

PACIFIC SALMON COMMISSION
JOINT CHINOOK TECHNICAL COMMITTEE REPORT
2020 Exploitation Rate Analysis

TCCHINOOK (21)-05

September 29, 2021

Membership of the Chinook Technical Committee

Canadian Members	United States Members
Dr. Antonio Velez-Espino, Co-Chair, DFO	Mr. John Carlile, Co-Chair, ADF&G
Ms. Sabrina Crowley, FNC	Mr. Jonathan Carey, Co-Chair, NOAA Fisheries
Mr. Michael Folkes, DFO	Mr. Ethan Clemons, ODFW
Mr. Nicholas Komick, DFO	Mr. Timothy Dalton, ODFW
Ms. Chelsea May, DFO	Dr. Derek Dapp, WDFW
Ms. Elinor McGrath, FNC	Mr. Brian Elliott, ADF&G
Mr. Chuck Parken, DFO	Ms. Danielle Evenson, ADF&G
Dr. Teresa Ryan, FNC	Mr. Gary Freitag, UAF
Ms. Laura Tessier, DFO	Mr. Thomas Garrison, CRITFC
Ms. Nicole Trouton, DFO	Ms. Sara Gilk-Baumer, ADF&G
Ms. Maxime Veilleux, DFO	Dr. Steven Haeseker, USFWS
Dr. Catarina Wor, DFO	Mr. Grant Hagerman, ADF&G
	Dr. Galen Johnson, NWIFC
	Mr. Edgar Jones, ADF&G
	Mr. David Leonard, ADF&G
	Dr. Martin Liermann, NOAA Fisheries
	Ms. Marianne McClure, CRITFC
	Dr. Oliver Miler, NWIFC
	Dr. Gary Morishima, QIN
	Mr. Jeff Nichols, ADF&G
	Mr. Randy Peterson, ADF&G
	Ms. Anne Reynolds-Manney, ADF&G
PSC Support	
Ms. Jessica Gill, CTC Coordinator	Dr. Kristen Ryding, WDFW
Mr. Mark McMillan, CTC Database Manager	Dr. Charlie Waters, NOAA Fisheries

NOTE: Mr. Ivan Winther and Mr. William Templin contributed to the production of this report.

List of Acronyms and Abbreviations

AABM	Aggregate Abundance-Based Management	NC	Not Calculated
ADF&G	Alaska Department of Fish & Game	ND	No Data Available
AEQ	Adult Equivalent	NMFS	National Marine Fisheries Service
AMA	Additional Management Actions	NSF	Non-Selective Fishery
AWG	Analytical Working Group of the CTC	NWIFC	Northwest Indian Fisheries Commission
B.C.	British Columbia	NWVI	Northwest Vancouver Island
BPC	Base Period Calibration	ODFW	Oregon Department of Fish & Wildlife
BY	Brood Year	PFMA	Pacific Fishery Management Area
BYER	Brood Year Exploitation Rate	PFMC	Pacific Fishery Management Council
CDN	Canada	PSC	Pacific Salmon Commission
CBC	Central British Columbia	PST	Pacific Salmon Treaty
CNR	Chinook Nonretention	QIN	Quinault Indian Nation
CRITFC	Columbia River Intertribal Fish Commission	RM	Release Mortality
CTC	Chinook Technical Committee	RMIS	Regional Mark Information System
CWT	Coded-wire Tag	SEAK	Southeast Alaska Cape Suckling to Dixon Entrance
CWTIP	Coded-wire Tag Improvement Program	SFEC	Selective Fishery Evaluation Committee
CY	Calendar Year	SIT	Single Index Tag
CYER	Calendar Year Exploitation Rate	SUS	Southern U.S.
DFO	Department of Fisheries and Oceans Canada	SWVI	Southwest Vancouver Island
DIT	Double Index Tag	TBR	Transboundary Rivers
EIS	Escapement Indicator Stock	TAM	Terminal Adjustment Method
ERA	Exploitation Rate Analysis	UAF	University of Alaska Fairbanks
ERIS	Exploitation Rate Indicator Stock	U.S.	United States
FNC	First Nations Caucus	USFWS	U.S. Fish & Wildlife Service
IM	Incidental Mortality	WA/OR	Ocean areas off Washington and Oregon North of Cape Falcon
ISBM	Individual Stock-Based Management	WCVI	West Coast Vancouver Island excluding Area 20
JDF	Juan de Fuca	WDFW	Washington Department of Fish and Wildlife
MDT	Mortality Distribution Table	WG	Work Group
MRP	Mark Recovery Program		
MSF	Mark-Selective Fishery		
NA	Not Available		
NBC	Northern B.C. Dixon Entrance to Kitimat including Haida Gwaii		

