	(0.7)	4.3	(0.8)	2.4	(0.8)	1.9	(0.7)	5.6	(0.9)	3.7	(0.8)	2.7	(0.9)
Suskwa	0.8	(0.3)	1.4	(0.5)	0.2	(0.2)	2.9	(0.6)	1.6	(0.5)	1.2	(0.4)	0.7	(0.3)	0.2	(0.2)	1.4	(0.5)
Sustut	1.7	(0.4)	2.2	(0.5)	1.9	(0.5)	2.0	(0.4)	2.1	(0.5)	2.3	(0.5)	1.7	(0.4)	1.9	(0.4)	1.3	(0.5)
Sweetin	2.5	(0.8)	3.2	(0.9)	4.1	(1.0)	1.8	(0.7)	3.6	(1.0)	3.7	(1.3)	4.4	(1.0)	3.9	(1.1)	4.7	(1.1)
Thomas_Cr	5.5	(0.7)	3.5	(0.6)	3.7	(0.7)	4.1	(0.6)	4.9	(0.8)	4.6	(0.7)	3.6	(0.6)	3.0	(0.6)	4.7	(0.8)
Zymogotitz_R	0.3	(0.2)	0.8	(0.3)	0.2	(0.2)	0.0	(0.1)	0.8	(0.4)	0.2	(0.2)	0.7	(0.3)	0.1	(0.1)	0.5	(0.3)

Table 9 continued. Mixture model analyses of Chinook salmon caught at the Tyee Test Fishery using the 30 stock Skeena baseline by year, 1984 to 2020.

Data are presented as percent of the annual catch at Tyee by stock. Est. = estimate, SE = Standard Error. The bold Kitsumkalum data were the basis for escapements estimates in the other populations.

Year	2011		2012		2013		2014		2015		2016		2017		2018		2019	
Sample size	907		497		503		506		663		349		227		438		424	
Stock	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE	Est.	SE
Babine	3.7	(1.1)	9.2	(1.5)	5.9	(1.7)	7.6	(1.9)	14.6	(1.8)	8.0	(2.0)	2.7	(1.8)	5.6	(1.6)	15.9	(2.4)
Bear	5.4	(1.1)	5.5	(1.4)	6.7	(1.7)	7.6	(2.0)	8.0	(1.5)	6.1	(1.8)	9.6	(3.0)	7.9	(1.6)	7.2	(2.1)
Bulkley_Early	2.5	(0.5)	2.8	(0.8)	1.8	(0.7)	0.7	(0.5)	1.1	(0.4)	0.3	(0.3)	0.2	(0.4)	0.8	(0.6)	0.3	(0.3)
Cedar_Early	0.2	(0.2)	0.6	(0.6)	0.0	(0.2)	0.0	(0.3)	0.0	(0.1)	0.0	(0.2)	0.8	(0.9)	0.0	(0.2)	0.0	(0.2)
Ecstall	1.5	(0.4)	0.6	(0.4)	2.1	(0.6)	2.8	(0.7)	2.4	(0.6)	1.5	(0.6)	2.3	(0.9)	2.2	(0.6)	1.9	(0.7)
Exchamsiks	0.4	(0.4)	0.3	(0.5)	0.6	(0.5)	0.1	(0.3)	0.5	(0.4)	0.1	(0.4)	1.9	(1.1)	0.4	(0.5)	0.6	(0.6)
Exstew_R	1.5	(0.6)	1.7	(0.9)	0.3	(0.5)	0.9	(0.6)	1.1	(0.5)	0.2	(0.3)	0.6	(0.8)	1.6	(1.1)	0.6	(0.6)
Fiddler_Cr	0.0	(0.1)	0.9	(0.7)	0.9	(0.7)	0.2	(0.4)	0.0	(0.2)	0.1	(0.3)	0.2	(0.4)	0.0	(0.2)	0.6	(0.5)
Gitnadoix	0.8	(0.5)	1.6	(0.9)	4.1	(1.0)	2.4	(0.8)	2.0	(0.6)	0.1	(0.3)	2.3	(1.2)	2.0	(1.0)	1.3	(0.7)
Kasiks_R	0.1	(0.2)	1.1	(0.8)	2.1	(0.8)	0.6	(0.6)	0.5	(0.4)	0.8	(0.5)	0.2	(0.4)	0.5	(0.6)	0.1	(0.3)
Khyex_R	0.5	(0.3)	0.6	(0.4)	0.2	(0.2)	0.5	(0.4)	0.3	(0.3)	0.5	(0.4)	0.3	(0.4)	1.0	(0.6)	0.2	(0.3)
Kispiox	1.9	(1.1)	0.9	(1.0)	10.2	(2.0)	4.5	(1.5)	5.8	(1.3)	1.6	(1.2)	5.7	(2.7)	5.9	(1.9)	0.5	(0.7)
Kitseguecla_R	0.2	(0.2)	0.1	(0.4)	0.1	(0.2)	1.1	(0.7)	0.1	(0.2)	0.1	(0.3)	0.3	(0.7)	0.2	(0.4)	0.1	(0.3)
Kitwanga	5.6	(1.3)	6.8	(1.9)	1.9	(1.3)	3.9	(1.3)	1.0	(0.8)	5.6	(1.3)	1.2	(1.5)	5.2	(2.3)	2.6	(1.2)
Kluatantan	0.3	(0.4)	1.7	(1.0)	0.4	(0.6)	0.6	(0.6)	0.5	(0.5)	0.5	(0.6)	0.1	(0.4)	0.2	(0.5)	0.3	(0.5)
Kluayaz_Cr	1.4	(0.6)	1.4	(0.8)	1.8	(0.9)	1.2	(0.8)	0.5	(0.5)	0.1	(0.3)	4.0	(1.7)	1.0	(0.7)	1.2	(0.8)
Kuldo_C	0.5	(0.5)	0.4	(0.5)	1.9	(0.8)	3.1	(1.1)	0.8	(0.6)	0.1	(0.4)	3.0	(1.6)	1.9	(1.3)	1.0	(0.8)
Kitsumkalum	**21.0**	**(1.4)**	**26.0**	**(2.0)**	**26.5**	**(1.9)**	**21.6**	**(1.8)**	**24.4**	**(1.8)**	**30.0**	**(2.5)**	**21.5**	**(2.6)**	**23.3**	**(2.1)**	**27.1**	**(2.3)**
Morice	39.6	(1.7)	18.1	(1.8)	14.1	(1.7)	26.6	(2.0)	24.4	(1.8)	35.8	(2.5)	20.4	(2.9)	22.4	(2.2)	23.8	(2.3)
Nangeese_R	0.1	(0.1)	0.2	(0.4)	0.1	(0.3)	0.5	(0.5)	1.4	(0.6)	0.4	(0.7)	0.5	(0.8)	2.3	(1.3)	0.4	(0.5)
Otsi_Cr	1.0	(0.5)	0.3	(0.4)	0.3	(0.5)	1.4	(0.7)	0.5	(0.5)	1.2	(0.8)	0.8	(1.0)	0.1	(0.4)	0.4	(0.5)
Shegunia_R	0.1	(0.2)	1.8	(0.8)	0.8	(0.7)	0.4	(0.5)	0.1	(0.2)	0.0	(0.2)	0.3	(0.6)	0.1	(0.2)	1.6	(0.8)
Sicintine_R	0.0	(0.1)	0.3	(0.3)	0.1	(0.2)	1.0	(0.6)	0.0	(0.2)	0.0	(0.2)	0.0	(0.3)	0.5	(0.7)	0.1	(0.3)
Slamgeesh	1.7	(0.8)	5.0	(1.5)	7.0	(1.8)	3.6	(1.5)	3.5	(1.0)	1.0	(0.9)	2.0	(1.7)	1.9	(1.3)	4.6	(1.4)
Squingula_R	0.3	(0.4)	2.9	(1.1)	1.5	(0.6)	0.8	(0.8)	1.6	(0.8)	2.4	(1.0)	3.4	(1.6)	1.8	(1.1)	2.5	(1.0)
Suskwa	2.0	(0.6)	1.9	(0.9)	0.5	(0.4)	0.1	(0.3)	0.6	(0.4)	0.6	(0.5)	2.0	(1.2)	3.3	(1.3)	0.1	(0.3)
Sustut	0.9	(0.4)	1.0	(0.5)	0.6	(0.4)	1.6	(0.7)	0.6	(0.3)	0.8	(0.6)	4.9	(1.7)	2.1	(1.0)	0.5	(0.4)
Sweetin	0.7	(0.6)	1.8	(1.0)	3.0	(1.5)	1.1	(0.7)	0.5	(0.5)	0.3	(0.5)	5.0	(2.7)	0.6	(0.8)	0.2	(0.4)
Thomas_Cr	5.6	(0.8)	4.3	(1.0)	4.3	(1.0)	3.1	(0.8)	2.9	(0.7)	1.0	(0.6)	2.7	(1.2)	4.8	(1.3)	4.0	(1.0)
Zymogotitz_R	0.6	(0.4)	0.2	(0.3)	0.3	(0.4)	0.3	(0.4)	0.4	(0.4)	0.7	(0.5)	0.9	(0.8)	0.4	(0.4)	0.3	(0.3)

Table 9 continued. Mixture model analyses of Chinook salmon caught at the Tyee Test Fishery using the 30 stock Skeena baseline by year, 1984 to 2020.

Data are presented as percent of the annual catch at Tyee by stock. Est. = estimate, SE = Standard Error. The bold Kitsumkalum data were the basis for escapements estimates in the other populations.

Year	2020	
Sample size	356	
Stock	Est.	SE
Babine	10.5	(2.2)
Bear	16.3	(2.7)
Bulkley_Early	0.5	(0.4)
Cedar_Early	0.0	(0.2)
Ecstall	2.1	(0.7)
Exchamsiks	1.8	(0.9)
Exstew_R	2.4	(1.1)
Fiddler_Cr	0.1	(0.2)
Gitnadoix	0.5	(0.6)
Kasiks_R	1.0	(0.9)
Khyex_R	0.6	(0.5)
Kispiox	1.3	(1.3)
Kitseguecla_R	0.3	(0.4)
Kitwanga	2.7	(1.3)
Kluatantan	0.7	(0.8)
Kluayaz_Cr	0.6	(0.9)
Kuldo_C	1.1	(0.8)
Kitsumkalum	**23.6**	**(2.3)**
Morice	16.8	(2.3)
Nangeese_R	0.2	(0.4)
Otsi_Cr	3.6	(1.5)
Shegunia_R	0.2	(0.4)
Sicintine_R	0.3	(0.5)
Slamgeesh	3.0	(1.5)
Squingula_R	2.8	(1.2)
Suskwa	0.5	(0.5)
Sustut	1.0	(0.6)
Sweetin	1.7	(1.3)
Thomas_Cr	3.6	(1.2)
Zymogotitz_R	0.3	(0.4)

Table 10. Age data from Skeena River Chinook salmon caught in the Tyee Test Fishery with complete marine and freshwater ages, 1984 to 2020, including fish that were not genetically sampled.

Year	Chinook salmon Age (Gilbert-Rich)															
	2_1	3_1	3_2	4_1	4_2	4_3	5_1	5_2	5_3	6_1	6_2	6_3	7_2	7_3	8_2	Total
1984		2	1	5	38		7	118			43	6	4			224
1985				3	41		3	180	1		47	1				276
1986		2	2	5	20		11	105			103	1				249
1987	2	1	20	3	35		3	89			144					297
1988	2	20	35	4	133		10	210	2		294		2			712
1989			19	2	11		10	170		1	134	1	3			351
1990	1	3	22	3	80		10	38	1		197	1	2			358
1991		1	5	16	73		1	209	1	1	58	4	8	1		378
1992		0	6	2	42		6	91	1		97	3	1			249
1993		4	5	7	25		10	154			154	1	2	3		365
1994					43		1	139			154	1		2		340
1995			10	1	133			129	2		101	1	4			381
1996			25	7	228	3		1089	8		288	20	10	4		1,682
1997		7	2	7	138		3	270	3		112	8	3	2		555
1998	1		13	3	69	1	0	147	1		52	2				289
1999	1	2	5	4	392		15	462	4		346	5	2	2		1,240
2000		5	7	7	496			647	27		143	16	5	1		1,354
2001		1	49	7	84		4	740	3		128	18	1	2		1,037
2002	1	5	1	2	401		16	337	4		273	8	1	2	1	1,052
2003			14	2	98	1	2	1098			129	2	2	1		1,349
2004			2		140		3	91	11		146	6	1			400
2005		1	33	4	25			245	2	1	37	7				355
2006		4	23	3	388		10	249	13	2	162	6	5	5		870
2007		1	15	15	78		8	800	1		63	15				996
2008		7	7		373	2	5	386	9		192	6	1	1		989
2009		2	27	15	109			643	2		69	4	1			872
2010		8	10	5	245	1	11	262	5	1	160	3	1			712
2011		1	15	8	103		1	547	3		50	5	1	1		735
2012			5	1	112	1	4	195	2		75	5		1		401
2013			32	4	63		1	241			39	5				385
2014		3	23	2	178		1	138			41	0	1			387
2015		1	27	3	132			340	1		25	5		1		535
2016		4	14	9	42		3	148	1		44	4				269
2017			75	2	35		2	105			21	1				241
2018		2	4	7	191	0	0	143	1	1	24	2				375
2019		1	31	9	36	0	0	192	0	0	17	0				286
2020			112	1	107	1	3	126	0	0	51	1				402
Total	**8**	**88**	**696**	**178**	**4,937**	**10**	**164**	**11,273**	**109**	**7**	**4,213**	**174**	**61**	**29**	**1**	**21,948**

Table 11. Age data from male Skeena River Chinook salmon with complete marine and freshwater ages caught in the Tyee Test Fishery and genetically sampled from 1984 to 2020.

Year	Male Chinook salmon Age (Gilbert-Rich)														
	2_1	3_1	3_2	4_1	4_2	4_3	5_1	5_2	5_3	6_1	6_2	6_3	7_2	7_3	Total
1984		1		2	27		2	42			6		2		82
1985					33		2	62	1		12				110
1986		2	2	1	12		2	38			39	1			97
1987	2	1	20	1	35		1	45			48				153
1988		7	10		59		1	44	1		46				168
1989			18	1	8		3	84			45		2		161
1990	1	3	21	2	75		2	20	1		59		2		186
1991		1	5	9	69			110	1	1	25	2	2	1	226
1992			6	1	42		3	42	1		37	3	1		136
1993		4	4	3	25		5	73			58				172
1994					41		1	62			45	1			150
1995			10	1	120			76	2		27	1			237
1996			16	5	127	2		342	5		82	12	2	3	596
1997		6	2	4	127		1	111	3		20	2	1		277
1998	1		12	2	66			66	1		21	2			171
1999		2	1	3	252		5	143	2		108		1		517
2000		1		2	178			149	9		21	3	1		364
2001			20	1	35		1	122	2		18	2		1	202
2002	1	4	1	1	387		8	177	3		86	3	1		672
2003			8	2	58	1		378			30	1			478
2004			2		135		1	47	9		50	5			249
2005		1	33	3	24			121	2		16	2			202
2006		4	22	3	344		4	130	10	1	53	2	2	1	576
2007		1	12	8	65		4	312	1		20	7			430
2008		7	6		352	2	2	184	7		72	4			636
2009		2	27	6	99			303	2		21	1	1		462
2010		8	10	2	232	1	5	113	5		54				430
2011		1	15	5	98			257	2		16	3			397
2012			5	1	105	1		83	1		20	1			217
2013			31	3	57		1	107			11	1			211
2014		3	23	1	175			57			18				277
2015		1	27	2	120			151	1		9	2			313
2016		3	14	4	33		3	50	1		14	2			124
2017			75	2	32		1	46			7	1			164
2018		2	4	4	168			53	1		5	1			238
2019		1	30	2	32			75			3				143
2020			112	1	93	1	2	53			17	1			280
Total	**5**	**66**	**604**	**88**	**3,940**	**8**	**60**	**4,328**	**74**	**2**	**1,239**	**66**	**18**	**6**	**10,504**

Table 12. Age data from female Skeena River Chinook salmon with complete marine and freshwater ages caught in the Tyee Test Fishery and genetically sampled from 1984 to 2020.

Year	Female Chinook salmon Age (Gilbert-Rich)														
	3_1	3_2	4_1	4_2	4_3	5_1	5_2	5_3	6_1	6_2	6_3	7_2	7_3	8_2	Total
1984		1	1	8		3	68			35	6	2			124
1985			3	6		1	107			34	1				152
1986			4	8		9	67			64					152
1987			2			2	44			96					144
1988			2	1		4	57			96		1			161
1989		1	1	2		7	86		1	89	1	1			189
1990			1	5		8	18			132	1				165
1991			5	2		1	97			31	2	6			144
1992			1			3	48			60					112
1993			4			5	73			91	1	1	3		178
1994				2			61			98			2		163
1995				6			51			72		4			133
1996			1	7			377	1		113	5	4	1		509
1997	1		2	5		2	144			85	6	1	2		248
1998			1	3	1		78			29					112
1999			1	13		7	172			103	4	1			301
2000			2	17			96			28	2	1			146
2001			2	1		1	144			27	6				181
2002	1		1	7		8	160	1		181	5		2	1	367
2003				5			354			47	1	1	1		409
2004				4		2	43	2		96	1	1			149
2005			1	1			123		1	21	5				152
2006				11		6	105	3	1	103	4	3	4		240
2007			6	7		4	407			39	5				468
2008				13		2	199	2		120	2	1	1		340
2009			9	10			340			48	3				410
2010			3	10		6	144		1	103	3	1			271
2011			3	4		1	279	1		34	2	1	1		326
2012				4		4	109	1		54	4		1		177
2013			1	5			129			24	3				162
2014			1	3		1	80			22		1			108
2015			1	12			181			16	3		1		214
2016			5	7			97			30	2				141
2017				2		1	58			14					75
2018			3	23			90		1	19	1				137
2019			7	2			117			14					140
2020				12		1	73			32					118
Total	**2**	**2**	**74**	**228**	**1**	**89**	**4,876**	**11**	**5**	**2,300**	**79**	**31**	**19**	**1**	**7,718**

Table 13. Sample sizes by brood year for Chinook salmon with known gender, POH length, GSI data and complete ages for the six summer run Skeena River CUs upstream of Tyee.

Brood Year	Males							Females							Grand Total
	LLK	KLM	MSK	USK	LSK	ZYF	Total	LLK	KLM	MSK	USK	LSK	ZYF	Total	
1980	63	26	20	5	9	7	130	94	36	25	10	7	5	177	307
1981	45	25	27	6	5	8	116	78	28	41	13	11	5	176	292
1982	34	16	27	9	9	6	101	64	30	37	8	3	7	149	250
1983	56	39	19	7	3	3	127	78	40	19	6	6	2	151	278
1984	125	40	37	9	8	4	223	127	51	32	10	7	2	229	452
1985	32	30	7	5	5	1	80	27	12	10	5	2	2	58	138
1986	122	25	41	21	17	11	237	96	24	17	9	10	3	159	396
1987	114	35	25	7	5	9	195	92	21	15	5	6	8	147	342
1988	93	21	35	17	5	2	173	95	31	35	14	1	3	179	352
1989	80	14	17	9	6	3	129	76	21	16	15	6	2	136	265
1990	119	30	26	25	8	9	217	82	31	25	20	6	9	173	390
1991	291	38	46	78	25	8	486	276	28	55	77	19	10	465	951
1992	141	21	45	50	11	11	279	82	12	38	39	7	2	180	459
1993	122	33	79	55	18	10	317	84	21	39	29	4	10	187	504
1994	126	27	44	26	12	10	245	103	26	44	24	11	6	214	459
1995	205	67	75	27	36	21	431	62	19	26	16	9	5	137	568
1996	122	60	98	48	31	22	381	118	60	79	41	18	20	336	717
1997	76	63	48	20	23	19	249	70	43	45	33	10	11	212	461
1998	367	184	139	58	42	31	821	216	67	74	37	25	16	435	1,256
1999	67	34	25	8	6	2	142	39	16	13	14		1	83	225
2000	158	56	60	18	11	15	318	118	42	39	12	9	13	233	551
2001	79	35	42	24	12	4	196	73	27	25	15	9	6	155	351
2002	299	115	177	57	61	39	748	184	79	132	66	34	28	523	1,271
2003	85	44	72	56	28	13	298	87	26	65	39	14	19	250	548
2004	359	94	148	62	28	17	708	258	38	81	51	10	11	449	1,157
2005	129	39	43	18	8	12	249	112	22	38	11	13	6	202	451
2006	250	131	63	15	25	33	517	186	75	40	9	7	16	333	850
2007	76	60	28	19	11	16	210	66	33	22	14	2	6	143	353
2008	78	86	37	6	21	12	240	46	41	40	8	11	5	151	391
2009	49	45	17	6	5	5	127	43	19	17	12	4	7	102	229
2010	177	112	48	8	8	11	364	105	59	19	12	10	6	211	575
2011	102	72	14	11	2	1	202	72	30	10	4	3	3	122	324
2012	50	42	7	8	6	4	117	34	16	12	15	7	6	90	207
2013	41	32	13	8	6	4	104	38	33	21	3	3	4	102	206
Total	4,332	1,791	1,649	806	516	383	9,477	3,381	1,157	1,246	696	304	265	7,049	16,526

Table 14. Mean size (POH length) at age of male and female, stream type, GSI sampled Skeena River Chinook salmon, with one freshwater annulus, all years combined, 1984 to 2020.

Gender	Age	Average POH (mm)	SD (mm)	Sample size (N)	% of Sample
Male	3_2	369	49	590	3.3%
Male	4_2	579	53	4,013	22.4%
Male	5_2	720	64	4,421	24.7%
Male	6_2	829	74	1,273	7.1%
Male	7_2	893	86	19	0.1%
Male total	all	659	127	10,316	57.5%
Female	3_2	493	153	2	0.0%
Female	4_2	638	58	231	1.3%
Female	5_2	727	43	4,989	27.8%
Female	6_2	801	52	2,365	13.2%
Female	7_2	842	58	32	0.2%
Female total	all	748	61	7,619	42.5%

POH length is post eye orbit to hypural plate length.
SD is standard deviation.

Table 15. Mean size (POH length) at age of male and female Skeena River Chinook salmon by CU, 1984 to 2020.

Age	CU	MALES			FEMALES		
		Average POH (mm)	SD (mm)	N	Average POH (mm)	SD (mm)	N
3_2	LLK	362	45	305	601		1
	KLM	389	53	155			0
	MSK	355	46	67			0
	USK	348	42	15			0
	LSK	372	36	22	385		1
	ZYF	343	35	4			0
	Total	**369**	**49**	**568**	**493**	**153**	**2**
4_2	LLK	577	53	1942	640	47	134
	KLM	586	58	751	628	74	24
	MSK	577	50	577	651	79	19
	USK	574	46	271	636	79	19
	LSK	582	52	176	633	56	8
	ZYF	588	39	159	648	58	7
	Total	**579**	**53**	**3,876**	**639**	**58**	**211**
5_2	LLK	719	62	2046	723	40	2607
	KLM	733	74	716	750	47	679
	MSK	712	58	738	725	39	750
	USK	714	60	369	726	40	426
	LSK	723	62	257	738	36	180
	ZYF	733	65	179	740	41	173
	Total	**721**	**64**	**4,305**	**729**	**42**	**4,815**
6_2	LLK	819	70	473	788	47	874
	KLM	867	78	300	836	49	556
	MSK	808	68	246	793	46	465
	USK	813	62	110	784	43	217
	LSK	829	66	77	801	49	114
	ZYF	824	81	47	792	48	87
	Total	**829**	**74**	**1,253**	**801**	**51**	**2,313**
7_2	LLK	848	99	5	795	34	8
	KLM	955	61	8	901	31	12
	MSK	841	68	4	814	38	8
	USK	865	35	2	790		1
	LSK			0	825	78	2
	ZYF			0			0
	Total	**893**	**86**	**19**	**843**	**59**	**31**
	Grand Total	**660**	**127**	**10,021**	**749**	**60**	**7,372**

POH length is post eye orbit to hypural plate length.
SD is standard deviation.
N is sample size.

Table 16. Mean size (POH length) of male and female GSI sampled Skeena River Chinook salmon, all ages combined, 1984 to 2020.

Year	MALES			FEMALES		
	Average POH (mm)	SD (mm)	N	Average POH (mm)	SD (mm)	N
1984	697	119	104	755	84	141
1985	681	107	138	747	71	180
1986	748	134	111	781	62	181
1987	677	196	207	797	67	179
1988	650	164	222	790	70	198
1989	697	150	176	760	69	202
1990	656	174	201	796	59	180
1991	675	131	245	750	61	150
1992	682	133	149	768	58	121
1993	722	125	183	766	55	185
1994	722	114	162	765	59	181
1995	633	116	255	768	59	145
1996	703	116	667	762	53	597
1997	660	104	323	763	55	293
1998	663	137	190	759	63	132
1999	672	109	762	752	60	422
2000	684	96	774	753	61	316
2001	689	142	553	770	51	517
2002	659	113	841	773	66	442
2003	705	103	574	742	50	493
2004	647	112	640	760	70	357
2005	636	138	701	718	47	520
2006	644	105	738	746	54	333
2007	714	95	535	744	48	587
2008	663	109	761	759	56	436
2009	664	116	627	730	46	528
2010	645	109	516	745	50	330
2011	658	106	490	719	43	413
2012	622	109	269	725	63	228
2013	623	132	280	716	51	206
2014	595	123	354	727	59	144
2015	618	125	388	708	53	255
2016	632	127	160	704	51	184
2017	545	157	203	703	49	96
2018	603	83	254	701	53	146
2019	581	167	198	718	51	203
2020	527	168	316	731	64	145
Total	**658**	**128**	**14,267**	**748**	**61**	**10,366**

POH length is post eye orbit to hypural plate length.
SD is standard deviation.
N is sample size.

Table 17. Mean size (POH length) at age for common ages of GSI sampled female Skeena River Chinook salmon 1984 to 2020.

Year	Age 4_2 females			Age 5_2 females			Age 6_2 females			Age 7_2 females		
	POH (mm)	SD (mm)	N	POH (mm)	SD (mm)	N	POH (mm)	SD (mm)	N	POH (mm)	SD (mm)	N
1984	582	48	8	730	49	68	828	57	35	888	37	2
1985	637	76	6	725	51	107	821	66	34			
1986	679	82	8	751	47	67	814	54	64			
1987				730	56	44	829	49	96			
1988	575		1	739	46	57	828	52	96	770		1
1989	550	0	2	718	37	86	806	47	89	850		1
1990	616	82	5	738	44	18	809	41	132			
1991	643	67	2	729	43	97	806	47	30	887	45	6
1992				723	42	48	802	45	60			
1993				724	41	72	795	45	90	840		1
1994	600	14	2	726	41	61	795	45	98			
1995	645	63	6	733	31	50	794	48	71	800	35	4
1996	637	58	7	746	35	377	817	49	113	858	52	4
1997	664	88	5	741	38	143	800	45	85	910		1
1998	567	47	3	748	45	78	814	48	29			
1999	671	60	13	728	40	172	799	49	103			
2000	654	55	17	743	46	96	803	43	28	790		1
2001	575		1	755	37	144	825	51	27			
2002	663	80	7	730	41	160	809	52	180			
2003	705	23	5	733	43	354	794	59	47	890		1
2004	609	33	4	717	46	43	797	56	96	740		1
2005	715		1	704	40	123	788	43	21			
2006	647	45	11	724	44	105	779	39	103	795	9	3
2007	620	81	7	742	39	407	794	52	39			
2008	639	28	13	738	37	199	801	43	120	780		1
2009	649	49	10	724	36	340	797	45	48			
2010	628	21	10	726	32	144	774	41	103	810		1
2011	669	31	4	715	41	279	758	35	34	810		1
2012	624	26	4	698	40	109	773	43	54			
2013	600	56	4	707	41	129	786	39	24			
2014	630	44	3	711	36	80	785	56	22	790		1
2015	613	32	12	709	40	181	770	55	16			
2016	643	53	7	690	38	97	755	54	30			
2017	640	0	2	693	38	55	760	42	14			
2018	642	33	19	703	42	86	732	70	17			
2019	725	212	2	717	41	112	770	51	13			
2020	631	35	12	716	43	68	800	49	31			
1984-2020	639	58	223	727	43	4,856	800	51	2,292	836	55	30

POH length is post eye orbit to hypural plate length. SD is standard deviation. N is sample size.
Data for uncommon ages presented in the text.

Table 18. Mean size (POH length) at age for common ages of GSI sampled male Skeena River Chinook salmon 1984 to 2020.

Year	Age 3_2 males			Age 4_2 males			Age 5_2 males			Age 6_2 males			Age 7_2 males		
	POH (mm)	SD (mm)	N	POH (mm)	SD (mm)	N	POH (mm)	SD (mm)	N	POH (mm)	SD (mm)	N	POH (mm)	SD (mm)	N
1984				571	66	26	736	59	42	859	77	6	939	69	2
1985				584	41	33	700	64	62	880	83	12			
1986	320	7	2	573	66	12	727	81	38	839	77	38			
1987	329	33	20	532	65	35	743	79	45	859	74	48			
1988	322	36	10	552	53	59	711	69	44	859	64	46			
1989	357	37	18	588	40	8	698	62	84	842	74	45	798	53	2
1990	362	43	21	556	56	75	706	62	20	841	73	59	945	78	2
1991	346	31	5	543	63	69	720	63	110	857	74	25	910	42	2
1992	312	19	6	580	32	42	697	60	42	820	76	37	810		1
1993	355	39	4	557	42	25	711	65	73	830	68	58			
1994				579	46	41	728	59	62	839	67	45			
1995	349	45	8	563	42	119	706	59	74	811	76	27			
1996	345	61	16	586	48	127	730	57	342	829	79	82	1000	42	2
1997	350	28	2	583	43	127	723	68	111	813	78	20	920		1
1998	399	50	12	579	40	66	735	56	66	840	91	20			
1999	393		1	593	52	251	722	60	143	816	64	108	692		1
2000				603	46	178	740	63	149	831	61	21	850		1
2001	356	24	20	574	46	35	748	55	122	850	48	18			
2002	315		1	584	46	387	726	70	176	839	83	86	925		1
2003	351	52	8	565	68	58	726	66	378	841	82	30			
2004	370	49	2	590	40	135	705	47	47	821	67	50			
2005	398	40	33	567	44	24	695	59	121	786	79	16			
2006	354	41	22	600	43	344	716	55	130	804	70	53	843	4	2
2007	418	37	12	590	48	65	740	58	312	820	65	20			
2008	384	45	6	594	49	351	735	56	184	834	64	72			
2009	411	48	27	568	55	99	716	63	303	798	94	21	980		1
2010	426	79	10	577	51	231	726	55	113	800	53	54			
2011	411	48	15	561	52	98	709	66	257	790	56	16			
2012	344	47	5	564	55	105	693	61	83	773	56	20			
2013	375	49	31	568	50	57	702	58	107	804	98	11			
2014	351	52	23	565	57	175	708	59	57	825	72	18			
2015	360	34	27	564	55	120	706	74	151	773	92	9			
2016	413	28	14	547	45	33	694	71	50	821	65	14			
2017	383	46	68	570	66	30	671	64	45	852	130	7			
2018	456	83	4	578	60	154	690	54	49	699	27	4			
2019	354	38	30	545	68	30	720	78	66	793	70	3			
2020	356	36	106	569	53	86	705	68	51	822	77	17			
1984-2020	369	49	589	580	53	3,910	720	64	4,309	827	74	1,236	891	88	18

Table 19. Age specific escapements, proportions at age from brood year and mean age at return by brood year for large Skeena River Chinook salmon.

This table uses ages available from GSI sampled fish caught at Tyee from 1984 to 2020 to be consistent with the data used for the component CUs.

Brood Year	#					%				Mean age (yrs)
	Age 4	Age 5	Age 6	Age 7	Total	Age 4	Age 5	Age 6	Age 7	
1977*				715						
1978*			8,400	0						
1979*		20,553	6,015	0						
1980	6,791	22,142	9,602	0	38,535	17.6%	57.5%	24.9%	0.0%	5.1
1981	5,375	10,710	50,371	192	66,649	8.1%	16.1%	75.6%	0.3%	5.7
1982	2,308	32,182	27,602	639	62,731	3.7%	51.3%	44.0%	1.0%	5.4
1983	13,292	20,510	28,981	207	62,990	21.1%	32.6%	46.0%	0.3%	5.3
1984	11,884	38,357	19,946	987	71,174	16.7%	53.9%	28.0%	1.4%	5.1
1985	2,557	5,064	6,690	360	14,671	17.4%	34.5%	45.6%	2.5%	5.3
1986	8,578	22,922	35,958	1,276	68,734	12.5%	33.3%	52.3%	1.9%	5.4
1987	9,323	34,879	47,856	539	92,596	10.1%	37.7%	51.7%	0.6%	5.4
1988	15,821	49,770	39,869	606	106,067	14.9%	46.9%	37.6%	0.6%	5.2
1989	10,209	34,482	15,151	933	60,775	16.8%	56.7%	24.9%	1.5%	5.1
1990	11,584	19,544	20,152	374	51,654	22.4%	37.8%	39.0%	0.7%	5.2
1991	19,241	68,014	10,554	0	97,810	19.7%	69.5%	10.8%	0.0%	4.9
1992	13,435	24,377	7,377	114	45,303	29.7%	53.8%	16.3%	0.3%	4.9
1993	12,889	20,571	12,272	238	45,971	28.0%	44.7%	26.7%	0.5%	5.0
1994	10,356	18,837	6,437	290	35,920	28.8%	52.4%	17.9%	0.8%	4.9
1995	15,355	30,276	15,366	112	61,109	25.1%	49.5%	25.1%	0.2%	5.0
1996	23,720	78,278	10,255	186	112,440	21.1%	69.6%	9.1%	0.2%	4.9
1997	11,307	13,313	7,352	264	32,235	35.1%	41.3%	22.8%	0.8%	4.9
1998	14,767	68,121	40,064	0	122,953	12.0%	55.4%	32.6%	0.0%	5.2
1999	6,142	27,412	7,927	684	42,166	14.6%	65.0%	18.8%	1.6%	5.1
2000	36,638	43,336	11,219	0	91,193	40.2%	47.5%	12.3%	0.0%	4.7
2001	5,109	17,649	4,988	91	27,836	18.4%	63.4%	17.9%	0.3%	5.0
2002	24,490	51,142	8,963	72	84,668	28.9%	60.4%	10.6%	0.1%	4.8
2003	6,042	17,926	5,264	93	29,325	20.6%	61.1%	18.0%	0.3%	5.0
2004	16,614	46,514	14,938	79	78,144	21.3%	59.5%	19.1%	0.1%	5.0
2005	8,942	25,329	2,164	55	36,491	24.5%	69.4%	5.9%	0.2%	4.8
2006	23,010	21,368	4,353	0	48,731	47.2%	43.8%	8.9%	0.0%	4.6
2007	4,368	10,910	5,035	118	20,430	21.4%	53.4%	24.6%	0.6%	5.0
2008	6,116	27,691	4,824	107	38,738	15.8%	71.5%	12.5%	0.3%	5.0
2009	7,666	16,354	3,215	0	27,236	28.1%	60.0%	11.8%	0.0%	4.8
2010	21,178	36,547	5,293	0	63,019	33.6%	58.0%	8.4%	0.0%	4.7
2011	14,469	16,762	2,092	0	33,322	43.4%	50.3%	6.3%	0.0%	4.6
2012	5,624	10,173	2,553	0	18,350	30.6%	55.4%	13.9%	0.0%	4.8
2013	3,518	13,613	1,373	0	18,504	19.0%	73.6%	7.4%	0.0%	4.9
2014*	18,718	15,503	3,104							
2015*	3,634	7,701								
2016*	6,507									
Avg 1980-2013						22.6%	52.6%	24.3%	0.5%	5.03

*1977 to 1979 and 2014 to 2016 brood years have incomplete sampling of returns,

Table 20. Age specific escapements of large Lower Skeena River Chinook salmon and mean age at return by brood year.

Brood Year	#					%				Mean age (yrs)
	Age 4	Age 5	Age 6	Age 7	Total	Age 4	Age 5	Age 6	Age 7	
1977*				0						
1978*			809	0						
1979*		0	0	0						
1980	404	2,277	554	0	3,236	12.5%	70.4%	17.1%	0.0%	5.0
1981	414	416	3,967	0	4,797	8.6%	8.7%	82.7%	0.0%	5.7
1982	139	2,524	1,131	0	3,794	3.7%	66.5%	29.8%	0.0%	5.3
1983	361	1,131	1,532	0	3,024	11.9%	37.4%	50.7%	0.0%	5.4
1984	283	1,149	1,355	0	2,788	10.1%	41.2%	48.6%	0.0%	5.4
1985	383	136	631	0	1,150	33.3%	11.8%	54.9%	0.0%	5.2
1986	407	2,209	2,662	0	5,277	7.7%	41.9%	50.4%	0.0%	5.4
1987	158	2,281	2,156	0	4,595	3.4%	49.7%	46.9%	0.0%	5.4
1988	380	1,617	497	118	2,611	14.6%	61.9%	19.0%	4.5%	5.1
1989	0	993	1,176	0	2,169	0.0%	45.8%	54.2%	0.0%	5.5
1990	497	588	870	0	1,955	25.4%	30.1%	44.5%	0.0%	5.2
1991	705	3,699	420	0	4,824	14.6%	76.7%	8.7%	0.0%	4.9
1992	544	1,050	220	68	1,881	28.9%	55.8%	11.7%	3.6%	4.9
1993	525	1,100	812	0	2,437	21.5%	45.1%	33.3%	0.0%	5.1
1994	880	1,015	512	0	2,407	36.6%	42.2%	21.3%	0.0%	4.8
1995	1,624	2,732	1,405	0	5,761	28.2%	47.4%	24.4%	0.0%	5.0
1996	2,391	6,321	821	0	9,534	25.1%	66.3%	8.6%	0.0%	4.8
1997	351	1,063	1,210	0	2,625	13.4%	40.5%	46.1%	0.0%	5.3
1998	676	4,842	2,868	0	8,386	8.1%	57.7%	34.2%	0.0%	5.3
1999	121	860	0	0	981	12.3%	87.7%	0.0%	0.0%	4.9
2000	1,721	1,301	998	0	4,020	42.8%	32.4%	24.8%	0.0%	4.8
2001	650	1,497	144	0	2,292	28.4%	65.3%	6.3%	0.0%	4.8
2002	2,163	3,684	1,015	0	6,862	31.5%	53.7%	14.8%	0.0%	4.8
2003	433	1,792	329	0	2,554	17.0%	70.1%	12.9%	0.0%	5.0
2004	657	1,810	630	0	3,097	21.2%	58.4%	20.3%	0.0%	5.0
2005	740	1,134	176	0	2,051	36.1%	55.3%	8.6%	0.0%	4.7
2006	1,512	822	385	0	2,719	55.6%	30.2%	14.2%	0.0%	4.6
2007	235	577	113	0	925	25.4%	62.4%	12.2%	0.0%	4.9
2008	385	2,822	204	0	3,411	11.3%	82.7%	6.0%	0.0%	4.9
2009	339	817	183	0	1,339	25.3%	61.0%	13.7%	0.0%	4.9
2010	1,226	2,382	103	0	3,711	33.0%	64.2%	2.8%	0.0%	4.7
2011	366	308	0	0	675	54.3%	45.7%	0.0%	0.0%	4.5
2012	308	1,001	451	0	1,761	17.5%	56.9%	25.6%	0.0%	5.1
2013	200	677	83	0	960	20.9%	70.5%	8.6%	0.0%	4.9
2014*	1,354	580	447							
2015*	83	447								
2016*	447									
Avg 1980-2013						21.8%	52.8%	25.2%	0.2%	5.04

*1977 to 1979 and 2014 to 2016 brood years have incomplete sampling of returns,

Table 21. Age specific escapements of large Zymoetz-Fiddler Chinook salmon and mean age at return by brood year.