TABLE OF CONTENTS

	Page
Table of Contents	iii
List of Tables	v
List of Tables (Continued)	vi
List of Figures	vii
List of Figures	viii
List of Appendices	ix
Executive Summary	xi
1. Introduction	1
2. Exploitation Rate Analysis	2
2.1 Overview of Coded-Wire Tag-Based Exploitation Rate Analyses	5
2.1.1 Description of Incidental Mortality	5
2.1.2 ISBM Indices	6
2.1.3 Assumptions of the CWT Exploitation Rate Analyses	7
3. Exploitation Rate Analysis Results	10
3.1 Southeast Alaska Stocks	10
3.1.1 Brood Year Exploitation Rates	10
3.1.2 Survival Rates	11
3.1.3 Mortality Distributions	12
3.2 North and Central British Columbia Stocks	13
3.2.1 Brood Year Exploitation Rates	14
3.2.2 Survival Rates	14
3.2.3 Mortality Distributions	14
3.3 West Coast Vancouver Island Stocks	15
3.3.1 Brood Year Exploitation Rates	15
3.3.2 Survival Rates	16
3.3.3 Mortality Distributions	16
3.3.4 Terminal Area Adjustments	17
3.4 Strait of Georgia Stocks	18
3.4.1 Brood Year Exploitation Rates	18
3.4.2 Survival Rates	19
3.4.3 Mortality Distributions	19
3.4.4 Terminal Area Adjustments	21
3.5 Fraser Stocks	22
3.5.1 Brood Year Exploitation Rates	23
3.5.2 Survival Rates	23
3.5.3 Mortality Distributions	24
3.6 Regional Summary for Canadian Stocks	25
3.7 Washington Coast Stocks	27
3.7.1 Brood Year Exploitation Rates	28
3.7.2 Survival Rates	28
3.7.3 Mortality Distributions	29
3.7.4 Terminal Area Adjustments	29
3.8 Washington Salish Sea Stocks	30
3.8.1 Northern Puget Sound	31
3.8.2 Central Puget Sound	33
3.8.3 South Puget Sound	34
3.8.4 Juan De Fuca and Hood Canal	35
3.8.5 Regional Summary for Washington Salish Sea Stocks	36
3.9 Columbia River Stocks	38
3.9.1 Brood Year Exploitation Rates	39

3.9.2 Survival Rates.....	39
3.9.3 Mortality Distributions.....	40
3.9.4 Regional Summary for Columbia River Stocks	41
3.10 North Oregon Coast Stocks	42
3.10.1 Brood Year Exploitation Rates	43
3.10.2 Survival Rates.....	43
3.10.3 Mortality Distributions.....	44
3.10.4 Terminal Area Adjustments	44
4. ISBM Fishery Performance	47
4.1 ISBM Fishery Performance Under 2009 PST Agreement	47
4.1.1 Canadian ISBM Indices.....	49
4.1.2 U.S. ISBM Indices	52
4.1.3 Paragraph 13 ISBM Analysis.....	55
4.2 ISBM Fishery Performance under 2019 PST Agreement.....	57
4.2.1 ISBM Management Framework.....	58
4.2.2 ISBM Performance Evaluation	61
5. CWT Analysis and Mark-Selective Fisheries	62
5.1 Catch in MSFs.....	62
5.2 Methods to estimate the impact of MSFs on unmarked Chinook salmon stocks.....	67
5.2.1 Double Index Tag Methods.....	67
5.2.2 Single Index Tag Methods.....	70
6. References Cited	80
Appendix A: Relationship between exploitation rate indicator stocks, escapement indicator stocks, and model stocks in the Pacific Salmon Treaty.....	84
Appendix B: Individual Stock-Based Management Indices	93
Appendix C: Percent distribution of landed catch and total mortality and escapement for exploitation rate indicator stocks by calendar year	96
Appendix D: Fishery exploitation rate indices by stock, age and fishery, based on Coded-Wire Tag (CWT) data	171
Appendix E: Issues with and Changes to the Exploitation Rate Analysis	182
Appendix F: Brood Year Exploitation Rate Plots.....	186
Appendix G: Survival Rate Plots	208
Appendix H: Terminal Area Adjustment Data	230
Appendix I: Parameters Used in the 2020 Exploitation Rate Analysis	236

LIST OF TABLES

Table	Page
<i>Table 2.1—Summary of coded-wire tag (CWT) exploitation rate indicator stocks, location, run type, and smolt age.....</i>	<i>3</i>
<i>Table 2.2—Coded-wire tag (CWT) exploitation rate indicator stocks used in the exploitation rate analysis (ERA) and data derived from them: fishery, individual stock-based management (ISBM) and survival indices, brood year exploitation rates (BYER), and stock catch distribution (Dist) with escapement estimates (Esc) and base period (1979–1982) tag recoveries.....</i>	<i>4</i>
<i>Table 2.3—Fisheries included in the individual stock-based management (ISBM) index by nation.....</i>	<i>7</i>
<i>Table 3.1—Summary of statistics generated by the 2020 coded-wire tag (CWT) cohort analysis for Southeast Alaska and transboundary river indicator stocks. Statistics include total mortality (catch plus incidental mortality), brood year exploitation rate (BYER), cohort survival rate to age 3, and calendar year (CY) percent distribution of the total mortality in escapement.....</i>	<i>11</i>
<i>Table 3.2—Summary of statistics generated by the 2020 CWT cohort analysis for Canadian indicator stocks by region. Statistics include total mortality (catch plus incidental mortality) brood year exploitation rate (BYER), cohort survival rate to age 2 (age 3 for KLM and DOM), and calendar year (CY) percent distribution of the total mortality and the escapement.....</i>	<i>26</i>
<i>Table 3.3—Summary of statistics generated by the 2020 CWT cohort analysis for Washington Coast indicator stocks. Statistics include total mortality (catch plus incidental mortality) brood year exploitation rate (BYER), cohort survival rate to age 2, and calendar year (CY) percent distribution of the total mortality in the escapement.....</i>	<i>28</i>
<i>Table 3.4—Summary of statistics generated by the 2020 CWT cohort analysis for Washington Salish Sea indicator stocks by region. Statistics include total ocean fishery mortality (adult equivalent catch plus incidental mortality) brood year exploitation rate (BYER), cohort survival rate to age 2 (age 3 for yearling stocks), and calendar year (CY) percent of total mortality in escapement.....</i>	<i>37</i>
<i>Table 3.5—Summary of statistics generated by the 2020 CWT cohort analysis for Columbia River indicator stocks. Statistics include total mortality (catch plus incidental mortality) brood year exploitation rate (BYER), cohort survival rate to age 2, and calendar year (CY) percent distribution of the total mortality in the escapement.....</i>	<i>42</i>
<i>Table 3.6—Summary of statistics generated by the 2020 CWT cohort analysis for Oregon Coast indicator stocks. Statistics include total mortality (catch plus incidental mortality) brood year exploitation rate (BYER), cohort survival rate to age 2, and calendar year (CY) percent distribution of the total mortality.....</i>	<i>43</i>
<i>Table 4.1—Review of performance in the Canadian individual stock-based management (ISBM) fisheries, 2018.....</i>	<i>49</i>
<i>Table 4.2—Review of performance in the Canadian individual stock-based management (ISBM) fisheries under the 2009 PST Agreement.....</i>	<i>51</i>
<i>Table 4.3—Review of performance in the U.S. individual-stock based management (ISBM) fisheries, 2018.....</i>	<i>52</i>
<i>Table 4.4—Review of performance in the U.S. individual stock-based management (ISBM) fisheries under the 2009 PST Agreement.....</i>	<i>54</i>
<i>Table 4.5—Evaluation of paragraphs 13(d) and 13(e) provisions for stock groups and indicator stocks listed in Attachments I and II of the 2009 PST Agreement. The last column shows if criteria were met for additional management actions (AMA) based on the evaluation for the last two years with data.....</i>	<i>57</i>

LIST OF TABLES (CONTINUED)

Table	Page
<i>Table 4.6—Attachment I indicator stocks, management objectives, and individual stock-based management (ISBM) limits applicable to ISBM obligations specified in paragraphs 1, 5, and 7.</i>	60
<i>Table 5.1—Estimated landed catch of tagged and marked Pacific Salmon Commission (PSC) Chinook indicator stocks in B.C., Washington, and Oregon, in all net, troll, and sport fisheries for catch years 2009–2018 and the percent of the total tagged and marked catch landed in MSFs.</i>	68
<i>Table 5.2—Percent distribution of Nicola River adult equivalent (AEQ) total fishing mortalities and escapement to represent unmarked fish when recoveries with incomplete data were assumed to have been caught in non-selective fisheries (NSFs).</i>	73
<i>Table 5.3—Percent distribution of Nicola River adult equivalent (AEQ) total fishing mortalities and escapement to represent unmarked fish when recoveries with incomplete data were assumed to have been caught in mark-selective fisheries (MSFs).</i>	74
<i>Table 5.4—Percent distribution of Lower Shuswap River adult equivalent (AEQ) total fishing mortalities and escapement to represent unmarked fish when recoveries with incomplete data were assumed to have been caught in non-selective fisheries (NSFs).</i>	75
<i>Table 5.5—Percent distribution of Lower Shuswap River adult equivalent (AEQ) total fishing mortalities and escapement to represent unmarked fish when recoveries with incomplete data were assumed to have been caught in mark-selective fisheries (MSFs).</i>	76
<i>Table 5.6—Percent distribution of Middle Shuswap River adult equivalent (AEQ) total fishing mortalities and escapement to represent unmarked fish when recoveries with incomplete data were assumed to have been caught in non-selective fisheries (NSFs).</i>	77
<i>Table 5.7—Percent distribution of Middle Shuswap River adult equivalent (AEQ) total fishing mortalities and escapement to represent unmarked fish when recoveries with incomplete data were assumed to have been caught in mark-selective fisheries (MSFs).</i>	78
<i>Table 5.8—Average absolute changes in Nicola, Lower Shuswap and Middle Shuswap calendar year exploitation rates (CYERs) (2002, 2008–2019) when coded-wire tag (CWT) recoveries with incomplete data were assumed to have been caught in non-selective fisheries (NSFs) or mark-selective fisheries (MSFs).</i>	79

LIST OF FIGURES

Figure	Page
<i>Figure 2.1—Geographical locations of Chinook salmon coded-wire tag (CWT) exploitation rate indicator stocks.....</i>	<i>2</i>
<i>Figure 3.1—Distribution of total mortality for Southeast Alaska indicator stocks from the 1999 (1999–2008) and 2009 (2009–2018) PST Agreement periods.....</i>	<i>13</i>
<i>Figure 3.2—Distribution of total mortality for North and Central B.C. indicator stocks for the 1999–2008 and 2009–2018 PST Agreement periods.....</i>	<i>15</i>
<i>Figure 3.3—Distribution of total mortality for the West Coast Vancouver Island indicator stock (Robertson Creek Fall) for the 1999–2008 and 2009–2018 PST Agreement periods.....</i>	<i>17</i>
<i>Figure 3.4—Distribution of total mortality for the West Coast Vancouver Island hatchery indicator stock before applying the terminal area adjustment (Robertson Creek Fall [RBT]) and after the terminal area adjustments for the escapement indicator stocks (Northwest Vancouver Island [NWVI] and Southwest Vancouver Island [SWVI]) for the 1999–2008 and 2009–2018 PST Agreement periods.....</i>	<i>18</i>
<i>Figure 3.5—Distribution of total mortality for Strait of Georgia indicator stocks for the 1999–2008 and 2009–2018 PST Agreement periods.....</i>	<i>21</i>
<i>Figure 3.6—Distribution of total mortality for upper Strait of Georgia hatchery indicator stock before applying terminal area adjustment (Quinsam [QUI]) and after the terminal area adjustment for the escapement indicator stock (East Vancouver Island North [EVIN]) for the 1999–2008 and 2009–2018 PST Agreement periods.....</i>	<i>22</i>
<i>Figure 3.7—Distribution of total mortality for the Fraser River indicator stocks for the 2009–2018 and 1999–2008 PST Agreement periods.....</i>	<i>25</i>
<i>Figure 3.8—Distribution of total mortality for Washington Coast indicator stocks for the 1999–2008 and 2009–2018 PST Agreement periods.....</i>	<i>29</i>
<i>Figure 3.9—Distribution of total mortality for the Washington Coast hatchery indicator stock before applying the terminal area adjustment (Queets [QUE]) and after the terminal area adjustments for the escapement indicator stocks (Grays Harbor, Hoh, and Quillayute) for the 1999–2008 and 2009–2018 PST Agreement periods.....</i>	<i>30</i>
<i>Figure 3.10—Distribution of total mortality for Washington Salish Sea indicator stocks for the 1999–2008 and 2009–2018 PST Agreement periods.....</i>	<i>33</i>
<i>Figure 3.11—Distribution of total mortality for Columbia River indicator stocks for the 1999–2008 and 2009–2018 PST Agreement periods.....</i>	<i>41</i>
<i>Figure 3.12—Distribution of total mortality for Oregon Coast indicator stocks for 1999–2008 and 2009–2018 PST Agreement periods.....</i>	<i>44</i>
<i>Figure 3.13—Distribution of total mortality for the northern Oregon Coast hatchery indicator stock before applying the terminal area adjustment (Salmon River [SRH]) and after the terminal area adjustments for the escapement indicator stocks (Nehalem, Siletz, Siuslaw) for the 1999–2008 and 2009–2018 PST Agreement periods.....</i>	<i>45</i>
<i>Figure 3.14—Distribution of total mortality for the middle Oregon Coast hatchery indicator stock before applying the terminal area adjustment (Elk River [ELK]) and after the terminal area adjustments for the escapement indicator stocks (Coquille and South Umpqua) for the 1999–2008 and 2009–2018 PST Agreement periods.....</i>	<i>46</i>
<i>Figure 4.1—Flow diagrams depicting the sequence of decisions leading to the implementation of individual stock-based management (ISBM) general and additional obligations for stocks in Attachments IV and V of Chapter 3 of the 2009 PST Agreement according to paragraph 8 of the Chinook Chapter.....</i>	<i>48</i>