Brood Year	#					%				Mean age (yrs)
	Age 4	Age 5	Age 6	Age 7	Total	Age 4	Age 5	Age 6	Age 7	
1977*				0						
1978*			0	0						
1979*		223	0	0						
1980	446	1,310	280	0	2,036	21.9%	64.3%	13.8%	0.0%	4.9
1981	327	841	2,798	0	3,967	8.3%	21.2%	70.5%	0.0%	5.6
1982	140	2,239	1,948	0	4,327	3.2%	51.7%	45.0%	0.0%	5.4
1983	560	731	224	0	1,514	37.0%	48.3%	14.8%	0.0%	4.8
1984	244	0	811	0	1,055	23.1%	0.0%	76.9%	0.0%	5.5
1985	0	0	321	0	321	0.0%	0.0%	100.0%	0.0%	6.0
1986	649	963	2,229	0	3,841	16.9%	25.1%	58.0%	0.0%	5.4
1987	963	3,901	1,674	0	6,538	14.7%	59.7%	25.6%	0.0%	5.1
1988	557	1,116	994	0	2,668	20.9%	41.8%	37.3%	0.0%	5.2
1989	558	497	808	0	1,864	29.9%	26.7%	43.4%	0.0%	5.1
1990	497	1,347	916	0	2,761	18.0%	48.8%	33.2%	0.0%	5.2
1991	269	999	631	0	1,899	14.2%	52.6%	33.2%	0.0%	5.2
1992	500	883	0	0	1,383	36.1%	63.9%	0.0%	0.0%	4.6
1993	631	915	673	0	2,219	28.4%	41.3%	30.3%	0.0%	5.0
1994	549	740	0	284	1,574	34.9%	47.0%	0.0%	18.1%	5.0
1995	875	1,432	569	0	2,875	30.4%	49.8%	19.8%	0.0%	4.9
1996	1,562	5,120	558	0	7,240	21.6%	70.7%	7.7%	0.0%	4.9
1997	284	1,256	246	0	1,786	15.9%	70.3%	13.8%	0.0%	5.0
1998	698	3,195	2,180	0	6,073	11.5%	52.6%	35.9%	0.0%	5.2
1999	0	727	191	0	918	0.0%	79.2%	20.8%	0.0%	5.2
2000	2,180	2,295	836	0	5,311	41.0%	43.2%	15.7%	0.0%	4.7
2001	382	585	73	0	1,041	36.7%	56.2%	7.0%	0.0%	4.7
2002	1,756	3,004	282	0	5,042	34.8%	59.6%	5.6%	0.0%	4.7
2003	293	1,239	523	0	2,055	14.3%	60.3%	25.4%	0.0%	5.1
2004	507	1,045	758	0	2,310	21.9%	45.2%	32.8%	0.0%	5.1
2005	523	1,083	85	0	1,690	30.9%	64.1%	5.0%	0.0%	4.7
2006	1,516	1,310	296	0	3,121	48.6%	42.0%	9.5%	0.0%	4.6
2007	423	591	469	0	1,482	28.5%	39.9%	31.6%	0.0%	5.0
2008	369	1,289	130	113	1,901	19.4%	67.8%	6.8%	6.0%	5.0
2009	469	778	227	0	1,473	31.8%	52.8%	15.4%	0.0%	4.8
2010	648	1,359	173	0	2,180	29.7%	62.3%	7.9%	0.0%	4.8
2011	113	86	93	0	293	38.7%	29.6%	31.7%	0.0%	4.9
2012	86	371	618	0	1,075	8.0%	34.5%	57.4%	0.0%	5.5
2013	93	741	104	0	938	9.9%	79.0%	11.1%	0.0%	5.0
2014*	618	1,037	92							
2015*	104	554								
2016*	92									
Avg 1980-2013						23.0%	48.6%	27.7%	0.7%	5.06

*1977 to 1979 and 2014 to 2016 brood years have incomplete sampling of returns,

Table 22. Age specific escapements of large Middle Skeena River Chinook salmon and mean age at return by brood year.

Brood Year	#					%				Mean age (yrs)
	Age 4	Age 5	Age 6	Age 7	Total	Age 4	Age 5	Age 6	Age 7	
1977*				0						
1978*			597	0						
1979*		1,394	762	0						
1980	199	1,906	928	0	3,034	6.6%	62.8%	30.6%	0.0%	5.2
1981	572	1,224	13,378	156	15,330	3.7%	8.0%	87.3%	1.0%	5.9
1982	338	7,135	5,781	689	13,943	2.4%	51.2%	41.5%	4.9%	5.5
1983	1,784	2,031	4,362	0	8,177	21.8%	24.8%	53.3%	0.0%	5.3
1984	1,563	5,739	2,444	100	9,846	15.9%	58.3%	24.8%	1.0%	5.1
1985	0	535	701	0	1,235	0.0%	43.3%	56.7%	0.0%	5.6
1986	1,375	2,802	5,098	361	9,635	14.3%	29.1%	52.9%	3.7%	5.5
1987	901	3,244	7,214	0	11,358	7.9%	28.6%	63.5%	0.0%	5.6
1988	1,854	10,820	10,189	372	23,236	8.0%	46.6%	43.9%	1.6%	5.4
1989	2,885	3,821	2,234	114	9,055	31.9%	42.2%	24.7%	1.3%	5.0
1990	955	2,793	3,543	0	7,291	13.1%	38.3%	48.6%	0.0%	5.4
1991	2,234	8,914	1,115	0	12,264	18.2%	72.7%	9.1%	0.0%	4.9
1992	2,514	4,554	1,527	0	8,596	29.3%	53.0%	17.8%	0.0%	4.9
1993	3,346	4,124	2,477	0	9,947	33.6%	41.5%	24.9%	0.0%	4.9
1994	1,069	2,858	1,942	0	5,870	18.2%	48.7%	33.1%	0.0%	5.1
1995	1,524	5,147	2,966	64	9,702	15.7%	53.1%	30.6%	0.7%	5.2
1996	5,827	13,916	1,773	91	21,607	27.0%	64.4%	8.2%	0.4%	4.8
1997	2,053	2,064	1,814	0	5,930	34.6%	34.8%	30.6%	0.0%	5.0
1998	1,902	10,700	7,731	0	20,333	9.4%	52.6%	38.0%	0.0%	5.3
1999	816	3,865	1,487	305	6,473	12.6%	59.7%	23.0%	4.7%	5.2
2000	5,315	5,946	2,927	0	14,188	37.5%	41.9%	20.6%	0.0%	4.8
2001	1,274	2,988	745	42	5,049	25.2%	59.2%	14.8%	0.8%	4.9
2002	5,061	11,110	2,494	0	18,665	27.1%	59.5%	13.4%	0.0%	4.9
2003	881	4,269	1,094	0	6,244	14.1%	68.4%	17.5%	0.0%	5.0
2004	2,621	8,461	4,521	0	15,602	16.8%	54.2%	29.0%	0.0%	5.1
2005	948	5,167	383	58	6,556	14.5%	78.8%	5.8%	0.9%	4.9
2006	2,768	2,299	1,045	0	6,111	45.3%	37.6%	17.1%	0.0%	4.7
2007	468	1,857	1,114	0	3,440	13.6%	54.0%	32.4%	0.0%	5.2
2008	638	7,181	1,300	0	9,119	7.0%	78.7%	14.3%	0.0%	5.1
2009	743	2,275	883	0	3,901	19.0%	58.3%	22.6%	0.0%	5.0
2010	2,600	4,668	549	0	7,816	33.3%	59.7%	7.0%	0.0%	4.7
2011	1,009	1,785	0	0	2,794	36.1%	63.9%	0.0%	0.0%	4.6
2012	137	2,125	124	0	2,386	5.8%	89.1%	5.2%	0.0%	5.0
2013	266	3,712	87	0	4,065	6.5%	91.3%	2.1%	0.0%	5.0
2014*	2,227	1,835	286							
2015*	87	972								
2016*	286									
Avg 1980-2013						18.4%	53.2%	27.8%	0.6%	5.11

*1977 to 1979 and 2014 to 2016 brood years have incomplete sampling of returns,

Table 23. Age specific escapements of large Upper Skeena River Chinook salmon and mean age at return by brood year.

Brood Year	#					%				Mean age (yrs)
	Age 4	Age 5	Age 6	Age 7	Total	Age 4	Age 5	Age 6	Age 7	
1977*				0						
1978*			526	0						
1979*		526	553	0						
1980	395	886	296	0	1,576	25.0%	56.2%	18.8%	0.0%	4.9
1981	553	222	4,814	0	5,589	9.9%	4.0%	86.1%	0.0%	5.8
1982	222	1,313	2,350	0	3,884	5.7%	33.8%	60.5%	0.0%	5.5
1983	1,313	1,495	499	90	3,397	38.7%	44.0%	14.7%	2.6%	4.8
1984	427	1,745	810	0	2,982	14.3%	58.5%	27.2%	0.0%	5.1
1985	249	270	687	0	1,206	20.7%	22.4%	57.0%	0.0%	5.4
1986	900	1,374	4,814	1,110	8,199	11.0%	16.8%	58.7%	13.5%	5.7
1987	275	602	3,884	330	5,091	5.4%	11.8%	76.3%	6.5%	5.8
1988	1,805	7,214	4,949	0	13,968	12.9%	51.6%	35.4%	0.0%	5.2
1989	0	2,639	3,331	99	6,069	0.0%	43.5%	54.9%	1.6%	5.6
1990	1,320	1,999	3,254	88	6,661	19.8%	30.0%	48.9%	1.3%	5.3
1991	2,221	12,031	2,117	0	16,369	13.6%	73.5%	12.9%	0.0%	5.0
1992	2,465	4,498	2,188	0	9,151	26.9%	49.2%	23.9%	0.0%	5.0
1993	2,822	2,344	1,759	97	7,023	40.2%	33.4%	25.1%	1.4%	4.9
1994	1,250	1,564	969	0	3,783	33.1%	41.3%	25.6%	0.0%	4.9
1995	489	2,131	2,851	0	5,471	8.9%	39.0%	52.1%	0.0%	5.4
1996	2,712	10,367	678	0	13,757	19.7%	75.4%	4.9%	0.0%	4.9
1997	1,037	1,389	815	0	3,241	32.0%	42.9%	25.1%	0.0%	4.9
1998	881	5,195	3,839	0	9,915	8.9%	52.4%	38.7%	0.0%	5.3
1999	306	2,258	1,138	202	3,904	7.8%	57.8%	29.1%	5.2%	5.3
2000	1,807	2,465	606	0	4,879	37.0%	50.5%	12.4%	0.0%	4.8
2001	948	1,482	749	0	3,180	29.8%	46.6%	23.6%	0.0%	4.9
2002	1,550	4,122	1,405	0	7,077	21.9%	58.2%	19.9%	0.0%	5.0
2003	874	3,024	468	0	4,366	20.0%	69.3%	10.7%	0.0%	4.9
2004	937	4,348	2,743	49	8,077	11.6%	53.8%	34.0%	0.6%	5.2
2005	468	1,975	196	0	2,639	17.7%	74.8%	7.4%	0.0%	4.9
2006	878	490	291	0	1,659	52.9%	29.6%	17.5%	0.0%	4.6
2007	392	930	1,093	0	2,415	16.2%	38.5%	45.3%	0.0%	5.3
2008	291	1,249	184	0	1,724	16.9%	72.5%	10.7%	0.0%	4.9
2009	156	2,945	216	0	3,318	4.7%	88.8%	6.5%	0.0%	5.0
2010	368	1,514	279	0	2,161	17.0%	70.0%	12.9%	0.0%	5.0
2011	541	744	197	0	1,482	36.5%	50.2%	13.3%	0.0%	4.8
2012	279	1,775	146	0	2,201	12.7%	80.7%	6.7%	0.0%	4.9
2013	296	1,172	0	0	1,468	20.2%	79.8%	0.0%	0.0%	4.8
2014*	879	1,097	330							
2015*	65	726								
2016*	462									
Avg 1980-2013						19.7%	50.0%	29.3%	1.0%	5.12

*1977 to 1979 and 2014 to 2016 brood years have incomplete sampling of returns,

Table 24. Age specific escapements of large (age 4 to 7) Large Lakes Chinook salmon and mean age at return by brood year.

Brood Year	#					%				Mean age (yrs)
	Age 4	Age 5	Age 6	Age 7	Total	Age 4	Age 5	Age 6	Age 7	
1977*				301						
1978*			3,308	0						
1979*		12,180	1,165	0						
1980	3,308	9,668	3,527	0	16,503	20.0%	58.6%	21.4%	0.0%	5.0
1981	2,097	3,527	14,908	0	20,532	10.2%	17.2%	72.6%	0.0%	5.6
1982	543	12,615	7,823	0	20,980	2.6%	60.1%	37.3%	0.0%	5.3
1983	6,307	9,154	10,884	0	26,346	23.9%	34.7%	41.3%	0.0%	5.2
1984	5,825	22,157	6,817	86	34,886	16.7%	63.5%	19.5%	0.2%	5.0
1985	777	1,894	1,816	305	4,792	16.2%	39.5%	37.9%	6.4%	5.3
1986	2,727	10,205	15,554	268	28,754	9.5%	35.5%	54.1%	0.9%	5.5
1987	4,151	18,299	23,319	237	46,006	9.0%	39.8%	50.7%	0.5%	5.4
1988	8,235	24,927	15,879	0	49,041	16.8%	50.8%	32.4%	0.0%	5.2
1989	5,629	20,145	5,370	258	31,402	17.9%	64.2%	17.1%	0.8%	5.0
1990	6,162	10,485	7,664	167	24,478	25.2%	42.8%	31.3%	0.7%	5.1
1991	11,124	36,855	4,514	0	52,493	21.2%	70.2%	8.6%	0.0%	4.9
1992	6,544	10,115	2,137	50	18,846	34.7%	53.7%	11.3%	0.3%	4.8
1993	4,180	7,648	3,764	0	15,592	26.8%	49.1%	24.1%	0.0%	5.0
1994	4,386	8,567	1,446	0	14,400	30.5%	59.5%	10.0%	0.0%	4.8
1995	6,785	12,907	2,604	33	22,329	30.4%	57.8%	11.7%	0.1%	4.8
1996	6,565	27,781	2,736	0	37,082	17.7%	74.9%	7.4%	0.0%	4.9
1997	4,630	3,648	1,360	245	9,884	46.8%	36.9%	13.8%	2.5%	4.7
1998	5,765	27,289	13,740	0	46,794	12.3%	58.3%	29.4%	0.0%	5.2
1999	2,081	13,985	2,708	124	18,898	11.0%	74.0%	14.3%	0.7%	5.0
2000	18,647	21,214	3,471	0	43,331	43.0%	49.0%	8.0%	0.0%	4.6
2001	1,204	7,437	1,495	39	10,174	11.8%	73.1%	14.7%	0.4%	5.0
2002	9,049	18,614	1,838	0	29,500	30.7%	63.1%	6.2%	0.0%	4.8
2003	1,834	4,653	1,173	82	7,742	23.7%	60.1%	15.1%	1.1%	4.9
2004	7,977	22,481	5,164	0	35,622	22.4%	63.1%	14.5%	0.0%	4.9
2005	3,910	12,295	968	0	17,172	22.8%	71.6%	5.6%	0.0%	4.8
2006	9,590	9,921	960	0	20,471	46.8%	48.5%	4.7%	0.0%	4.6
2007	1,659	3,748	713	108	6,228	26.6%	60.2%	11.4%	1.7%	4.9
2008	1,691	7,842	540	0	10,073	16.8%	77.8%	5.4%	0.0%	4.9
2009	1,731	7,240	644	0	9,616	18.0%	75.3%	6.7%	0.0%	4.9
2010	8,969	16,290	1,432	0	26,691	33.6%	61.0%	5.4%	0.0%	4.7
2011	6,810	8,082	511	0	15,403	44.2%	52.5%	3.3%	0.0%	4.6
2012	3,171	2,699	622	0	6,492	48.8%	41.6%	9.6%	0.0%	4.6
2013	1,386	3,886	293	0	5,565	24.9%	69.8%	5.3%	0.0%	4.8
2014*	6,684	6,307	539							
2015*	1,760	3,037								
2016*	3,233									
Avg 1980-2013						23.9%	56.1%	19.5%	0.5%	4.96

*1977 to 1979 and 2014 to 2016 brood years have incomplete sampling of returns,

Table 25. Age specific escapements of large Kitsumkalum River Chinook salmon and mean age at return by brood year calculated from GSI samples collected at Tyee.

These estimates show the differences in mean age at maturity between the Tyee samples and the escapement samples in Appendix 4. The Kitsumkalum escapement estimates from Table 2 (Winther et al. 2021) were used to estimate escapements to other CUs.

Brood Year	#					%				Mean age (yrs)
	Age 4	Age 5	Age 6	Age 7	Total	Age 4	Age 5	Age 6	Age 7	
1977*				467						
1978*			3,034	0						
1979*		4,201	3,222	0						
1980	1,867	4,833	4,368	0	11,068	16.9%	43.7%	39.5%	0.0%	5.2
1981	1,025	3,494	10,141	0	14,660	7.0%	23.8%	69.2%	0.0%	5.6
1982	218	3,380	8,393	0	11,992	1.8%	28.2%	70.0%	0.0%	5.7
1983	2,028	4,663	11,442	179	18,312	11.1%	25.5%	62.5%	1.0%	5.5
1984	2,798	5,501	7,712	998	17,008	16.4%	32.3%	45.3%	5.9%	5.4
1985	880	2,152	2,994	0	6,026	14.6%	35.7%	49.7%	0.0%	5.4
1986	1,076	3,422	5,440	0	9,938	10.8%	34.4%	54.7%	0.0%	5.4
1987	1,853	3,060	8,787	0	13,701	13.5%	22.3%	64.1%	0.0%	5.5
1988	2,380	4,080	8,039	171	14,671	16.2%	27.8%	54.8%	1.2%	5.4
1989	314	4,409	2,571	439	7,732	4.1%	57.0%	33.3%	5.7%	5.4
1990	1,556	2,057	3,596	130	7,339	21.2%	28.0%	49.0%	1.8%	5.3
1991	1,714	3,859	1,558	0	7,132	24.0%	54.1%	21.9%	0.0%	5.0
1992	702	2,208	1,299	0	4,209	16.7%	52.5%	30.9%	0.0%	5.1
1993	779	3,248	2,373	192	6,592	11.8%	49.3%	36.0%	2.9%	5.3
1994	1,462	3,103	1,536	0	6,101	24.0%	50.9%	25.2%	0.0%	5.0
1995	3,559	5,570	5,955	0	15,084	23.6%	36.9%	39.5%	0.0%	5.2
1996	2,881	10,209	3,462	104	16,657	17.3%	61.3%	20.8%	0.6%	5.0
1997	1,702	3,506	2,191	0	7,398	23.0%	47.4%	29.6%	0.0%	5.1
1998	4,251	12,622	9,671	0	26,544	16.0%	47.6%	36.4%	0.0%	5.2
1999	2,608	4,191	2,134	0	8,933	29.2%	46.9%	23.9%	0.0%	4.9
2000	5,802	8,359	2,282	0	16,444	35.3%	50.8%	13.9%	0.0%	4.8
2001	889	2,690	1,849	0	5,428	16.4%	49.6%	34.1%	0.0%	5.2
2002	3,424	8,684	1,826	84	14,016	24.4%	62.0%	13.0%	0.6%	4.9
2003	1,206	2,111	1,169	0	4,486	26.9%	47.1%	26.1%	0.0%	5.0
2004	2,967	5,428	914	0	9,308	31.9%	58.3%	9.8%	0.0%	4.8
2005	1,670	2,639	387	0	4,696	35.6%	56.2%	8.2%	0.0%	4.7
2006	5,380	5,207	1,344	0	11,931	45.1%	43.6%	11.3%	0.0%	4.7
2007	1,162	2,527	1,654	0	5,343	21.7%	47.3%	31.0%	0.0%	5.1
2008	2,420	6,174	2,120	0	10,714	22.6%	57.6%	19.8%	0.0%	5.0
2009	3,528	2,232	1,155	0	6,915	51.0%	32.3%	16.7%	0.0%	4.7
2010	5,690	9,358	2,791	0	17,840	31.9%	52.5%	15.6%	0.0%	4.8
2011	4,390	5,350	1,033	0	10,773	40.8%	49.7%	9.6%	0.0%	4.7
2012	1,396	2,348	586	0	4,330	32.2%	54.2%	13.5%	0.0%	4.8
2013	751	3,435	834	0	5,020	15.0%	68.4%	16.6%	0.0%	5.0
2014*	5,529	4,541	1,418							
2015*	1,298	1,791								
2016*	1,567									
Avg 1980-2013						22.1%	45.2%	32.2%	0.6%	5.11

*1977 to 1979 and 2014 to 2016 brood years have incomplete sampling of returns,

Table 26. Mean Chinook salmon run timing past Tyee by sample type and CU.

2009 to 2016 full sample ~May 25 to August 31

Unit	Mean run timing		10% run date	90% run date	80% duration (days)
	JD	Date			
LLK	192	11-Jul	23-Jun	31-Jul	37
KLM	199	18-Jul	02-Jul	02-Aug	30
MSK	177	26-Jun	08-Jun	12-Jul	33
USK	177	26-Jun	10-Jun	11-Jul	30
LSK	181	30-Jun	15-Jun	16-Jul	30
ZYF	176	25-Jun	11-Jun	09-Jul	27
SKN	188	07-Jul	14-Jun	30-Jul	45
2009 to 2016 truncated sample June 10 to August 31					
LLK	192	11-Jul	24-Jun	31-Jul	36
KLM	199	18-Jul	03-Jul	03-Aug	30
MSK	180	29-Jun	15-Jun	14-Jul	28
USK	179	28-Jun	16-Jun	13-Jul	26
LSK	183	02-Jul	17-Jun	17-Jul	29
ZYF	179	28-Jun	15-Jun	09-Jul	23
SKN	190	09-Jul	20-Jun	30-Jul	39
1984 to 2020 truncated sample June 10 to August 31					
LLK	190	09-Jul	12-Jun	27-Jul	44
KLM	195	14-Jul	16-Jun	30-Jul	43
MSK	178	27-Jun	14-Jun	12-Jul	27
USK	178	27-Jun	14-Jun	11-Jul	26
LSK	181	30-Jun	17-Jun	15-Jul	27
ZYF	177	26-Jun	14-Jun	09-Jul	24
SKN	187	06-Jul	16-Jun	26-Jul	39

JD = Julian day

Table 27. Spawning escapement (stock) and total production by age (recruits) for summer run Skeena River Chinook salmon upstream of Tyee, 1984 to 2015.

Brood year	Spawning Escapement	Age 4 Recruits	Age 5 Recruits	Age 6 Recruits	Total Recruits	Recruits per spawner
1984	36,425	53,750	72,009	46,846	172,604	4.7
1985	33,498	5,983	13,773	21,036	40,792	1.2
1986	22,587	38,729	53,372	43,797	135,898	6.0
1987	95,812	37,592	68,950	93,627	200,169	2.1
1988	60,156	56,086	112,198	67,152	235,436	3.9
1989	70,494	26,305	76,425	28,794	131,524	1.9
1990	33,766	23,020	39,325	29,937	92,282	2.7
1991	39,891	45,699	140,568	19,804	206,071	5.2
1992	86,980	38,478	45,830	14,169	98,476	1.1
1993	109,079	27,220	33,259	34,961	95,440	0.9
1994	86,443	24,718	42,178	11,945	78,840	0.9
1995	54,505	47,145	62,127	31,973	141,245	2.6
1996	102,507	57,722	168,774	25,133	251,630	2.5
1997	48,164	35,571	37,808	13,364	86,744	1.8
1998	38,276	46,695	114,368	62,580	223,643	5.8
1999	46,543	13,910	48,839	13,280	76,028	1.6
2000	60,636	63,199	91,304	23,060	177,563	2.9
2001	105,206	10,888	34,517	5,697	51,102	0.5
2002	38,416	70,867	113,599	18,495	202,962	5.3
2003	81,770	8,696	37,957	9,003	55,656	0.7
2004	104,347	36,163	62,962	35,241	134,367	1.3
2005	56,330	20,123	45,198	5,357	70,678	1.3
2006	54,015	31,864	42,760	8,076	82,700	1.5
2007	62,142	9,227	19,924	6,123	35,274	0.6
2008	43,554	15,087	40,186	8,262	63,535	1.5
2009	60,749	13,169	23,227	4,108	40,504	0.7
2010	63,328	28,616	62,133	8,677	99,426	1.6
2011	27,931	27,401	32,664	3,156	63,221	2.3
2012	21,408	11,186	18,839	3,081	33,106	1.5
2013	40,346	9,659	18,530	3,298	31,486	0.8
2014*	42,425	25,302	26,480	0	51,783	
2015*	54,288	6,303	0	0	6,303	

* Incomplete broods.

Table 28. Spawning escapement (stock) and total production by age (recruits) for Large Lakes CU Chinook salmon 1984 to 2015.

Brood year	Spawning Escapement	Age 4 Recruits	Age 5 Recruits	Age 6 Recruits	Total Recruits	Recruits per spawner
1984	19,097	28,681	45,039	20,759	94,479	4.9
1985	12,930	1,989	6,948	6,283	15,220	1.2
1986	7,596	15,412	27,492	20,218	63,122	8.3
1987	33,831	19,392	38,808	46,011	104,211	3.1
1988	22,802	30,688	57,485	27,432	115,605	5.1
1989	33,819	14,805	45,799	10,137	70,742	2.1
1990	11,437	12,567	21,811	11,435	45,813	4.0
1991	16,259	27,139	76,949	9,008	113,095	7.0
1992	42,393	18,944	19,959	4,584	43,486	1.0
1993	54,143	9,129	13,716	12,332	35,177	0.6
1994	42,423	11,593	22,590	2,876	37,059	0.9
1995	26,979	23,942	29,081	5,591	58,614	2.2
1996	51,321	17,372	62,549	7,424	87,345	1.7
1997	18,976	15,148	11,655	2,694	29,497	1.6
1998	14,172	20,288	49,536	22,792	92,616	6.5
1999	19,165	5,048	27,205	4,852	37,105	1.9
2000	20,918	34,051	47,611	7,473	89,135	4.3
2001	35,016	2,737	15,804	1,853	20,393	0.6
2002	12,180	27,602	43,308	4,087	74,997	6.2
2003	30,731	2,884	10,776	2,166	15,826	0.5
2004	46,617	18,697	32,269	12,644	63,609	1.4
2005	25,126	9,406	23,225	2,466	35,096	1.4
2006	20,080	14,015	21,687	1,938	37,640	1.9
2007	21,942	3,888	7,657	949	12,493	0.6
2008	14,507	4,575	12,154	1,117	17,846	1.2
2009	27,563	3,226	11,019	863	15,108	0.5
2010	27,131	13,173	30,577	2,574	46,324	1.7
2011	12,548	13,856	16,991	869	31,716	2.5
2012	6,399	6,876	5,518	841	13,234	2.1
2013	10,286	4,126	5,925	797	10,848	1.1
2014*	16,857	10,120	12,026		22,146	
2015*	23,745	3,425			3,425	

* Incomplete broods.

Table 29. Spawning escapement (stock) and total production by age (recruits) for Middle Skeena CU Chinook salmon 1984 to 2015.

Brood year	Spawning Escapement	Age 4 Recruits	Age 5 Recruits	Age 6 Recruits	Total Recruits	Recruits per spawner
1984	2,190	7,693	11,666	7,510	26,869	12.3
1985	3,240	0	1,962	2,511	4,473	1.4
1986	2,490	7,770	7,549	6,590	21,909	8.8
1987	22,297	4,207	6,880	14,678	25,766	1.2
1988	9,532	6,909	24,953	17,475	49,337	5.2
1989	10,789	7,590	8,687	4,816	21,093	2.0
1990	4,353	1,948	5,810	5,251	13,009	3.0
1991	4,503	5,451	18,612	2,163	26,225	5.8
1992	10,196	7,278	8,986	3,243	19,506	1.9
1993	21,280	7,307	7,395	8,053	22,756	1.1
1994	14,965	2,826	7,536	3,862	14,224	1.0
1995	7,633	5,379	11,597	6,384	23,361	3.1
1996	15,086	15,420	31,332	4,944	51,696	3.4
1997	9,015	6,717	6,594	3,610	16,921	1.9
1998	6,720	6,695	19,423	12,642	38,761	5.8
1999	6,860	1,980	7,519	2,759	12,258	1.8
2000	12,917	9,705	13,346	6,636	29,687	2.3
2001	18,935	2,897	6,349	934	10,179	0.5
2002	5,804	15,437	25,849	5,528	46,814	8.1
2003	13,421	1,385	9,887	1,998	13,269	1.0
2004	16,911	6,143	12,144	10,913	29,200	1.7
2005	8,707	2,281	9,760	1,003	13,044	1.5
2006	11,280	4,045	5,025	2,198	11,268	1.0
2007	12,736	1,097	3,794	1,433	6,324	0.5
2008	9,426	1,727	11,129	2,323	15,180	1.6
2009	10,503	1,384	3,462	1,183	6,029	0.6
2010	12,456	3,818	8,761	987	13,566	1.1
2011	3,150	2,053	3,752	0	5,805	1.8
2012	3,598	298	4,344	167	4,809	1.3
2013	9,038	791	5,659	238	6,687	0.7
2014*	6,174	3,372	3,499		6,872	
2015*	6,560	170			170	

* Incomplete broods.

Table 30. Spawning escapement (stock) and total production by age (recruits) for Upper Skeena CU Chinook salmon 1984 to 2015.

Brood year	Spawning Escapement	Age 4 Recruits	Age 5 Recruits	Age 6 Recruits	Total Recruits	Recruits per spawner
1984	1,448	2,103	3,547	2,579	8,229	5.7
1985	1,992	638	991	2,262	3,890	2.0
1986	740	5,087	3,703	6,403	15,193	20.5
1987	7,440	1,284	1,276	9,502	12,063	1.6
1988	4,272	6,728	16,636	8,929	32,293	7.6
1989	2,493	0	6,001	6,280	12,280	4.9
1990	2,070	2,691	4,158	4,848	11,697	5.7
1991	2,336	5,418	25,119	4,239	34,776	14.9
1992	7,222	7,136	8,876	4,645	20,657	2.9
1993	12,208	6,164	4,204	5,801	16,170	1.3
1994	9,238	3,304	4,123	2,059	9,486	1.0
1995	7,551	1,724	4,801	6,097	12,622	1.7
1996	17,849	7,178	23,341	1,824	32,342	1.8
1997	9,526	3,392	4,439	1,563	9,394	1.0
1998	5,782	3,101	9,429	6,278	18,809	3.3
1999	3,812	741	4,393	2,099	7,234	1.9
2000	5,909	3,299	5,533	1,607	10,439	1.8
2001	14,254	2,156	3,150	921	6,226	0.4
2002	2,948	4,727	9,590	3,076	17,392	5.9
2003	6,315	1,374	7,003	855	9,232	1.5
2004	7,904	2,196	6,240	6,641	15,077	1.9
2005	4,552	1,126	3,731	597	5,455	1.2
2006	3,840	1,283	1,072	587	2,942	0.8
2007	5,745	919	1,900	1,406	4,225	0.7
2008	5,366	786	1,936	329	3,051	0.6
2009	5,284	291	4,483	290	5,063	1.0
2010	5,596	541	2,841	501	3,883	0.7
2011	1,128	1,100	1,564	336	3,000	2.7
2012	1,511	605	3,629	198	4,432	2.9
2013	2,499	881	1,787	0	2,667	1.1
2014*	3,498	1,331	2,091		3,422	
2015*	2,271	126			126	

* Incomplete broods.

Table 31. Spawning escapement (stock) and total production by age (recruits) for Lower Skeena CU Chinook salmon 1984 to 2015.

Brood year	Spawning Escapement	Age 4 Recruits	Age 5 Recruits	Age 6 Recruits	Total Recruits	Recruits per spawner
1984	1,213	1,114	1,949	2,113	5,176	4.3
1985	2,692	814	252	1,430	2,497	0.9
1986	1,109	1,331	4,105	2,777	8,213	7.4
1987	6,852	515	4,071	3,806	8,392	1.2
1988	2,545	1,202	3,347	767	5,316	2.1
1989	3,065	0	2,016	2,151	4,167	1.4
1990	1,898	914	1,070	1,187	3,171	1.7
1991	2,998	1,524	7,414	695	9,632	3.2
1992	5,323	1,514	1,753	351	3,619	0.7
1993	3,772	997	1,414	1,857	4,268	1.1
1994	1,986	1,654	1,722	765	4,142	2.1
1995	2,587	3,719	4,678	2,668	11,064	4.3
1996	5,113	4,909	12,688	1,751	19,348	3.8
1997	1,994	1,043	2,715	1,918	5,677	2.8
1998	2,200	1,879	7,306	3,995	13,180	6.0
1999	3,518	250	1,430	0	1,680	0.5
2000	5,635	2,699	2,441	1,762	6,903	1.2
2001	8,077	1,236	2,670	159	4,066	0.5
2002	2,561	5,717	7,757	1,801	15,275	6.0
2003	6,173	608	3,335	523	4,467	0.7
2004	5,449	1,252	2,266	1,416	4,935	0.9
2005	1,951	1,566	1,894	378	3,838	2.0
2006	4,659	1,933	1,498	627	4,059	0.9
2007	4,262	459	968	130	1,558	0.4
2008	3,464	895	3,954	317	5,166	1.5
2009	2,880	573	1,079	203	1,856	0.6
2010	3,276	1,562	3,725	155	5,443	1.7
2011	1,233	622	534	0	1,157	0.9
2012	1,347	536	1,590	464	2,589	1.9
2013	3,274	486	784	166	1,436	0.4
2014*	2,248	1,557	844		2,402	
2015*	2,932	122			122	

* Incomplete broods.

Table 32. Spawning escapement (stock) and total production by age (recruits) for Zymoetz-Fiddler CU Chinook salmon 1984 to 2015.

Brood year	Spawning Escapement	Age 4 Recruits	Age 5 Recruits	Age 6 Recruits	Total Recruits	Recruits per spawner
1984	669	959	0	1,265	2,224	3.3
1985	1,637	0	0	727	727	0.4
1986	1,262	2,125	1,789	2,326	6,240	4.9
1987	5,597	3,144	6,961	2,955	13,060	2.3
1988	2,923	1,762	2,310	1,522	5,595	1.9
1989	224	1,320	1,009	1,349	3,678	16.4
1990	1,460	915	2,452	1,250	4,617	3.2
1991	2,246	582	2,003	1,043	3,628	1.6
1992	6,688	1,391	1,475	0	2,866	0.4
1993	3,348	1,198	1,177	1,431	3,806	1.1
1994	1,988	1,033	1,256	30	2,319	1.2
1995	2,425	2,003	2,451	1,589	6,043	2.5
1996	2,415	3,207	10,277	1,190	14,673	6.1
1997	2,144	845	3,208	389	4,443	2.1
1998	1,465	1,938	4,821	3,037	9,796	6.7
1999	2,287	0	1,208	284	1,491	0.7
2000	2,994	3,420	4,306	1,476	9,202	3.1
2001	6,257	727	1,044	81	1,851	0.3
2002	2,512	4,641	6,326	499	11,467	4.6
2003	3,440	411	2,306	830	3,548	1.0
2004	5,087	966	1,309	1,703	3,978	0.8
2005	2,869	1,105	1,808	181	3,094	1.1
2006	3,178	1,938	2,387	481	4,807	1.5
2007	3,371	826	991	540	2,358	0.7
2008	2,028	860	1,806	218	2,883	1.4
2009	2,090	793	1,027	364	2,184	1.0
2010	3,356	826	2,125	261	3,212	1.0
2011	1,817	192	150	115	458	0.3
2012	1,256	150	589	634	1,374	1.1
2013	2,226	225	858	207	1,291	0.6
2014*	1,555	710	1,510		2,220	
2015*	1,812	152			152	

* Incomplete broods.

Table 33. Spawning escapement (stock) and total production by age (recruits) for Kitsumkalum Chinook salmon 1984 to 2015.

This data uses GSI-based data rather than CWT-based data for the calculations of total mortality in the freshwater terminal fisheries.

Brood year	Spawning Escapement	Age 4 Recruits	Age 5 Recruits	Age 6 Recruits	Total Recruits	Recruits per spawner
1984	9,535	3,706	4,418	12,494	20,618	2.2
1985	9,047	170	2,953	13,460	16,583	1.8
1986	8,046	3,828	4,475	6,536	14,839	1.8
1987	15,516	2,117	6,618	19,221	27,956	1.8
1988	15,823	774	3,753	16,789	21,316	1.3
1989	17,782	707	5,109	7,981	13,798	0.8
1990	11,089	772	2,861	8,075	11,708	1.1
1991	9,236	0	4,097	1,882	5,979	0.6
1992	10,841	840	4,464	4,472	9,776	0.9
1993	13,148	504	2,686	8,059	11,248	0.9
1994	13,972	1,200	2,430	4,392	8,022	0.6
1995	6,476	7,382	8,335	14,512	30,230	4.7
1996	8,567	4,282	18,954	13,765	37,002	4.3
1997	4,647	1,530	6,111	5,627	13,267	2.9
1998	5,981	5,643	17,745	16,533	39,921	6.7
1999	9,000	3,252	6,064	4,041	13,358	1.5
2000	10,141	3,987	13,530	6,179	23,696	2.3
2001	17,830	1,738	3,407	2,794	7,939	0.4
2002	11,189	6,244	16,449	6,362	29,055	2.6
2003	17,492	400	2,772	1,616	4,789	0.3
2004	19,633	2,433	6,404	4,912	13,749	0.7
2005	11,340	1,930	3,956	2,432	8,317	0.7
2006	8,369	4,303	8,063	3,030	15,396	1.8
2007	11,709	1,380	3,576	3,415	8,371	0.7
2008	6,862	4,400	8,011	4,846	17,257	2.5
2009	8,307	3,100	4,318	1,938	9,356	1.1
2010	8,890	3,475	14,566	5,686	23,726	2.7
2011	6,706	3,271	6,093	987	10,350	1.5
2012	6,264	1,882	3,081	1,605	6,568	1.0
2013	11,311	1,113	2,682	1,197	4,993	0.4
2014*	9,993	3,421	6,603		10,023	
2015*	14,854	1,474			1,474	

* Incomplete broods.

Table 34. Model weights for each respective model, static model (1), autocorrelated static model (2) and time-varying productivity model (3) for the 6 Skeena Chinook salmon CUs and the aggregate of Skeena Chinook salmon upstream of Tyee.

CU	Weight of Static Model 1	Weight of Autocorrelated Static Model 2	Weight of time-varying productivity Model 3
Middle Skeena	0.03	0.00	0.97
Upper Skeena	0.00	0.00	0.99
Large Lakes	0.06	0.03	0.91
Lower Skeena	0.25	0.12	0.63
Zymoetz-Fiddler	0.20	0.15	0.65
Kitsumkalum	0.99	0.01	0.00
Skeena Aggregate	0.07	0.03	0.91

Table 35. Median posterior estimates for the long-term productivity, ln(α), from the autocorrelated static model (2; static model 1 for Kitsumkalum) versus recent average productivity from the last 6 brood cohorts estimated from the time-varying productivity model (3) and their 90% credible intervals for Skeena River Chinook salmon CUs and the aggregate.

CU	Autocorrelated static model (2)			Time-varying productivity model (3)		
	ln(α)	ln(α) lower 90% CI	ln(α) upper 90% CI	Recent ln(α)	Recent ln(α) lower 90% CI	Recent ln(α) upper 90% CI
Middle Skeena	1.44	1.07	1.83	0.85	0.48	1.23
Upper Skeena	1.34	0.92	1.77	0.68	0.35	1.02
Large Lakes	1.33	0.97	1.72	0.96	0.60	1.32
Lower Skeena	1.15	0.77	1.55	0.74	0.34	1.17
Zymoetz-Fiddler	1.15	0.72	1.60	0.57	0.10	1.06
Kitsumkalum	1.52	1.11	1.93	1.31	0.88	1.72
Skeena Aggregate	1.31	0.95	1.71	0.94	0.59	1.31

Table 36. S_{MSY} from the autocorrelated static model (2; static model 1 for Kitsumkalum) with 90% credible intervals compared with recent S_{MSY} from the last 6 brood cohorts estimated from the time-varying productivity model (3) with 90% credible intervals.