LIST OF FIGURES

Figure	Page
Figure 4.2—Diagram outlining the steps involved in a single-year evaluation of Paragraph 13(d) and 13(e) provisions in the 2009 PST Agreement pertaining to criteria for adjustment of individual stock-based management (ISBM) fisheries.....	55
Figure 4.3—Flow diagram depicting the sequence of steps for individual stock-based management (ISBM) fisheries management framework under the 2019 PST Agreement.	59
Figure 5.1—Estimated total Chinook catch in Columbia River mark-selective and non-selective sport fisheries during spring (May–Jun) and summer-fall (Jul–Dec) seasons (left y-axis) and percent of catch in mark-selective fisheries (MSFs) (right y-axis) for catch years 2003–2018.....	64
Figure 5.2—Estimated total Chinook catch in mark-selective and non-selective Puget Sound sport fisheries (left y-axis) and percent of catch in mark-selective fisheries (MSFs) (right y-axis) for catch years 2003–2018.....	65
Figure 5.3—Average number of wild fish killed under alternative mark-selective fishery (MSF) regulations, with release mortality rate equal to 0.25.....	66
Figure 5.4—Percent of total fishery coded-wire tag (CWT) recoveries in mark-selective fisheries (MSFs) for regional groupings of Chinook indicator stocks, 2003–2018.	70

LIST OF APPENDICES

Appendix	Page
<i>List of Appendices</i>	<i>82</i>
<i>Appendix A: Relationship between exploitation rate indicator stocks, escapement indicator stocks, and model stocks in the Pacific Salmon Treaty</i>	<i>84</i>
<i>Appendix B: Individual Stock-Based Management Indices.....</i>	<i>93</i>
<i>Appendix C: Percent distribution of landed catch and total mortality and escapement for exploitation rate indicator stocks by calendar year.....</i>	<i>96</i>
<i>Appendix D: Fishery exploitation rate indices by stock, age and fishery, based on Coded-Wire Tag (CWT) data</i>	<i>171</i>
<i>Appendix E: Issues with and Changes to the Exploitation Rate Analysis</i>	<i>182</i>
<i>Appendix F: Brood Year Exploitation Rate Plots</i>	<i>186</i>
<i>Appendix G: Survival Rate Plots</i>	<i>208</i>
<i>Appendix H: Terminal Area Adjustment Data</i>	<i>230</i>
<i>Appendix I: Parameters Used in the 2020 Exploitation Rate Analysis</i>	<i>236</i>

Note: Product names used in this publication are included for completeness, but do not constitute product endorsement.

EXECUTIVE SUMMARY

Chapter 3 of the 2019 Pacific Salmon Treaty (PST) Agreement requires the Chinook Technical Committee (CTC) to report annual catches, harvest rate indices, estimates of incidental mortality (IM) and exploitation rates for all Chinook salmon fisheries and stocks harvested within the Treaty area. The CTC provides annual reports to the Pacific Salmon Commission (PSC) to fulfill this obligation, as agreed by Canada and the United States (U.S.) under Chapter 3 of the Treaty. This report contains five sections: an introduction and description of the Chapter 3 2019 PST Agreement requirements related to the annual exploitation rate analysis (ERA); a review of the ERA methods; a review of the results from the annual ERA based on coded-wire tag (CWT) data; a performance evaluation of individual stock-based management (ISBM) fisheries; and CWT analyses for mark-selective fisheries (MSF). This report includes the results of the 2020 annual ERA through 2018 (Southern U.S. stocks) and 2019 (Alaskan and Canadian stocks). Results include the ISBM indices for each country through 2018 and ISBM fisheries performance to fulfill 2009 PST Agreement reporting requirements. The 2019 PST Agreement applies to all analyses and results for 2019 and 2020 fisheries.

Exploitation Rate Analysis

The CTC currently monitors 53 CWT exploitation rate indicator stocks. The ERA relies on cohort analysis, a procedure that reconstructs the cohort size and exploitation history of a given stock and brood year (BY) using CWT release and recovery data (CTC 1988). The ERA provides brood- and stock-specific estimates of total, age- and fishery-specific exploitation rates, maturation rates, smolt to age-2 or age-3 survival rates, annual distributions of fishery mortalities, fishery indices for aggregate abundance-based (AABM) fisheries, and fishery indices for ISBM fisheries. Methods and results from the annual ERA are provided in Section 2 and 3, and the appendices of this report.