CU	Autocorrelated static model (2)			Time-varying productivity model (3)		
	S_{MSY}	S_{MSY} lower 90% CI	S_{MSY} upper 90% CI	Recent S_{MSY}	Recent S_{MSY} lower 90% CI	Recent S_{MSY} upper 90% CI
Middle Skeena	7,211	5,437	11,636	4,473	2,677	6,983
Upper Skeena	4,764	3,163	8,792	2,547	1,190	4,527
Large Lakes	19,223	13,957	33,949	12,259	7,759	20,338
Lower Skeena	2,228	1,661	3,612	1,397	594	2,381
Zymoetz-Fiddler	1,728	1,227	3,043	883	0	1,777
Kitsumkalum	5,261	4,467	6,725	4,327	3,402	5,811
Skeena Aggregate	42,540	31,388	69,743	27,793	18,942	43,266

Table 37. U_{MSY} from the autocorrelated static model (2; static model 1 for Kitsumkalum) with 90% credible intervals compared with recent U_{MSY} from the last 6 brood cohorts estimated from the time-varying productivity model (3) with 90% credible intervals.

CU	Autocorrelated Static Model (2)			Time-varying Productivity Model (3)		
	U_{MSY}	U_{MSY} lower 90% CI	U_{MSY} upper 90% CI	Recent U_{MSY}	Recent U_{MSY} lower 90% CI	Recent U_{MSY} upper 90% CI
Middle Skeena	0.58	0.42	0.71	0.38	0.18	0.55
Upper Skeena	0.55	0.35	0.70	0.30	0.12	0.47
Large Lakes	0.54	0.39	0.69	0.41	0.22	0.57
Lower Skeena	0.49	0.30	0.64	0.33	0.10	0.53
Zymoetz-Fiddler	0.49	0.27	0.66	0.26	0	0.50
Kitsumkalum	0.60	0.43	0.73	0.53	0.34	0.68
Skeena Aggregate	0.54	0.38	0.69	0.41	0.23	0.57

Table 38. S_{MAX} from the autocorrelated static model (2; static model 1 for Kitsumkalum) with 90% credible intervals compared with recent S_{MAX} from the last 6 brood cohorts estimated from the time-varying productivity model (3) with 90% credible intervals.

CU	Autocorrelated Static Model (2)			Time-varying Productivity Model (3)		
	S_{MAX}	S_{MAX} lower 90% CI	S_{MAX} upper 90% CI	Recent S_{MAX}	Recent S_{MAX} lower 90% CI	Recent S_{MAX} upper 90% CI
Middle Skeena	12,555	8,151	25,621	12,081	8,308	21,795
Upper Skeena	8,767	5,601	18,964	8,456	5,680	16,729
Large Lakes	35,497	21,693	80,290	29,815	20,317	58,010
Lower Skeena	4,605	2,871	10,477	4,289	2,805	8,898
Zymoetz-Fiddler	3,608	2,178	8,966	3,517	2,213	7,848
Kitsumkalum	8,799	6,297	15,025	8,301	5,920	13,854
Skeena Aggregate	79,496	48,985	171,126	68,920	46,197	129,586

Table 39. S_{Gen} from the autocorrelated static model (2; static model 1 for Kitsumkalum) with 90% credible intervals compared with recent S_{Gen} from the last 6 brood cohorts estimated from the time-varying productivity model (3) with 90% credible intervals.

CU	Autocorrelated Static Model (2)			Time-varying Productivity Model (3)		
	S_{Gen}	S_{Gen} lower 90% CI	S_{Gen} upper 90% CI	Recent S_{Gen}	Recent S_{Gen} lower 90% CI	Recent S_{Gen} upper 90% CI
Middle Skeena	2,018	953	4,858	1,121	344	3,178
Upper Skeena	1,463	700	3,506	716	145	2,658
Large Lakes	6,044	2,751	15,383	3,337	990	9,197
Lower Skeena	844	409	1,963	483	126	1,404
Zymoetz-Fiddler	655	296	1,645	356	58	2,066
Kitsumkalum	1,340	664	2,867	1,012	354	2,530
Skeena Aggregate	13,718	6,149	33,093	7,611	2,599	20,092

APPENDIX

Appendix 1. Skeena River Chinook salmon baseline samples used in the genetic analyses.

Stock name	CU*	Year	Locus specific N															Maximum
			1b	i1	3g	a1	go2	go4	oke	oki	omy	ots2	ots 201b	ots 211	ots 213	ots9	sa	
Babine	LLK	2010	179	179	179	178	178	178	178	177	179	179	178	178	179	179	178	179
Babine	LLK	2011	19	19	19	19	19	19	19	18	19	18	19	18	19		18	19
Bear	LLK	1991	88	91	86	92	90	99	99	96	90	90	22	28	15	94	95	99
Bear	LLK	1995	13	17	10	11	15	19	18	20	15	19	22	20	23	21	23	23
Bear	LLK	1996	50	50	47	50	51	53	52	52	45	51	50	49	50	51	52	53
Bear	LLK	2005	5	5	5	4	5	5	5	5	5	5	5	5	4	5	5	5
Bear	LLK	2012	91	91	91	89	91	91	91	91	91	89	91	91	92	90	92	92
Bulkley_Early	BLK	1991	92	93	87	92	91	109	110	111	81	91	93	91	93	94	111	111
Bulkley_Early	BLK	1996	11	20	28	11	68	1	23	28		65				88	4	88
Bulkley_Early	BLK	1998	197	197	181	189	208	206	206	204	204	198	6	6	6	204	208	208
Bulkley_Early	BLK	1999	135	136	121	141	142	131	131	129	139	121	269	271	250	139	124	271
Cedar_Early	CED	1996	114	111	110	109	112	114	116	116	106	114	108	115	111	115	116	116
Ecstall	ECS	1995	10	11	10	9	13	7	15	14	9	11				10	16	16
Ecstall	ECS	2000	39	41	36	34	40	35	23	36	35	39	63	58	62	42	29	63
Ecstall	ECS	2001	64	66	66	65	64	62	63	61	62	64	60	61	60	66	64	66
Ecstall	ECS	2002	60	58	59	60	58	60	59	58	59	57	74	79	68	57	56	79
Ecstall	ECS	2003	103	104	102	98	101	104	102	99	105	103				104	106	106
Exchamsiks	LSK	1995	4		6	7		8	9	9	9	4	8	7	7	9	11	11
Exchamsiks	LSK	2009	105	103	105	105	103	103	103	105	102	101	102	103	101	99	104	105
Exstew_R	LSK	2009	138	138	138	134	138	138	135	137	136	136	138	138	139	136	138	139
Fiddler_Cr	ZYF	2010	109	109	109	109	109	109	108	106	109	109	111	110	113	109	109	113
Gitnadoix	LSK	1995	13		12	14		12	19	17	18	15	11	8	11	24	22	24
Gitnadoix	LSK	2002	22	22	22	22	22	22	18	22	22	22	9	13	13	22	21	22
Gitnadoix	LSK	2003	19	19	19	19	18	18	19	20	19	19				19	20	20
Gitnadoix	LSK	2009	168	170	171	171	172	166	170	173	163	170	163	168	172	170	172	173
Kasiks_R	LSK	2009	62	61	62	61	59	59	62	61	61	61	62	62	62	63	62	63
Khyex_R	LSK	2010	35	37	35	37	37	37	37	37	37	37	36	36	37	36	37	37
Kispiox	MSK	1979	1	3			3	3	2	3	3	3				3	3	3
Kispiox	MSK	1985	21	24	9	19	23	24	24	19	12	26				26	20	26
Kispiox	MSK	1989	15	21	6	18	16	19	20	20	9	21				21	17	21
Kispiox	MSK	1991	13	17	3	9	16	17	19	11	15	17				17	17	19
Kispiox	MSK	1995	18		17	18		24	21	22	22	18	15	16	14	14	25	25
Kispiox	MSK	2004	61	60	61	59	61	57	61	59	61	61	61	62	62	61	62	62
Kispiox	MSK	2006	28	28	28	28	27	28	25	26	28	28	28	26	28	28	28	28
Kispiox	MSK	2008	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Kispiox	MSK	2010	8	8	8	8	7	8	8	8	8	8	8	8	8	8	8	8
Kitseguecla_R	MSK	2009	258	255	258	253	256	258	254	246	257	260	259	255	258	259	258	260

Appendix 1. continued.

Stock name	CU	Year	Locus specific N															Maximum
			1b	i1	3g	a1	go2	go4	oke	oki	omy	ots2	ots 201b	ots 211	ots 213	ots9	sa	
Kitsumkalum_R	KLM	1991	153	152	139	143	142	177	176	177	143	153				151	180	180
Kitsumkalum_R	KLM	1995	17	18	13	19	16	13	22	21	21	19				18	22	22
Kitsumkalum_R	KLM	1996	41	42	41	41	41	41	41	42	39	42	42	42	42	40	42	42
Kitsumkalum_R	KLM	1998	172	171	86	170	166	167	167	151	169	165	84	49	85	172	173	173
Kitsumkalum_R	KLM	2001	219	219	217	217	218	213	215	192	214	211	282	318	283	218	214	318
Kitsumkalum_R	KLM	2009	200	195	199	198	194	197	197	197	198	197	193	199	198	199	200	200
Kitwanga	MSK	1991	88	91	85	87	93	92	95	95	78	87				88	93	95
Kitwanga	MSK	1996	14	18	13	18	18	19	19	19	16	17	17	19	17	17	19	19
Kitwanga	MSK	2002	68	51	64	62	49	69	68	67	68	56	69	70	66	58	68	70
Kitwanga	MSK	2003	88	84	78	78	84	80	88	64	64	69	100	97	96	85	83	100
Kluatantan	USK	2006	7	7	7	7	6	7	7	7	7	7	7	7	7	7	7	7
Kluatantan	USK	2008	8	9	6	9	9	9	9	9	4	9	2	6		9	9	9
Kluatantan	USK	2009	14	14	14	14	14	14	14	14	14	14	14	14	14	14	13	14
Kluatantan	USK	2010	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Kluayaz_Cr	USK	2007	85	86	85	86	86	85	85	86	86	84	86	85	86	83	86	86
Kluayaz_Cr	USK	2008	19	18	18	21	21	20	18	22	19	20	19	21	20	20	19	22
Kluayaz_Cr	USK	2009	50	50	50	50	49	50	50	50	49	50	49	48	50	50	49	50
Kluayaz_Cr	USK	2010	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Kuldo_C	USK	2008	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Kuldo_C	USK	2009	166	162	165	166	164	167	168	168	168	167	168	158	168	166	168	168
Kuldo_C	USK	2010	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1
Morice_R	LLK	2010	82	82	82	82	82	81	82	81	82	81	82	82	82	81	82	82
Morice_R	LLK	2011	158	156	160	155	157	160	154	156	157	154	160	160	155	152	155	160
Nangeese_R	MSK	2010	29	31	30	32	32	32	32	32	29	30	28	30	29	30	31	32
Otsi_Cr	USK	2007	30	30	30	30	30	30	30	30	30	29	30	30	30	29	28	30
Otsi_Cr	USK	2008	48	56	50	53	58	52	53	53	52	52	55	54	53	56	54	58
Otsi_Cr	USK	2009	107	106	107	106	106	105	107	105	107	107	107	107	107	107	103	107
Otsi_Cr	USK	2010	69	69	69	69	69	69	68	69	69	68	49	69	69	68	69	69
Otsi_Cr	USK	2011	6	5	6	5	5	6	6	6	6	5	5	5	6		6	6
Shegunia_R	MSK	2009	79	79	79	78	79	77	78	79	79	79	78	77	79	78	75	79
Shegunia_R	MSK	2010	51	52	51	53	53	51	53	53	51	52	50	52	50	53	52	53
Sicintine_R	USK	2009	110	110	111	108	110	109	109	106	107	111	109	108	108	111	111	111
Sicintine_R	USK	2010	202	202	204	205	203	202	203	203	202	206	206	203	204	205	205	206
Slamgeesh	MSK	2004	34	32	34	34	34	32	34	31	34	34	33	33	34	34	34	34
Slamgeesh	MSK	2005	4	4	4	4	4	4	4	4	4	4	4	3	4	4	4	4
Slamgeesh	MSK	2006	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Slamgeesh	MSK	2007	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
Slamgeesh	MSK	2008	18	18	18	18	18	18	18	18	17	18	17	18	18	18	18	18
Slamgeesh	MSK	2009	49	49	49	49	49	49	49	47	49	49	48	49	48	49	49	49
Squingula_R	USK	2008	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Squingula_R	USK	2009	266	264	267	262	263	263	268	263	265	259	261	256	263	261	260	268

Appendix 1. continued.

Stock name	CU	Year	Locus specific N															Maximum
			1b	i1	3g	a1	go2	go4	oke	oki	omy	ots2	ots 201b	ots 211	ots 213	ots9	sa	
Suskwa	MSK	2004	20	20	19	20	19	16	21	21	20	20	13	19	14	20	20	21
Suskwa	MSK	2005	3	3	3	3	3	3	3	3	3	2	3	3	3	2	3	3
Suskwa	MSK	2009	81	79	79	83	76	77	77	76	74	78	74	77	76	75	77	83
Suskwa	MSK	2010	1	2	1	2	2	2	2	2	1	2	1	2	2	2	2	2
Sustut	USK	1995	28		28	28		28	34	36	25	28	26	28	26	30	37	37
Sustut	USK	1996	36	36	20	32	35	35	37	23	36	35	18	18	18	33	34	37
Sustut	USK	1999	78	85	73	85	83	84	83	83	88	83	87	63	87	90	87	90
Sustut	USK	2001	177	175	181	183	181	190	182	174	187	168	152	148	149	177	197	197
Sustut	USK	2002	42	44	43	43	43	46	36	43	42	39	46	45	47	38	40	47
Sustut	USK	2003					3					4				5		5
Sustut	USK	2005	47	47	47	46	47	46	44	46	47	46	47	40	44	46	46	47
Sustut	USK	2006	48	48	48	48	48	47	44	46	48	48	48	42	45	48	48	48
Sweetin	MSK	2004	43	42	42	41	41	40	41	38	43	43	42	44	42	44	43	44
Sweetin	MSK	2005	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Sweetin	MSK	2008	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Sweetin	MSK	2010	180	181	180	181	181	181	181	180	179	180	180	180	180	179	180	181
Thomas_Cr	ZYF	2003	2	2	2	2	2	2	2	2	2	2				2	2	2
Thomas_Cr	ZYF	2004	19	19	21	20	21	19	21	20	16	20	21	21	21	19	21	21
Thomas_Cr	ZYF	2009	32	32	31	31	32	30	32	31	32	32	31	31	31	32	31	32
Thomas_Cr	ZYF	2010	62	62	61	62	62	60	62	61	62	62	60	61	61	61	61	62
Zymogotitz_R	LSK	2006	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Zymogotitz_R	LSK	2009	116	119	116	116	119	118	117	116	118	117	115	116	115	116	119	119

*Abbreviations for CUs appear in Table 1.

Appendix 2. Terminal Run Total Mortality Calculations

Terminal fisheries for Skeena River Chinook salmon where GSI data were used for the exploitation rate analyses were the Tyee Test fisheries, the freshwater sport fisheries and the freshwater First Nations' fisheries. Terminal run total mortality estimates were calculated for harvests and incidental mortalities of mature Chinook salmon in the terminal area. Total mortalities by the First Nations' and sport terminal fisheries in freshwater were separated spatially into estimates upstream and downstream of Terrace (Appendix 2, Table 1).

The Tyee Test Fishery is described in the Methods section. Incidental mortalities were calculated as 4.6% of the catch for dropout mortality. There were no releases of Chinook salmon from the test fishery.

Catches of Chinook salmon in Skeena River watershed sport fisheries were available as Fishery officer estimates from 1984 to 1996. The Fishery Officer estimates were watershed wide. To separate the Fishery Officer estimates into values upstream and downstream of Terrace we applied a ratio of 2/3 of the catch to the lower river and 1/3 of the catch to the upper river based on professional opinion (E. Fast, personal communication, 2001). Creel survey estimates were available for the lower river (below Terrace) from 2002, 2003 and from 2012 to 2020. The sport fishery was closed in the Skeena River watershed in 2018. From 2010 to 2017 we generated place holder values for the upper river (upstream of Terrace) as 20% of sport catches observed in the lower river based on professional opinion and additional management actions in the upper river. Estimates were imputed from 1997 to 2001 and from 2004 to 2009 based on fishery catch estimates around these periods, fish abundance, water levels and management actions (values = 3,500 catch in 1997-2000, 2005, 2006, 2008 and 2009 with 2,500 assigned to the lower river and 1000 to the upper river). The place holder values were informed by large returns in 2001 and 2004 (values = 6,000 catch with 5,000 assigned to the lower river and 1,000 to the upper river), and floods and persistent high-water levels in 2007 (value = 500 catch in the lower river). Incidental mortalities were calculated as 6.9% of the catch as drop-off mortality and 5% of the released fish as release mortalities (Cox-Rogers et al. 1999) (Appendix 2, Table 1).

Data for catches of Chinook salmon in First Nations's fisheries were available as Fisheries Officer estimates from 1984 to 1992 and as Aboriginal Fisheries Strategy (AFS) estimates from 1993 to 2020. Incidental mortalities were calculated as 4.6% of the catch for dropout mortality. Releases were assumed to be zero (Appendix 2, Table 1).

Total mortalities below Terrace were calculated as the sum of catch and incidental mortality estimates for the Tyee Test, sport and First Nations' fisheries. Total mortalities upstream of Terrace were the sum of catch and incidental mortality estimates for sport and First Nations' fisheries (Appendix 2, Table 1).

Catch estimates for terminal fisheries upstream of Tyee included age 3 fish. Some sport fisheries and some First Nations' fisheries included catch estimates for "jacks". The jack designation was problematic as the size of a jack could differ between fisheries and years. Further, the most common size designation for jacks was Chinook salmon less than 65 cm nose-fork length. Skeena River Chinook salmon between 55 cm and 65 cm nose-fork length were predominantly age 4 and these fish often made up much of the jack catch. In fisheries where catch estimates included separate large and jack components, the estimates were combined into a total catch estimate. The annual age proportions from Tyee were then applied to the total catch estimate for the fishery. Age 3 fish were subtracted and the remaining catch estimates for age 4 through 7 fish were assigned to the appropriate cohort (Appendix 2, Table 2). This removed the age 3 fish from the terminal catches and solved the problem of differences in size designations for jacks through time and across fisheries. Calculations below refer to age 4 through 7 (large) Chinook salmon.

The Ecstall, Cedar (Kitsumkalum-early) and upper Bulkley CUs were removed from the calculations of terminal run upstream of Tyee. We assumed contributions by the Ecstall CU to terminal fisheries upstream of Tyee to be zero. Terminal fisheries other than the Tyee Test Fishery occur after the spring timed CUs have passed. Contributions by the early timed CU's of Cedar (Kitsumkalum-early) and upper Bulkley were assumed to be zero in terminal fisheries. We use the contributions by the remaining six summer run Skeena River CUs upstream of Tyee to assign catch and incidental mortalities from terminal fisheries to specific CUs (Appendix 2, Table 3).

The cohort analyses required age specific terminal mortality estimates for each CU in each year. The procedure for assigning total freshwater terminal mortalities by fisheries in the lower river, or *TFTM lower* for each CU, age, and year was the same for all six CUs. For each year, the proportion of the CU measured at Tyee ($\%\ at\ Tyee_{CU,year}$) was corrected (to remove Ecstall, Bulkley and Cedar CUs) by dividing by the sum of the proportions for the 6 summer run CUs at Tyee: Lower Skeena, Kitumkalum, Zymoetz-Fiddler, Large Lakes, Middle Skeena, and Upper Skeena ($\%\ at\ Tyee_{6CUs,year}$) (Appendix 2, Table 3). The corrected proportion was multiplied by the total terminal mortalities in the lower Skeena (*TFTM lower*) and by the proportion for the specific age (*% Age*). The results are age specific total mortality estimates for each CU by the fisheries below Terrace (*TFTM lower*) (Appendix 2, Table 4, Appendix 2, Table 5, and Appendix 2, Table 6).

$$TFTM\ lower_{CU,Age,year} = TFTM\ lower_{year} \times \%Age_{CU,year} \times \frac{\%\ at\ Tyee_{CU,year}}{\sum \%\ at\ Tyee_{6CUs,year}} \quad (44)$$

The procedure for assigning total terminal mortalities for CUs upstream of Terrace, or *TFTM upper*, required an additional step. The method above was used to calculate total terminal mortality estimates by fisheries below Terrace for each CU. The total terminal mortalities by fisheries upstream of Terrace were estimated as follows: For each year, the proportion of the CU measured at Tyee ($\%\ at\ Tyee_{CU,year}$) was divided by the sum of the proportions for the 3 summer run CUs upstream of Terrace ($\%\ at\ Tyee_{3.upper.CUs}$), which were Large Lakes, Middle Skeena, and Upper Skeena (Appendix 2, Table 3). This proportion was multiplied by the total terminal mortalities in the upper Skeena (*TFTM upper*) and the age proportion ($\%\ Age_{CU,year}$) to get the total mortalities for the CU for each age and return year ($TFTM\ upper_{year}$). The result was age specific total mortality estimates for each CU based on the fisheries upstream of Terrace (Appendix 2, Table 7, Appendix 2, Table 8, and Appendix 2, Table 9). This estimate was subtracted from the return to Terrace for the CU to determine escapement. Total terminal mortalities upstream of Terrace were assumed to be zero for the CUs adjacent to or downstream of Terrace (Kitsumkalum, Zymoetz-Fiddler and Lower Skeena CUs).

$$TFTM\ upper_{CU,Age,year} = TFTM\ upper_{year} \times \%\ Age_{CU,year} \times \frac{\%\ at\ Tyee_{CU,year}}{\sum \%\ at\ Tyee_{3\ upper\ CUs,\ year}} \quad (45)$$

$$TFTM_{\ CU,Age,year} = TFTM\ upper_{CU,Age,year} + TFTM\ lower_{CU,Age,year} \quad (46)$$

$$Escapement_{CU,Age,year} = ReturntoTerrace_{CU,Age,year} - TFTM\ upper_{CU,Age,year} \quad (47)$$

The terminal run total mortality estimates for the Skeena aggregate of summer run Chinook salmon returns represent the sum of the total mortality calculations for the six CUs above. They can also be calculated from the Skeena return to Terrace and the terminal total mortality estimates upstream and downstream of Terrace (Appendix 2, Table 10).

The final step in calculating terminal run total mortality estimates (TTM_{CU}) was to add the terminal marine total mortalities calculated from CWT's to the total mortalities in freshwater calculated above. The exploitation rates for terminal marine net fisheries (coded TNBC TERM N by the CTC) and terminal marine Sport fisheries (coded TNBC TERM S by the CTC) were summed (sums in Appendix 8) and divided by 1 minus the natural origin spawning escapement for the CU ($Natural\ origin\ spawners_{\ CU}$) to get the terminal marine total mortalities ($TMTM_{CU}$). The terminal marine total mortalities were added to the freshwater total mortalities ($TFTM_{CU}$) calculated above to get the terminal total mortalities for the CU (TTM_{CU}).

$$TMTM_{\ CU,Age,year} = \frac{ER\ terminal\ net\ and\ marine\ sport_{\ KLM,Age,year}}{1 - Natural\ origin\ spawners_{\ CU,Age,year}} \quad (48)$$

$$TTM_{\ CU,Age,year} = TFTM_{\ CU,Age,year} + TMTM_{\ CU,Age,year} \quad (49)$$

The terminal total mortalities for the CU (TTM_{CU}) were applied to the calculations in equations 14 and 16.

Appendix 2, Table 1. Catch and incidental mortality estimates for terminal fisheries on Skeena River Chinook salmon upstream of Tyee.

Includes age 3 fish.

Year	Tyee catch	Tyee IM	FW Sport catch below Terrace	FW Sport releases below Terrace	FW Sport IM below Terrace	FW Sport catch above Terrace	FW Sport IM above Terrace
1984	740	34	1,984		137	992	68
1985	657	30	1,350		93	675	47
1986	878	40	2,007		138	1,003	69
1987	863	40	1,683		116	842	58
1988	825	38	2,197		152	1,098	76
1989	761	35	3,014		208	1,507	104
1990	759	35	2,440		168	1,220	84
1991	627	29	2,960		204	1,480	102
1992	565	26	3,353		231	1,677	116
1993	795	37	4,555		314	2,277	157
1994	539	25	1,467		101	733	51
1995	346	16	1,865		129	933	64
1996	2,237	103	833		57	417	29
1997	1,637	75	2,500		173	1,000	69
1998	1,481	68	2,500		173	1,000	69
1999	2,339	108	2,500		173	1,000	69
2000	3,084	142	2,500		173	1,000	69
2001	3,232	149	5,000		345	1,000	69
2002	1,546	71	3,962		273		0
2003	1,770	81	6,280	1,092	488		0
2004	1,087	50	5,000		345	1,000	69
2005	1,332	61	2,500		173	1,000	69
2006	1,229	57	2,500		173	1,000	69
2007	1,418	65	500		35		0
2008	1,401	64	2,500		173	1,000	69
2009	1,322	61	2,500		173	1,000	69
2010	1,043	48	2,351		162	470	32
2011	1,104	51	1,694		117	339	23
2012	645	30	676		47	135	9
2013	642	30	2,390	958	213	478	33
2014	604	28	3,865	428	288	773	53
2015	852	39	4,914	584	368	983	68
2016	499	23	3,230	1,615	304	646	45
2017	538	25	1,240	2,149	193	248	17
2018	530	24	0	0	0	0	0
2019	473	22	762	141	60	0	0
2020	550	25	1,072	451	97	0	0

Appendix 2, Table 1 continued. Catch and incidental mortality estimates for terminal fisheries on Skeena River Chinook salmon upstream of Tyee.

Includes age 3 fish.

Year	FN catch below Terrace	FN IM below Terrace	FN catch above Terrace	FN IM above Terrace	Total catch & IM below Terrace	Total catch & IM above Terrace
1984	1,568	72	7,900	363	8,169	9,324
1985	3,130	144	10,300	474	13,239	11,495
1986	6,236	287	10,653	490	14,456	12,215
1987	4,318	199	7,900	363	9,819	9,163
1988	3,745	172	13,700	630	20,536	15,504
1989	5,414	249	9,400	432	16,901	11,443
1990	5,112	235	17,855	821	15,908	19,981
1991	3,167	146	11,700	538	14,751	13,820
1992	0	0	11,361	523	13,340	13,676
1993	4,306	198	9,569	440	19,773	12,443
1994	1,638	75	8,140	374	11,752	9,298
1995	714	33	5,724	263	7,925	6,985
1996	1,164	54	4,828	222	19,619	5,496
1997	1,434	66	6,289	289	17,634	7,647
1998	1,669	77	9,783	450	10,327	11,302
1999	1,775	82	15,345	706	13,149	17,120
2000	991	46	12,296	566	17,470	13,931
2001	1,000	46	10,354	476	12,219	11,899
2002	83	4	6,207	286	12,136	6,493
2003	331	15	10,472	482	14,340	10,954
2004	158	7	10,924	503	11,611	12,496
2005	306	14	6,939	319	7,693	8,327
2006	73	3	6,235	287	7,286	7,591
2007	114	5	4,816	222	6,427	5,038
2008	439	20	7,887	363	9,542	9,319
2009	476	22	5,576	256	7,778	6,901
2010	124	6	6,115	281	6,016	6,899
2011	366	17	3,764	173	5,345	4,300
2012	175	8	2,533	117	1,909	2,794
2013	19	1	2,142	99	4,337	2,752
2014	149	7	3,365	155	5,383	4,346
2015	515	24	5,850	269	7,362	7,170
2016	74	3	3,532	162	4,133	4,385
2017	239	11	4,474	206	2,246	4,945
2018	509	23	5,983	275	1,087	6,258
2019	180	8	4,460	205	1,505	4,665
2020	329	15	3,904	180	2,088	4,084

Appendix 2, Table 2. Age composition of Skeena River Chinook salmon and terminal fishery total mortality estimates of large Skeena River Chinook salmon.
Large = age 3 fish removed.

Year	Skeena Age 3	Skeena Age 4	Skeena Age 5	Skeena Age 6	Skeena Age 7	Catch & IM of large below Terrace	Catch & IM of large above Terrace
1984	1.0%	18.4%	55.8%	22.8%	1.9%	4,491	9,233
1985	0.0%	16.0%	66.0%	17.9%	0.0%	5,404	11,495
1986	1.6%	10.0%	46.6%	41.8%	0.0%	9,433	12,019
1987	7.1%	12.9%	31.2%	48.8%	0.0%	6,705	8,511
1988	5.1%	18.7%	32.3%	43.5%	0.3%	6,763	14,708
1989	5.4%	3.4%	51.4%	38.9%	0.9%	9,155	10,822
1990	6.8%	23.6%	14.0%	55.0%	0.6%	8,151	18,614
1991	1.6%	23.0%	56.5%	16.5%	2.4%	7,017	13,596
1992	2.4%	17.7%	39.1%	40.3%	0.4%	4,074	13,345
1993	2.3%	9.1%	44.6%	42.9%	1.1%	9,972	12,159
1994	0.0%	13.4%	39.9%	46.1%	0.6%	3,845	9,298
1995	2.7%	34.3%	34.9%	27.0%	1.1%	3,019	6,796
1996	1.4%	12.9%	65.4%	19.4%	0.9%	4,384	5,417
1997	1.7%	26.3%	49.7%	21.5%	0.8%	5,784	7,516
1998	4.3%	25.9%	51.4%	18.4%	0.0%	5,713	10,821
1999	0.4%	32.8%	40.3%	26.3%	0.2%	6,950	17,057
2000	0.2%	39.0%	49.8%	10.6%	0.4%	6,921	13,903
2001	5.2%	10.2%	70.5%	13.8%	0.3%	9,261	11,278
2002	0.6%	38.2%	34.4%	26.5%	0.3%	5,905	6,455
2003	0.9%	7.4%	82.5%	8.9%	0.2%	8,885	10,855
2004	0.5%	34.9%	26.1%	38.2%	0.3%	6,614	12,433
2005	9.6%	8.2%	69.5%	12.7%	0.0%	3,965	7,527
2006	3.2%	43.9%	31.6%	20.1%	1.2%	3,906	7,349
2007	1.4%	9.6%	81.1%	7.9%	0.0%	2,106	4,965
2008	1.3%	37.6%	40.6%	20.3%	0.2%	4,536	9,195
2009	3.3%	14.2%	74.0%	8.4%	0.1%	4,402	6,672
2010	2.6%	35.4%	38.9%	23.0%	0.1%	3,638	6,722
2011	2.2%	15.3%	74.7%	7.6%	0.3%	3,275	4,205
2012	1.3%	28.2%	50.3%	20.1%	0.3%	1,560	2,758
2013	8.3%	17.4%	62.9%	11.4%	0.0%	3,020	2,523
2014	6.7%	46.5%	35.9%	10.6%	0.3%	4,609	4,054
2015	5.2%	25.2%	63.7%	5.6%	0.2%	6,361	6,795
2016	6.7%	19.0%	56.5%	17.8%	0.0%	3,856	4,092
2017	31.1%	15.4%	44.4%	9.1%	0.0%	1,547	3,406
2018	1.6%	52.8%	38.4%	7.2%	0.0%	1,069	6,158
2019	11.2%	15.7%	67.1%	5.9%	0.0%	1,336	4,143
2020	27.9%	27.1%	32.1%	12.9%	0.0%	1,506	2,946

Appendix 2, Table 3. Proportions at Tyee of the six Skeena River summer run CUs upstream of Tyee.

Year	% LSK at Tyee	% KLM at Tyee	% ZYF at Tyee	%LLK at Tyee	%MSK at Tyee	%USK at Tyee	Sum of 6 CUs at Tyee	Sum of 3 CUs above Terrace
1984	2.7%	20.9%	1.5%	58.8%	6.7%	4.5%	95.0%	70.0%
1985	6.0%	20.2%	3.6%	46.9%	11.8%	7.2%	95.6%	65.9%
1986	3.2%	23.3%	3.6%	46.3%	15.2%	4.5%	96.1%	65.9%
1987	6.6%	14.9%	5.4%	36.8%	24.2%	8.1%	95.9%	69.1%
1988	3.4%	21.2%	3.9%	42.7%	17.8%	8.0%	97.0%	68.5%
1989	3.8%	21.9%	0.3%	51.1%	16.3%	3.8%	97.1%	71.2%
1990	3.6%	21.2%	2.8%	44.6%	17.0%	8.1%	97.2%	69.6%
1991	5.6%	17.3%	4.2%	48.3%	13.4%	6.9%	95.7%	68.6%
1992	5.3%	10.8%	6.7%	51.7%	12.4%	8.8%	95.7%	72.9%
1993	3.1%	10.9%	2.8%	50.8%	20.0%	11.5%	99.0%	82.3%
1994	2.1%	14.6%	2.1%	50.5%	17.8%	11.0%	98.0%	79.3%
1995	4.2%	10.6%	4.0%	51.1%	14.5%	14.3%	98.6%	79.8%
1996	4.7%	8.0%	2.2%	50.6%	14.9%	17.6%	98.0%	83.1%
1997	3.6%	8.4%	3.8%	40.9%	19.4%	20.5%	96.7%	80.8%
1998	4.5%	12.2%	3.0%	40.6%	19.2%	16.5%	96.0%	76.3%
1999	5.5%	14.2%	3.6%	47.3%	16.9%	9.4%	97.0%	73.7%
2000	7.6%	13.6%	4.0%	37.9%	23.4%	10.7%	97.2%	71.9%
2001	6.9%	15.3%	5.4%	35.0%	18.9%	14.3%	95.9%	68.2%
2002	5.7%	25.0%	5.6%	35.5%	16.9%	8.6%	97.3%	61.0%
2003	6.7%	18.9%	3.7%	40.3%	17.6%	8.3%	95.5%	66.2%
2004	4.7%	16.8%	4.4%	46.9%	17.0%	7.9%	97.6%	71.8%
2005	3.1%	17.8%	4.5%	47.0%	16.3%	8.5%	97.2%	71.8%
2006	7.6%	13.7%	5.2%	39.5%	22.2%	7.6%	95.8%	69.3%
2007	6.3%	17.5%	5.0%	36.7%	21.3%	9.6%	96.5%	67.6%
2008	6.6%	13.1%	3.8%	36.1%	23.5%	13.4%	96.4%	72.9%
2009	4.3%	12.4%	3.1%	47.1%	18.0%	9.0%	93.9%	74.1%
2010	4.7%	12.7%	4.8%	44.5%	20.4%	9.2%	96.3%	74.1%
2011	3.8%	21.0%	5.6%	48.7%	12.2%	4.4%	95.8%	65.3%
2012	5.6%	26.0%	5.2%	32.8%	18.4%	7.7%	95.7%	59.0%
2013	7.6%	26.5%	5.2%	26.7%	23.5%	6.5%	96.0%	56.7%
2014	4.8%	21.6%	3.3%	41.8%	15.3%	8.7%	95.5%	65.7%
2015	4.8%	24.4%	3.0%	46.9%	13.0%	4.5%	96.5%	64.4%
2016	2.3%	30.0%	1.1%	49.9%	9.7%	5.1%	98.1%	64.7%
2017	6.3%	21.5%	2.9%	32.8%	17.0%	16.2%	96.7%	66.0%
2018	6.0%	23.3%	4.8%	35.9%	19.4%	7.0%	96.5%	62.4%
2019	3.0%	27.1%	5.1%	46.1%	11.1%	6.4%	98.7%	63.6%
2020	6.6%	23.6%	3.6%	43.6%	9.9%	9.7%	97.1%	63.3%

Abbreviations for CUs appear in Table 1.

Appendix 2, Table 4. Age proportions at Tyee and estimates of total terminal mortalities (TTM) by age for returns of Lower Skeena CU Chinook salmon 1984 to 2020.

Year	% Age 4	% Age 5	%Age 6	% Age 7	TTM Age 4	TTM Age 5	TTM Age 6	TTM Age7	TTM large
1984	33.3%	0.0%	66.7%	0.0%	42	0	84	0	125
1985	15.4%	84.6%	0.0%	0.0%	52	286	0	0	338
1986	12.5%	37.5%	50.0%	0.0%	39	118	157	0	314
1987	5.3%	36.8%	57.9%	0.0%	24	169	266	0	459
1988	11.1%	44.4%	44.4%	0.0%	26	105	105	0	237
1989	12.5%	37.5%	50.0%	0.0%	44	133	178	0	355
1990	21.4%	7.1%	71.4%	0.0%	65	22	217	0	304
1991	5.3%	73.7%	21.1%	0.0%	22	303	86	0	411
1992	7.1%	42.9%	50.0%	0.0%	16	97	113	0	226
1993	0.0%	42.9%	57.1%	0.0%	0	134	179	0	313
1994	25.0%	50.0%	25.0%	0.0%	20	41	20	0	81
1995	27.3%	22.7%	45.5%	4.5%	35	29	59	6	129
1996	10.6%	72.3%	17.0%	0.0%	23	153	36	0	212
1997	26.3%	52.6%	21.1%	0.0%	56	113	45	0	214
1998	40.0%	50.0%	10.0%	0.0%	107	133	27	0	266
1999	46.2%	28.8%	23.1%	1.9%	183	114	91	8	396
2000	42.4%	48.5%	9.1%	0.0%	228	261	49	0	538
2001	4.3%	78.3%	17.4%	0.0%	29	524	116	0	670
2002	26.4%	41.5%	32.1%	0.0%	91	144	111	0	346
2003	2.0%	78.4%	19.6%	0.0%	12	486	122	0	620
2004	31.6%	15.8%	52.6%	0.0%	100	50	166	0	316
2005	33.3%	66.7%	0.0%	0.0%	42	83	0	0	125
2006	46.4%	32.1%	21.4%	0.0%	144	100	66	0	310
2007	10.2%	86.4%	3.4%	0.0%	14	120	5	0	139
2008	19.0%	51.7%	29.3%	0.0%	59	160	91	0	309
2009	25.7%	62.9%	11.4%	0.0%	51	126	23	0	200
2010	46.2%	34.6%	19.2%	0.0%	82	61	34	0	177
2011	19.0%	66.7%	14.3%	0.0%	25	87	19	0	131
2012	28.6%	42.9%	28.6%	0.0%	26	39	26	0	91
2013	10.3%	86.2%	3.4%	0.0%	25	207	8	0	240
2014	54.5%	36.4%	9.1%	0.0%	127	85	21	0	233
2015	12.5%	81.3%	6.3%	0.0%	40	257	20	0	316
2016	42.9%	42.9%	14.3%	0.0%	38	38	13	0	89
2017	16.7%	83.3%	0.0%	0.0%	17	83	0	0	100
2018	54.5%	27.3%	18.2%	0.0%	37	18	12	0	67
2019	11.1%	77.8%	11.1%	0.0%	5	32	5	0	41
2020	33.3%	33.3%	33.3%	0.0%	34	34	34	0	103

Appendix 2, Table 5. Age proportions at Tyee and estimates of total terminal mortalities (TTM) by age for large returns of Zymoetz-Fiddler CU Chinook salmon 1984 to 2020.

Year	% Age 4	% Age 5	%Age 6	% Age 7	TTM Age 4	TTM Age 5	TTM Age 6	TTM Age7	TTM large
1984	66.7%	33.3%	0.0%	0.0%	46	23	0	0	69
1985	20.0%	80.0%	0.0%	0.0%	41	164	0	0	205
1986	11.1%	66.7%	22.2%	0.0%	40	238	79	0	357
1987	10.0%	40.0%	50.0%	0.0%	37	150	187	0	375
1988	8.3%	25.0%	66.7%	0.0%	23	68	181	0	272
1989	0.0%	0.0%	100.0%	0.0%	0	0	26	0	26
1990	44.4%	0.0%	55.6%	0.0%	104	0	130	0	234
1991	42.9%	42.9%	14.3%	0.0%	132	132	44	0	308
1992	8.3%	58.3%	33.3%	0.0%	24	165	95	0	284
1993	16.7%	33.3%	50.0%	0.0%	46	93	139	0	278
1994	25.0%	25.0%	50.0%	0.0%	20	20	41	0	81
1995	11.1%	55.6%	33.3%	0.0%	13	67	40	0	121
1996	20.7%	41.4%	37.9%	0.0%	21	41	38	0	100
1997	29.4%	41.2%	29.4%	0.0%	68	95	68	0	230
1998	37.5%	62.5%	0.0%	0.0%	67	111	0	0	177
1999	38.2%	32.4%	29.4%	0.0%	98	83	76	0	258
2000	52.2%	47.8%	0.0%	0.0%	149	137	0	0	286
2001	4.5%	81.8%	9.1%	4.5%	24	425	47	24	519
2002	27.8%	50.0%	22.2%	0.0%	94	170	75	0	340
2003	0.0%	92.9%	7.1%	0.0%	0	321	25	0	346
2004	42.9%	14.3%	42.9%	0.0%	126	42	126	0	295
2005	13.3%	80.0%	6.7%	0.0%	24	146	12	0	183
2006	55.3%	18.4%	26.3%	0.0%	117	39	56	0	211
2007	8.7%	89.1%	2.2%	0.0%	10	98	2	0	110
2008	25.0%	61.1%	13.9%	0.0%	45	110	25	0	181
2009	25.0%	50.0%	25.0%	0.0%	36	73	36	0	145
2010	45.2%	32.3%	22.6%	0.0%	82	58	41	0	181
2011	23.3%	72.1%	4.7%	0.0%	45	139	9	0	193
2012	29.4%	47.1%	23.5%	0.0%	25	40	20	0	85
2013	21.1%	57.9%	21.1%	0.0%	34	94	34	0	163
2014	41.7%	50.0%	8.3%	0.0%	67	81	13	0	161
2015	6.3%	75.0%	12.5%	6.3%	12	146	24	12	195
2016	25.0%	25.0%	50.0%	0.0%	11	11	21	0	43
2017	16.7%	66.7%	16.7%	0.0%	8	31	8	0	46
2018	31.3%	37.5%	31.3%	0.0%	17	20	17	0	53
2019	8.3%	83.3%	8.3%	0.0%	6	57	6	0	68
2020	12.5%	75.0%	12.5%	0.0%	7	42	7	0	57

Appendix 2, Table 6. Age proportions at Tyee and estimates of total terminal mortalities (TTM) by age for large returns of Kitsumkalum CU Chinook salmon 1984 to 2020.

Year	% Age 4	% Age 5	%Age 6	% Age 7	TTM Age 4	TTM Age 5	TTM Age 6	TTM Age7	TTM large
1984	19.5%	43.9%	31.7%	4.9%	193	435	314	48	990
1985	11.3%	53.2%	35.5%	0.0%	129	607	404	0	1140
1986	2.7%	43.2%	54.1%	0.0%	62	990	1237	0	2289
1987	13.0%	21.7%	65.2%	0.0%	136	226	679	0	1042
1988	17.6%	29.4%	52.9%	0.0%	260	434	781	0	1476
1989	4.9%	30.9%	64.2%	0.0%	102	637	1325	0	2065
1990	9.7%	19.4%	69.4%	1.6%	172	344	1234	29	1779
1991	20.0%	36.9%	32.3%	10.8%	254	469	410	137	1270
1992	21.9%	28.1%	50.0%	0.0%	101	130	231	0	462
1993	2.4%	31.0%	66.7%	0.0%	26	339	730	0	1094
1994	11.1%	31.5%	57.4%	0.0%	64	181	329	0	573
1995	26.3%	31.6%	39.5%	2.6%	86	103	128	9	325
1996	8.2%	44.9%	41.8%	5.1%	29	160	149	18	356
1997	16.7%	47.2%	33.3%	2.8%	84	237	167	14	502
1998	24.3%	54.1%	21.6%	0.0%	177	393	157	0	728
1999	39.4%	34.3%	26.3%	0.0%	401	349	267	0	1017
2000	28.3%	54.7%	15.1%	1.9%	275	532	147	18	972
2001	9.5%	57.1%	33.3%	0.0%	141	847	494	0	1482
2002	37.9%	31.3%	30.9%	0.0%	575	474	468	0	1517
2003	14.9%	72.0%	12.5%	0.6%	262	1268	220	10	1760
2004	29.5%	21.3%	49.2%	0.0%	336	243	561	0	1140
2005	7.8%	73.4%	18.8%	0.0%	57	534	136	0	726
2006	40.8%	32.0%	27.2%	0.0%	227	179	152	0	558
2007	10.3%	74.0%	15.8%	0.0%	39	282	60	0	382
2008	43.0%	30.6%	26.4%	0.0%	264	188	163	0	615
2009	20.0%	65.0%	14.0%	1.0%	116	377	81	6	580
2010	60.2%	29.5%	10.2%	0.0%	290	142	49	0	482
2011	17.2%	77.1%	5.7%	0.0%	123	553	41	0	717
2012	38.5%	40.2%	21.4%	0.0%	163	170	91	0	424
2013	31.1%	54.4%	14.6%	0.0%	259	453	121	0	833
2014	56.7%	22.2%	21.1%	0.0%	590	231	220	0	1042
2015	29.5%	62.8%	7.8%	0.0%	473	1009	125	0	1606
2016	14.6%	56.1%	29.3%	0.0%	173	662	346	0	1181
2017	18.2%	56.8%	25.0%	0.0%	63	196	86	0	345
2018	57.9%	36.0%	6.1%	0.0%	149	93	16	0	258
2019	19.4%	68.1%	12.5%	0.0%	71	249	46	0	366
2020	32.8%	37.5%	29.7%	0.0%	120	137	109	0	366

Appendix 2, Table 7. Age proportions at Tyee and estimates of total terminal mortalities (TTM) by age for large returns of Middle Skeena CU Chinook salmon 1984 to 2020.

Year	% Age 4	% Age 5	%Age 6	% Age 7	TTM Age 4	TTM Age 5	TTM Age 6	TTM Age7	TTM large
1984	9.1%	63.6%	27.3%	0.0%	110	769	329	0	1,208
1985	17.6%	58.8%	23.5%	0.0%	479	1,597	639	0	2,715
1986	13.6%	49.2%	37.3%	0.0%	577	2,090	1,586	0	4,253
1987	8.0%	32.0%	60.0%	0.0%	374	1,497	2,808	0	4,679
1988	16.4%	21.3%	60.7%	1.6%	832	1,081	3,077	83	5,074
1989	0.0%	53.2%	40.4%	6.4%	0	2,136	1,624	256	4,016
1990	31.6%	12.3%	56.1%	0.0%	1,882	732	3,345	0	5,959
1991	20.0%	62.2%	15.6%	2.2%	726	2,259	565	81	3,631
1992	18.2%	31.8%	50.0%	0.0%	510	892	1,402	0	2,804
1993	13.6%	50.8%	33.9%	1.7%	673	2,524	1,683	84	4,965
1994	6.4%	25.5%	68.1%	0.0%	178	712	1,897	0	2,787
1995	29.3%	36.6%	29.3%	4.9%	490	612	490	82	1,673
1996	16.7%	59.1%	23.5%	0.8%	273	966	384	12	1,635
1997	37.1%	50.5%	12.4%	0.0%	1,102	1,499	367	0	2,968
1998	15.9%	61.4%	22.7%	0.0%	616	2,375	880	0	3,870
1999	22.2%	41.7%	36.1%	0.0%	1,141	2,140	1,854	0	5,135
2000	45.1%	39.8%	15.0%	0.0%	2,790	2,464	930	0	6,184
2001	10.8%	73.5%	15.7%	0.0%	538	3,646	777	0	4,961
2002	32.8%	35.6%	30.6%	1.1%	923	1,001	861	31	2,816
2003	6.1%	79.7%	13.5%	0.7%	275	3,607	611	31	4,525
2004	31.4%	22.9%	45.7%	0.0%	1,287	936	1,872	0	4,094
2005	14.6%	68.3%	17.1%	0.0%	347	1,620	405	0	2,372
2006	44.9%	26.5%	25.9%	2.7%	1,463	864	846	88	3,261
2007	6.9%	87.2%	5.9%	0.0%	140	1,770	119	0	2,029
2008	27.8%	45.3%	26.5%	0.4%	1,129	1,840	1,075	18	4,062
2009	9.0%	80.6%	10.4%	0.0%	222	1,981	256	0	2,459
2010	22.2%	41.5%	36.3%	0.0%	583	1,089	953	0	2,625
2011	14.9%	73.0%	12.2%	0.0%	179	880	147	0	1,205
2012	17.7%	51.6%	29.0%	1.6%	206	600	338	19	1,163
2013	8.2%	79.5%	12.3%	0.0%	147	1,417	220	0	1,784
2014	42.1%	36.8%	21.1%	0.0%	708	620	354	0	1,682
2015	15.4%	71.2%	13.5%	0.0%	342	1,582	299	0	2,223
2016	5.6%	72.2%	22.2%	0.0%	55	720	221	0	996
2017	11.1%	88.9%	0.0%	0.0%	128	1,024	0	0	1,152
2018	36.7%	61.2%	2.0%	0.0%	784	1,307	44	0	2,135
2019	4.3%	91.3%	4.3%	0.0%	38	796	38	0	872
2020	18.5%	63.0%	18.5%	0.0%	114	387	114	0	614

Appendix 2, Table 8. Age proportions at Tyee and estimates of total terminal mortalities (TTM) by age for large returns of Upper Skeena CU Chinook salmon 1984 to 2020.

Year	% Age 4	% Age 5	%Age 6	% Age 7	TTM Age 4	TTM Age 5	TTM Age 6	TTM Age7	TTM large
1984	27.3%	36.4%	36.4%	0.0%	218	290	290	0	798
1985	27.8%	44.4%	27.8%	0.0%	464	742	464	0	1,669
1986	30.0%	30.0%	40.0%	0.0%	379	379	505	0	1,263
1987	17.6%	17.6%	64.7%	0.0%	276	276	1,010	0	1,561
1988	10.0%	35.0%	55.0%	0.0%	227	796	1,251	0	2,274
1989	10.0%	70.0%	20.0%	0.0%	93	649	186	0	928
1990	43.5%	13.0%	39.1%	4.3%	1,232	370	1,109	123	2,834
1991	11.8%	58.8%	29.4%	0.0%	222	1,108	554	0	1,884
1992	25.0%	8.3%	66.7%	0.0%	497	166	1,324	0	1,986
1993	0.0%	59.1%	31.8%	9.1%	0	1,683	906	259	2,848
1994	14.3%	28.6%	53.6%	3.6%	246	492	922	61	1,720
1995	29.4%	26.5%	44.1%	0.0%	487	438	730	0	1,655
1996	13.8%	67.4%	18.2%	0.6%	267	1,304	353	11	1,935
1997	29.6%	47.2%	22.2%	0.9%	929	1,481	697	29	3,137
1998	21.6%	40.5%	37.8%	0.0%	720	1,350	1,260	0	3,330
1999	12.8%	41.0%	46.2%	0.0%	366	1,171	1,317	0	2,853
2000	45.9%	36.1%	16.4%	1.6%	1,299	1,020	464	46	2,829
2001	7.3%	72.7%	20.0%	0.0%	272	2,716	747	0	3,734
2002	29.9%	47.1%	23.0%	0.0%	428	674	329	0	1,431
2003	4.8%	82.3%	12.9%	0.0%	103	1,751	275	0	2,129
2004	22.9%	28.6%	48.6%	0.0%	437	547	930	0	1,914
2005	20.8%	54.2%	25.0%	0.0%	258	672	310	0	1,240
2006	40.4%	38.6%	15.8%	5.3%	448	428	175	58	1,110
2007	15.2%	71.7%	13.0%	0.0%	139	657	119	0	915
2008	17.5%	56.3%	26.2%	0.0%	404	1,303	606	0	2,312
2009	8.9%	82.3%	8.9%	0.0%	110	1,018	110	0	1,237
2010	15.7%	35.3%	49.0%	0.0%	185	416	578	0	1,179
2011	34.8%	43.5%	17.4%	4.3%	150	188	75	19	432
2012	19.2%	61.5%	19.2%	0.0%	94	301	94	0	488
2013	6.3%	50.0%	43.8%	0.0%	31	247	216	0	493
2014	10.5%	84.2%	5.3%	0.0%	100	802	50	0	953
2015	23.8%	66.7%	9.5%	0.0%	183	513	73	0	769
2016	21.4%	57.1%	21.4%	0.0%	112	300	112	0	525
2017	13.0%	78.3%	8.7%	0.0%	143	856	95	0	1,094
2018	40.0%	53.3%	6.7%	0.0%	309	413	52	0	774
2019	5.6%	94.4%	0.0%	0.0%	28	476	0	0	504
2020	30.4%	47.8%	21.7%	0.0%	184	289	131	0	604

Appendix 2, Table 9. Age proportions at Tyee and estimates of total terminal mortalities (TTM) by age for large returns of Skeena Large Lakes CU Chinook salmon 1984 to 2020.

Year	% Age 4	% Age 5	%Age 6	% Age 7	TTM Age 4	TTM Age 5	TTM Age 6	TTM Age7	TTM large
1984	17.3%	63.8%	17.3%	1.6%	1,825	6,718	1,825	166	10,533
1985	16.2%	74.8%	9.0%	0.0%	1,757	8,100	976	0	10,833
1986	7.1%	46.4%	46.4%	0.0%	927	6,024	6,024	0	12,975
1987	18.6%	37.3%	44.1%	0.0%	1,324	2,647	3,129	0	7,100
1988	25.5%	40.1%	34.3%	0.0%	3,101	4,873	4,164	0	12,138
1989	2.3%	65.5%	32.2%	0.0%	289	8,247	4,051	0	12,588
1990	23.8%	16.6%	59.6%	0.0%	3,733	2,592	9,332	0	15,657
1991	25.5%	62.8%	11.2%	0.5%	3,347	8,228	1,464	70	13,110
1992	19.4%	43.2%	36.7%	0.7%	2,265	5,033	4,278	84	11,659
1993	10.4%	46.0%	43.1%	0.5%	1,313	5,816	5,440	63	12,632
1994	14.5%	47.5%	37.4%	0.6%	1,147	3,751	2,957	44	7,900
1995	41.2%	38.9%	19.9%	0.0%	2,438	2,298	1,177	0	5,912
1996	12.8%	71.8%	14.9%	0.5%	709	3,995	831	28	5,563
1997	22.0%	53.3%	23.8%	0.9%	1,376	3,331	1,486	55	6,248
1998	31.0%	54.0%	15.1%	0.0%	2,526	4,405	1,231	0	8,162
1999	35.4%	44.7%	19.6%	0.3%	5,079	6,414	2,818	37	14,348
2000	31.4%	61.7%	6.9%	0.0%	3,143	6,179	693	0	10,015
2001	13.2%	79.3%	7.4%	0.0%	1,213	7,278	682	0	9,174
2002	47.3%	29.9%	22.5%	0.3%	2,797	1,770	1,327	16	5,910
2003	6.8%	88.8%	4.4%	0.0%	701	9,200	459	0	10,360
2004	40.0%	30.0%	29.5%	0.5%	4,515	3,386	3,327	59	11,287
2005	4.8%	84.4%	10.8%	0.0%	328	5,780	738	0	6,846
2006	45.1%	37.0%	17.3%	0.6%	2,616	2,150	1,003	36	5,805
2007	8.4%	84.8%	6.8%	0.0%	292	2,966	238	0	3,496
2008	55.0%	32.1%	12.7%	0.3%	3,437	2,005	792	17	6,251
2009	14.2%	81.6%	4.3%	0.0%	915	5,263	275	0	6,453
2010	35.3%	45.3%	19.0%	0.3%	2,021	2,591	1,088	17	5,717
2011	13.2%	79.1%	7.7%	0.0%	635	3,796	370	0	4,801
2012	26.4%	58.6%	15.0%	0.0%	547	1,211	310	0	2,068
2013	16.8%	76.2%	6.9%	0.0%	342	1,548	141	0	2,030
2014	53.2%	42.9%	3.2%	0.6%	2,443	1,972	147	29	4,592
2015	28.7%	68.6%	2.7%	0.0%	2,308	5,520	218	0	8,046
2016	25.0%	63.7%	11.3%	0.0%	1,279	3,258	577	0	5,114
2017	30.2%	58.7%	11.1%	0.0%	668	1,301	246	0	2,216
2018	59.7%	34.7%	5.6%	0.0%	2,354	1,368	219	0	3,941
2019	21.1%	75.4%	3.5%	0.0%	764	2,737	127	0	3,628
2020	47.5%	44.6%	7.9%	0.0%	1,286	1,208	214	0	2,709

Appendix 2, Table 10. Age proportions at Tyee and estimates of total terminal mortalities (TTM) by age for large returns of the Skeena River aggregate of Chinook salmon upstream of Tyee 1984 to 2020.

Year	% Age 4	% Age 5	%Age 6	% Age 7	TTM Age 4	TTM Age 5	TTM Age 6	TTM Age7	TTM large
1984	18.6%	56.4%	23.0%	2.0%	2,556	7,737	3,162	269	13,724
1985	16.0%	66.0%	17.9%	0.0%	2,709	11,159	3,032	0	16,900
1986	10.2%	47.3%	42.4%	0.0%	2,189	10,157	9,106	0	21,452
1987	13.9%	33.6%	52.6%	0.0%	2,110	5,109	7,997	0	15,216
1988	19.7%	34.1%	45.9%	0.3%	4,239	7,316	9,846	68	21,470
1989	3.6%	54.4%	41.1%	0.9%	724	10,864	8,208	181	19,978
1990	25.4%	15.0%	59.0%	0.6%	6,794	4,011	15,797	164	26,765
1991	23.4%	57.4%	16.8%	2.5%	4,814	11,836	3,454	510	20,613
1992	18.2%	40.1%	41.3%	0.4%	3,167	6,982	7,198	72	17,420
1993	9.4%	45.6%	43.9%	1.2%	2,071	10,095	9,706	259	22,131
1994	13.4%	39.9%	46.1%	0.6%	1,761	5,241	6,060	82	13,143
1995	35.3%	35.8%	27.8%	1.1%	3,462	3,517	2,726	109	9,815
1996	13.1%	66.3%	19.7%	0.9%	1,284	6,501	1,926	89	9,801
1997	26.7%	50.6%	21.9%	0.8%	3,557	6,727	2,913	103	13,300
1998	27.0%	53.7%	19.3%	0.0%	4,470	8,880	3,184	0	16,535
1999	33.0%	40.4%	26.3%	0.2%	7,914	9,709	6,325	59	24,007
2000	39.1%	49.9%	10.6%	0.4%	8,142	10,392	2,209	82	20,825
2001	10.7%	74.4%	14.6%	0.3%	2,207	15,277	2,999	57	20,539
2002	38.4%	34.6%	26.7%	0.3%	4,747	4,280	3,297	36	12,360
2003	7.5%	83.3%	9.0%	0.2%	1,482	16,438	1,774	45	19,740
2004	35.1%	26.3%	38.4%	0.3%	6,686	5,002	7,311	48	19,047
2005	9.1%	76.9%	14.1%	0.0%	1,041	8,834	1,616	0	11,492
2006	45.3%	32.7%	20.8%	1.3%	5,100	3,676	2,336	142	11,255
2007	9.7%	82.3%	8.0%	0.0%	687	5,816	567	0	7,071
2008	38.1%	41.1%	20.6%	0.2%	5,233	5,646	2,823	29	13,731
2009	14.7%	76.5%	8.7%	0.1%	1,629	8,473	959	13	11,074
2010	36.3%	40.0%	23.6%	0.1%	3,762	4,141	2,442	15	10,360
2011	15.6%	76.4%	7.7%	0.3%	1,168	5,712	579	21	7,480
2012	28.5%	50.9%	20.3%	0.3%	1,232	2,198	877	11	4,319
2013	19.0%	68.6%	12.5%	0.0%	1,052	3,800	691	0	5,543
2014	49.9%	38.5%	11.4%	0.3%	4,319	3,336	984	24	8,663
2015	26.6%	67.3%	5.9%	0.2%	3,503	8,848	778	26	13,156
2016	20.3%	60.6%	19.1%	0.0%	1,615	4,813	1,520	0	7,948
2017	22.3%	64.5%	13.3%	0.0%	1,104	3,193	656	0	4,953
2018	53.7%	39.0%	7.3%	0.0%	3,878	2,820	529	0	7,227
2019	17.7%	75.6%	6.7%	0.0%	971	4,142	367	0	5,479
2020	37.6%	44.5%	17.9%	0.0%	1,673	1,980	798	0	4,452

Appendix 3. Tables of Skeena Chinook return to Terrace using options of all age data collected at Tyee and the sub-sample of age data for GSI sampled fish.

Age specific escapements of large Skeena River Chinook salmon and mean age at return by brood year.

This table uses all complete ages available from Tyee 1984 to 2020, not just from GSI sampled fish. The escapement calculations use the age composition from the DNA sampled fish to be consistent with the samples of the component CUs so they add up. Age at maturity results were essentially the same here as the GSI sub-sample because of large sample sizes.

Brood Year	#					%				Mean age (yrs)
	Age 4	Age 5	Age 6	Age 7	Total	Age 4	Age 5	Age 6	Age 7	
1977				660						
1978			8,084	0						
1979		20,621	5,832	0						
1980	7,094	22,355	9,602	0	39,051	18.2%	57.2%	24.6%	0.0%	5.1
1981	5,346	10,710	50,371	184	66,611	8.0%	16.1%	75.6%	0.3%	5.7
1982	2,308	32,182	27,015	637	62,143	3.7%	51.8%	43.5%	1.0%	5.4
1983	13,292	20,399	28,894	204	62,789	21.2%	32.5%	46.0%	0.3%	5.3
1984	12,589	38,242	20,155	966	71,951	17.5%	53.1%	28.0%	1.3%	5.1
1985	2,762	4,988	6,761	358	14,869	18.6%	33.5%	45.5%	2.4%	5.3
1986	8,449	22,644	35,810	1,532	68,435	12.3%	33.1%	52.3%	2.2%	5.4
1987	9,551	35,094	47,507	509	92,660	10.3%	37.9%	51.3%	0.5%	5.4
1988	15,756	50,265	39,422	588	106,031	14.9%	47.4%	37.2%	0.6%	5.2
1989	9,808	35,607	14,996	866	61,276	16.0%	58.1%	24.5%	1.4%	5.1
1990	10,936	19,259	19,059	441	49,696	22.0%	38.8%	38.4%	0.9%	5.2
1991	19,700	67,882	10,592	0	98,174	20.1%	69.1%	10.8%	0.0%	4.9
1992	14,727	24,361	7,522	151	46,761	31.5%	52.1%	16.1%	0.3%	4.9
1993	12,798	20,615	13,270	271	46,955	27.3%	43.9%	28.3%	0.6%	5.0
1994	10,168	18,185	7,188	320	35,862	28.4%	50.7%	20.0%	0.9%	4.9
1995	14,972	30,471	15,568	110	61,121	24.5%	49.9%	25.5%	0.2%	5.0
1996	22,741	79,651	10,348	184	112,923	20.1%	70.5%	9.2%	0.2%	4.9
1997	9,703	13,147	8,027	262	31,139	31.2%	42.2%	25.8%	0.8%	5.0
1998	14,841	67,402	39,863	0	122,106	12.2%	55.2%	32.6%	0.0%	5.2
1999	6,189	27,537	7,903	641	42,269	14.6%	65.1%	18.7%	1.5%	5.1
2000	36,716	43,377	10,898	0	90,991	40.4%	47.7%	12.0%	0.0%	4.7
2001	5,093	17,437	4,948	89	27,568	18.5%	63.3%	17.9%	0.3%	5.0
2002	25,066	51,323	8,853	72	85,314	29.4%	60.2%	10.4%	0.1%	4.8
2003	5,900	17,885	5,264	91	29,140	20.2%	61.4%	18.1%	0.3%	5.0
2004	16,767	46,514	14,975	78	78,333	21.4%	59.4%	19.1%	0.1%	5.0
2005	8,942	25,385	2,140	54	36,521	24.5%	69.5%	5.9%	0.1%	4.8
2006	22,919	21,442	4,330	0	48,691	47.1%	44.0%	8.9%	0.0%	4.6
2007	4,319	10,880	5,035	118	20,351	21.2%	53.5%	24.7%	0.6%	5.0
2008	6,171	27,691	4,824	107	38,792	15.9%	71.4%	12.4%	0.3%	5.0
2009	7,666	16,354	3,215	0	27,236	28.1%	60.0%	11.8%	0.0%	4.8
2010	21,178	36,547	5,293	0	63,019	33.6%	58.0%	8.4%	0.0%	4.7
2011	14,469	16,762	2,092	0	33,322	43.4%	50.3%	6.3%	0.0%	4.6
2012	5,624	10,173	2,553	0	18,350	30.6%	55.4%	13.9%	0.0%	4.8
2013	3,518	13,613	1,373	0	18,504	19.0%	73.6%	7.4%	0.0%	4.9
2014	18,718	15,503	3,104							
2015	3,634	7,701								
2016	6,507									
Avg 1980-2013						22.5%	52.5%	24.4%	0.5%	5.03

1977 to 1979 and 2014 to 2016 brood years have incomplete sampling of returns, Age specific returns to Terrace and escapements of large Skeena River Chinook salmon by return year from age data for GSI sampled fish.

This table uses the age composition from the DNA sampled fish to be consistent with the data applied to the component CUs.

Return Year	Return to Terrace					Escapement				
	Age 4	Age 5	Age 6	Age 7	Total	Age 4	Age 5	Age 6	Age 7	Total
1984	8,511	25,758	10,527	896	45,692	6,791	20,553	8,400	715	36,459
1985	7,204	29,964	7,859	0	45,028	5,375	22,142	6,015	0	33,532
1986	3,535	16,401	14,704	0	34,640	2,308	10,710	9,602	0	22,621
1987	14,473	35,040	54,845	0	104,357	13,292	32,182	50,371	0	95,846
1988	16,473	25,259	32,947	220	74,899	11,884	20,510	27,602	192	60,187
1989	3,186	44,109	33,327	735	81,357	2,557	38,357	28,981	639	70,535
1990	13,303	7,853	30,933	321	52,409	8,578	5,064	19,946	207	33,795
1991	12,839	30,293	9,088	1,298	53,518	9,323	22,922	6,690	987	39,922
1992	18,248	40,228	41,472	415	100,363	15,821	34,879	35,958	360	87,018
1993	11,347	55,317	53,189	1,418	121,271	10,209	49,770	47,856	1,276	109,112
1994	12,442	39,061	43,690	579	95,771	11,584	34,482	39,869	539	86,473
1995	21,639	21,980	17,038	682	61,339	19,241	19,544	15,151	606	54,543
1996	15,505	71,468	20,066	912	107,952	13,435	68,014	20,152	933	102,535
1997	14,795	28,161	12,244	510	55,709	12,889	24,377	10,554	374	48,193
1998	13,282	26,382	9,461	0	49,126	10,356	20,571	7,377	0	38,304
1999	20,454	24,845	18,130	207	63,635	15,355	18,837	12,272	114	46,578
2000	27,952	37,454	8,836	333	74,575	23,720	30,276	6,437	238	60,672
2001	10,743	88,186	17,236	354	116,519	11,307	78,278	15,366	290	105,241
2002	17,333	15,354	12,086	129	44,902	14,767	13,313	10,255	112	38,447
2003	7,010	76,346	9,092	208	92,656	6,142	68,121	7,352	186	81,802
2004	41,193	30,895	44,429	294	116,811	36,638	27,412	40,064	264	104,378
2005	5,773	49,169	8,958	0	63,900	5,109	43,336	7,927	0	56,372
2006	28,474	19,808	12,380	728	61,391	24,490	17,649	11,219	684	54,042
2007	6,437	55,232	5,468	0	67,136	6,042	51,142	4,988	0	62,172
2008	20,118	21,707	10,854	110	52,788	16,614	17,926	8,963	91	43,594
2009	9,933	51,572	5,880	79	67,464	8,942	46,514	5,264	72	60,792
2010	25,350	28,077	16,563	101	70,092	23,010	25,329	14,938	93	63,370
2011	5,025	24,579	2,490	91	32,184	4,368	21,368	2,164	79	27,979
2012	6,965	12,280	4,887	61	24,193	6,116	10,910	4,353	55	21,434
2013	8,145	29,420	5,349	0	42,914	7,666	27,691	5,035	0	40,392
2014	23,200	17,915	5,284	129	46,529	21,178	16,354	4,824	118	42,475
2015	16,278	41,117	3,617	121	61,134	14,469	36,547	3,215	107	54,339
2016	6,455	19,239	6,076	0	31,770	5,624	16,762	5,293	0	27,679
2017	4,277	12,369	2,543	0	19,189	3,518	10,173	2,092	0	15,783
2018	22,023	16,017	3,003	0	41,042	18,718	13,613	2,553	0	34,884
2019	4,368	18,635	1,650	0	24,653	3,634	15,503	1,373	0	20,510
2020	7,614	9,011	3,632	0	20,258	6,507	7,701	3,104	0	17,312

Appendix 4. Age specific escapements of large Kitsumkalum River Chinook salmon and mean age at return by brood year from escapement sampling.

These data were from escapement samples collected on the Kitsumkalum River as part of the mark-recapture program (Winther et al. 2021).

Brood Year	#					%				Mean age (yrs)
	Age 4	Age 5	Age 6	Age 7	Total	Age 4	Age 5	Age 6	Age 7	
1977*				188						
1978*			5,500	0						
1979*		2,322	2,737	11						
1980	1,559	5,457	3,822	0	10,838	14.4%	50.4%	35.3%	0.0%	5.2
1981	887	3,521	11,991	411	16,810	5.3%	20.9%	71.3%	2.4%	5.7
1982	726	3,022	12,553	199	16,500	4.4%	18.3%	76.1%	1.2%	5.7
1983	537	2,031	14,271	126	16,965	3.2%	12.0%	84.1%	0.7%	5.8
1984	859	3,237	8,097	638	12,831	6.7%	25.2%	63.1%	5.0%	5.7
1985	116	1,711	5,661	58	7,546	1.5%	22.7%	75.0%	0.8%	5.8
1986	1,184	2,347	6,254	28	9,813	12.1%	23.9%	63.7%	0.3%	5.5
1987	621	4,394	11,094	370	16,479	3.8%	26.7%	67.3%	2.2%	5.7
1988	173	1,761	10,770	169	12,873	1.3%	13.7%	83.7%	1.3%	5.8
1989	298	2,445	4,711	411	7,865	3.8%	31.1%	59.9%	5.2%	5.7
1990	417	1,634	5,673	48	7,772	5.4%	21.0%	73.0%	0.6%	5.7
1991	0	2,173	1,363	38	3,574	0.0%	60.8%	38.1%	1.1%	5.4
1992	338	3,011	3,150	16	6,515	5.2%	46.2%	48.3%	0.2%	5.4
1993	254	2,200	3,998	94	6,546	3.9%	33.6%	61.1%	1.4%	5.6
1994	621	1,807	3,051	0	5,479	11.3%	33.0%	55.7%	0.0%	5.4
1995	3,214	4,973	7,788	81	16,056	20.0%	31.0%	48.5%	0.5%	5.3
1996	2,059	9,565	6,733	218	18,575	11.1%	51.5%	36.2%	1.2%	5.3
1997	512	2,571	3,517	78	6,678	7.7%	38.5%	52.7%	1.2%	5.5
1998	1,835	12,248	12,016	15	26,114	7.0%	46.9%	46.0%	0.1%	5.4
1999	1,541	4,782	2,889	0	9,212	16.7%	51.9%	31.4%	0.0%	5.1
2000	2,788	7,510	3,699	30	14,027	19.9%	53.5%	26.4%	0.2%	5.1
2001	968	2,305	2,733	52	6,058	16.0%	38.0%	45.1%	0.9%	5.3
2002	2,392	8,407	3,656	68	14,523	16.5%	57.9%	25.2%	0.5%	5.1
2003	569	1,861	1,155	74	3,659	15.6%	50.9%	31.6%	2.0%	5.2
2004	1,333	5,988	2,272	0	9,593	13.9%	62.4%	23.7%	0.0%	5.1
2005	1,139	2,934	1,174	49	5,296	21.5%	55.4%	22.2%	0.9%	5.0
2006	3,652	4,753	1,838	24	10,267	35.6%	46.3%	17.9%	0.2%	4.8
2007	827	2,383	3,079	142	6,431	12.9%	37.1%	47.9%	2.2%	5.4
2008	2,020	6,228	3,150	80	11,478	17.6%	54.3%	27.4%	0.7%	5.1
2009	2,026	3,629	1,726	150	7,531	26.9%	48.2%	22.9%	2.0%	5.0
2010	3,122	10,406	3,844	16	17,388	18.0%	59.8%	22.1%	0.1%	5.0
2011	2,693	4,368	889	0	7,950	33.9%	54.9%	11.2%	0.0%	4.8
2012	1,177	2,231	1,716	50	5,174	22.7%	43.1%	33.2%	1.0%	5.1
2013	995	4,288	690	132	6,105	16.3%	70.2%	11.3%	2.2%	5.0
2014*	3,545	4,944	1,953							
2015*	989	2,127								
2016*	565									
Avg 1980-2013						12.7%	40.9%	45.3%	1.1%	5.35

*1977 to 1979 and 2014 to 2016 brood years have incomplete sampling of returns.

Appendix 5. Run timing data and cumulative run timing curves for individual years compared to average run timing curves for the full and truncated data sets for the Skeena aggregate and the six component CUs.

MUZ is the combination of Middle Skeena, Upper Skeena and Zymoetz-Fiddler CUs. Abbreviations for CUs appear in Table 1.

Appendix 5, Table 1. Mean annual Chinook salmon run timing in Julian day past Tyee by CU and group for years when the test fishery started approximately May 25, 2009 to 2016.

Year	KLM	LLK	LSK	MSK	USK	ZYF	MUZ	SKN
2009	195	190.9	178.3	176.5	175.5	174.8	176.0	185.5
2010	197	186.6	176.5	171.2	172.5	176.1	172.2	182.2
2011	200	191.8	181.9	176.6	177.3	178.4	177.2	189.2
2012	199	193.6	181.7	176.9	181.7	180.6	178.6	188.3
2013	195	188.3	177.1	173.5	169.6	169.7	172.3	182.5
2014	195	189.4	188.0	183.3	178.9	181.0	181.9	188.5
2015	206	200.7	175.3	179.6	182.3	171.6	179.3	196.1
2016	203	192.4	187.2	177.7	177.9	178.4	177.8	192.3
Avg	199	191.7	180.8	176.9	177.0	176.3	176.9	188.1
Min	195	186.6	175.3	171.2	169.6	169.7	172.2	182.2
Max	206	200.7	188.0	183.3	182.3	181.0	181.9	196.1

Appendix 5, Table 2. Mean run timing, duration of run and portion of run before June 10 for the complete data set 2009 to 2016 by CU and group.

CU or group	Mean run timing (JD)	Mean run timing (date)	10% run past Tyee (date)	90% run past Tyee (date)	Duration for 80% of run to pass (days)	% of run prior to 10 June
KLM	198.8	18-Jul	02-Jul	02-Aug	30	0.8%
LLK	191.7	11-Jul	23-Jun	31-Jul	37	1.8%
LSK	180.8	30-Jun	15-Jun	16-Jul	30	6.4%
MSK	176.9	26-Jun	08-Jun	12-Jul	33	12.6%
USK	177.0	26-Jun	10-Jun	11-Jul	30	9.9%
ZYF	176.3	25-Jun	11-Jun	09-Jul	27	9.3%
MUZ	176.9	26-Jun	09-Jun	12-Jul	32	11.3%
SKN	188.1	07-Jul	14-Jun	30-Jul	45	6.3%

JD = Julian day

Appendix 5, Table 3. Mean run timing and duration of run for the 2009 to 2016 data set truncated to June 10 by CU and group.

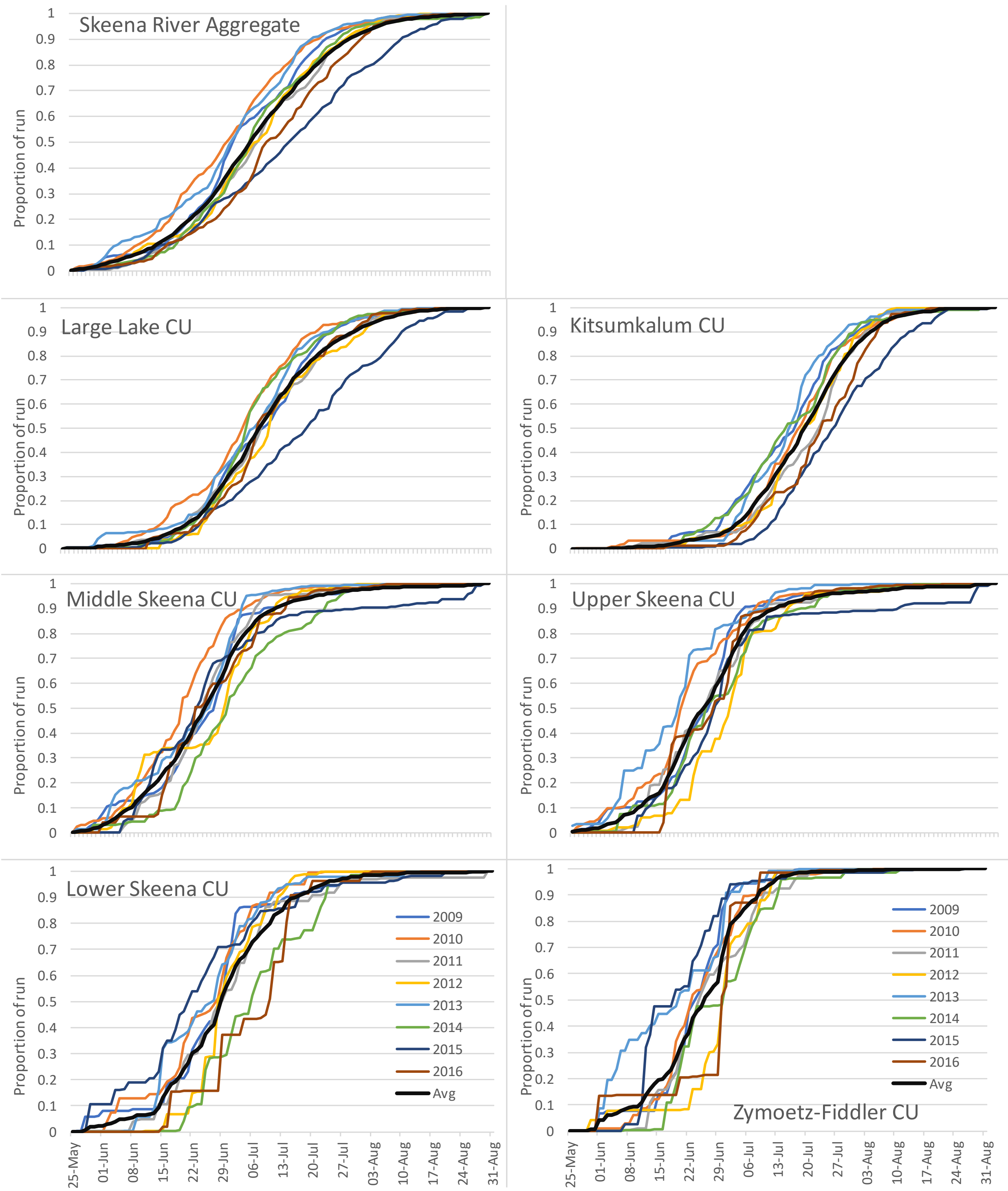
CU or group	Mean run timing (JD)	Mean run timing (date)	10% run past Tyee (date)	90% run past Tyee (date)	Duration for 80% of run to pass (days)
KLM	199.1	18-Jul	03-Jul	03-Aug	30
LLK	192.4	11-Jul	24-Jun	31-Jul	36
LSK	182.6	02-Jul	17-Jun	17-Jul	29
MSK	180.0	29-Jun	15-Jun	14-Jul	28
USK	179.4	28-Jun	16-Jun	13-Jul	26
ZYF	178.6	28-Jun	15-Jun	09-Jul	23
MUZ	179.7	29-Jun	16-Jun	13-Jul	26
SKN	190.4	09-Jul	20-Jun	30-Jul	39

JD = Julian day

Appendix 5, Table 4. Mean run timing and duration of run for the 1984 to 2020 data set truncated to June 10 by CU and group.