Estimates of age- and fishery-specific exploitation and maturation rates, and adult equivalent estimates, from the ERA are combined with data on catches, escapements, incidental mortalities, and stock enhancement to complete the annual calibration of the PSC Chinook Model.

ISBM Fisheries Performance

Because CWT recovery data were not available for some fisheries for the previous publication in this report series, ISBM indices and fishery evaluations are included herein to fulfill the CTC's 2009 PST Agreement reporting requirements. The 2019 PST Agreement has a markedly different framework for ISBM fisheries management. The new management regime relies on calendar year exploitation rates (CYERs) as the metric used to evaluate performance of ISBM fisheries. Under the 2019 PST Agreement, the CYER metric averaged across three consecutive years is used for evaluating ISBM fisheries beginning in 2019.

Performance Under the 2009 PST Agreement

For ISBM fisheries, paragraph 8 of the Chinook Chapter of the 2009 PST Agreement specifies that Canada and the U.S. will reduce base period exploitation rates on specified stocks by 36.5% (Canada) and 40% (U.S.), equivalent to ISBM indices of 63.5% (Canada) and 60% (U.S.). This requirement is referred to as the *general obligation* and does not apply to stocks that achieve

their CTC-agreed escapement goal. The 2009 PST Agreement also specifies that for those stocks in which the general obligation is insufficient to meet the CTC-agreed escapement goal, the Party in whose waters the stock originates shall further constrain its fisheries to an extent that is not greater than the average ISBM exploitation rate which occurred in the years 1991 to 1996 (paragraph 8(c)). This requirement is referred to as the *additional obligation*.

Of the seven Canadian ISBM indices that could be calculated for 2018 from the CWT data, six of seven were subject to ISBM limitations (Cowichan escapement exceeded the goal, thus the obligations did not apply). Of the remaining six, five had ISBM indices that were below the general obligation rate of 0.635 (Table 4.1). Only the Green River ISBM index was above the general obligation rate. WCVI Falls (0.430) does not have a CTC-agreed escapement goal and was below the additional obligation rate (0.475). Harrison (0.235) did not meet its escapement goal and was below its additional obligation rate (0.268). In the case of Lower Strait of Georgia, Nanaimo was dropped from the CWT-based index because of concern about the method of estimating the terminal fishery rates. Nanaimo and Cowichan stocks are no longer reported separately in the model-based index because a way to split the two stocks in the base period has not yet been developed.

Review of performance in the Canadian individual stock-based management (ISBM) fisheries, 2009–2018.

Fisheries shaded in green or red indicate whether the Treaty obligation was met or not, respectively.

Stock Group	Stock (CTC agreed goal year)	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018 ¹
North/ Central B.C.	Yakoun, Nass, Skeena, Atnarko, Dean (no goal)	N.A.									
WCVI Falls	Artlish, Burman, Kauok, Tahsis, Tashish, Marble, Gold (no goal)	0.489	0.207	0.633	0.625	0.333	0.313	0.610	0.409	0.629	0.430
L. Georgia Strait	Cowichan (2005)	0.469	0.372	0.181	0.409	0.387	0.431	0.297	0.456	0.281	0.806
	Nanaimo (no goal)	N.A.									
U. Georgia Strait	Klinaklini, Kakweikan, Wakeman, Kingcome, Nimpkish (no goal)	0.200	0.365	0.091	0.143	0.086	0.079	0.211	0.207	0.235	0.197
Fraser Late	Harrison (2001)	0.062	0.083	0.069	0.125	0.138	0.185	0.142	0.182	0.272	0.235
Fraser Early (spring & summers)	Upper Fraser, Mid- Fraser, Thompson	N.A.									
Puget Sound Spring	Nooksack (no goal) ¹	0.147	0.029	0.134	0.056	0.069	0.086	0.084	0.095	0.082	0.102
	Skagit (no goal)	N.A.									
Puget Sound Falls	Skagit (no goal)	N.A.									
	Stillaguamish (no goal) ²	0.210	0.138	0.209	0.241	0.170	0.451	0.275	0.238	0.189	0.192
	Snohomish (no goal)	N.A.									
	Lake Wash. (no goal)	N.A.									
	Green River (no goal) ²	0.275	0.135	0.275	0.310	0.301	0.413	1.024	0.771	0.353	1.148

Note: General obligation (0.635) or additional obligation (1991–1996 ISBM rate average for the Party in whose waters the stock not meeting escapement goal originates), whichever is lower, for stocks listed in Annex 4, Chapter 3, Attachment V.

N.A. = no data available.

¹ 2018 ISBM indices for Canadian stock groups were calculated using 2019 ERA results and U.S. stock groups were calculated using 2020 ERA results.

In 2018, 9 of the 15 U.S. ISBM indices that could be calculated from CWT data for the U.S. ISBM fishery met the Treaty obligation. Twelve of the 15 stocks have PSC-agreed escapement goals. Six of the stocks have PSC-agreed escapement goals that were met or exceeded; thus, the general obligation did not apply in 2018 under the terms of the 2009 PST Agreement. Six stocks have PSC-agreed escapement goals that were not met, Harrison, Queets, Deschutes, Lewis, Nehalem, and Siuslaw; thus, either the general obligation or the additional obligation applies. In four of these six cases (Deschutes, Lewis, Nehalem, and Siuslaw), the Treaty obligation was not met. The Canadian Harrison River stock has a PSC-agreed escapement goal which was not met in 2018, but the U.S. ISBM index (0.361) was below the general obligation for this stock. Of the three stocks without escapement goals, the general obligation was exceeded for two—the Nooksack and Green rivers.

Review of performance in the U.S. individual stock-based management (ISBM) fisheries, 2009–2018.

Fisheries shaded in green or red indicate whether the Treaty obligation was met or not, respectively.