CU or group	Mean run timing (JD)	Mean run timing (date)	10% run past Tyee (date)	90% run past Tyee (date)	Duration for 80% of run to pass (days)
KLM	195.1	14-Jul	16-Jun	30-Jul	43
LLK	189.8	09-Jul	12-Jun	27-Jul	44
LSK	181.4	30-Jun	17-Jun	15-Jul	27
MSK	178.1	27-Jun	14-Jun	12-Jul	27
USK	178.1	27-Jun	14-Jun	11-Jul	26
ZYF	177.5	26-Jun	14-Jun	09-Jul	24
MUZ	178.0	27-Jun	14-Jun	11-Jul	26
SKN	186.8	06-Jul	16-Jun	26-Jul	39

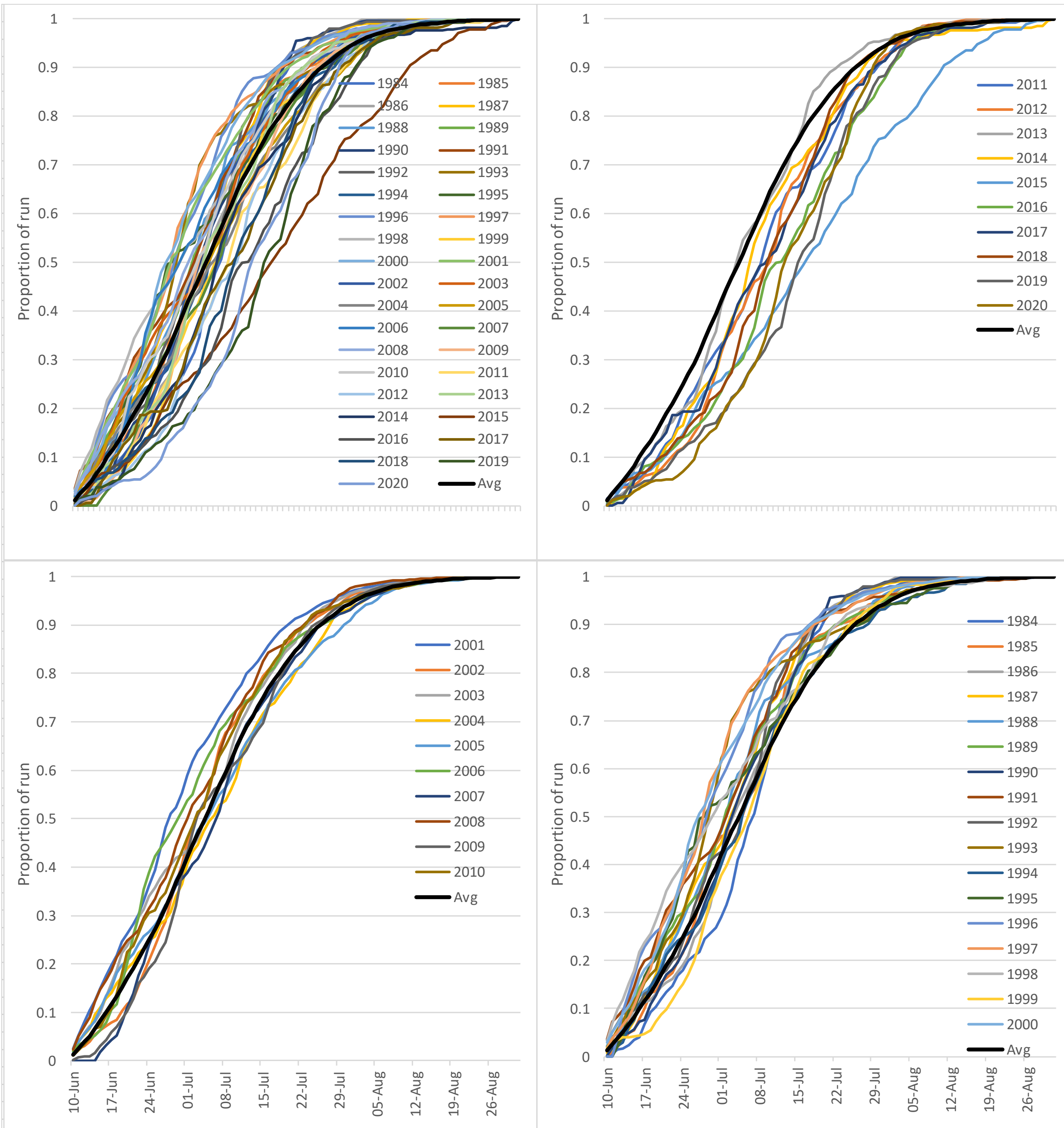
JD = Julian day



Appendix 5, Figure 1. Cumulative run timing curves of individual years from the full data sets May 25 to August 31, 2009 to 2016 for the Skeena aggregate and the six component CUs.

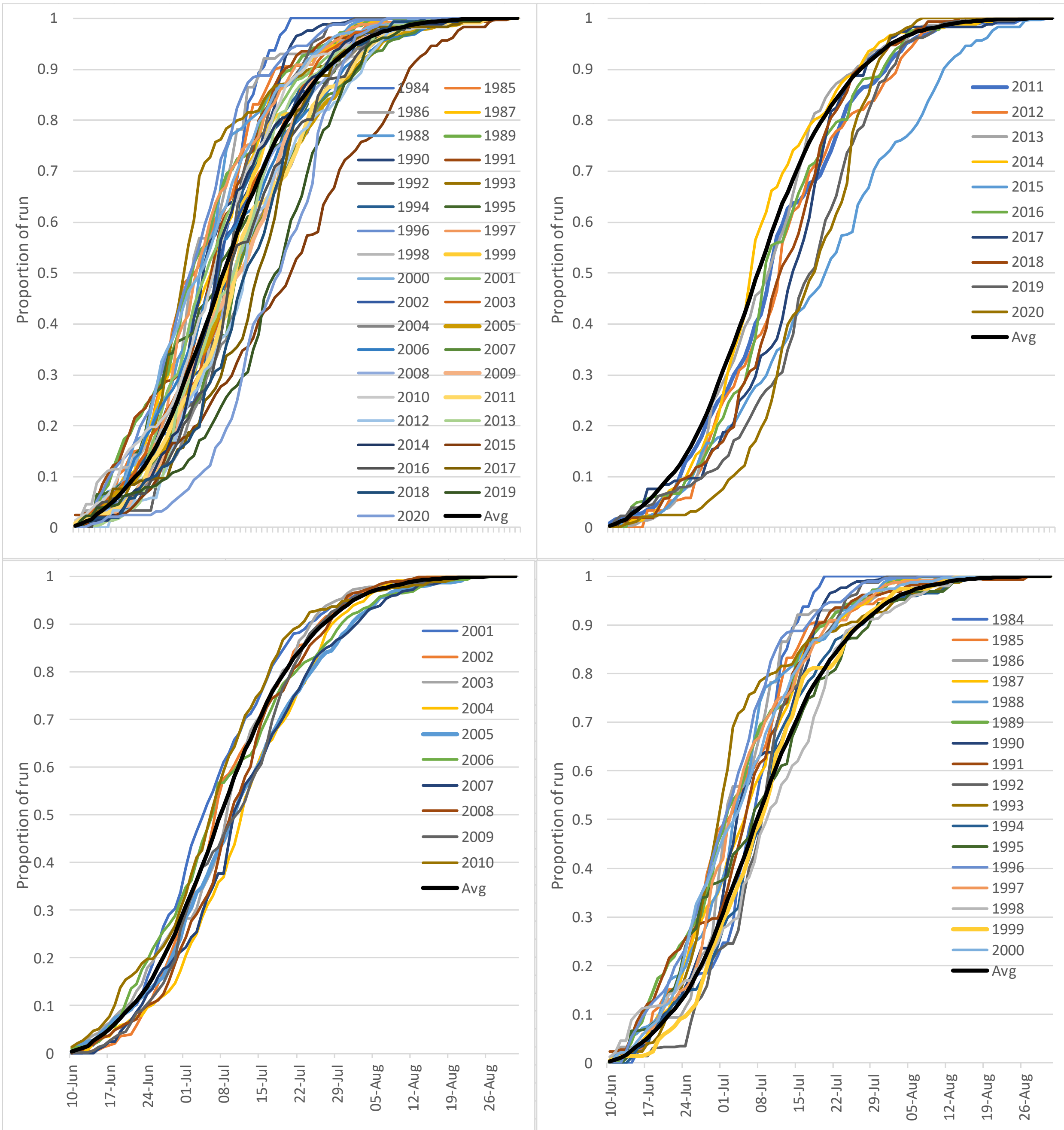
Year specific colors in the legends at the bottom of the page are the same in all panels.

The Appendix 5 Figures 2 through 7 below show 4 panels each displaying the individual cumulative run timing curves and the 1984 to 2020 average for the aggregate or the CU. The top left panels have all curves; top right panels have 2011 to 2020 curves; bottom right panels have 2001 to 2010 curves; and bottom left panels have 1984 to 2000 curves.



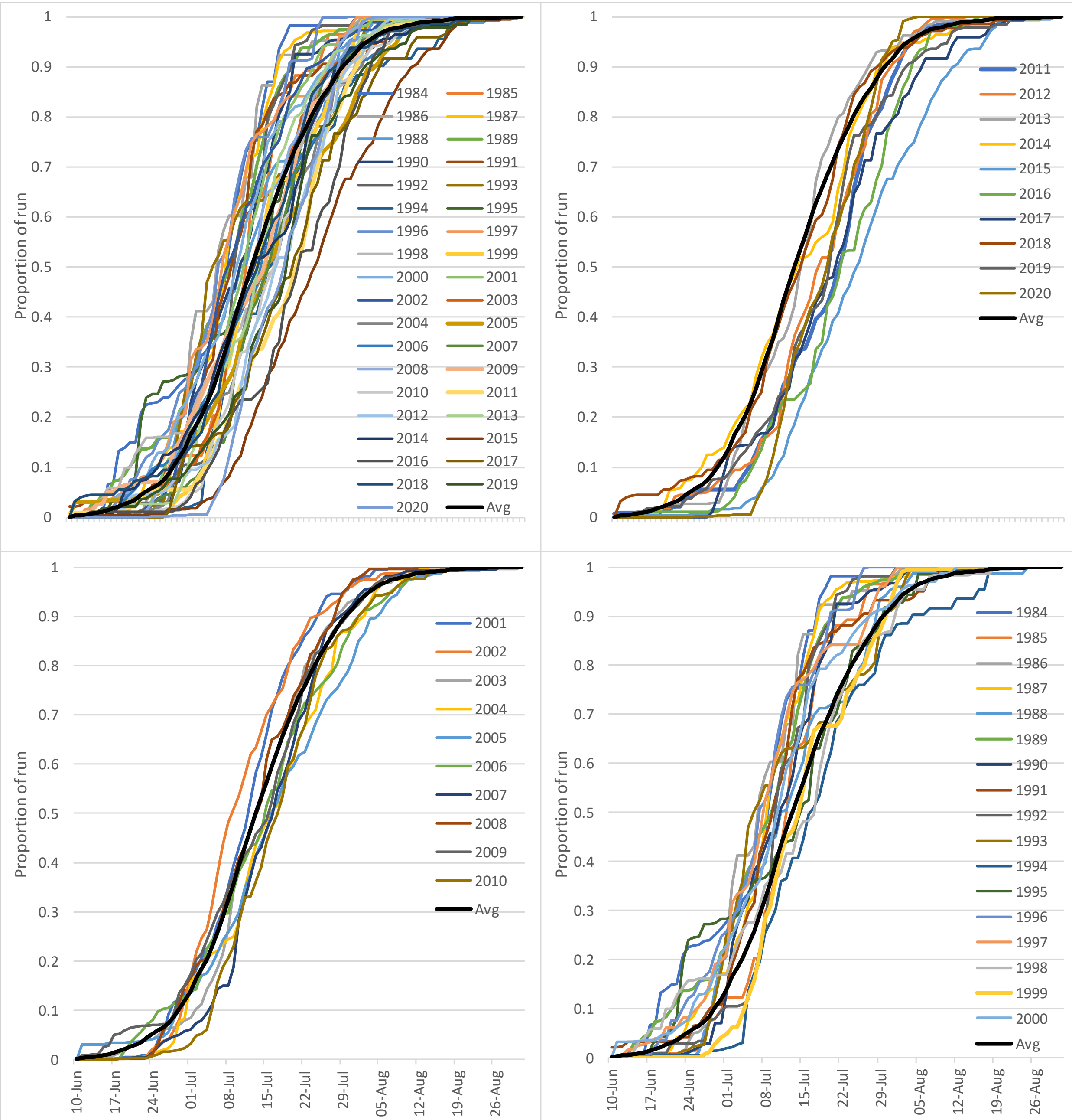
Appendix 5, Figure 2. Cumulative annual run timing curves for the truncated data sets for the Skeena aggregate of Chinook salmon past Tyee for years 1984 to 2020 compared to the average.

Average curves are from 1984 to 2020 for the Skeena aggregate in all panels.



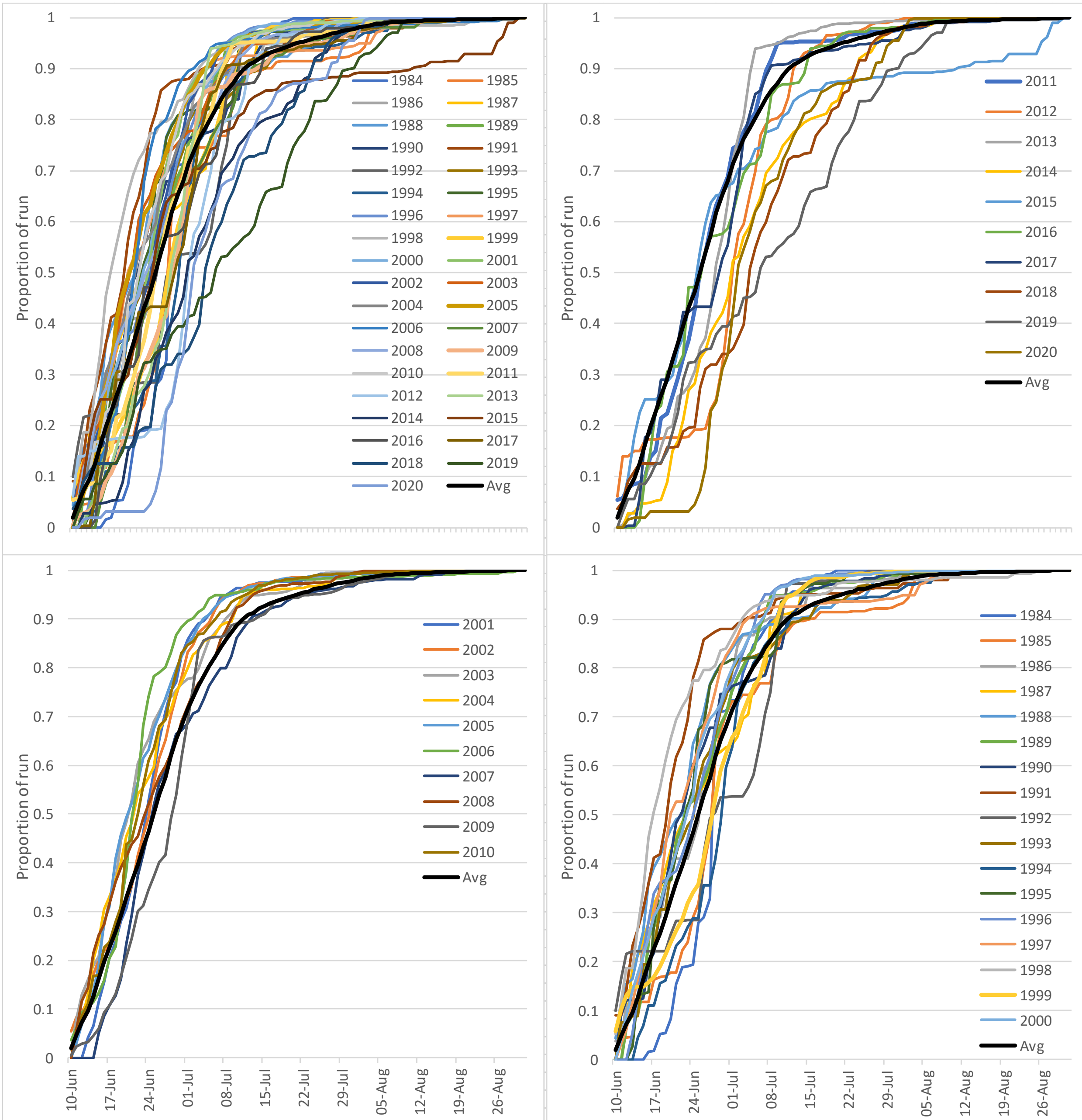
Appendix 5, Figure 3. Cumulative annual run timing curves for the truncated data sets for the Large Lakes CU past Tyee for years 1984 to 2020 compared to the average.

Average curves are from 1984 to 2020 for the Large Lakes CU in all panels.



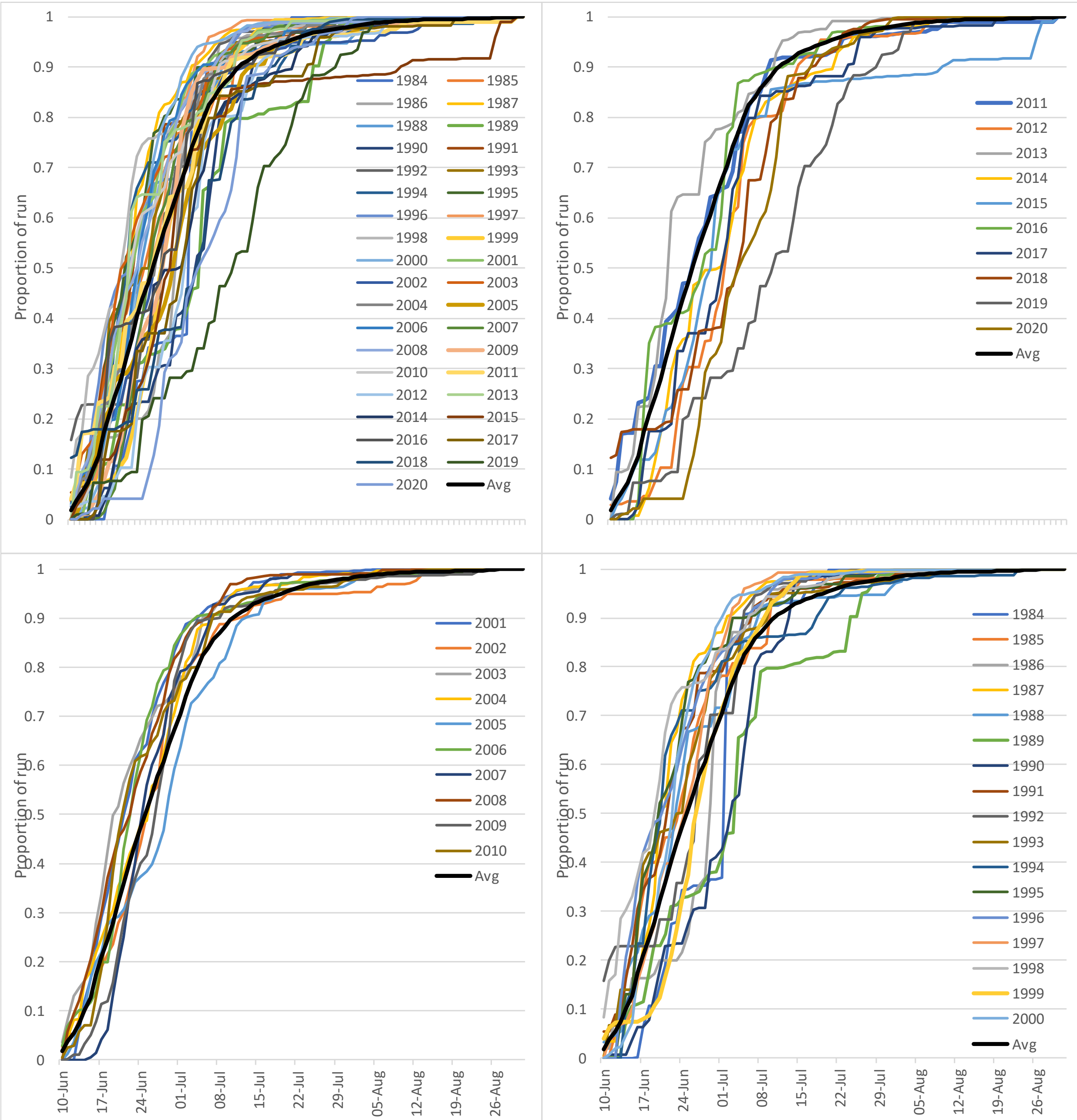
Appendix 5, Figure 4. Cumulative annual run timing curves for the truncated data sets for the Kitsumkalum CU past Tyee for years 1984 to 2020 compared to the average.

Average curves are from 1984 to 2020 for the Kitsumkalum CU in all panels.



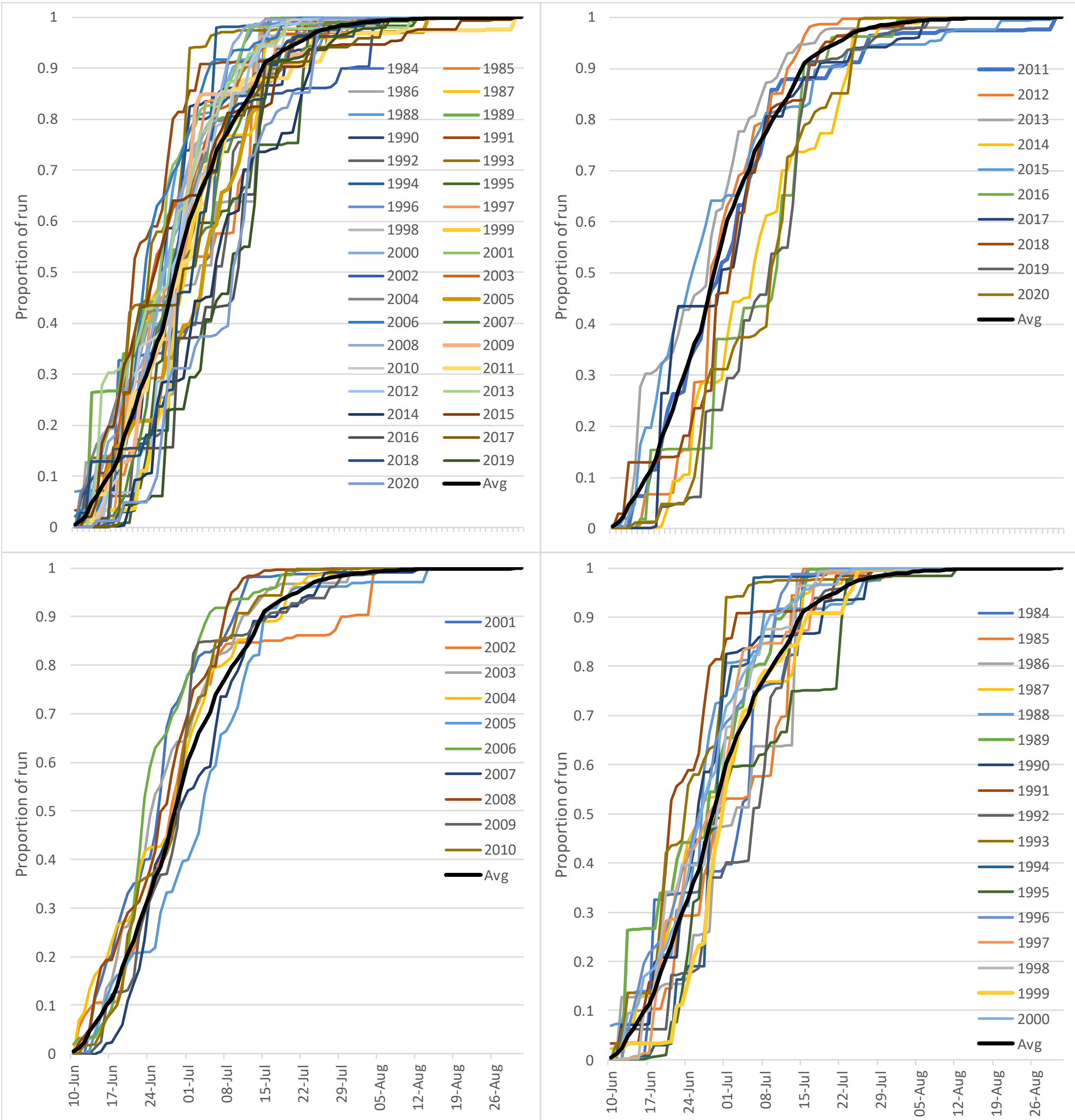
Appendix 5, Figure 5. Cumulative annual run timing curves for the truncated data sets for the Middle Skeena CU past Tyee for years 1984 to 2020 compared to the average.

Average curves are from 1984 to 2020 for the Middle Skeena CU in all panels.



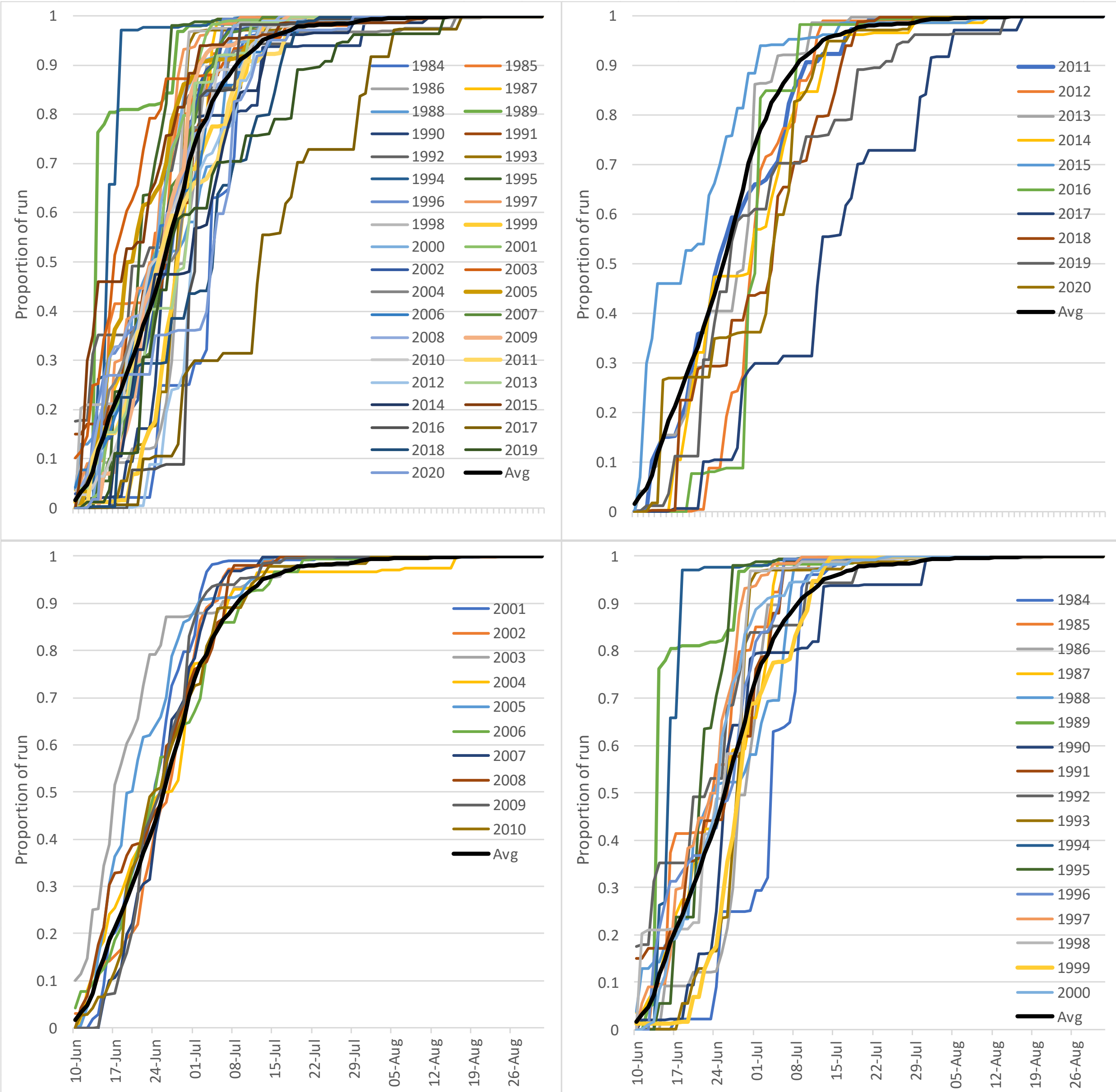
Appendix 5, Figure 6. Cumulative annual run timing curves for the truncated data sets for the Upper Skeena CU past Tyee for years 1984 to 2020 compared to the average.

Average curves are from 1984 to 2020 for the Upper Skeena CU in all panels.



Appendix 5, Figure 7. Cumulative annual run timing curves for the truncated data sets for the Lower Skeena CU past Tyee for years 1984 to 2020 compared to the average.

Average curves are from 1984 to 2020 for the Lower Skeena CU in all panels.



Appendix 5, Figure 8. Cumulative annual run timing curves for the truncated data sets for the Zymoetz-Fiddler Skeena CU past Tyee for years 1984 to 2020 compared to the average.

Average curves are for 1984 to 2020 for the Zymoetz-Fiddler CU in all panels.

Appendix 6. Kitsumkalum Chinook salmon CWT recoveries by major fishery group and escapement.
Kitsumkalum Chinook salmon CWT recoveries of fry releases (KLM) (Winther et al. 2021).

Brood Year	ALASKA						CANADA										TOTAL	
	COMMERCIAL TROLL		MARINE SPORT		OTHER		COMMERCIAL TROLL		COMMERCIAL NET		MARINE SPORT		FW SPORT		ESCAPEMENT			
	Obs.	Est.	Obs.	Est.	Obs.	Est.	Obs.	Est.	Obs.	Est.	Obs.	Est.	Obs.	Est.	Obs.	Est.	Obs.	Est.
1979	10	36	2	7	1	4	0	0	2	8	0	0	0	0	5	35	20	90
1980	10	45	0	0	0	0	8	38	13	56	0	0	1	5	20	107	52	252
1981	12	51	0	0	0	0	11	41	6	24	1	5	0	0	44	185	74	307
1983	6	17	1	3	0	0	0	0	5	18	1	6	0	0	11	68	24	112
1984	40	121	7	68	1	2	15	54	38	120	6	39	8	49	78	677	193	1131
1985	21	63	3	17	1	1	11	42	15	41	6	24	8	42	44	211	109	441
1986	5	15	0	0	0	0	0	0	6	15	0	0	1	5	7	47	19	82
1987	50	129	3	13	0	0	21	95	41	111	11	41	2	8	62	440	190	837
1988	10	24	1	5	1	2	6	20	14	42	3	10	0	0	11	111	46	214
1989	3	9	0	0	0	0	2	6	11	28	1	2	2	8	1	28	20	81
1990	10	24	1	5	0	0	2	7	10	22	3	10	2	7	8	112	36	188
1991	22	53	5	42	0	0	2	5	53	115	8	30	11	34	43	276	144	554
1992	30	74	5	50	0	0	0	0	24	49	4	11	3	11	64	291	130	486
1993	12	34	3	18	1	1	0	0	9	15	6	33	4	18	49	216	84	334
1994	31	86	11	57	0	0	0	0	9	12	7	42	2	7	80	393	140	597
1995	10	28	5	22	0	0	0	0	9	18	2	28	1	5	25	155	52	256
1996	18	42	12	46	0	0	0	0	22	41	5	31	6	28	42	250	105	439
1997	42	119	12	44	0	0	3	14	29	46	15	102	3	14	37	269	141	607
1998	30	95	2	8	1	1	5	39	5	8	3	32	4	18	52	424	102	626
1999	25	97	10	39	4	25	4	8	6	15	6	64	3	14	51	443	109	705
2000	11	37	5	17	0	0	4	8	3	4	2	13	2	9	20	118	47	205
2001	10	40	2	7	2	10	4	9	6	13	2	16	3	14	24	167	53	275
2002	18	52	4	21	2	3	4	10	8	18	5	37	1	5	13	125	55	270
2003	20	57	3	20	0	0	3	8	15	37	9	68	11	51	45	290	106	531
2004	8	19	2	4	0	0	1	3	3	9	3	32	1	5	34	183	52	255
2005	37	101	20	62	4	19	10	29	12	26	38	174	7	32	116	502	244	944
2006	13	42	4	7	0	0	2	7	3	12	8	42	3	14	38	233	71	357
2007	17	50	7	8	2	2	1	4	4	7	9	38	1	5	41	193	82	307
2008	8	23	1	1	1	2	3	9	4	20	5	23	3	15	21	134	46	228
2009	6	17	4	7	0	0	2	6	2	2	4	15	2	11	48	173	68	231
2010	9	26	2	2	1	8	0	0	0	0	4	21	3	16	34	187	53	260
2011	31	78	10	24	9	36	7	26	0	0	23	123	6	44	106	502	192	833
2012	4	8	0	0	1	3	1	4	0	0	5	30	1	6	21	94	33	145
2013	13	31	2	5	0	0	4	14	0	0	6	49	1	9	41	208	67	317
2014	2	6	1	4	1	1	1	3	0	0	2	9	0	0	21	96	28	119
2015	10	24	5	8	4	6	1	3	0	0	13	87	0	0	138	489	171	617

There were no CWT releases from the 1982 brood year. 2013 is the last complete brood year.
Obs. = observed, Est. = estimated.

Kitsumkalum Chinook salmon CWT recoveries of yearling releases (KLY) (Winther et al. 2021).

Brood Year	ALASKA						CANADA										TOTAL	
	COMMERCIAL TROLL		MARINE SPORT		OTHER		COMMERCIAL TROLL		COMMERCIAL NET		MARINE SPORT		FW SPORT		ESCAPEMENT			
	Obs.	Est.	Obs.	Est.	Obs.	Est.	Obs.	Est.	Obs.	Est.	Obs.	Est.	Obs.	Est.	Obs.	Est.	Obs.	Est.
1996	22	50	6	26	0	0	3	7	42	89	12	67	4	18	40	322	129	580
1997																		
1998																		
1999	23	75	5	14	1	1	12	31	1	5	7	59	5	23	50	367	104	576
2000	65	236	17	67	1	6	15	29	8	19	11	82	9	42	68	448	194	930
2001	27	98	6	19	1	3	7	15	11	24	5	39	4	18	28	240	89	457
2002	35	108	4	19	2	26	5	12	17	41	11	94	4	18	34	367	112	684
2003	32	85	12	60	0	0	1	3	46	126	17	126	8	37	39	254	155	692
2004	48	124	19	48	0	0	3	9	30	90	20	83	10	46	90	456	220	857
2005																		
2006	24	74	4	4	1	3	5	16	7	20	10	48	1	5	45	272	97	442
2007	18	53	3	5	0	0	0	0	3	3	6	34	3	14	16	86	49	195
2008	18	49	2	3	0	0	1	3	5	5	12	48	3	14	39	316	80	439
2009	10	33	0	0	2	7	2	8	4	4	4	14	4	18	21	140	47	225
2010	52	154	33	51	4	10	5	19	0	0	38	110	21	117	157	863	310	1324
2011	18	53	11	19	9	38	5	19	0	0	12	52	4	24	112	624	171	831
2012	7	18	7	11	1	0	2	8	0	0	2	10	2	18	30	185	51	251
2013	16	38	9	19	8	1	6	21	0	0	30	158	5	44	226	1177	300	1459
2014	10	27	6	6	2	2	0	0	1	3	12	70	1	9	91	451	123	568
2015	3	8	2	2	2	3	0	0	0	0	3	39	0	0	29	273	39	325
2016	4	7	1	2	0	4	0	0	0	0	0	0	0	0	16	70	21	83

There were no CWT releases of yearlings from brood years 1997, 1998 or 2005. 2013 is the last complete brood year.
Obs. = observed, Est. = estimated.

Appendix 7. Cohort specific production and parameters by CU from the terminal run calculations and the CTC exploitation rate analyses for complete broods of Kitsumkalum Chinook salmon returns 1984 to 2019.