Stock Group	Stock (CTC agreed goal in year)	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Fraser Late	Harrison (2001)	0.136	0.295	0.285	0.351	0.442	0.380	0.283	0.173	0.285	0.361
Puget Sound Spring	Nooksack (no goal)	0.585	0.757	0.890	1.859	0.871	1.286	0.556	0.262	0.506	0.958
	Skagit (no goal)	N.A.									
Puget Sound Fall	Skagit (no goal)	N.A.									
	Stillaguamish (no goal)	0.210	0.192	0.199	0.168	0.236	0.753	0.279	0.176	0.188	0.129
	Snohomish (no goal)	N.A.									
	Lake Wash. (no goal)	N.A.									
	Green (no goal)	0.486	0.289	0.417	0.521	0.301	0.409	0.621	0.320	0.292	0.819
WA Coast Falls	Hoko (no goal)	N.A.									
	Grays (2014)	0.689	0.624	0.741	0.943	0.781	0.750	0.983	0.637	0.546	0.508
	Queets (2004)	0.662	0.482	0.701	1.030	0.926	0.518	0.278	0.416	0.739	0.600
	Hoh (2004)	1.003	0.839	1.753	1.590	2.642	1.257	1.211	0.254	1.227	0.380
	Quillayute (2004)	1.821	1.377	1.693	1.961	1.782	2.579	2.034	1.080	2.179	1.671
Columbia Fall	Brights (2002)	2.601	1.643	2.293	1.736	1.933	1.737	1.375	1.366	1.425	1.069
	Deschutes (2010)	0.816	0.695	0.770	0.772	0.794	0.758	0.698	0.785	1.026	0.715
	Lewis (1999)	0.217	0.554	1.370	0.865	1.110	0.813	0.570	0.506	0.501	0.936
Columbia Summers	Summers (1999)	4.063	6.056	9.148	5.050	5.373	6.313	5.633	6.764	6.301	7.237
N. Oregon Coast	Nehalem (1999)	0.340	1.030	2.085	1.787	2.299	2.909	3.456	1.743	2.043	1.726
	Siletz (1999)	1.345	0.637	3.069	1.689	1.781	1.807	3.559	1.874	2.732	3.804
	Siuslaw (1999)	1.389	1.395	2.244	1.522	2.388	1.882	2.519	2.630	2.616	4.138

Note: General obligation (0.600) or additional obligation (1991–1996 ISBM rate average for the Party in whose waters the stock not meeting escapement goal originates), whichever is lower, for stocks listed in Annex 4, Chapter 3, Attachment V.

NA = no data available; NC = not calculated.

Performance Under the 2019 PST Agreement

Implementation of the newly revised PST Agreement began with fishing year 2019. As noted above, CWT recovery data were not available at the time of this analysis for some fisheries that occurred during fishing year 2019. Thus, the CTC will begin fulfilling its annual reporting requirements regarding CYERs for evaluating ISBM fisheries performance per Chapter 3,

paragraph 5 of the 2019 PST Agreement after the 2021 ERA is completed, which will allow the computation of 2019 CYERs for all stocks.

Attachment I of Chapter 3 identifies CYER limits applicable to ISBM obligations for 31 stocks; of these, 16 have management objectives.¹ The CTC has conducted its evaluation of status towards achieving PSC-agreed management objectives for the 16 stocks in Attachment I with identified management objectives for which CYER limits are applicable (CTC 2020). In 2019, 3 of the 16 stocks were below their escapement goals; of these 2 stocks (Harrison, Siuslaw) were more than 85% below and 1 stock (Atnarko) was within 85% of its escapement goal. Thus, for stocks with management objectives, CYER limits only apply to the Harrison and Siuslaw for 2019 per paragraph 7(c).

Mark-Selective Fisheries

Section 5 of this report contains harvest information by region from mark-selective fisheries (MSFs). Mark-selective fisheries occurred along the Oregon Coast, Washington Coast, and in the Columbia River, Puget Sound, and Canadian Strait of Juan de Fuca in 2019. The magnitude of impact of a MSF relative to the total exploitation of a stock can be measured using the percentage of the total landed catch in net, sport, and troll fisheries of tagged and marked PSC indicator stocks that occurs in MSFs. Traditionally, the CTC has used PSC indicator stocks that have been double index tagged (DIT) to evaluate the impact of MSFs on the unmarked stocks represented by the unmarked tag group in a DIT pair,² however many CWT indicator stocks do not have a DIT pair. Accordingly, an approach was applied to estimate mortality distributions for natural stocks that have single index tag (SIT) indicator stocks under conditions where the MSF impacts mainly occur on mature SIT fish proximal to their terminal area.

¹ Attachment I of the 2019 PST Agreement has a total of 38 stocks of which 31 are subject to ISBM obligations. There are currently 22 with management objectives and 16 of those are subject to ISBM obligations.

² A DIT group consists of at least two tag groups, one with the mass mark (or adipose fin clip) and one without the mark. These 2 tag groups are treated identically except for the mark, and differences in mortality should be due to the MSFs—assuming there is no mark mortality occurring prior to recruitment to the fisheries.

1. INTRODUCTION

Chapter 3 of the 2019 Pacific Salmon Treaty (PST) Agreement requires the Chinook Technical Committee (CTC) to annually report catch and escapement data and modeling results used to manage Chinook salmon fisheries and stocks harvested within the Treaty area. To fulfill this obligation, the CTC provides a series of annual reports to the Pacific Salmon Commission (PSC). This report provides an overview of the annual exploitation rate analysis (ERA) and results, and beginning in 2021, will include calendar year exploitation rates (CYER) which are the metric used to evaluate performance of individual stock-based management (ISBM) fisheries under the 2019 PST Agreement. The results of the ERA are relevant to the PSC's fishery management framework for ISBM fisheries and used as inputs to the PSC Chinook Model calibration (see CTC 2021a for details).

Paragraph 3(b) of the 2019 PST Agreement defines ISBM fisheries as "*a regime that constrains the annual impacts within the fisheries of a jurisdiction for a naturally spawning Chinook salmon stock or stock group.*" Per paragraph 5(a) "ISBM fisheries shall be managed to limit the total adult equivalent mortality for stocks listed in Attachment I that are not meeting agreed biologically-based management objectives, or that do not have agreed management objectives, to no more than the limits identified in Attachment I." The CTC is tasked with evaluating ISBM fishery performance relative to the obligations set forth in paragraphs 5 and 7 annually using the CYER metric to monitor total mortality.

Section 2 of this report describes the methods used to perform the ERA from coded-wire tag (CWT) data provided by management agencies throughout the PST area. Section 3 contains the annual results of the ERA. The results of the 2020 ERA are based on CWT data through catch year 2019 and 2018 for southern U.S. stocks. As data become available, Section 4 will contain a performance evaluation of ISBM fisheries relative to the 2019 PST Agreement. Also included in this section is a performance evaluation of ISBM fisheries subject to the 2009 PST Agreement to finalize reporting requirements on southern United States (U.S.) fisheries, where catch data are currently available through 2018. Section 5 is a summary of catch in mark-selective fishery (MSFs) and methods used to evaluate their impacts.

Appendix A shows the relationship between the exploitation rate indicator stocks, escapement indicator stocks, model stocks, and PST Attachment I stocks. Appendices B through D present additional output from the ERA beyond the summaries presented in the main body of the report. Appendix B provides the time series of ISBM CWT indices for evaluating ISBM fishery performance under the 2009 PST Agreement. Appendix C shows the percent distribution of total mortality by catch year for exploitation rate indicator stocks. Appendix D presents exploitation rates by stock and age for each aggregate abundance-based management (AABM) fishery. CWT data quality and ERA documentation are detailed in Appendix E. Appendix F presents methods for estimating brood year exploitation rate (BYER) and accompanying plots by stock. For Appendix F, only complete brood years are shown. Appendix G presents methods for estimating smolt-to-youngest age survival and associated plots by stock. Appendix H presents the data used to adjust ERA results for when a terminal area adjustment was applied (see Section 2.1.3.1 for details). Appendix I provides a description of notations found throughout this report.

2. EXPLOITATION RATE ANALYSIS

The CTC currently monitors 53 CWT exploitation rate indicator stocks (Figure 2.1; Table 2.1). The ERA relies on cohort analysis, a procedure that reconstructs the cohort size and exploitation history of a given stock and brood year (BY) using CWT release and recovery data (CTC 1988). The ERA provides stock-specific estimates of BY total, age- and fishery-specific exploitation rates, maturation rates, smolt-to-age 2 or 3 survival rates, annual distributions of fishery mortalities, fishery indices for AABM fisheries, and ISBM indices for ISBM fisheries (Table 2.2). Estimates of age- and fishery-specific exploitation and maturation rates from the cohort analysis are combined with data on catches, escapements, incidental mortalities, and stock enhancement to complete the annual calibration of the PSC Chinook Model (CTC 2021a).

Indicator stocks used for ERA and the estimates derived from the analysis for each stock are shown in Table 2.2. Relationships between the exploitation rate indicator stocks, model stocks, and escapement indicator stocks are provided in Appendix A.

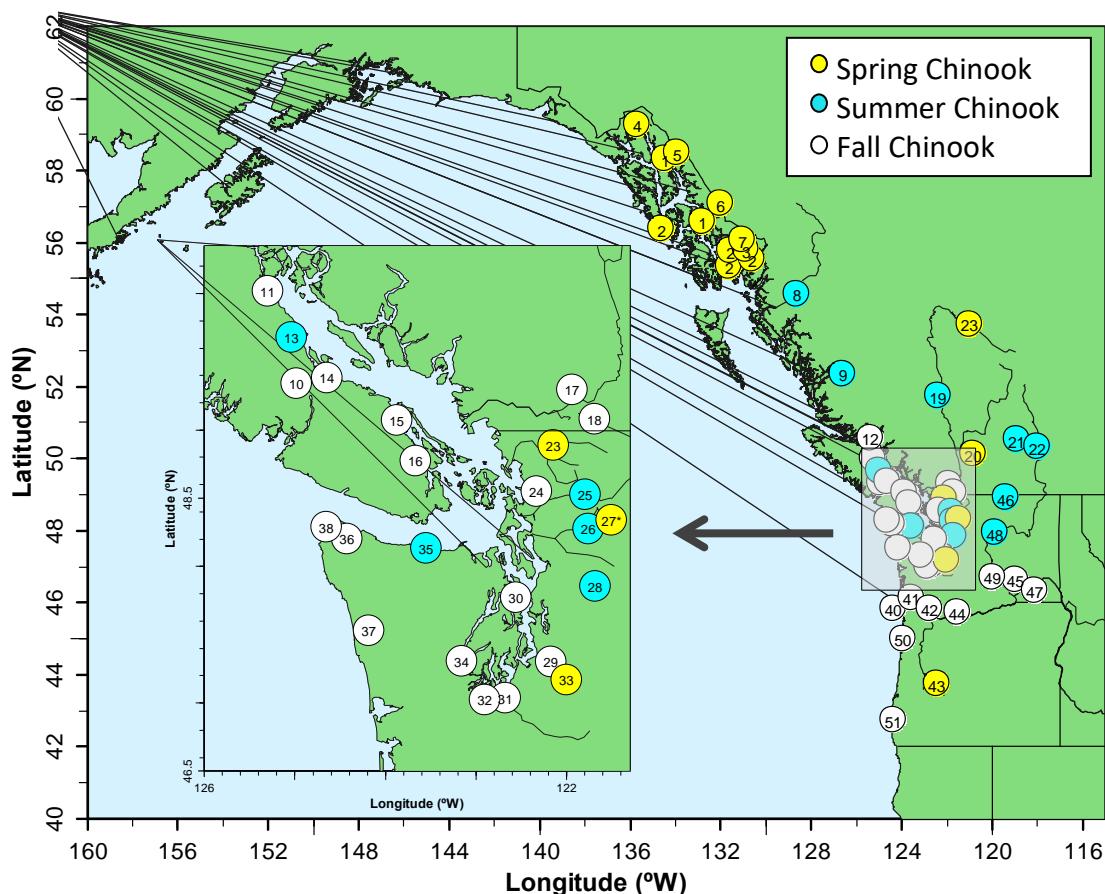


Figure 2.1—Geographical locations of Chinook salmon coded-wire tag (CWT) exploitation rate indicator stocks.