ER = exploitation rate, AEQ = adult equivalents, LLK = Large Lakes

CU	Brood Year	Age	Spawning Escapement	Terminal Total Mortalities	Total Mature Run	Maturation Rate	Pre-terminal Post-fishery Abundance	Non-Maturing Abundance	Pre-terminal Total Mortality ER (nominal)	Ocean Pre-fishery Abundance	Natural Mortality Rate	Cohort Abundance before Natural Mortality	Pre-terminal Fishing Mortality (nominal)	AEQ Rate	Pre-terminal Fishing Mortality (AEQ)	Total Recruits
LLK	1980	4	3,308	2,682	5,990	0.0576	103992	98002	0.1338	120055	0.3	171507	16063	0.7811	12,547	18,537
LLK	1981	4	2,097	1,764	3,861	0.0401	96284	92423	0.0964	106555	0.3	152222	10272	0.7553	7,758	11,619
LLK	1982	4	543	1,043	1,586	0.0644	24611	23025	0.0646	26311	0.3	37588	1701	0.7857	1,336	2,922
LLK	1983	4	6,307	1,324	7,631	0.0644	118,434	110,803	0.0194	120,777	0.3	172,538	2,343	0.7593	1,779	9,410
LLK	1984	4	5,825	6,970	12,795	0.0255	501,776	488,981	0.0389	522,085	0.3	745,836	20,309	0.7822	15,886	28,681
LLK	1985	4	777	403	1,180	0.1061	11,122	9,942	0.0846	12,150	0.3	17,357	1,028	0.7867	809	1,989
LLK	1986	4	2,727	5,107	7,834	0.0617	126,962	119,129	0.0704	136,577	0.3	195,111	9,615	0.7882	7,579	15,412
LLK	1987	4	4,151	5,077	9,229	0.0654	141,111	131,882	0.0829	153,866	0.3	219,809	12,756	0.7968	10,164	19,392
LLK	1988	4	8,235	4,398	12,633	0.0375	336,870	324,237	0.0655	360,481	0.3	514,973	23,612	0.7647	18,056	30,688
LLK	1989	4	5,629	2,771	8,400	0.0758	110,819	102,419	0.0717	119,379	0.3	170,541	8,559	0.7483	6,405	14,805
LLK	1990	4	6,162	3,001	9,163	0.0956	95,843	86,681	0.0439	100,244	0.3	143,206	4,401	0.7735	3,404	12,567
LLK	1991	4	11,124	5,319	16,443	0.0374	439,661	423,217	0.0311	453,773	0.3	648,247	14,112	0.7579	10,696	27,139
LLK	1992	4	6,544	4,871	11,415	0.091	125,439	114,024	0.0707	134,983	0.3	192,832	9,543	0.7889	7,529	18,944
LLK	1993	4	4,180	2,957	7,137	0.0502	142,166	135,029	0.0179	144,757	0.3	206,796	2,591	0.7687	1,992	9,129
LLK	1994	4	4,386	2,529	6,915	0.0589	117,403	110,488	0.0476	123,271	0.3	176,101	5,868	0.7973	4,678	11,593
LLK	1995	4	6,785	5,508	12,293	0.0523	235,048	222,755	0.0595	249,918	0.3	357,026	14,870	0.7834	11,649	23,942
LLK	1996	4	6,565	4,660	11,225	0.0748	150,064	138,839	0.0492	157,829	0.3	225,470	7,765	0.7917	6,148	17,372
LLK	1997	4	4,630	4,396	9,026	0.0835	108,101	99,074	0.066	115,739	0.3	165,342	7,639	0.8014	6,122	15,148
LLK	1998	4	5,765	3,800	9,565	0.0541	176,796	167,232	0.071	190,308	0.3	271,869	13,512	0.7936	10,723	20,288
LLK	1999	4	2,081	1,241	3,321	0.0841	39,503	36,182	0.0524	41,688	0.3	59,554	2,184	0.7907	1,727	5,048
LLK	2000	4	18,647	5,728	24,375	0.1309	186,212	161,837	0.0604	198,183	0.3	283,118	11,970	0.8083	9,676	34,051
LLK	2001	4	1,204	328	1,532	0.0678	22,589	21,058	0.0626	24,098	0.3	34,425	1,509	0.7988	1,205	2,737
LLK	2002	4	9,049	6,039	15,088	0.0327	461,410	446,322	0.0329	477,107	0.3	681,581	15,697	0.7972	12,513	27,602
LLK	2003	4	1,834	337	2,172	0.2131	10,190	8,019	0.0775	11,046	0.3	15,781	856	0.8318	712	2,884
LLK	2004	4	7,977	6,620	14,597	0.0863	169,147	154,549	0.0295	174,288	0.3	248,983	5,141	0.7973	4,099	18,697
LLK	2005	4	3,910	1,405	5,315	0.2002	26,549	21,234	0.1555	31,437	0.3	44,911	4,889	0.8368	4,091	9,406
LLK	2006	4	9,590	2,432	12,022	0.2526	47,592	35,570	0.0471	49,944	0.3	71,349	2,352	0.8473	1,993	14,015
LLK	2007	4	1,659	1,116	2,775	0.2898	9,576	6,801	0.1202	10,885	0.3	15,550	1,308	0.8505	1,113	3,888
LLK	2008	4	1,691	1,403	3,094	0.1425	21,713	18,619	0.078	23,549	0.3	33,642	1,837	0.8063	1,481	4,575
LLK	2009	4	1,731	613	2,345	0.3977	5,895	3,551	0.1459	6,902	0.3	9,861	1,007	0.8756	882	3,226
LLK	2010	4	8,969	2,445	11,414	0.2414	47,282	35,868	0.0432	49,417	0.3	70,596	2,135	0.8241	1,759	13,173
LLK	2011	4	6,810	2,717	9,528	0.2592	36,758	27,230	0.1216	41,846	0.3	59,780	5,088	0.8506	4,328	13,856
LLK	2012	4	3,171	1,279	4,450	0.1429	31,144	26,693	0.0863	34,085	0.3	48,693	2,942	0.8245	2,425	6,876
LLK	2013	4	1,386	1,617	3,003	0.3327	9,027	6,024	0.126	10,329	0.3	14,755	1,301	0.8623	1,122	4,126
LLK	2014	4	6,684	2,354	9,038	0.3202	28,225	19,188	0.0429	29,491	0.3	42,129	1,265	0.8553	1,082	10,120

CU	Brood Year	Age	Spawning Escapement	Terminal Total Mortalities	Total Mature Run	Maturation Rate	Pre-terminal Post-fishery Abundance	Non-Maturing Abundance	Pre-terminal Total Mortality ER (nominal)	Ocean Pre-fishery Abundance	Natural Mortality Rate	Cohort Abundance before Natural Mortality	Pre-terminal Fishing Mortality (nominal)	AEQ Rate	Pre-terminal Fishing Mortality (AEQ)	Total Recruits
LLK	2015	4	1,760	938	2,698	0.2527	10,679	7,980	0.0749	11,543	0.3	16,490	865	0.8409	727	3,425
LLK	1979	5	12,180	6,718	18,898	0.6338	29,816	10,918	0.3053	42,919	0.2	53,649	13,103	0.9	11,793	30,691
LLK	1980	5	9,668	10,739	20,407	0.5968	34,194	13,787	0.1821	41,807	0.2	52,259	7,613	0.9597	7,306	27,713
LLK	1981	5	3,527	6,656	10,183	0.3136	32,472	22,289	0.126	37,153	0.2	46,441	4,681	0.9314	4,360	14,543
LLK	1982	5	12,615	5,749	18,365	0.6338	28,975	10,610	0.181	35,379	0.2	44,223	6,404	0.9634	6,169	24,534
LLK	1983	5	9,154	10,146	19,302	0.4916	39,264	19,962	0.1187	44,552	0.2	55,690	5,288	0.9492	5,020	24,322
LLK	1984	5	22,157	12,109	34,459	0.7057	48,829	14,370	0.1825	59,730	0.2	74,662	10,901	0.9706	10,580	45,039
LLK	1985	5	1,894	2,753	4,646	0.5167	8,992	4,346	0.212	11,411	0.2	14,264	2,419	0.9517	2,302	6,948
LLK	1986	5	10,205	11,814	22,019	0.6791	32,424	10,405	0.1485	38,078	0.2	47,598	5,655	0.9679	5,473	27,492
LLK	1987	5	18,299	8,534	26,833	0.7818	34,322	7,489	0.2629	46,564	0.2	58,204	12,242	0.9782	11,975	38,808
LLK	1988	5	24,927	11,686	37,929	0.4437	85,483	47,554	0.195	106,190	0.2	132,737	20,707	0.9444	19,556	57,485
LLK	1989	5	20,145	7,152	27,297	0.0956	285,537	258,240	0.0665	305,878	0.2	382,348	20,341	0.9096	18,502	45,799
LLK	1990	5	10,485	3,700	14,185	0.3694	38,400	24,215	0.1749	46,539	0.2	58,174	8,140	0.9369	7,626	21,811
LLK	1991	5	36,855	24,681	61,536	0.3555	173,096	111,561	0.0869	189,570	0.2	236,963	16,474	0.9356	15,413	76,949
LLK	1992	5	10,115	4,512	14,627	0.5973	24,489	9,862	0.1849	30,044	0.2	37,555	5,555	0.9597	5,331	19,959
LLK	1993	5	7,648	4,639	12,287	0.4559	26,952	14,664	0.0531	28,463	0.2	35,579	1,511	0.9456	1,429	13,716
LLK	1994	5	8,567	6,721	15,288	0.8069	18,947	3,659	0.2821	26,392	0.2	32,990	7,445	0.9807	7,302	22,590
LLK	1995	5	12,907	7,689	20,596	0.643	32,031	11,435	0.2155	40,830	0.2	51,037	8,799	0.9643	8,485	29,081
LLK	1996	5	27,781	18,071	45,852	0.6859	66,850	20,998	0.205	84,088	0.2	105,110	17,238	0.9686	16,697	62,549
LLK	1997	5	3,648	2,713	6,362	0.7921	8,031	1,670	0.4023	13,437	0.2	16,797	5,406	0.9792	5,293	11,655
LLK	1998	5	27,289	11,007	38,296	0.773	49,543	11,246	0.1884	61,043	0.2	76,304	11,501	0.9773	11,239	49,536
LLK	1999	5	13,985	3,720	18,887	0.8803	21,456	2,568	0.2818	29,874	0.2	37,342	8,418	0.988	8,317	27,205
LLK	2000	5	21,214	5,780	26,994	0.7434	36,311	9,317	0.3682	57,472	0.2	71,840	21,161	0.9743	20,617	47,611
LLK	2001	5	7,437	2,850	11,083	0.8022	13,815	2,733	0.2585	18,632	0.2	23,290	4,816	0.9802	4,721	15,804
LLK	2002	5	18,614	6,230	25,307	0.879	28,790	3,484	0.3876	47,012	0.2	58,766	18,222	0.9879	18,002	43,308
LLK	2003	5	4,653	3,452	8,105	0.8287	9,781	1,675	0.2174	12,498	0.2	15,623	2,717	0.9829	2,671	10,776
LLK	2004	5	22,481	6,508	28,998	0.7264	39,920	10,922	0.0777	43,283	0.2	54,104	3,363	0.9726	3,271	32,269
LLK	2005	5	12,295	4,342	16,798	0.9498	17,686	888	0.2675	24,145	0.2	30,181	6,459	0.995	6,426	23,225
LLK	2006	5	9,921	6,578	16,499	0.947	17,422	923	0.2304	22,638	0.2	28,297	5,216	0.9947	5,188	21,687
LLK	2007	5	3,748	1,610	5,359	0.8688	6,168	809	0.274	8,496	0.2	10,621	2,328	0.9869	2,298	7,657
LLK	2008	5	7,842	2,290	10,132	0.6757	14,995	4,863	0.1223	17,084	0.2	21,355	2,089	0.9676	2,022	12,154
LLK	2009	5	7,240	1,972	9,212	0.9179	10,036	824	0.1536	11,858	0.2	14,822	1,821	0.9918	1,806	11,019
LLK	2010	5	16,290	6,268	24,961	0.6019	41,471	16,510	0.1236	47,320	0.2	59,150	5,849	0.9602	5,616	30,577
LLK	2011	5	8,082	4,743	13,805	0.9788	14,104	299	0.1846	17,297	0.2	21,621	3,193	0.9979	3,186	16,991
LLK	2012	5	2,699	2,120	4,819	0.9402	5,125	306	0.1207	5,829	0.2	7,286	704	0.994	699	5,518
LLK	2013	5	3,886	1,368	5,255	0.9203	5,710	455	0.1058	6,385	0.2	7,981	676	0.992	670	5,925
LLK	2014	5	6,307	3,780	10,378	0.8391	12,368	1,990	0.1193	14,043	0.2	17,554	1,675	0.9839	1,648	12,026
LLK	1978	6	3,609	2,439	6,049	1	6,049	0	0.1759	7,339	0.1	8,155	1,291	1	1,291	7,339
LLK	1979	6	1,165	1,109	2,274	1	2,274	0	0.2691	3,111	0.1	3,457	837	1	837	3,111
LLK	1980	6	3,527	6,496	10,521	1	10,521	0	0.2895	14,808	0.1	16,453	4,287	1	4,287	14,808

CU	Brood Year	Age	Spawning Escapement	Terminal Total Mortalities	Total Mature Run	Maturation Rate	Pre-terminal Post-fishery Abundance	Non-Maturing Abundance	Pre-terminal Total Mortality ER (nominal)	Ocean Pre-fishery Abundance	Natural Mortality Rate	Cohort Abundance before Natural Mortality	Pre-terminal Fishing Mortality (nominal)	AEQ Rate	Pre-terminal Fishing Mortality (AEQ)	Total Recruits
LLK	1981	6	14,908	4,898	19,807	1	19,807	0	0.2526	26,501	0.1	29,445	6,694	1	6,694	26,501
LLK	1982	6	7,823	5,496	13,320	1	13,320	0	0.1759	16,162	0.1	17,958	2,842	1	2,842	16,162
LLK	1983	6	10,884	4,934	15,820	1	15,820	0	0.1477	18,561	0.1	20,624	2,741	1	2,741	18,561
LLK	1984	6	6,817	10,210	17,026	1	17,026	0	0.1798	20,759	0.1	23,065	3,732	1	3,732	20,759
LLK	1985	6	1,903	2,201	4,103	1	4,103	0	0.3469	6,283	0.1	6,981	2,180	1	2,180	6,283
LLK	1986	6	15,859	4,340	20,200	1	20,200	0	0.0009	20,218	0.1	22,464	18	1	18	20,218
LLK	1987	6	23,587	13,549	37,140	1	37,140	0	0.1928	46,011	0.1	51,123	8,871	1	8,871	46,011
LLK	1988	6	16,116	6,757	22,873	1	22,873	0	0.1662	27,432	0.1	30,480	4,559	1	4,559	27,432
LLK	1989	6	5,370	2,719	8,508	1	8,508	0	0.1607	10,137	0.1	11,264	1,629	1	1,629	10,137
LLK	1990	6	7,922	2,236	10,158	1	10,158	0	0.1117	11,435	0.1	12,706	1,277	1	1,277	11,435
LLK	1991	6	4,681	2,337	7,018	1	7,018	0	0.2209	9,008	0.1	10,009	1,990	1	1,990	9,008
LLK	1992	6	2,137	1,517	3,654	1	3,654	0	0.2029	4,584	0.1	5,093	930	1	930	4,584
LLK	1993	6	3,813	3,163	6,976	1	6,976	0	0.4343	12,332	0.1	13,702	5,356	1	5,356	12,332
LLK	1994	6	1,446	783	2,230	1	2,230	0	0.2247	2,876	0.1	3,195	646	1	646	2,876
LLK	1995	6	2,604	1,577	4,182	1	4,182	0	0.252	5,591	0.1	6,212	1,409	1	1,409	5,591
LLK	1996	6	2,768	1,878	4,646	1	4,646	0	0.3741	7,424	0.1	8,248	2,777	1	2,777	7,424
LLK	1997	6	1,360	551	1,911	1	1,911	0	0.2904	2,694	0.1	2,993	782	1	782	2,694
LLK	1998	6	13,985	3,327	17,315	1	17,315	0	0.2403	22,792	0.1	25,325	5,477	1	5,477	22,792
LLK	1999	6	2,708	774	3,482	1	3,482	0	0.2824	4,852	0.1	5,391	1,370	1	1,370	4,852
LLK	2000	6	3,595	1,472	5,067	1	5,067	0	0.322	7,473	0.1	8,304	2,406	1	2,406	7,473
LLK	2001	6	1,495	358	1,853	1	1,853	0	0.0002	1,853	0.1	2,059	0	1	0	1,853
LLK	2002	6	1,877	1,490	3,367	1	3,367	0	0.1762	4,087	0.1	4,541	720	1	720	4,087
LLK	2003	6	1,173	330	1,503	1	1,503	0	0.3064	2,166	0.1	2,407	664	1	664	2,166
LLK	2004	6	5,246	6,696	11,942	1	11,942	0	0.0555	12,644	0.1	14,049	702	1	702	12,644
LLK	2005	6	968	730	1,698	1	1,698	0	0.3113	2,466	0.1	2,740	768	1	768	2,466
LLK	2006	6	960	310	1,270	1	1,270	0	0.3446	1,938	0.1	2,153	668	1	668	1,938
LLK	2007	6	713	170	883	1	883	0	0.0691	949	0.1	1,054	66	1	66	949
LLK	2008	6	648	147	796	1	796	0	0.2881	1,117	0.1	1,242	322	1	322	1,117
LLK	2009	6	644	218	863	1	863	0	0.0002	863	0.1	959	0	1	0	863
LLK	2010	6	1,432	1,051	2,484	1	2,484	0	0.0349	2,574	0.1	2,860	90	1	90	2,574
LLK	2011	6	511	246	757	1	757	0	0.1292	869	0.1	966	112	1	112	869
LLK	2012	6	622	219	841	1	841	0	0	841	0.1	934	0	1	0	841
LLK	2013	6	293	127	421	1	421	0	0.4724	797	0.1	886	377	1	377	797

MSK = Middle Skeena

CU	Brood Year	Age	Spawning Escapement	Terminal Total Mortalities	Total Mature Run	Maturation Rate	Pre-terminal Post-fishery Abundance	Non-Maturing Abundance	Pre-terminal Total Mortality ER (nominal)	Ocean Pre-fishery Abundance	Natural Mortality Rate	Cohort Abundance before Natural Mortality	Pre-terminal Fishing Mortality (nominal)	AEQ Rate	Pre-terminal Fishing Mortality (AEQ)	Total Recruits
MSK	1980	4	199	161	361	0.0576	6,259	5,898	0.1338	7,226	0.3	10,322	967	0.7811	755	1,116
MSK	1981	4	572	481	1,053	0.0401	26,259	25,206	0.0964	29,061	0.3	41,516	2,801	0.7553	2,116	3,169
MSK	1982	4	338	649	987	0.0644	15,312	14,326	0.0646	16,370	0.3	23,386	1,058	0.7857	831	1,818
MSK	1983	4	1,784	374	2,158	0.0644	33,494	31,336	0.0194	34,156	0.3	48,795	663	0.7593	503	2,661
MSK	1984	4	1,563	1,870	3,432	0.0255	134,591	131,159	0.0389	140,039	0.3	200,055	5,448	0.7822	4,261	7,693
MSK	1985	4	0	0	0	0.1061	0	0	0.0846	0	0.3	0	0	0.7867	0	0
MSK	1986	4	1,375	2,575	3,949	0.0617	64,008	60,059	0.0704	68,855	0.3	98,365	4,847	0.7882	3,821	7,770
MSK	1987	4	901	1,102	2,002	0.0654	30,616	28,614	0.0829	33,384	0.3	47,691	2,768	0.7968	2,205	4,207
MSK	1988	4	1,854	990	2,844	0.0375	75,838	72,994	0.0655	81,154	0.3	115,934	5,316	0.7647	4,065	6,909
MSK	1989	4	2,885	1,421	4,306	0.0758	56,809	52,503	0.0717	61,197	0.3	87,424	4,388	0.7483	3,283	7,590
MSK	1990	4	955	465	1,420	0.0956	14,858	13,437	0.0439	15,540	0.3	22,200	682	0.7735	528	1,948
MSK	1991	4	2,234	1,068	3,302	0.0374	88,302	84,999	0.0311	91,136	0.3	130,194	2,834	0.7579	2,148	5,451
MSK	1992	4	2,514	1,871	4,386	0.091	48,193	43,808	0.0707	51,860	0.3	74,085	3,666	0.7889	2,892	7,278
MSK	1993	4	3,346	2,367	5,713	0.0502	113,798	108,086	0.0179	115,872	0.3	165,532	2,074	0.7687	1,594	7,307
MSK	1994	4	1,069	616	1,685	0.0589	28,614	26,929	0.0476	30,044	0.3	42,920	1,430	0.7973	1,140	2,826
MSK	1995	4	1,524	1,238	2,762	0.0523	52,812	50,050	0.0595	56,153	0.3	80,219	3,341	0.7834	2,617	5,379
MSK	1996	4	5,827	4,136	9,963	0.0748	133,200	123,237	0.0492	140,093	0.3	200,133	6,893	0.7917	5,457	15,420
MSK	1997	4	2,053	1,949	4,003	0.0835	47,936	43,933	0.066	51,323	0.3	73,319	3,387	0.8014	2,715	6,717
MSK	1998	4	1,902	1,254	3,156	0.0541	58,344	55,188	0.071	62,803	0.3	89,719	4,459	0.7936	3,539	6,695
MSK	1999	4	816	487	1,303	0.0841	15,494	14,192	0.0524	16,351	0.3	23,359	857	0.7907	677	1,980
MSK	2000	4	5,315	1,633	6,947	0.1309	53,075	46,127	0.0604	56,487	0.3	80,695	3,412	0.8083	2,758	9,705
MSK	2001	4	1,274	347	1,621	0.0678	23,914	22,293	0.0626	25,511	0.3	36,444	1,597	0.7988	1,276	2,897
MSK	2002	4	5,061	3,378	8,439	0.0327	258,061	249,622	0.0329	266,840	0.3	381,200	8,779	0.7972	6,999	15,437
MSK	2003	4	881	162	1,043	0.2131	4,893	3,850	0.0775	5,304	0.3	7,577	411	0.8318	342	1,385
MSK	2004	4	2,621	2,175	4,796	0.0863	55,572	50,776	0.0295	57,261	0.3	81,801	1,689	0.7973	1,347	6,143
MSK	2005	4	948	341	1,289	0.2002	6,439	5,150	0.1555	7,624	0.3	10,892	1,186	0.8368	992	2,281
MSK	2006	4	2,768	702	3,470	0.2526	13,736	10,267	0.0471	14,415	0.3	20,594	679	0.8473	575	4,045
MSK	2007	4	468	315	783	0.2898	2,702	1,919	0.1202	3,072	0.3	4,388	369	0.8505	314	1,097
MSK	2008	4	638	530	1,168	0.1425	8,196	7,028	0.078	8,889	0.3	12,699	693	0.8063	559	1,727
MSK	2009	4	743	263	1,006	0.3977	2,530	1,524	0.1459	2,962	0.3	4,231	432	0.8756	378	1,384
MSK	2010	4	2,600	709	3,308	0.2414	13,705	10,396	0.0432	14,324	0.3	20,462	619	0.8241	510	3,818
MSK	2011	4	1,009	403	1,412	0.2592	5,447	4,035	0.1216	6,201	0.3	8,858	754	0.8506	641	2,053
MSK	2012	4	137	55	193	0.1429	1,348	1,156	0.0863	1,476	0.3	2,108	127	0.8245	105	298
MSK	2013	4	266	310	576	0.3327	1,730	1,154	0.126	1,979	0.3	2,828	249	0.8623	215	791
MSK	2014	4	2,227	784	3,011	0.3202	9,405	6,394	0.0429	9,827	0.3	14,038	422	0.8553	361	3,372
MSK	2015	4	87	47	134	0.2527	530	396	0.0749	573	0.3	819	43	0.8409	36	170
MSK	1979	5	1,394	769	2,162	0.6338	3,412	1,249	0.3053	4,911	0.2	6,139	1,499	0.9	1,349	3,512
MSK	1980	5	1,906	2,117	4,023	0.5968	6,742	2,718	0.1821	8,242	0.2	10,303	1,501	0.9597	1,440	5,464
MSK	1981	5	1,224	2,310	3,533	0.3136	11,267	7,734	0.126	12,892	0.2	16,115	1,624	0.9314	1,513	5,046

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MSK	1982	5	7,135	3,251	10,388	0.6338	16,389	6,001	0.181	20,011	0.2	25,013	3,622	0.9634	3,489	13,877
MSK	1983	5	2,031	2,251	4,283	0.4916	8,713	4,429	0.1187	9,886	0.2	12,358	1,173	0.9492	1,114	5,397
MSK	1984	5	5,739	3,136	8,925	0.7057	12,648	3,722	0.1825	15,471	0.2	19,339	2,823	0.9706	2,740	11,666
MSK	1985	5	535	777	1,312	0.5167	2,539	1,227	0.212	3,222	0.2	4,027	683	0.9517	650	1,962
MSK	1986	5	2,802	3,244	6,046	0.6791	8,903	2,857	0.1485	10,455	0.2	13,069	1,553	0.9679	1,503	7,549
MSK	1987	5	3,244	1,513	4,757	0.7818	6,085	1,328	0.2629	8,255	0.2	10,319	2,170	0.9782	2,123	6,880
MSK	1988	5	10,820	5,072	16,464	0.4437	37,106	20,642	0.195	46,095	0.2	57,619	8,988	0.9444	8,489	24,953
MSK	1989	5	3,821	1,357	5,178	0.0956	54,159	48,981	0.0665	58,017	0.2	72,521	3,858	0.9096	3,509	8,687
MSK	1990	5	2,793	986	3,778	0.3694	10,228	6,450	0.1749	12,396	0.2	15,495	2,168	0.9369	2,031	5,810
MSK	1991	5	8,914	5,970	14,884	0.3555	41,868	26,984	0.0869	45,853	0.2	57,316	3,985	0.9356	3,728	18,612
MSK	1992	5	4,554	2,031	6,585	0.5973	11,025	4,440	0.1849	13,526	0.2	16,908	2,501	0.9597	2,400	8,986
MSK	1993	5	4,124	2,501	6,625	0.4559	14,531	7,907	0.0531	15,346	0.2	19,183	815	0.9456	771	7,395
MSK	1994	5	2,858	2,242	5,100	0.8069	6,321	1,221	0.2821	8,805	0.2	11,006	2,484	0.9807	2,436	7,536
MSK	1995	5	5,147	3,066	8,214	0.643	12,774	4,560	0.2155	16,283	0.2	20,353	3,509	0.9643	3,384	11,597
MSK	1996	5	13,916	9,052	22,968	0.6859	33,487	10,518	0.205	42,121	0.2	52,652	8,635	0.9686	8,364	31,332
MSK	1997	5	2,064	1,535	3,599	0.7921	4,544	945	0.4023	7,602	0.2	9,502	3,058	0.9792	2,995	6,594
MSK	1998	5	10,700	4,316	15,016	0.773	19,426	4,410	0.1884	23,935	0.2	29,919	4,509	0.9773	4,407	19,423
MSK	1999	5	3,865	1,028	5,220	0.8803	5,930	710	0.2818	8,257	0.2	10,321	2,327	0.988	2,299	7,519
MSK	2000	5	5,946	1,620	7,566	0.7434	10,178	2,612	0.3682	16,110	0.2	20,137	5,932	0.9743	5,779	13,346
MSK	2001	5	2,988	1,145	4,452	0.8022	5,550	1,098	0.2585	7,485	0.2	9,356	1,935	0.9802	1,897	6,349
MSK	2002	5	11,110	3,718	15,105	0.879	17,184	2,079	0.3876	28,060	0.2	35,075	10,876	0.9879	10,744	25,849
MSK	2003	5	4,269	3,167	7,437	0.8287	8,974	1,537	0.2174	11,467	0.2	14,334	2,493	0.9829	2,450	9,887
MSK	2004	5	8,461	2,449	10,913	0.7264	15,024	4,110	0.0777	16,289	0.2	20,362	1,266	0.9726	1,231	12,144
MSK	2005	5	5,167	1,825	7,059	0.9498	7,433	373	0.2675	10,147	0.2	12,684	2,714	0.995	2,701	9,760
MSK	2006	5	2,299	1,524	3,823	0.947	4,037	214	0.2304	5,245	0.2	6,556	1,208	0.9947	1,202	5,025
MSK	2007	5	1,857	798	2,655	0.8688	3,056	401	0.274	4,210	0.2	5,262	1,153	0.9869	1,138	3,794
MSK	2008	5	7,181	2,097	9,278	0.6757	13,731	4,453	0.1223	15,644	0.2	19,555	1,913	0.9676	1,851	11,129
MSK	2009	5	2,275	620	2,894	0.9179	3,153	259	0.1536	3,725	0.2	4,657	572	0.9918	568	3,462
MSK	2010	5	4,668	1,796	7,152	0.6019	11,883	4,730	0.1236	13,558	0.2	16,948	1,676	0.9602	1,609	8,761
MSK	2011	5	1,785	1,047	3,049	0.9788	3,115	66	0.1846	3,820	0.2	4,775	705	0.9979	704	3,752
MSK	2012	5	2,125	1,669	3,793	0.9402	4,035	241	0.1207	4,589	0.2	5,736	554	0.994	551	4,344
MSK	2013	5	3,712	1,307	5,019	0.9203	5,454	435	0.1058	6,099	0.2	7,624	645	0.992	640	5,659
MSK	2014	5	1,835	1,100	3,020	0.8391	3,599	579	0.1193	4,086	0.2	5,108	488	0.9839	480	3,499
MSK	1978	6	597	431	1,029	1	1,029	0	0.1759	1,248	0.1	1,387	219	1	219	1,248
MSK	1979	6	762	726	1,488	1	1,488	0	0.2691	2,036	0.1	2,263	548	1	548	2,036
MSK	1980	6	928	1,710	2,769	1	2,769	0	0.2895	3,898	0.1	4,331	1,128	1	1,128	3,898
MSK	1981	6	13,378	4,479	17,857	1	17,857	0	0.2526	23,892	0.1	26,547	6,035	1	6,035	23,892
MSK	1982	6	5,938	4,345	10,283	1	10,283	0	0.1759	12,478	0.1	13,864	2,194	1	2,194	12,478
MSK	1983	6	5,050	2,033	7,084	1	7,084	0	0.1477	8,312	0.1	9,235	1,228	1	1,228	8,312
MSK	1984	6	2,444	3,716	6,160	1	6,160	0	0.1798	7,510	0.1	8,345	1,350	1	1,350	7,510

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MSK	1985	6	801	839	1,640	1	1,640	0	0.3469	2,511	0.1	2,790	871	1	871	2,511
MSK	1986	6	5,098	1,486	6,584	1	6,584	0	0.0009	6,590	0.1	7,322	6	1	6	6,590
MSK	1987	6	7,574	4,273	11,848	1	11,848	0	0.1928	14,678	0.1	16,309	2,830	1	2,830	14,678
MSK	1988	6	10,189	4,382	14,571	1	14,571	0	0.1662	17,475	0.1	19,417	2,904	1	2,904	17,475
MSK	1989	6	2,606	1,237	4,042	1	4,042	0	0.1607	4,816	0.1	5,352	774	1	774	4,816
MSK	1990	6	3,657	1,007	4,664	1	4,664	0	0.1117	5,251	0.1	5,834	587	1	587	5,251
MSK	1991	6	1,115	570	1,685	1	1,685	0	0.2209	2,163	0.1	2,403	478	1	478	2,163
MSK	1992	6	1,527	1,057	2,585	1	2,585	0	0.2029	3,243	0.1	3,603	658	1	658	3,243
MSK	1993	6	2,477	2,079	4,556	1	4,556	0	0.4343	8,053	0.1	8,948	3,498	1	3,498	8,053
MSK	1994	6	1,942	1,052	2,994	1	2,994	0	0.2247	3,862	0.1	4,291	868	1	868	3,862
MSK	1995	6	2,966	1,810	4,775	1	4,775	0	0.252	6,384	0.1	7,093	1,609	1	1,609	6,384
MSK	1996	6	1,838	1,257	3,094	1	3,094	0	0.3741	4,944	0.1	5,493	1,850	1	1,850	4,944
MSK	1997	6	1,904	657	2,562	1	2,562	0	0.2904	3,610	0.1	4,011	1,048	1	1,048	3,610
MSK	1998	6	7,731	1,872	9,604	1	9,604	0	0.2403	12,642	0.1	14,047	3,038	1	3,038	12,642
MSK	1999	6	1,487	493	1,980	1	1,980	0	0.2824	2,759	0.1	3,065	779	1	779	2,759
MSK	2000	6	3,232	1,267	4,499	1	4,499	0	0.322	6,636	0.1	7,373	2,137	1	2,137	6,636
MSK	2001	6	745	188	933	1	933	0	0.0002	934	0.1	1,037	0	1	0	934
MSK	2002	6	2,536	2,018	4,554	1	4,554	0	0.1762	5,528	0.1	6,142	974	1	974	5,528
MSK	2003	6	1,094	291	1,386	1	1,386	0	0.3064	1,998	0.1	2,220	612	1	612	1,998
MSK	2004	6	4,521	5,786	10,307	1	10,307	0	0.0555	10,913	0.1	12,125	606	1	606	10,913
MSK	2005	6	383	308	691	1	691	0	0.3113	1,003	0.1	1,115	312	1	312	1,003
MSK	2006	6	1,103	338	1,440	1	1,440	0	0.3446	2,198	0.1	2,442	757	1	757	2,198
MSK	2007	6	1,114	220	1,334	1	1,334	0	0.0691	1,433	0.1	1,592	99	1	99	1,433
MSK	2008	6	1,300	354	1,654	1	1,654	0	0.2881	2,323	0.1	2,581	669	1	669	2,323
MSK	2009	6	883	299	1,183	1	1,183	0	0.0002	1,183	0.1	1,314	0	1	0	1,183
MSK	2010	6	549	403	952	1	952	0	0.0349	987	0.1	1,096	34	1	34	987
MSK	2011	6	0	0	0	1	0	0	0.1292	0	0.1	0	0	1	0	0
MSK	2012	6	124	44	167	1	167	0	0	167	0.1	186	0	1	0	167
MSK	2013	6	87	38	125	1	125	0	0.4724	238	0.1	264	112	1	112	238

USK = Upper Skeena

CU	Brood Year	Age	Spawning Escapement	Terminal Total Mortalities	Total Mature Run	Maturation Rate	Pre-terminal Post-fishery Abundance	Non-Maturing Abundance	Pre-terminal Total Mortality ER (nominal)	Ocean Pre-fishery Abundance	Natural Mortality Rate	Cohort Abundance before Natural Mortality	Pre-terminal Fishing Mortality (nominal)	AEQ Rate	Pre-terminal Fishing Mortality (AEQ)	Total Recruits
USK	1980	4	395	320	715	0.0576	12,411	11,696	0.1338	14,328	0.3	20,468	1,917	0.7811	1,497	2,212
USK	1981	4	553	466	1,019	0.0401	25,415	24,395	0.0964	28,126	0.3	40,180	2,711	0.7553	2,048	3,067
USK	1982	4	222	427	648	0.0644	10,064	9,416	0.0646	10,760	0.3	15,371	695	0.7857	546	1,195
USK	1983	4	1,313	276	1,588	0.0644	24,652	23,063	0.0194	25,139	0.3	35,913	488	0.7593	370	1,959
USK	1984	4	427	511	938	0.0255	36,798	35,859	0.0389	38,287	0.3	54,696	1,489	0.7822	1,165	2,103
USK	1985	4	249	129	378	0.1061	3,566	3,187	0.0846	3,895	0.3	5,565	330	0.7867	259	638
USK	1986	4	900	1,686	2,586	0.0617	41,906	39,321	0.0704	45,080	0.3	64,400	3,174	0.7882	2,501	5,087
USK	1987	4	275	336	611	0.0654	9,344	8,733	0.0829	10,189	0.3	14,555	845	0.7968	673	1,284
USK	1988	4	1,805	964	2,770	0.0375	73,858	71,088	0.0655	79,034	0.3	112,906	5,177	0.7647	3,959	6,728
USK	1989	4	0	0	0	0.0758	0	0	0.0717	0	0.3	0	0	0.7483	0	0
USK	1990	4	1,320	643	1,962	0.0956	20,526	18,564	0.0439	21,469	0.3	30,669	942	0.7735	729	2,691
USK	1991	4	2,221	1,062	3,283	0.0374	87,774	84,492	0.0311	90,592	0.3	129,417	2,817	0.7579	2,135	5,418
USK	1992	4	2,465	1,835	4,300	0.091	47,255	42,955	0.0707	50,850	0.3	72,643	3,595	0.7889	2,836	7,136
USK	1993	4	2,822	1,997	4,819	0.0502	95,999	91,180	0.0179	97,748	0.3	139,641	1,750	0.7687	1,345	6,164
USK	1994	4	1,250	721	1,971	0.0589	33,462	31,491	0.0476	35,134	0.3	50,191	1,672	0.7973	1,333	3,304
USK	1995	4	489	397	885	0.0523	16,930	16,044	0.0595	18,001	0.3	25,715	1,071	0.7834	839	1,724
USK	1996	4	2,712	1,925	4,638	0.0748	61,999	57,362	0.0492	65,208	0.3	93,154	3,208	0.7917	2,540	7,178
USK	1997	4	1,037	984	2,021	0.0835	24,203	22,182	0.066	25,913	0.3	37,019	1,710	0.8014	1,371	3,392
USK	1998	4	881	581	1,462	0.0541	27,021	25,559	0.071	29,086	0.3	41,551	2,065	0.7936	1,639	3,101
USK	1999	4	306	182	488	0.0841	5,801	5,314	0.0524	6,122	0.3	8,746	321	0.7907	254	741
USK	2000	4	1,807	555	2,362	0.1309	18,042	15,680	0.0604	19,202	0.3	27,431	1,160	0.8083	937	3,299
USK	2001	4	948	258	1,207	0.0678	17,797	16,590	0.0626	18,985	0.3	27,122	1,188	0.7988	949	2,156
USK	2002	4	1,550	1,034	2,584	0.0327	79,015	76,432	0.0329	81,703	0.3	116,719	2,688	0.7972	2,143	4,727
USK	2003	4	874	161	1,035	0.2131	4,857	3,822	0.0775	5,265	0.3	7,522	408	0.8318	339	1,374
USK	2004	4	937	778	1,715	0.0863	19,867	18,153	0.0295	20,471	0.3	29,245	604	0.7973	481	2,196
USK	2005	4	468	168	636	0.2002	3,179	2,543	0.1555	3,765	0.3	5,378	585	0.8368	490	1,126
USK	2006	4	878	223	1,100	0.2526	4,356	3,256	0.0471	4,571	0.3	6,531	215	0.8473	182	1,283
USK	2007	4	392	264	656	0.2898	2,265	1,608	0.1202	2,574	0.3	3,677	309	0.8505	263	919
USK	2008	4	291	241	532	0.1425	3,731	3,199	0.078	4,046	0.3	5,780	316	0.8063	254	786
USK	2009	4	156	55	211	0.3977	532	320	0.1459	623	0.3	889	91	0.8756	80	291
USK	2010	4	368	100	469	0.2414	1,941	1,472	0.0432	2,029	0.3	2,898	88	0.8241	72	541
USK	2011	4	541	216	756	0.2592	2,918	2,161	0.1216	3,322	0.3	4,745	404	0.8506	344	1,100
USK	2012	4	279	113	392	0.1429	2,740	2,349	0.0863	2,999	0.3	4,284	259	0.8245	213	605
USK	2013	4	296	345	641	0.3327	1,927	1,286	0.126	2,205	0.3	3,150	278	0.8623	240	881
USK	2014	4	879	309	1,188	0.3202	3,711	2,523	0.0429	3,878	0.3	5,540	166	0.8553	142	1,331
USK	2015	4	65	34	99	0.2527	391	293	0.0749	423	0.3	604	32	0.8409	27	126
USK	1979	5	526	290	817	0.6338	1,289	472	0.3053	1,855	0.2	2,319	566	0.9	510	1,326
USK	1980	5	886	984	1,869	0.5968	3,132	1,263	0.1821	3,829	0.2	4,786	697	0.9597	669	2,538
USK	1981	5	222	419	641	0.3136	2,043	1,402	0.126	2,337	0.2	2,922	295	0.9314	274	915

CU	Brood Year	Age	Spawning Escapement	Terminal Total Mortalities	Total Mature Run	Maturation Rate	Pre-terminal Post-fishery Abundance	Non-Maturing Abundance	Pre-terminal Total Mortality ER (nominal)	Ocean Pre-fishery Abundance	Natural Mortality Rate	Cohort Abundance before Natural Mortality	Pre-terminal Fishing Mortality (nominal)	AEQ Rate	Pre-terminal Fishing Mortality (AEQ)	Total Recruits
USK	1982	5	1,313	598	1,911	0.6338	3,016	1,104	0.181	3,682	0.2	4,602	666	0.9634	642	2,553
USK	1983	5	1,495	1,657	3,153	0.4916	6,413	3,260	0.1187	7,277	0.2	9,096	864	0.9492	820	3,973
USK	1984	5	1,745	954	2,714	0.7057	3,845	1,132	0.1825	4,704	0.2	5,879	858	0.9706	833	3,547
USK	1985	5	270	392	662	0.5167	1,282	620	0.212	1,627	0.2	2,034	345	0.9517	328	991
USK	1986	5	1,374	1,591	2,966	0.6791	4,367	1,401	0.1485	5,128	0.2	6,410	762	0.9679	737	3,703
USK	1987	5	602	281	882	0.7818	1,129	246	0.2629	1,531	0.2	1,914	403	0.9782	394	1,276
USK	1988	5	7,214	3,382	10,976	0.4437	24,738	13,762	0.195	30,731	0.2	38,414	5,993	0.9444	5,659	16,636
USK	1989	5	2,639	937	3,576	0.0956	37,411	33,834	0.0665	40,076	0.2	50,094	2,665	0.9096	2,424	6,001
USK	1990	5	1,999	705	2,704	0.3694	7,320	4,616	0.1749	8,872	0.2	11,090	1,552	0.9369	1,454	4,158
USK	1991	5	12,031	8,057	20,088	0.3555	56,506	36,418	0.0869	61,883	0.2	77,354	5,378	0.9356	5,031	25,119
USK	1992	5	4,498	2,007	6,505	0.5973	10,890	4,386	0.1849	13,361	0.2	16,701	2,470	0.9597	2,371	8,876
USK	1993	5	2,344	1,422	3,766	0.4559	8,261	4,495	0.0531	8,724	0.2	10,905	463	0.9456	438	4,204
USK	1994	5	1,564	1,227	2,790	0.8069	3,458	668	0.2821	4,817	0.2	6,021	1,359	0.9807	1,333	4,123
USK	1995	5	2,131	1,269	3,401	0.643	5,289	1,888	0.2155	6,741	0.2	8,427	1,453	0.9643	1,401	4,801
USK	1996	5	10,367	6,743	17,110	0.6859	24,945	7,835	0.205	31,378	0.2	39,222	6,432	0.9686	6,230	23,341
USK	1997	5	1,389	1,034	2,423	0.7921	3,059	636	0.4023	5,118	0.2	6,398	2,059	0.9792	2,016	4,439
USK	1998	5	5,195	2,095	7,290	0.773	9,431	2,141	0.1884	11,620	0.2	14,525	2,189	0.9773	2,139	9,429
USK	1999	5	2,258	601	3,050	0.8803	3,465	415	0.2818	4,824	0.2	6,030	1,359	0.988	1,343	4,393
USK	2000	5	2,465	672	3,137	0.7434	4,220	1,083	0.3682	6,679	0.2	8,349	2,459	0.9743	2,396	5,533
USK	2001	5	1,482	568	2,209	0.8022	2,753	545	0.2585	3,713	0.2	4,641	960	0.9802	941	3,150
USK	2002	5	4,122	1,379	5,604	0.879	6,375	771	0.3876	10,410	0.2	13,012	4,035	0.9879	3,986	9,590
USK	2003	5	3,024	2,243	5,267	0.8287	6,356	1,089	0.2174	8,122	0.2	10,152	1,766	0.9829	1,735	7,003
USK	2004	5	4,348	1,259	5,608	0.7264	7,720	2,112	0.0777	8,370	0.2	10,463	650	0.9726	633	6,240
USK	2005	5	1,975	698	2,698	0.9498	2,841	143	0.2675	3,879	0.2	4,848	1,038	0.995	1,032	3,731
USK	2006	5	490	325	816	0.947	861	46	0.2304	1,119	0.2	1,399	258	0.9947	257	1,072
USK	2007	5	930	399	1,330	0.8688	1,530	201	0.274	2,108	0.2	2,635	578	0.9869	570	1,900
USK	2008	5	1,249	365	1,614	0.6757	2,389	775	0.1223	2,722	0.2	3,402	333	0.9676	322	1,936
USK	2009	5	2,945	802	3,748	0.9179	4,083	335	0.1536	4,824	0.2	6,030	741	0.9918	735	4,483
USK	2010	5	1,514	582	2,319	0.6019	3,854	1,534	0.1236	4,397	0.2	5,496	543	0.9602	522	2,841
USK	2011	5	744	437	1,271	0.9788	1,298	28	0.1846	1,592	0.2	1,991	294	0.9979	293	1,564
USK	2012	5	1,775	1,394	3,169	0.9402	3,371	202	0.1207	3,834	0.2	4,792	463	0.994	460	3,629
USK	2013	5	1,172	413	1,584	0.9203	1,722	137	0.1058	1,925	0.2	2,407	204	0.992	202	1,787
USK	2014	5	1,097	657	1,805	0.8391	2,151	346	0.1193	2,442	0.2	3,053	291	0.9839	287	2,091
USK	1978	6	526	380	906	1	906	0	0.1759	1,100	0.1	1,222	193	1	193	1,100
USK	1979	6	553	527	1,080	1	1,080	0	0.2691	1,478	0.1	1,642	398	1	398	1,478
USK	1980	6	296	545	883	1	883	0	0.2895	1,242	0.1	1,380	360	1	360	1,242
USK	1981	6	4,814	1,582	6,395	1	6,395	0	0.2526	8,557	0.1	9,508	2,161	1	2,161	8,557
USK	1982	6	2,350	1,651	4,001	1	4,001	0	0.1759	4,854	0.1	5,394	854	1	854	4,854
USK	1983	6	499	349	848	1	848	0	0.1477	995	0.1	1,105	147	1	147	995
USK	1984	6	900	1,216	2,116	1	2,116	0	0.1798	2,579	0.1	2,866	464	1	464	2,579

CU	Brood Year	Age	Spawning Escapement	Terminal Total Mortalities	Total Mature Run	Maturation Rate	Pre-terminal Post-fishery Abundance	Non-Maturing Abundance	Pre-terminal Total Mortality ER (nominal)	Ocean Pre-fishery Abundance	Natural Mortality Rate	Cohort Abundance before Natural Mortality	Pre-terminal Fishing Mortality (nominal)	AEQ Rate	Pre-terminal Fishing Mortality (AEQ)	Total Recruits
USK	1985	6	687	790	1,477	1	1,477	0	0.3469	2,262	0.1	2,513	785	1	785	2,262
USK	1986	6	4,814	1,583	6,397	1	6,397	0	0.0009	6,403	0.1	7,115	6	1	6	6,403
USK	1987	6	4,994	2,675	7,670	1	7,670	0	0.1928	9,502	0.1	10,558	1,832	1	1,832	9,502
USK	1988	6	5,279	2,166	7,445	1	7,445	0	0.1662	8,929	0.1	9,921	1,484	1	1,484	8,929
USK	1989	6	3,331	1,680	5,271	1	5,271	0	0.1607	6,280	0.1	6,978	1,009	1	1,009	6,280
USK	1990	6	3,353	953	4,306	1	4,306	0	0.1117	4,848	0.1	5,386	541	1	541	4,848
USK	1991	6	2,205	1,097	3,303	1	3,303	0	0.2209	4,239	0.1	4,710	936	1	936	4,239
USK	1992	6	2,188	1,515	3,703	1	3,703	0	0.2029	4,645	0.1	5,161	943	1	943	4,645
USK	1993	6	1,759	1,523	3,282	1	3,282	0	0.4343	5,801	0.1	6,446	2,520	1	2,520	5,801
USK	1994	6	1,066	531	1,596	1	1,596	0	0.2247	2,059	0.1	2,287	463	1	463	2,059
USK	1995	6	2,851	1,709	4,560	1	4,560	0	0.252	6,097	0.1	6,774	1,536	1	1,536	6,097
USK	1996	6	678	464	1,141	1	1,141	0	0.3741	1,824	0.1	2,026	682	1	682	1,824
USK	1997	6	815	294	1,109	1	1,109	0	0.2904	1,563	0.1	1,737	454	1	454	1,563
USK	1998	6	3,839	930	4,770	1	4,770	0	0.2403	6,278	0.1	6,976	1,509	1	1,509	6,278
USK	1999	6	1,138	368	1,506	1	1,506	0	0.2824	2,099	0.1	2,332	593	1	593	2,099
USK	2000	6	808	281	1,089	1	1,089	0	0.322	1,607	0.1	1,785	517	1	517	1,607
USK	2001	6	749	171	920	1	920	0	0.0002	921	0.1	1,023	0	1	0	921
USK	2002	6	1,405	1,128	2,534	1	2,534	0	0.1762	3,076	0.1	3,417	542	1	542	3,076
USK	2003	6	468	125	593	1	593	0	0.3064	855	0.1	950	262	1	262	855
USK	2004	6	2,743	3,529	6,272	1	6,272	0	0.0555	6,641	0.1	7,379	369	1	369	6,641
USK	2005	6	245	166	411	1	411	0	0.3113	597	0.1	664	186	1	186	597
USK	2006	6	291	94	385	1	385	0	0.3446	587	0.1	652	202	1	202	587
USK	2007	6	1,093	216	1,309	1	1,309	0	0.0691	1,406	0.1	1,562	97	1	97	1,406
USK	2008	6	184	50	234	1	234	0	0.2881	329	0.1	366	95	1	95	329
USK	2009	6	216	73	290	1	290	0	0.0002	290	0.1	322	0	1	0	290
USK	2010	6	279	205	484	1	484	0	0.0349	501	0.1	557	17	1	17	501
USK	2011	6	197	95	292	1	292	0	0.1292	336	0.1	373	43	1	43	336
USK	2012	6	146	52	198	1	198	0	0	198	0.1	220	0	1	0	198
USK	2013	6	0	0	0	1	0	0	0.4724	0	0.1	0	0	1	0	0

LSK = Lower Skeena

CU	Brood Year	Age	Spawning Escapement	Terminal Total Mortalities	Total Mature Run	Maturation Rate	Pre-terminal Post-fishery Abundance	Non-Maturing Abundance	Pre-terminal Total Mortality ER (nominal)	Ocean Pre-fishery Abundance	Natural Mortality Rate	Cohort Abundance before Natural Mortality	Pre-terminal Fishing Mortality (nominal)	AEQ Rate	Pre-terminal Fishing Mortality (AEQ)	Total Recruits
LSK	1980	4	404	147	551	0.0576	9,563	9,012	0.1338	11,040	0.3	15,771	1,477	0.7811	1,154	1,705
LSK	1981	4	414	53	468	0.0401	11,659	11,192	0.0964	12,903	0.3	18,433	1,244	0.7553	939	1,407
LSK	1982	4	139	69	208	0.0644	3,222	3,015	0.0646	3,445	0.3	4,921	223	0.7857	175	383
LSK	1983	4	361	24	385	0.0644	5,972	5,587	0.0194	6,090	0.3	8,700	118	0.7593	90	474
LSK	1984	4	283	214	497	0.0255	19,490	18,993	0.0389	20,279	0.3	28,969	789	0.7822	617	1,114
LSK	1985	4	383	100	483	0.1061	4,555	4,072	0.0846	4,976	0.3	7,109	421	0.7867	331	814
LSK	1986	4	407	270	677	0.0617	10,967	10,290	0.0704	11,797	0.3	16,853	831	0.7882	655	1,331
LSK	1987	4	158	87	245	0.0654	3,749	3,504	0.0829	4,088	0.3	5,840	339	0.7968	270	515
LSK	1988	4	380	115	495	0.0375	13,197	12,702	0.0655	14,122	0.3	20,174	925	0.7647	707	1,202
LSK	1989	4	0	0	0	0.0758	0	0	0.0717	0	0.3	0	0	0.7483	0	0
LSK	1990	4	497	170	666	0.0956	6,969	6,302	0.0439	7,289	0.3	10,412	320	0.7735	247	914
LSK	1991	4	705	218	923	0.0374	24,691	23,768	0.0311	25,484	0.3	36,406	793	0.7579	601	1,524
LSK	1992	4	544	368	912	0.091	10,027	9,114	0.0707	10,789	0.3	15,413	763	0.7889	602	1,514
LSK	1993	4	525	255	780	0.0502	15,532	14,752	0.0179	15,815	0.3	22,593	283	0.7687	218	997
LSK	1994	4	880	107	987	0.0589	16,754	15,767	0.0476	17,591	0.3	25,131	837	0.7973	668	1,654
LSK	1995	4	1,624	286	1,909	0.0523	36,508	34,599	0.0595	38,818	0.3	55,454	2,310	0.7834	1,809	3,719
LSK	1996	4	2,391	781	3,172	0.0748	42,402	39,230	0.0492	44,596	0.3	63,708	2,194	0.7917	1,737	4,909
LSK	1997	4	351	271	622	0.0835	7,446	6,824	0.066	7,972	0.3	11,389	526	0.8014	422	1,043
LSK	1998	4	676	209	886	0.0541	16,371	15,485	0.071	17,622	0.3	25,174	1,251	0.7936	993	1,879
LSK	1999	4	121	44	165	0.0841	1,957	1,793	0.0524	2,066	0.3	2,951	108	0.7907	86	250
LSK	2000	4	1,721	212	1,932	0.1309	14,763	12,830	0.0604	15,712	0.3	22,445	949	0.8083	767	2,699
LSK	2001	4	650	42	692	0.0678	10,207	9,515	0.0626	10,888	0.3	15,555	682	0.7988	544	1,236
LSK	2002	4	2,163	962	3,125	0.0327	95,570	92,445	0.0329	98,822	0.3	141,174	3,251	0.7972	2,592	5,717
LSK	2003	4	433	25	458	0.2131	2,150	1,692	0.0775	2,331	0.3	3,329	181	0.8318	150	608
LSK	2004	4	657	321	978	0.0863	11,329	10,352	0.0295	11,674	0.3	16,677	344	0.7973	275	1,252
LSK	2005	4	740	144	885	0.2002	4,419	3,535	0.1555	5,233	0.3	7,476	814	0.8368	681	1,566
LSK	2006	4	1,512	146	1,658	0.2526	6,566	4,907	0.0471	6,890	0.3	9,843	325	0.8473	275	1,933
LSK	2007	4	235	93	328	0.2898	1,132	804	0.1202	1,286	0.3	1,838	155	0.8505	131	459
LSK	2008	4	385	221	606	0.1425	4,250	3,644	0.078	4,609	0.3	6,584	360	0.8063	290	895
LSK	2009	4	339	78	417	0.3977	1,048	631	0.1459	1,227	0.3	1,752	179	0.8756	157	573
LSK	2010	4	1,226	127	1,354	0.2414	5,607	4,254	0.0432	5,861	0.3	8,372	253	0.8241	209	1,562
LSK	2011	4	366	62	428	0.2592	1,651	1,223	0.1216	1,880	0.3	2,686	229	0.8506	194	622
LSK	2012	4	308	38	347	0.1429	2,426	2,080	0.0863	2,655	0.3	3,793	229	0.8245	189	536
LSK	2013	4	200	154	354	0.3327	1,064	710	0.126	1,218	0.3	1,740	153	0.8623	132	486
LSK	2014	4	1,354	37	1,391	0.3202	4,344	2,953	0.0429	4,539	0.3	6,484	195	0.8553	167	1,557
LSK	2015	4	83	13	96	0.2527	380	284	0.0749	411	0.3	587	31	0.8409	26	122
LSK	1979	5	0	0	0	0.6338	0	0	0.3053	0	0.2	0	0	0.9	0	0

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LSK	1980	5	2,277	907	3,185	0.5968	5,336	2,152	0.1821	6,525	0.2	8,156	1,188	0.9597	1,140	4,325
LSK	1981	5	416	192	608	0.3136	1,939	1,331	0.126	2,219	0.2	2,774	280	0.9314	260	869
LSK	1982	5	2,524	790	3,314	0.6338	5,229	1,915	0.181	6,385	0.2	7,981	1,156	0.9634	1,113	4,428
LSK	1983	5	1,131	757	1,888	0.4916	3,841	1,953	0.1187	4,359	0.2	5,449	517	0.9492	491	2,380
LSK	1984	5	1,149	333	1,491	0.7057	2,113	622	0.1825	2,585	0.2	3,231	472	0.9706	458	1,949
LSK	1985	5	136	33	169	0.5167	327	158	0.212	414	0.2	518	88	0.9517	84	252
LSK	1986	5	2,209	1,079	3,288	0.6791	4,841	1,554	0.1485	5,686	0.2	7,107	844	0.9679	817	4,105
LSK	1987	5	2,281	533	2,815	0.7818	3,600	786	0.2629	4,884	0.2	6,106	1,284	0.9782	1,256	4,071
LSK	1988	5	1,617	515	2,208	0.4437	4,977	2,769	0.195	6,182	0.2	7,728	1,206	0.9444	1,139	3,347
LSK	1989	5	993	208	1,201	0.0956	12,567	11,366	0.0665	13,462	0.2	16,828	895	0.9096	814	2,016
LSK	1990	5	588	108	696	0.3694	1,884	1,188	0.1749	2,283	0.2	2,854	399	0.9369	374	1,070
LSK	1991	5	3,699	2,230	5,929	0.3555	16,677	10,748	0.0869	18,264	0.2	22,830	1,587	0.9356	1,485	7,414
LSK	1992	5	1,050	235	1,285	0.5973	2,151	866	0.1849	2,640	0.2	3,299	488	0.9597	468	1,753
LSK	1993	5	1,100	167	1,267	0.4559	2,778	1,512	0.0531	2,934	0.2	3,668	156	0.9456	147	1,414
LSK	1994	5	1,015	151	1,166	0.8069	1,444	279	0.2821	2,012	0.2	2,515	568	0.9807	557	1,722
LSK	1995	5	2,732	581	3,313	0.643	5,152	1,839	0.2155	6,568	0.2	8,209	1,415	0.9643	1,365	4,678
LSK	1996	5	6,321	2,980	9,301	0.6859	13,561	4,259	0.205	17,058	0.2	21,322	3,497	0.9686	3,387	12,688
LSK	1997	5	1,063	419	1,482	0.7921	1,871	389	0.4023	3,130	0.2	3,913	1,259	0.9792	1,233	2,715
LSK	1998	5	4,842	807	5,649	0.773	7,307	1,659	0.1884	9,004	0.2	11,255	1,696	0.9773	1,658	7,306
LSK	1999	5	860	70	993	0.8803	1,128	135	0.2818	1,570	0.2	1,963	443	0.988	437	1,430
LSK	2000	5	1,301	83	1,384	0.7434	1,862	478	0.3682	2,947	0.2	3,683	1,085	0.9743	1,057	2,441
LSK	2001	5	1,497	240	1,872	0.8022	2,334	462	0.2585	3,148	0.2	3,935	814	0.9802	798	2,670
LSK	2002	5	3,684	766	4,533	0.879	5,157	624	0.3876	8,420	0.2	10,525	3,264	0.9879	3,224	7,757
LSK	2003	5	1,792	717	2,509	0.8287	3,027	519	0.2174	3,868	0.2	4,835	841	0.9829	827	3,335
LSK	2004	5	1,810	226	2,037	0.7264	2,804	767	0.0777	3,040	0.2	3,800	236	0.9726	230	2,266
LSK	2005	5	1,134	223	1,370	0.9498	1,442	72	0.2675	1,969	0.2	2,461	527	0.995	524	1,894
LSK	2006	5	822	318	1,140	0.947	1,204	64	0.2304	1,564	0.2	1,955	360	0.9947	358	1,498
LSK	2007	5	577	100	678	0.8688	780	102	0.274	1,074	0.2	1,343	294	0.9869	291	968
LSK	2008	5	2,822	474	3,296	0.6757	4,878	1,582	0.1223	5,558	0.2	6,948	680	0.9676	658	3,954
LSK	2009	5	817	85	902	0.9179	983	81	0.1536	1,161	0.2	1,452	178	0.9918	177	1,079
LSK	2010	5	2,382	366	3,041	0.6019	5,053	2,011	0.1236	5,765	0.2	7,207	713	0.9602	684	3,725
LSK	2011	5	308	95	434	0.9788	444	9	0.1846	544	0.2	680	100	0.9979	100	534
LSK	2012	5	1,001	387	1,388	0.9402	1,477	88	0.1207	1,679	0.2	2,099	203	0.994	201	1,590
LSK	2013	5	677	18	695	0.9203	756	60	0.1058	845	0.2	1,056	89	0.992	89	784
LSK	2014	5	580	128	729	0.8391	868	140	0.1193	986	0.2	1,233	118	0.9839	116	844
LSK	1978	6	809	221	1,030	1	1,030	0	0.1759	1,250	0.1	1,389	220	1	220	1,250
LSK	1979	6	0	0	0	1	0	0	0.2691	0	0.1	0	0	1	0	0
LSK	1980	6	554	231	825	1	825	0	0.2895	1,161	0.1	1,290	336	1	336	1,161
LSK	1981	6	3,967	737	4,703	1	4,703	0	0.2526	6,293	0.1	6,992	1,590	1	1,590	6,293
LSK	1982	6	1,131	298	1,429	1	1,429	0	0.1759	1,734	0.1	1,927	305	1	305	1,734

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LSK	1983	6	1,532	302	1,834	1	1,834	0	0.1477	2,152	0.1	2,392	318	1	318	2,152
LSK	1984	6	1,355	378	1,733	1	1,733	0	0.1798	2,113	0.1	2,348	380	1	380	2,113
LSK	1985	6	631	303	934	1	934	0	0.3469	1,430	0.1	1,589	496	1	496	1,430
LSK	1986	6	2,662	113	2,775	1	2,775	0	0.0009	2,777	0.1	3,086	2	1	2	2,777
LSK	1987	6	2,156	916	3,072	1	3,072	0	0.1928	3,806	0.1	4,228	734	1	734	3,806
LSK	1988	6	497	143	640	1	640	0	0.1662	767	0.1	853	128	1	128	767
LSK	1989	6	1,293	423	1,806	1	1,806	0	0.1607	2,151	0.1	2,390	346	1	346	2,151
LSK	1990	6	870	184	1,055	1	1,055	0	0.1117	1,187	0.1	1,319	133	1	133	1,187
LSK	1991	6	420	121	541	1	541	0	0.2209	695	0.1	772	153	1	153	695
LSK	1992	6	220	60	280	1	280	0	0.2029	351	0.1	390	71	1	71	351
LSK	1993	6	880	171	1,051	1	1,051	0	0.4343	1,857	0.1	2,064	807	1	807	1,857
LSK	1994	6	512	81	593	1	593	0	0.2247	765	0.1	850	172	1	172	765
LSK	1995	6	1,405	591	1,995	1	1,995	0	0.252	2,668	0.1	2,964	672	1	672	2,668
LSK	1996	6	821	274	1,096	1	1,096	0	0.3741	1,751	0.1	1,945	655	1	655	1,751
LSK	1997	6	1,210	151	1,361	1	1,361	0	0.2904	1,918	0.1	2,131	557	1	557	1,918
LSK	1998	6	2,868	166	3,035	1	3,035	0	0.2403	3,995	0.1	4,438	960	1	960	3,995
LSK	1999	6	0	0	0	1	0	0	0.2824	0	0.1	0	0	1	0	0
LSK	2000	6	998	196	1,195	1	1,195	0	0.322	1,762	0.1	1,958	567	1	567	1,762
LSK	2001	6	144	15	159	1	159	0	0.0002	159	0.1	177	0	1	0	159
LSK	2002	6	1,015	468	1,483	1	1,483	0	0.1762	1,801	0.1	2,001	317	1	317	1,801
LSK	2003	6	329	33	363	1	363	0	0.3064	523	0.1	581	160	1	160	523
LSK	2004	6	630	708	1,338	1	1,338	0	0.0555	1,416	0.1	1,574	79	1	79	1,416
LSK	2005	6	176	84	260	1	260	0	0.3113	378	0.1	420	118	1	118	378
LSK	2006	6	385	26	411	1	411	0	0.3446	627	0.1	696	216	1	216	627
LSK	2007	6	113	8	121	1	121	0	0.0691	130	0.1	145	9	1	9	130
LSK	2008	6	204	21	226	1	226	0	0.2881	317	0.1	352	91	1	91	317
LSK	2009	6	183	20	203	1	203	0	0.0002	203	0.1	226	0	1	0	203
LSK	2010	6	103	47	150	1	150	0	0.0349	155	0.1	172	5	1	5	155
LSK	2011	6	0	0	0	1	0	0	0.1292	0	0.1	0	0	1	0	0
LSK	2012	6	451	12	464	1	464	0	0	464	0.1	515	0	1	0	464
LSK	2013	6	83	5	87	1	87	0	0.4724	166	0.1	184	78	1	78	166

ZYF = Zymoetz-Fiddler

CU	Brood Year	Age	Spawning Escapement	Terminal Total Mortalities	Total Mature Run	Maturation Rate	Pre-terminal Post-fishery Abundance	Non-Maturing Abundance	Pre-terminal Total Mortality ER (nominal)	Ocean Pre-fishery Abundance	Natural Mortality Rate	Cohort Abundance before Natural Mortality	Pre-terminal Fishing Mortality (nominal)	AEQ Rate	Pre-terminal Fishing Mortality (AEQ)	Total Recruits
ZYF	1980	4	446	162	607	0.0576	10,547	9,939	0.1338	12,176	0.3	17,394	1,629	0.7811	1,273	1,880
ZYF	1981	4	327	42	370	0.0401	9,219	8,849	0.0964	10,202	0.3	14,574	983	0.7553	743	1,112
ZYF	1982	4	140	70	210	0.0644	3,259	3,049	0.0646	3,484	0.3	4,977	225	0.7857	177	387
ZYF	1983	4	560	37	597	0.0644	9,268	8,671	0.0194	9,452	0.3	13,502	183	0.7593	139	736
ZYF	1984	4	244	184	428	0.0255	16,784	16,356	0.0389	17,463	0.3	24,947	679	0.7822	531	959
ZYF	1985	4	0	0	0	0.1061	0	0	0.0846	0	0.3	0	0	0.7867	0	0
ZYF	1986	4	649	431	1,080	0.0617	17,502	16,422	0.0704	18,827	0.3	26,896	1,325	0.7882	1,045	2,125
ZYF	1987	4	963	533	1,496	0.0654	22,875	21,379	0.0829	24,943	0.3	35,632	2,068	0.7968	1,648	3,144
ZYF	1988	4	557	168	725	0.0375	19,343	18,618	0.0655	20,699	0.3	29,570	1,356	0.7647	1,037	1,762
ZYF	1989	4	558	191	749	0.0758	9,880	9,131	0.0717	10,643	0.3	15,204	763	0.7483	571	1,320
ZYF	1990	4	497	170	667	0.0956	6,977	6,310	0.0439	7,297	0.3	10,424	320	0.7735	248	915
ZYF	1991	4	269	83	353	0.0374	9,432	9,079	0.0311	9,735	0.3	13,906	303	0.7579	229	582
ZYF	1992	4	500	338	838	0.091	9,210	8,372	0.0707	9,911	0.3	14,159	701	0.7889	553	1,391
ZYF	1993	4	631	306	937	0.0502	18,662	17,725	0.0179	19,002	0.3	27,146	340	0.7687	261	1,198
ZYF	1994	4	549	67	616	0.0589	10,459	9,843	0.0476	10,982	0.3	15,688	523	0.7973	417	1,033
ZYF	1995	4	875	154	1,028	0.0523	19,663	18,634	0.0595	20,907	0.3	29,867	1,244	0.7834	975	2,003
ZYF	1996	4	1,562	510	2,072	0.0748	27,700	25,628	0.0492	29,133	0.3	41,619	1,433	0.7917	1,135	3,207
ZYF	1997	4	284	219	504	0.0835	6,031	5,527	0.066	6,457	0.3	9,224	426	0.8014	342	845
ZYF	1998	4	698	216	914	0.0541	16,889	15,975	0.071	18,179	0.3	25,970	1,291	0.7936	1,024	1,938
ZYF	1999	4	0	0	0	0.0841	0	0	0.0524	0	0.3	0	0	0.7907	0	0
ZYF	2000	4	2,180	268	2,448	0.1309	18,704	16,256	0.0604	19,906	0.3	28,438	1,202	0.8083	972	3,420
ZYF	2001	4	382	24	407	0.0678	6,001	5,594	0.0626	6,402	0.3	9,146	401	0.7988	320	727
ZYF	2002	4	1,756	781	2,537	0.0327	77,588	75,051	0.0329	80,228	0.3	114,611	2,639	0.7972	2,104	4,641
ZYF	2003	4	293	17	310	0.2131	1,454	1,144	0.0775	1,576	0.3	2,252	122	0.8318	102	411
ZYF	2004	4	507	247	754	0.0863	8,741	7,987	0.0295	9,007	0.3	12,867	266	0.7973	212	966
ZYF	2005	4	523	102	624	0.2002	3,119	2,494	0.1555	3,693	0.3	5,275	574	0.8368	481	1,105
ZYF	2006	4	1,516	147	1,662	0.2526	6,581	4,918	0.0471	6,906	0.3	9,865	325	0.8473	276	1,938
ZYF	2007	4	423	167	590	0.2898	2,036	1,446	0.1202	2,314	0.3	3,305	278	0.8505	237	826
ZYF	2008	4	369	212	581	0.1425	4,080	3,498	0.078	4,425	0.3	6,321	345	0.8063	278	860
ZYF	2009	4	469	108	576	0.3977	1,450	873	0.1459	1,697	0.3	2,425	248	0.8756	217	793
ZYF	2010	4	648	67	715	0.2414	2,964	2,248	0.0432	3,097	0.3	4,425	134	0.8241	110	826
ZYF	2011	4	113	19	132	0.2592	510	378	0.1216	581	0.3	830	71	0.8506	60	192
ZYF	2012	4	86	11	97	0.1429	680	583	0.0863	745	0.3	1,064	64	0.8245	53	150
ZYF	2013	4	93	71	164	0.3327	493	329	0.126	564	0.3	806	71	0.8623	61	225
ZYF	2014	4	618	17	634	0.3202	1,981	1,347	0.0429	2,070	0.3	2,957	89	0.8553	76	710
ZYF	2015	4	104	16	120	0.2527	475	355	0.0749	514	0.3	734	38	0.8409	32	152
ZYF	1979	5	223	23	246	0.6338	388	142	0.3053	559	0.2	698	171	0.9	154	399
ZYF	1980	5	1,310	522	1,831	0.5968	3,069	1,237	0.1821	3,752	0.2	4,690	683	0.9597	656	2,487
ZYF	1981	5	841	389	1,230	0.3136	3,923	2,693	0.126	4,488	0.2	5,610	566	0.9314	527	1,757

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ZYF	1982	5	2,239	700	2,939	0.6338	4,637	1,698	0.181	5,662	0.2	7,078	1,025	0.9634	987	3,927
ZYF	1983	5	731	489	1,220	0.4916	2,481	1,261	0.1187	2,815	0.2	3,519	334	0.9492	317	1,537
ZYF	1984	5	0	0	0	0.7057	0	0	0.1825	0	0.2	0	0	0.9706	0	0
ZYF	1985	5	0	0	0	0.5167	0	0	0.212	0	0.2	0	0	0.9517	0	0
ZYF	1986	5	963	470	1,433	0.6791	2,110	677	0.1485	2,478	0.2	3,098	368	0.9679	356	1,789
ZYF	1987	5	3,901	912	4,813	0.7818	6,157	1,343	0.2629	8,353	0.2	10,441	2,196	0.9782	2,148	6,961
ZYF	1988	5	1,116	355	1,524	0.4437	3,436	1,911	0.195	4,268	0.2	5,335	832	0.9444	786	2,310
ZYF	1989	5	497	104	601	0.0956	6,291	5,689	0.0665	6,739	0.2	8,424	448	0.9096	408	1,009
ZYF	1990	5	1,347	248	1,595	0.3694	4,318	2,723	0.1749	5,233	0.2	6,541	915	0.9369	857	2,452
ZYF	1991	5	999	602	1,602	0.3555	4,506	2,904	0.0869	4,934	0.2	6,168	429	0.9356	401	2,003
ZYF	1992	5	883	198	1,081	0.5973	1,810	729	0.1849	2,220	0.2	2,775	410	0.9597	394	1,475
ZYF	1993	5	915	139	1,054	0.4559	2,313	1,258	0.0531	2,442	0.2	3,053	130	0.9456	123	1,177
ZYF	1994	5	740	110	850	0.8069	1,053	203	0.2821	1,467	0.2	1,834	414	0.9807	406	1,256
ZYF	1995	5	1,432	304	1,736	0.643	2,700	964	0.2155	3,441	0.2	4,302	742	0.9643	715	2,451
ZYF	1996	5	5,120	2,414	7,533	0.6859	10,983	3,450	0.205	13,815	0.2	17,269	2,832	0.9686	2,743	10,277
ZYF	1997	5	1,256	495	1,751	0.7921	2,211	460	0.4023	3,699	0.2	4,623	1,488	0.9792	1,457	3,208
ZYF	1998	5	3,195	532	3,727	0.773	4,822	1,094	0.1884	5,941	0.2	7,426	1,119	0.9773	1,094	4,821
ZYF	1999	5	727	59	839	0.8803	953	114	0.2818	1,327	0.2	1,658	374	0.988	369	1,208
ZYF	2000	5	2,295	146	2,441	0.7434	3,284	843	0.3682	5,198	0.2	6,497	1,914	0.9743	1,865	4,306
ZYF	2001	5	585	94	732	0.8022	912	180	0.2585	1,230	0.2	1,538	318	0.9802	312	1,044
ZYF	2002	5	3,004	625	3,696	0.879	4,205	509	0.3876	6,867	0.2	8,584	2,662	0.9879	2,629	6,326
ZYF	2003	5	1,239	496	1,735	0.8287	2,093	359	0.2174	2,675	0.2	3,344	582	0.9829	572	2,306
ZYF	2004	5	1,045	131	1,176	0.7264	1,619	443	0.0777	1,755	0.2	2,194	136	0.9726	133	1,309
ZYF	2005	5	1,083	213	1,308	0.9498	1,377	69	0.2675	1,880	0.2	2,350	503	0.995	500	1,808
ZYF	2006	5	1,310	506	1,816	0.947	1,918	102	0.2304	2,492	0.2	3,115	574	0.9947	571	2,387
ZYF	2007	5	591	103	694	0.8688	799	105	0.274	1,100	0.2	1,375	301	0.9869	297	991
ZYF	2008	5	1,289	217	1,505	0.6757	2,228	722	0.1223	2,538	0.2	3,173	310	0.9676	300	1,806
ZYF	2009	5	778	81	858	0.9179	935	77	0.1536	1,105	0.2	1,381	170	0.9918	168	1,027
ZYF	2010	5	1,359	209	1,735	0.6019	2,883	1,148	0.1236	3,289	0.2	4,111	407	0.9602	390	2,125
ZYF	2011	5	86	27	122	0.9788	124	3	0.1846	153	0.2	191	28	0.9979	28	150
ZYF	2012	5	371	143	515	0.9402	547	33	0.1207	622	0.2	778	75	0.994	75	589
ZYF	2013	5	741	20	761	0.9203	827	66	0.1058	925	0.2	1,156	98	0.992	97	858
ZYF	2014	5	1,037	229	1,303	0.8391	1,552	250	0.1193	1,763	0.2	2,203	210	0.9839	207	1,510
ZYF	1978	6	0	0	0	1	0	0	0.1759	0	0.1	0	0	1	0	0
ZYF	1979	6	0	0	0	1	0	0	0.2691	0	0.1	0	0	1	0	0
ZYF	1980	6	280	117	417	1	417	0	0.2895	587	0.1	652	170	1	170	587
ZYF	1981	6	2,798	520	3,318	1	3,318	0	0.2526	4,439	0.1	4,933	1,121	1	1,121	4,439
ZYF	1982	6	1,948	513	2,462	1	2,462	0	0.1759	2,987	0.1	3,319	525	1	525	2,987
ZYF	1983	6	224	44	268	1	268	0	0.1477	314	0.1	349	46	1	46	314
ZYF	1984	6	811	226	1,037	1	1,037	0	0.1798	1,265	0.1	1,405	227	1	227	1,265

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ZYF	1985	6	321	154	475	1	475	0	0.3469	727	0.1	808	252	1	252	727
ZYF	1986	6	2,229	95	2,324	1	2,324	0	0.0009	2,326	0.1	2,584	2	1	2	2,326
ZYF	1987	6	1,674	711	2,386	1	2,386	0	0.1928	2,955	0.1	3,284	570	1	570	2,955
ZYF	1988	6	994	275	1,269	1	1,269	0	0.1662	1,522	0.1	1,692	253	1	253	1,522
ZYF	1989	6	808	268	1,133	1	1,133	0	0.1607	1,349	0.1	1,499	217	1	217	1,349
ZYF	1990	6	916	194	1,110	1	1,110	0	0.1117	1,250	0.1	1,389	140	1	140	1,250
ZYF	1991	6	631	182	813	1	813	0	0.2209	1,043	0.1	1,159	230	1	230	1,043
ZYF	1992	6	0	0	0	1	0	0	0.2029	0	0.1	0	0	1	0	0
ZYF	1993	6	673	137	809	1	809	0	0.4343	1,431	0.1	1,590	621	1	621	1,431
ZYF	1994	6	0	24	24	1	24	0	0.2247	30	0.1	34	7	1	7	30
ZYF	1995	6	853	335	1,189	1	1,189	0	0.252	1,589	0.1	1,766	400	1	400	1,589
ZYF	1996	6	558	187	745	1	745	0	0.3741	1,190	0.1	1,322	445	1	445	1,190
ZYF	1997	6	246	31	276	1	276	0	0.2904	389	0.1	433	113	1	113	389
ZYF	1998	6	2,180	126	2,307	1	2,307	0	0.2403	3,037	0.1	3,374	730	1	730	3,037
ZYF	1999	6	191	12	203	1	203	0	0.2824	284	0.1	315	80	1	80	284
ZYF	2000	6	836	165	1,001	1	1,001	0	0.322	1,476	0.1	1,640	475	1	475	1,476
ZYF	2001	6	73	7	81	1	81	0	0.0002	81	0.1	90	0	1	0	81
ZYF	2002	6	282	130	411	1	411	0	0.1762	499	0.1	555	88	1	88	499
ZYF	2003	6	523	53	576	1	576	0	0.3064	830	0.1	922	254	1	254	830
ZYF	2004	6	758	851	1,609	1	1,609	0	0.0555	1,703	0.1	1,893	95	1	95	1,703
ZYF	2005	6	85	40	125	1	125	0	0.3113	181	0.1	202	56	1	56	181
ZYF	2006	6	296	20	316	1	316	0	0.3446	481	0.1	535	166	1	166	481
ZYF	2007	6	469	34	503	1	503	0	0.0691	540	0.1	600	37	1	37	540
ZYF	2008	6	130	26	155	1	155	0	0.2881	218	0.1	242	63	1	63	218
ZYF	2009	6	340	24	364	1	364	0	0.0002	364	0.1	405	0	1	0	364
ZYF	2010	6	173	79	252	1	252	0	0.0349	261	0.1	290	9	1	9	261
ZYF	2011	6	93	8	100	1	100	0	0.1292	115	0.1	128	15	1	15	115
ZYF	2012	6	618	17	634	1	634	0	0	634	0.1	705	0	1	0	634
ZYF	2013	6	104	6	109	1	109	0	0.4724	207	0.1	231	98	1	98	207

KLM = Kitsumkalum CU

CU	Brood Year	Age	Spawning Escapement	Terminal Total Mortalities	Total Mature Run	Maturation Rate	Pre-terminal Post-fishery Abundance	Non-Maturing Abundance	Pre-terminal Total Mortality ER (nominal)	Ocean Pre-fishery Abundance	Natural Mortality Rate	Cohort Abundance before Natural Mortality	Pre-terminal Fishing Mortality (nominal)	AEQ Rate	Pre-terminal Fishing Mortality (AEQ)	Total Recruits
KLM	1980	4	1,559	597	2,156	0.0576	37,431	35,275	0.1338	43,212	0.3	61,732	5,782	0.7811	4,516	6,672
KLM	1981	4	887	128	986	0.0401	24,586	23,600	0.0964	27,209	0.3	38,870	2,623	0.7553	1,981	2,938
KLM	1982	4	726	218	944	0.0644	14,644	13,701	0.0646	15,656	0.3	22,366	1,012	0.7857	795	1,739
KLM	1983	4	537	136	673	0.0644	10,443	9,770	0.0194	10,650	0.3	15,214	207	0.7593	157	830
KLM	1984	4	859	816	1,660	0.0255	65,102	63,442	0.0389	67,737	0.3	96,767	2,635	0.7822	2,061	3,706
KLM	1985	4	116	66	131	0.1061	1,236	1,105	0.0846	1,351	0.3	1,930	114	0.7867	90	170
KLM	1986	4	1,184	766	1,948	0.0617	31,568	29,621	0.0704	33,959	0.3	48,513	2,391	0.7882	1,884	3,828
KLM	1987	4	621	468	1,034	0.0654	15,807	14,773	0.0829	17,236	0.3	24,623	1,429	0.7968	1,139	2,117
KLM	1988	4	173	146	319	0.0375	8,501	8,182	0.0655	9,097	0.3	12,995	596	0.7647	456	774
KLM	1989	4	298	103	401	0.0758	5,294	4,892	0.0717	5,703	0.3	8,146	409	0.7483	306	707
KLM	1990	4	417	180	578	0.0956	6,048	5,470	0.0439	6,326	0.3	9,037	278	0.7735	215	772
KLM	1991	4	0	0	0	0.0374	0	0	0.0311	0	0.3	0	0	0.7579	0	0
KLM	1992	4	338	220	526	0.091	5,777	5,251	0.0707	6,216	0.3	8,880	439	0.7889	347	840
KLM	1993	4	254	168	406	0.0502	8,096	7,690	0.0179	8,244	0.3	11,777	148	0.7687	113	504
KLM	1994	4	621	165	742	0.0589	12,598	11,856	0.0476	13,228	0.3	18,897	630	0.7973	502	1,200
KLM	1995	4	3,214	601	3,799	0.0523	72,635	68,836	0.0595	77,230	0.3	110,328	4,595	0.7834	3,600	7,382
KLM	1996	4	2,059	743	2,781	0.0748	37,176	34,395	0.0492	39,100	0.3	55,857	1,924	0.7917	1,523	4,282
KLM	1997	4	512	458	933	0.0835	11,177	10,243	0.066	11,966	0.3	17,095	790	0.8014	633	1,530
KLM	1998	4	1,835	877	2,677	0.0541	49,478	46,802	0.071	53,260	0.3	76,085	3,781	0.7936	3,001	5,643
KLM	1999	4	1,541	648	2,159	0.0841	25,683	23,523	0.0524	27,103	0.3	38,718	1,420	0.7907	1,123	3,252
KLM	2000	4	2,788	474	3,024	0.1309	23,103	20,079	0.0604	24,588	0.3	35,125	1,485	0.8083	1,200	3,987
KLM	2001	4	968	55	991	0.0678	14,613	13,622	0.0626	15,589	0.3	22,270	976	0.7988	780	1,738
KLM	2002	4	2,392	1,106	3,443	0.0327	105,301	101,857	0.0329	108,883	0.3	155,547	3,582	0.7972	2,856	6,244
KLM	2003	4	569	37	432	0.2131	2,028	1,596	0.0775	2,198	0.3	3,140	170	0.8318	142	400
KLM	2004	4	1,333	739	1,975	0.0863	22,887	20,912	0.0295	23,582	0.3	33,689	696	0.7973	555	2,433
KLM	2005	4	1,139	220	1,187	0.2002	5,932	4,744	0.1555	7,024	0.3	10,034	1,092	0.8368	914	1,930
KLM	2006	4	3,652	421	3,867	0.2526	15,310	11,443	0.0471	16,067	0.3	22,953	757	0.8473	641	4,303
KLM	2007	4	827	321	1,053	0.2898	3,634	2,581	0.1202	4,131	0.3	5,901	497	0.8505	422	1,380
KLM	2008	4	2,020	1,126	3,045	0.1425	21,365	18,321	0.078	23,173	0.3	33,104	1,807	0.8063	1,457	4,400
KLM	2009	4	2,026	527	2,379	0.3977	5,982	3,603	0.1459	7,004	0.3	10,006	1,022	0.8756	895	3,100
KLM	2010	4	3,122	526	3,307	0.2414	13,697	10,391	0.0432	14,316	0.3	20,451	618	0.8241	510	3,475
KLM	2011	4	2,693	503	2,635	0.2592	10,165	7,530	0.1216	11,572	0.3	16,532	1,407	0.8506	1,197	3,271
KLM	2012	4	1,177	162	1,267	0.1429	8,863	7,597	0.0863	9,700	0.3	13,858	837	0.8245	690	1,882
KLM	2013	4	995	464	1,084	0.3327	3,257	2,173	0.126	3,726	0.3	5,323	470	0.8623	405	1,113
KLM	2014	4	3,545	135	3,351	0.3202	10,465	7,114	0.0429	10,934	0.3	15,620	469	0.8553	401	3,421
KLM	2015	4	989	169	1,161	0.2527	4,596	3,435	0.0749	4,968	0.3	7,097	372	0.8409	313	1,474
KLM	1979	5	2,322	435	2,767	0.6338	4,365	1,598	0.3053	6,283	0.2	7,854	1,918	0.9	1,726	4,493
KLM	1980	5	5,457	2,054	7,426	0.5968	12,443	5,017	0.1821	15,213	0.2	19,016	2,770	0.9597	2,659	9,975
KLM	1981	5	3,521	1,562	4,969	0.3136	15,845	10,876	0.126	18,130	0.2	22,662	2,284	0.9314	2,128	6,969

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KLM	1982	5	3,022	969	3,999	0.6338	6,309	2,310	0.181	7,703	0.2	9,629	1,394	0.9634	1,343	5,342
KLM	1983	5	2,031	1,579	3,581	0.4916	7,285	3,704	0.1187	8,266	0.2	10,332	981	0.9492	931	4,480
KLM	1984	5	3,237	1,013	3,769	0.7057	5,341	1,572	0.1825	6,533	0.2	8,166	1,192	0.9706	1,157	4,418
KLM	1985	5	1,711	456	2,053	0.5167	3,973	1,920	0.212	5,042	0.2	6,303	1,069	0.9517	1,017	2,953
KLM	1986	5	2,347	1,278	3,607	0.6791	5,311	1,704	0.1485	6,237	0.2	7,796	926	0.9679	896	4,475
KLM	1987	5	4,394	878	4,865	0.7818	6,223	1,358	0.2629	8,443	0.2	10,553	2,220	0.9782	2,171	6,618
KLM	1988	5	1,761	727	2,517	0.4437	5,673	3,156	0.195	7,047	0.2	8,809	1,374	0.9444	1,298	3,753
KLM	1989	5	2,445	593	3,045	0.0956	31,855	28,809	0.0665	34,124	0.2	42,655	2,269	0.9096	2,064	5,109
KLM	1990	5	1,634	311	1,896	0.3694	5,132	3,237	0.1749	6,220	0.2	7,776	1,088	0.9369	1,019	2,861
KLM	1991	5	2,173	1,306	3,369	0.3555	9,478	6,109	0.0869	10,380	0.2	12,975	902	0.9356	844	4,097
KLM	1992	5	3,011	554	3,404	0.5973	5,698	2,295	0.1849	6,991	0.2	8,739	1,293	0.9597	1,241	4,464
KLM	1993	5	2,200	434	2,519	0.4559	5,525	3,006	0.0531	5,835	0.2	7,294	310	0.9456	293	2,686
KLM	1994	5	1,807	344	1,852	0.8069	2,296	443	0.2821	3,198	0.2	3,997	902	0.9807	885	2,430
KLM	1995	5	4,973	1,090	5,979	0.643	9,299	3,320	0.2155	11,854	0.2	14,817	2,554	0.9643	2,463	8,335
KLM	1996	5	9,565	4,509	13,977	0.6859	20,378	6,401	0.205	25,633	0.2	32,041	5,255	0.9686	5,090	18,954
KLM	1997	5	2,571	1,054	3,441	0.7921	4,344	903	0.4023	7,268	0.2	9,085	2,924	0.9792	2,863	6,111
KLM	1998	5	12,248	2,024	13,968	0.773	18,070	4,102	0.1884	22,265	0.2	27,831	4,195	0.9773	4,100	17,745
KLM	1999	5	4,782	305	4,693	0.8803	5,331	638	0.2818	7,423	0.2	9,278	2,092	0.988	2,067	6,064
KLM	2000	5	7,510	516	7,807	0.7434	10,502	2,695	0.3682	16,622	0.2	20,778	6,120	0.9743	5,963	13,530
KLM	2001	5	2,305	350	2,576	0.8022	3,211	635	0.2585	4,331	0.2	5,413	1,119	0.9802	1,097	3,407
KLM	2002	5	8,407	1,669	9,856	0.879	11,213	1,357	0.3876	18,310	0.2	22,887	7,097	0.9879	7,011	16,449
KLM	2003	5	1,861	662	2,276	0.8287	2,747	471	0.2174	3,510	0.2	4,387	763	0.9829	750	2,772
KLM	2004	5	5,988	652	6,185	0.7264	8,515	2,330	0.0777	9,232	0.2	11,540	717	0.9726	698	6,404
KLM	2005	5	2,934	493	3,116	0.9498	3,280	165	0.2675	4,478	0.2	5,598	1,198	0.995	1,192	3,956
KLM	2006	5	4,753	1,788	6,321	0.947	6,675	354	0.2304	8,673	0.2	10,841	1,998	0.9947	1,988	8,063
KLM	2007	5	2,383	394	2,619	0.8688	3,014	395	0.274	4,152	0.2	5,190	1,138	0.9869	1,123	3,576
KLM	2008	5	6,228	991	6,933	0.6757	10,261	3,328	0.1223	11,691	0.2	14,613	1,430	0.9676	1,383	8,011
KLM	2009	5	3,629	222	3,729	0.9179	4,062	333	0.1536	4,799	0.2	5,999	737	0.9918	731	4,318
KLM	2010	5	10,406	1,398	12,398	0.6019	20,597	8,200	0.1236	23,502	0.2	29,378	2,905	0.9602	2,789	14,566
KLM	2011	5	4,368	1,264	5,437	0.9788	5,555	118	0.1846	6,812	0.2	8,515	1,258	0.9979	1,255	6,093
KLM	2012	5	2,231	798	2,856	0.9402	3,038	182	0.1207	3,455	0.2	4,318	417	0.994	414	3,081
KLM	2013	5	4,288	70	3,321	0.9203	3,609	288	0.1058	4,036	0.2	5,045	427	0.992	424	2,682
KLM	2014	5	4,944	1,015	5,908	0.8391	7,041	1,133	0.1193	7,994	0.2	9,993	954	0.9839	938	6,603
KLM	1978	6	5,688	1,282	6,995	1	6,995	0	0.1759	8,487	0.1	9,431	1,493	1	1,493	8,487
KLM	1979	6	2,737	707	3,416	1	3,416	0	0.2691	4,673	0.1	5,192	1,258	1	1,258	4,635
KLM	1980	6	3,833	1,731	5,816	1	5,816	0	0.2895	8,186	0.1	9,096	2,370	1	2,370	8,144
KLM	1981	6	11,991	2,068	13,887	1	13,887	0	0.2526	18,581	0.1	20,645	4,693	1	4,693	18,382
KLM	1982	6	12,964	2,988	15,982	1	15,982	0	0.1759	19,392	0.1	21,547	3,410	1	3,410	19,392
KLM	1983	6	14,470	2,521	16,991	1	16,991	0	0.1477	19,935	0.1	22,150	2,944	1	2,944	19,898
KLM	1984	6	8,223	2,299	10,382	1	10,382	0	0.1798	12,658	0.1	14,064	2,276	1	2,276	12,494

CU	Brood Year	Age	Spawning Escapement	Terminal Total Mortalities	Total Mature Run	Maturation Rate	Pre-terminal Post-fishery Abundance	Non-Maturing Abundance	Pre-terminal Total Mortality ER (nominal)	Ocean Pre-fishery Abundance	Natural Mortality Rate	Cohort Abundance before Natural Mortality	Pre-terminal Fishing Mortality (nominal)	AEQ Rate	Pre-terminal Fishing Mortality (AEQ)	Total Recruits
KLM	1985	6	6,299	2,551	8,823	1	8,823	0	0.3469	13,509	0.1	15,010	4,686	1	4,686	13,460
KLM	1986	6	6,312	230	6,549	1	6,549	0	0.0009	6,555	0.1	7,283	6	1	6	6,536
KLM	1987	6	11,122	4,501	15,577	1	15,577	0	0.1928	19,298	0.1	21,442	3,721	1	3,721	19,221
KLM	1988	6	11,140	2,948	14,049	1	14,049	0	0.1662	16,849	0.1	18,721	2,800	1	2,800	16,789
KLM	1989	6	4,880	1,512	6,725	1	6,725	0	0.1607	8,012	0.1	8,903	1,288	1	1,288	7,981
KLM	1990	6	6,084	1,187	7,229	1	7,229	0	0.1117	8,138	0.1	9,042	909	1	909	8,075
KLM	1991	6	1,411	369	1,608	1	1,608	0	0.2209	2,064	0.1	2,293	456	1	456	1,882
KLM	1992	6	3,188	514	3,633	1	3,633	0	0.2029	4,558	0.1	5,065	925	1	925	4,472
KLM	1993	6	4,014	637	4,601	1	4,601	0	0.4343	8,134	0.1	9,038	3,533	1	3,533	8,059
KLM	1994	6	3,145	338	3,444	1	3,444	0	0.2247	4,443	0.1	4,936	998	1	998	4,392
KLM	1995	6	7,788	3,109	10,881	1	10,881	0	0.252	14,547	0.1	16,163	3,666	1	3,666	14,512
KLM	1996	6	6,814	1,826	8,634	1	8,634	0	0.3741	13,794	0.1	15,326	5,160	1	5,160	13,765
KLM	1997	6	3,735	307	4,019	1	4,019	0	0.2904	5,663	0.1	6,293	1,645	1	1,645	5,627
KLM	1998	6	12,094	558	12,611	1	12,611	0	0.2403	16,600	0.1	18,445	3,989	1	3,989	16,533
KLM	1999	6	2,904	132	2,966	1	2,966	0	0.2824	4,133	0.1	4,592	1,167	1	1,167	4,041
KLM	2000	6	3,699	618	4,251	1	4,251	0	0.322	6,270	0.1	6,967	2,019	1	2,019	6,179
KLM	2001	6	2,763	241	2,904	1	2,904	0	0.0002	2,905	0.1	3,228	1	1	1	2,794
KLM	2002	6	3,708	1,538	5,258	1	5,258	0	0.1762	6,383	0.1	7,092	1,125	1	1,125	6,362
KLM	2003	6	1,223	107	1,215	1	1,215	0	0.3064	1,752	0.1	1,947	537	1	537	1,616
KLM	2004	6	2,346	2,452	4,731	1	4,731	0	0.0555	5,009	0.1	5,566	278	1	278	4,912
KLM	2005	6	1,174	478	1,675	1	1,675	0	0.3113	2,432	0.1	2,702	757	1	757	2,432
KLM	2006	6	1,887	90	1,990	1	1,990	0	0.3446	3,036	0.1	3,374	1,046	1	1,046	3,030
KLM	2007	6	3,103	120	3,213	1	3,213	0	0.0691	3,451	0.1	3,834	238	1	238	3,415
KLM	2008	6	3,292	216	3,487	1	3,487	0	0.2881	4,898	0.1	5,442	1,411	1	1,411	4,846
KLM	2009	6	1,806	124	1,949	1	1,949	0	0.0002	1,949	0.1	2,166	0	1	0	1,938
KLM	2010	6	3,994	1,631	5,571	1	5,571	0	0.0349	5,772	0.1	6,414	201	1	201	5,686
KLM	2011	6	905	79	926	1	926	0	0.1292	1,063	0.1	1,181	137	1	137	987
KLM	2012	6	1,716	15	1,678	1	1,678	0	0	1,678	0.1	1,865	0	1	0	1,605
KLM	2013	6	740	39	688	1	688	0	0.4724	1,303	0.1	1,448	616	1	616	1,197

SKN = Skeena River summer run aggregate of CUs upstream of Tyee

CU	Brood Year	Age	Spawning Escapement	Terminal Total Mortalities	Total Mature Run	Maturation Rate	Pre-terminal Post-fishery Abundance	Non-Maturing Abundance	Pre-terminal Total Mortality ER (nominal)	Ocean Pre-fishery Abundance	Natural Mortality Rate	Cohort Abundance before Natural Mortality	Pre-terminal Fishing Mortality (nominal)	AEQ Rate	Pre-terminal Fishing Mortality (AEQ)	Total Recruits
SKN	1980	4	6,791	4,316	11,107	0.0576	192,833	181,726	0.1338	222,620	0.3	318,028	29,787	0.7811	23,266	34,373
SKN	1981	4	5,375	2,714	8,061	0.0401	201,015	192,954	0.0964	222,460	0.3	317,800	21,445	0.7553	16,198	24,229
SKN	1982	4	2,308	2,684	4,992	0.0644	77,480	72,487	0.0646	82,834	0.3	118,334	5,354	0.7857	4,206	9,199
SKN	1983	4	13,292	2,110	15,403	0.0644	239,049	223,646	0.0194	243,778	0.3	348,254	4,729	0.7593	3,591	18,994
SKN	1984	4	11,884	12,117	23,986	0.0255	940,615	916,630	0.0389	978,686	0.3	1,398,123	38,071	0.7822	29,779	53,750
SKN	1985	4	2,557	1,075	3,581	0.1061	33,747	30,167	0.0846	36,866	0.3	52,666	3,119	0.7867	2,454	5,983
SKN	1986	4	8,578	11,111	19,687	0.0617	319,074	299,387	0.0704	343,238	0.3	490,340	24,164	0.7882	19,046	38,729
SKN	1987	4	9,323	8,648	17,916	0.0654	273,946	256,030	0.0829	298,708	0.3	426,726	24,763	0.7968	19,731	37,592
SKN	1988	4	15,821	7,266	23,087	0.0375	615,663	592,576	0.0655	658,816	0.3	941,165	43,152	0.7647	32,999	56,086
SKN	1989	4	10,209	4,716	14,925	0.0758	196,898	181,973	0.0717	212,106	0.3	303,008	15,208	0.7483	11,380	26,305
SKN	1990	4	11,584	5,235	16,800	0.0956	175,731	158,931	0.0439	183,800	0.3	262,571	8,069	0.7735	6,241	23,020
SKN	1991	4	19,241	8,447	27,689	0.0374	740,334	712,646	0.0311	764,098	0.3	1,091,568	23,763	0.7579	18,010	45,699
SKN	1992	4	13,435	9,803	23,205	0.091	255,003	231,798	0.0707	274,404	0.3	392,005	19,400	0.7889	15,305	38,478
SKN	1993	4	12,889	8,421	21,293	0.0502	424,172	402,878	0.0179	431,903	0.3	617,004	7,731	0.7687	5,943	27,220
SKN	1994	4	10,356	4,457	14,769	0.0589	250,752	235,983	0.0476	263,284	0.3	376,120	12,532	0.7973	9,992	24,718
SKN	1995	4	15,355	8,876	24,215	0.0523	463,000	438,785	0.0595	492,291	0.3	703,273	29,291	0.7834	22,947	47,145
SKN	1996	4	23,720	13,610	37,309	0.0748	498,789	461,480	0.0492	524,599	0.3	749,428	25,810	0.7917	20,434	57,722
SKN	1997	4	11,307	9,948	21,218	0.0835	254,107	232,889	0.066	272,063	0.3	388,662	17,956	0.8014	14,390	35,571
SKN	1998	4	14,767	7,299	22,031	0.0541	407,231	385,199	0.071	438,354	0.3	626,219	31,123	0.7936	24,699	46,695
SKN	1999	4	6,142	3,058	9,170	0.0841	109,074	99,904	0.0524	115,106	0.3	164,437	6,032	0.7907	4,769	13,910
SKN	2000	4	36,638	9,011	45,411	0.1309	346,915	301,503	0.0604	369,215	0.3	527,450	22,301	0.8083	18,026	63,199
SKN	2001	4	5,109	1,035	6,112	0.0678	90,141	84,030	0.0626	96,161	0.3	137,372	6,020	0.7988	4,809	10,888
SKN	2002	4	24,490	14,334	38,769	0.0327	1,185,593	1,146,824	0.0329	1,225,926	0.3	1,751,323	40,333	0.7972	32,153	70,867
SKN	2003	4	6,042	812	6,679	0.2131	31,344	24,664	0.0775	33,977	0.3	48,539	2,633	0.8318	2,190	8,696
SKN	2004	4	16,614	11,793	28,310	0.0863	328,038	299,728	0.0295	338,009	0.3	482,870	9,971	0.7973	7,950	36,163
SKN	2005	4	8,942	2,697	11,468	0.2002	57,283	45,815	0.1555	67,830	0.3	96,901	10,548	0.8368	8,826	20,123
SKN	2006	4	23,010	4,705	27,509	0.2526	108,904	81,395	0.0471	114,287	0.3	163,267	5,383	0.8473	4,561	31,864
SKN	2007	4	4,368	2,381	6,654	0.2898	22,961	16,307	0.1202	26,098	0.3	37,283	3,137	0.8505	2,668	9,227
SKN	2008	4	6,116	4,257	10,272	0.1425	72,081	61,810	0.078	78,179	0.3	111,685	6,098	0.8063	4,917	15,087
SKN	2009	4	7,666	2,204	9,696	0.3977	24,380	14,684	0.1459	28,545	0.3	40,779	4,165	0.8756	3,647	13,169
SKN	2010	4	21,178	4,254	25,091	0.2414	103,938	78,847	0.0432	108,631	0.3	155,187	4,693	0.8241	3,867	28,616
SKN	2011	4	14,469	4,373	18,842	0.2592	72,691	53,850	0.1216	82,754	0.3	118,220	10,063	0.8506	8,560	27,401
SKN	2012	4	5,624	1,616	7,240	0.1429	50,665	43,425	0.0863	55,451	0.3	79,215	4,785	0.8245	3,946	11,186
SKN	2013	4	3,518	3,513	7,031	0.3327	21,134	14,103	0.126	24,181	0.3	34,544	3,047	0.8623	2,627	9,659
SKN	2014	4	18,718	3,878	22,597	0.3202	70,570	47,974	0.0429	73,733	0.3	105,333	3,163	0.8553	2,705	25,302
SKN	2015	4	3,634	1,331	4,965	0.2527	19,648	14,683	0.0749	21,239	0.3	30,341	1,591	0.8409	1,338	6,303
SKN	1979	5	20,553	7,737	28,299	0.6338	44,648	16,349	0.3053	64,270	0.2	80,337	19,621	0.9	17,659	45,959
SKN	1980	5	22,142	17,116	39,173	0.5968	65,639	26,466	0.1821	80,253	0.2	100,316	14,614	0.9597	14,025	53,088
SKN	1981	5	10,710	11,932	22,528	0.3136	71,838	49,310	0.126	82,195	0.2	102,744	10,357	0.9314	9,646	32,047

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SKN	1982	5	32,182	13,021	45,214	0.6338	71,334	26,120	0.181	87,099	0.2	108,874	15,765	0.9634	15,188	60,402
SKN	1983	5	20,510	19,101	39,585	0.4916	80,524	40,938	0.1187	91,369	0.2	114,211	10,846	0.9492	10,295	49,848
SKN	1984	5	38,357	17,316	55,482	0.7057	78,619	23,138	0.1825	96,170	0.2	120,213	17,551	0.9706	17,035	72,009
SKN	1985	5	5,064	4,337	9,287	0.5167	17,974	8,687	0.212	22,810	0.2	28,513	4,836	0.9517	4,602	13,773
SKN	1986	5	22,922	19,865	42,769	0.6791	62,979	20,210	0.1485	73,963	0.2	92,453	10,983	0.9679	10,631	53,372
SKN	1987	5	34,879	13,492	47,964	0.7818	61,351	13,387	0.2629	83,232	0.2	104,040	21,882	0.9782	21,405	68,950
SKN	1988	5	49,770	21,788	74,070	0.4437	166,937	92,867	0.195	207,375	0.2	259,219	40,438	0.9444	38,190	112,198
SKN	1989	5	34,482	11,062	45,551	0.0956	476,471	430,921	0.0665	510,414	0.2	638,017	33,943	0.9096	30,874	76,425
SKN	1990	5	19,544	6,115	25,610	0.3694	69,330	43,719	0.1749	84,026	0.2	105,032	14,696	0.9369	13,769	39,325
SKN	1991	5	68,014	44,600	112,505	0.3555	316,471	203,965	0.0869	346,589	0.2	433,237	30,119	0.9356	28,179	140,568
SKN	1992	5	24,377	9,504	33,720	0.5973	56,454	22,734	0.1849	69,260	0.2	86,575	12,806	0.9597	12,290	45,830
SKN	1993	5	20,571	9,451	29,907	0.4559	65,599	35,692	0.0531	69,278	0.2	86,597	3,679	0.9456	3,479	33,259
SKN	1994	5	18,837	10,215	28,753	0.8069	35,634	6,881	0.2821	49,636	0.2	62,046	14,002	0.9807	13,732	42,178
SKN	1995	5	30,276	13,883	44,076	0.643	68,548	24,472	0.2155	87,378	0.2	109,222	18,830	0.9643	18,158	62,127
SKN	1996	5	78,278	45,623	123,805	0.6859	180,500	56,695	0.205	227,044	0.2	283,805	46,544	0.9686	45,082	168,774
SKN	1997	5	13,313	7,611	20,742	0.7921	26,186	5,444	0.4023	43,812	0.2	54,765	17,626	0.9792	17,259	37,808
SKN	1998	5	68,121	20,850	88,668	0.773	114,706	26,038	0.1884	141,333	0.2	176,666	26,627	0.9773	26,023	114,368
SKN	1999	5	27,412	5,513	34,390	0.8803	39,066	4,676	0.2818	54,394	0.2	67,993	15,328	0.988	15,144	48,839
SKN	2000	5	43,336	8,785	51,902	0.7434	69,818	17,915	0.3682	110,506	0.2	138,132	40,688	0.9743	39,643	91,304
SKN	2001	5	17,649	5,256	24,393	0.8022	30,407	6,015	0.2585	41,008	0.2	51,259	10,600	0.9802	10,391	34,517
SKN	2002	5	51,142	14,664	66,625	0.879	75,796	9,171	0.3876	123,769	0.2	154,712	47,973	0.9879	47,393	113,599
SKN	2003	5	17,926	11,062	28,741	0.8287	34,682	5,941	0.2174	44,317	0.2	55,396	9,634	0.9829	9,470	37,957
SKN	2004	5	46,514	10,936	57,010	0.7264	78,483	21,473	0.0777	85,095	0.2	106,369	6,612	0.9726	6,431	62,962
SKN	2005	5	25,329	7,642	32,946	0.9498	34,687	1,741	0.2675	47,355	0.2	59,194	12,667	0.995	12,604	45,198
SKN	2006	5	21,368	11,570	32,717	0.947	34,548	1,831	0.2304	44,891	0.2	56,114	10,343	0.9947	10,288	42,760
SKN	2007	5	10,910	3,307	14,061	0.8688	16,185	2,123	0.274	22,293	0.2	27,866	6,108	0.9869	6,028	19,924
SKN	2008	5	27,691	6,351	33,756	0.6757	49,957	16,201	0.1223	56,918	0.2	71,148	6,961	0.9676	6,736	40,186
SKN	2009	5	16,354	3,307	19,538	0.9179	21,286	1,748	0.1536	25,149	0.2	31,436	3,863	0.9918	3,831	23,227
SKN	2010	5	36,547	10,347	51,228	0.6019	85,111	33,883	0.1236	97,114	0.2	121,393	12,003	0.9602	11,526	62,133
SKN	2011	5	16,762	7,892	26,538	0.9788	27,113	575	0.1846	33,251	0.2	41,564	6,138	0.9979	6,125	32,664
SKN	2012	5	10,173	6,278	16,451	0.9402	17,498	1,046	0.1207	19,899	0.2	24,874	2,402	0.994	2,387	18,839
SKN	2013	5	13,613	2,820	16,434	0.9203	17,857	1,423	0.1058	19,970	0.2	24,962	2,113	0.992	2,096	18,530
SKN	2014	5	15,503	6,708	22,851	0.8391	27,233	4,382	0.1193	30,922	0.2	38,652	3,689	0.9839	3,630	26,480
SKN	1978	6	9,115	4,714	13,854	1	13,854	0	0.1759	16,810	0.1	18,678	2,956	1	2,956	16,810
SKN	1979	6	6,015	3,696	9,683	1	9,683	0	0.2691	13,247	0.1	14,719	3,565	1	3,565	13,210
SKN	1980	6	9,602	10,346	20,914	1	20,914	0	0.2895	29,436	0.1	32,707	8,522	1	8,522	29,393
SKN	1981	6	50,371	13,988	64,188	1	64,188	0	0.2526	85,882	0.1	95,424	21,694	1	21,694	85,683
SKN	1982	6	27,793	14,759	42,584	1	42,584	0	0.1759	51,671	0.1	57,413	9,087	1	9,087	51,671
SKN	1983	6	29,620	10,760	40,383	1	40,383	0	0.1477	47,381	0.1	52,645	6,998	1	6,998	47,344
SKN	1984	6	20,153	18,544	38,558	1	38,558	0	0.1798	47,010	0.1	52,233	8,452	1	8,452	46,846

CU	Brood Year	Age	Spawning Escapement	Terminal Total Mortalities	Total Mature Run	Maturation Rate	Pre-terminal Post-fishery Abundance	Non-Maturing Abundance	Pre-terminal Total Mortality ER (nominal)	Ocean Pre-fishery Abundance	Natural Mortality Rate	Cohort Abundance before Natural Mortality	Pre-terminal Fishing Mortality (nominal)	AEQ Rate	Pre-terminal Fishing Mortality (AEQ)	Total Recruits
SKN	1985	6	7,677	6,120	13,771	1	13,771	0	0.3469	21,085	0.1	23,428	7,314	1	7,314	21,036
SKN	1986	6	36,317	7,453	43,777	1	43,777	0	0.0009	43,817	0.1	48,685	39	1	39	43,797
SKN	1987	6	49,132	26,546	75,638	1	75,638	0	0.1928	93,705	0.1	104,116	18,066	1	18,066	93,627
SKN	1988	6	40,408	15,673	56,042	1	56,042	0	0.1662	67,212	0.1	74,680	11,171	1	11,171	67,152
SKN	1989	6	15,757	7,243	24,193	1	24,193	0	0.1607	28,825	0.1	32,028	4,632	1	4,632	28,794
SKN	1990	6	21,085	5,606	26,649	1	26,649	0	0.1117	30,000	0.1	33,334	3,351	1	3,351	29,937
SKN	1991	6	10,927	4,816	15,571	1	15,571	0	0.2209	19,986	0.1	22,207	4,415	1	4,415	19,804
SKN	1992	6	7,377	4,055	11,363	1	11,363	0	0.2029	14,255	0.1	15,839	2,892	1	2,892	14,169
SKN	1993	6	12,387	7,483	19,820	1	19,820	0	0.4343	35,037	0.1	38,929	15,216	1	15,216	34,961
SKN	1994	6	6,675	2,664	9,300	1	9,300	0	0.2247	11,995	0.1	13,328	2,695	1	2,695	11,945
SKN	1995	6	15,656	8,302	23,941	1	23,941	0	0.252	32,007	0.1	35,564	8,066	1	8,066	31,973
SKN	1996	6	10,367	5,389	15,749	1	15,749	0	0.3741	25,162	0.1	27,958	9,413	1	9,413	25,133
SKN	1997	6	7,538	1,995	9,509	1	9,509	0	0.2904	13,401	0.1	14,890	3,892	1	3,892	13,364
SKN	1998	6	40,328	7,299	47,593	1	47,593	0	0.2403	62,647	0.1	69,608	15,054	1	15,054	62,580
SKN	1999	6	7,927	1,738	9,595	1	9,595	0	0.2824	13,371	0.1	14,857	3,776	1	3,776	13,280
SKN	2000	6	11,903	3,858	15,696	1	15,696	0	0.322	23,151	0.1	25,723	7,455	1	7,455	23,060
SKN	2001	6	4,988	919	5,807	1	5,807	0	0.0002	5,808	0.1	6,454	1	1	1	5,697
SKN	2002	6	9,054	6,188	15,254	1	15,254	0	0.1762	18,516	0.1	20,573	3,263	1	3,263	18,495
SKN	2003	6	5,336	1,117	6,339	1	6,339	0	0.3064	9,139	0.1	10,155	2,800	1	2,800	9,003
SKN	2004	6	15,031	18,413	33,377	1	33,377	0	0.0555	35,339	0.1	39,265	1,961	1	1,961	35,241
SKN	2005	6	2,243	1,424	3,690	1	3,690	0	0.3113	5,357	0.1	5,953	1,668	1	1,668	5,357
SKN	2006	6	4,408	876	5,297	1	5,297	0	0.3446	8,082	0.1	8,980	2,785	1	2,785	8,076
SKN	2007	6	5,035	710	5,734	1	5,734	0	0.0691	6,160	0.1	6,844	426	1	426	6,123
SKN	2008	6	4,942	999	5,919	1	5,919	0	0.2881	8,315	0.1	9,239	2,395	1	2,395	8,262
SKN	2009	6	3,322	776	4,118	1	4,118	0	0.0002	4,119	0.1	4,577	1	1	1	4,108
SKN	2010	6	5,293	3,218	8,457	1	8,457	0	0.0349	8,763	0.1	9,737	306	1	306	8,677
SKN	2011	6	2,092	656	2,748	1	2,748	0	0.1292	3,156	0.1	3,507	408	1	408	3,156
SKN	2012	6	2,553	529	3,081	1	3,081	0	0	3,081	0.1	3,424	0	1	0	3,081
SKN	2013	6	1,373	367	1,740	1	1,740	0	0.4724	3,298	0.1	3,664	1,558	1	1,558	3,298

Appendix 8. Parameters from the CTC (2021) cohort analyses of Kitsumkalum Chinook salmon that were common to the recruit calculations for the aggregate of Skeena River summer run CU's upstream of Tyee.

Brood Year	Age	Terminal Net and Terminal Marine Sport harvest rate	Pre-terminal Net Total Mortality harvest rate on the mature run	Maturation Rate	Pre-terminal Total Mortality ER (nominal)	Natural Mortality Rate	AEQ Rate
1980	4	0.2058	0	0.0576	0.1338	0.3	0.7811
1981	4	0.0036	0	0.0401	0.0964	0.3	0.7553
1982	4	0.1766	0	0.0644	0.0646	0.3	0.7857
1983	4	0	0	0.0644	0.0194	0.3	0.7593
1984	4	0.3991	0	0.0255	0.0389	0.3	0.7822
1985	4	0.1271	0	0.1061	0.0846	0.3	0.7867
1986	4	0.3351	0	0.0617	0.0704	0.3	0.7882
1987	4	0.2942	0	0.0654	0.0829	0.3	0.7968
1988	4	0.2058	0	0.0375	0.0655	0.3	0.7647
1989	4	0.2058	0	0.0758	0.0717	0.3	0.7483
1990	4	0.2312	0	0.0956	0.0439	0.3	0.7735
1991	4	0.2058	0	0.0374	0.0311	0.3	0.7579
1992	4	0.3887	0	0.0910	0.0707	0.3	0.7889
1993	4	0.2744	0	0.0502	0.0179	0.3	0.7687
1994	4	0.0005	0	0.0589	0.0476	0.3	0.7973
1995	4	0.0595	0	0.0523	0.0595	0.3	0.7834
1996	4	0.1877	0	0.0748	0.0492	0.3	0.7917
1997	4	0.4074	0	0.0835	0.0660	0.3	0.8014
1998	4	0.1482	0	0.0541	0.0710	0.3	0.7936
1999	4	0.2058	0	0.0841	0.0524	0.3	0.7907
2000	4	0.0611	0	0.1309	0.0604	0.3	0.8083
2001	4	0	0	0.0678	0.0626	0.3	0.7988
2002	4	0.2745	0	0.0327	0.0329	0.3	0.7972
2003	4	0.024	0	0.2131	0.0775	0.3	0.8318
2004	4	0.2852	0	0.0863	0.0295	0.3	0.7973
2005	4	0.1114	0	0.2002	0.1555	0.3	0.8368
2006	4	0.0411	0	0.2526	0.0471	0.3	0.8473
2007	4	0.2248	0	0.2898	0.1202	0.3	0.8505
2008	4	0.3361	0	0.1425	0.0780	0.3	0.8063
2009	4	0.1356	0	0.3977	0.1459	0.3	0.8756
2010	4	0.0002	0	0.2414	0.0432	0.3	0.8241
2011	4	0.0567	0	0.2592	0.1216	0.3	0.8506
2012	4	0.0002	0	0.1429	0.0863	0.3	0.8245
2013	4	0.4065	0	0.3327	0.1260	0.3	0.8623
2014	4	0	0	0.3202	0.0429	0.3	0.8553
2015	4	0.0903	0	0.2527	0.0749	0.3	0.8409
1979	5	0	0	0.6338	0.3053	0.2	0.9000
1980	5	0.2144	0	0.5968	0.1821	0.2	0.9597
1981	5	0.152	0	0.3136	0.1260	0.2	0.9314
1982	5	0.1973	0.0001	0.6338	0.1810	0.2	0.9634
1983	5	0.3655	0.0001	0.4916	0.1187	0.2	0.9492
1984	5	0.1484	0.0056	0.7057	0.1825	0.2	0.9706
1985	5	0.0781	0	0.5167	0.2120	0.2	0.9517
1986	5	0.26	0	0.6791	0.1485	0.2	0.9679
1987	5	0.1606	0	0.7818	0.2629	0.2	0.9782
1988	5	0.1906	0.0347	0.4437	0.1950	0.2	0.9444
1989	5	0.1444	0	0.0956	0.0665	0.2	0.9096
1990	5	0.118	0	0.3694	0.1749	0.2	0.9369
1991	5	0.3595	0	0.3555	0.0869	0.2	0.9356
1992	5	0.1046	0	0.5973	0.1849	0.2	0.9597
1993	5	0.0297	0	0.4559	0.0531	0.2	0.9456
1994	5	0.0346	0	0.8069	0.2821	0.2	0.9807
1995	5	0.1047	0	0.6430	0.2155	0.2	0.9643
1996	5	0.2798	0	0.6859	0.2050	0.2	0.9686

Brood Year	Age	Terminal Net and Terminal Marine Sport harvest rate	Pre-terminal Net Total Mortality harvest rate on the mature run	Maturation Rate	Pre-terminal Total Mortality ER (nominal)	Natural Mortality Rate	AEQ Rate
1997	5	0.2055	0.0001	0.7921	0.4023	0.2	0.9792
1998	5	0.0621	0	0.7730	0.1884	0.2	0.9773
1999	5	0.0233	0.0626	0.8803	0.2818	0.2	0.9880
2000	5	0	0	0.7434	0.3682	0.2	0.9743
2001	5	0.086	0.0718	0.8022	0.2585	0.2	0.9802
2002	5	0.1492	0.0183	0.8790	0.3876	0.2	0.9879
2003	5	0.2372	0	0.8287	0.2174	0.2	0.9829
2004	5	0.0525	0.0003	0.7264	0.0777	0.2	0.9726
2005	5	0.1247	0.0096	0.9498	0.2675	0.2	0.9950
2006	5	0.219	0	0.9470	0.2304	0.2	0.9947
2007	5	0.0961	0.0002	0.8688	0.2740	0.2	0.9869
2008	5	0.0865	0	0.6757	0.1223	0.2	0.9676
2009	5	0	0	0.9179	0.1536	0.2	0.9918
2010	5	0.0439	0.0963	0.6019	0.1236	0.2	0.9602
2011	5	0.1552	0.071	0.9788	0.1846	0.2	0.9979
2012	5	0.2327	0	0.9402	0.1207	0.2	0.9940
2013	5	0	0	0.9203	0.1058	0.2	0.9920
2014	5	0.142	0.028	0.8391	0.1193	0.2	0.9839
1978	6	0.1455	0.0001	1	0.1759	0.1	1
1979	6	0.1026	0	1	0.2691	0.1	1
1980	6	0.1181	0.0473	1	0.2895	0.1	1
1981	6	0.1061	0	1	0.2526	0.1	1
1982	6	0.1455	0.0001	1	0.1759	0.1	1
1983	6	0.075	0.0001	1	0.1477	0.1	1
1984	6	0.106	0	1	0.1798	0.1	1
1985	6	0.2554	0	1	0.3469	0.1	1
1986	6	0	0	1	0.0009	0.1	1
1987	6	0.2548	0.0001	1	0.1928	0.1	1
1988	6	0.1908	0	1	0.1662	0.1	1
1989	6	0.2199	0.0493	1	0.1607	0.1	1
1990	6	0.1456	0	1	0.1117	0.1	1
1991	6	0.1537	0	1	0.2209	0.1	1
1992	6	0.1043	0	1	0.2029	0.1	1
1993	6	0.083	0	1	0.4343	0.1	1
1994	6	0.059	0	1	0.2247	0.1	1
1995	6	0.2524	0	1	0.2520	0.1	1
1996	6	0.1659	0	1	0.3741	0.1	1
1997	6	0.0236	0	1	0.2904	0.1	1
1998	6	0	0.0002	1	0.2403	0.1	1
1999	6	0	0	1	0.2824	0.1	1
2000	6	0.1153	0.0001	1	0.3220	0.1	1
2001	6	0.0645	0	1	0.0002	0.1	1
2002	6	0.27102	0	1	0.1762	0.1	1
2003	6	0.0312	0.0001	1	0.3064	0.1	1
2004	6	0.5167	0	1	0.0555	0.1	1
2005	6	0.27102	0	1	0.3113	0.1	1
2006	6	0	0.0001	1	0.3446	0.1	1
2007	6	0	0	1	0.0691	0.1	1
2008	6	0	0	1	0.2881	0.1	1
2009	6	0	0.0003	1	0.0002	0.1	1
2010	6	0.2486	0.0002	1	0.0349	0.1	1
2011	6	0	0	1	0.1292	0.1	1
2012	6	0	0	1	0.0000	0.1	1
2013	6	0	0.0002	1	0.4724	0.1	1