Note: See Table 2.1 for the full stock names associated with each number.

Note: The southern B.C. and Puget Sound area, where concentration of the CWT indicators is greatest, is shown in the expanded view.

Table 2.1—Summary of coded-wire tag (CWT) exploitation rate indicator stocks, location, run type, and smolt age.

Stock/Area	Exploitation Rate Indicator Stock	Hatchery	Run Type	Smolt Age	Map No.
Southeast Alaska	Northern Southeast Alaska (NSA)	Crystal Lake (ACI), Macaulay (AMC)	Spring	Age 1	1
	Southern Southeast Alaska (SSA)	Whitman Lake (AHC), Little Port Walter (ALP), Deer Mountain (ADM), Neets Bay (ANB)	Spring	Age 1	2
	Alaska Springs (AKS)	Whitman Lake (AHC), Little Port Walter (ALP), Deer Mountain (ADM), Neets Bay (ANB), Crystal Lake (ACI)	Spring	Age 1	1,2 ⁹
	Chickamin (CHM)	Wild	Spring	Age 1	3
	Chilkat (CHK)	Wild	Spring	Age 1	4
	Taku (TAK)	Wild	Spring	Age 1	5
	Stikine (STI)	Wild	Spring	Age 1	6
North/Central B.C.	Unuk (UNU)	Wild	Spring	Age 1	7
	Kitsumkalum (KLM)	Deep Creek	Summer	Age 1	8
	Atnarko (ATN)	Snootli	Summer	Age 0	9
WCVI	Robertson Creek (RBT)	Robertson Creek	Fall	Age 0	10
Strait of Georgia	Quinsam (QUI)	Quinsam	Fall	Age 0	11
	Phillips (PHI)	Gillard Pass	Summer/Fall	Age 0	12
	Puntledge (PPS)	Puntledge	Summer	Age 0	13
	Big Qualicum (BQR)	Big Qualicum	Fall	Age 0	14
	Nanaimo (NAN) ¹	Nanaimo	Fall	Age 0	15
	Cowichan (COW) ²	Cowichan	Fall	Age 0	16
Fraser River	Harrison (HAR)	Chehalis	Fall	Age 0	17
	Chilliwack (CHI) ²	Chilliwack	Fall	Age 0	18
	Chilko (CKO)	Spius Creek, Chehalis	Summer	Age 1	19
	Nicola (NIC)	Spius Creek	Spring	Age 1	20
	Lower Shuswap (SHU) ²	Shuswap Falls	Summer	Age 0	21
	Middle Shuswap (MSH)	Shuswap Falls	Summer	Age 0	22
	Dome (DOM) ³	Penny Creek	Spring	Age 1	23
North Puget Sound	Nooksack Spring Fingerling (NSF)	Kendall Creek	Spring	Age 0	24
	Nooksack Spring Yearling (NKS)	Kendall Creek	Spring	Age 1	
	Samish Fall Fingerling (SAM) ⁴	Samish	Summer/Fall	Age 0	25
	Skagit Summer Fingerling (SSF)	Marblemount	Summer	Age 0	26
	Skagit Spring Fingerling (SKF)	Marblemount	Spring	Age 0	
	Skagit Spring Yearling (SKS) ⁴	Marblemount	Spring	Age 1	28
Central Puget Sound	Stillaguamish Fall Fingerling (STL) ⁵	Stillaguamish Tribal	Summer/Fall	Age 0	27
	Skykomish Summer Fingerling (SKY) ^{4,5}	Wallace	Summer/Fall	Age 0	29
South Puget Sound	Nisqually Fall Fingerling (NIS) ⁴	Clear Creek	Summer/Fall	Age 0	32
	South Puget Sound Fall Fingerling (SPS) ⁴	Soos/Grovers/Issaquah creeks	Summer/Fall	Age 0	30,31
	South Puget Sound Fall Yearling (SPY)	Tumwater Falls	Summer/Fall	Age 1	33
	White River Spring Yearling (WRY) ⁶	White River	Spring	Age 1	34
Hood Canal	George Adams Fall Fingerling (GAD) ⁴	George Adams	Summer/Fall	Age 0	35
Juan de Fuca	Elwha Fall Fingerling (ELW)	Lower Elwha	Summer/Fall	Age 0	36
North Washington Coast	Hoko Fall Fingerling (HOK)	Hoko Makah National Fish Hatchery	Fall	Age 0	37
	Queets Fall Fingerling (QUE)	Wild broodstock, Salmon River (WA)	Fall	Age 0	38
	Tsoo-Yess Fall Fingerling (SOO) ⁷	Makah National Fish Hatchery	Fall	Age 0	39
Lower Columbia River	Columbia Lower River Hatchery (LRH) ⁴	Big Creek	Fall Tule	Age 0	40
	Cowlitz Tule (WA) (CWF)	Cowlitz	Fall Tule	Age 0	41
	Lewis River Wild (LRW)	Wild	Fall Bright	Age 0	42
	Willamette Spring (WSH) ²	Willamette Hatcheries	Spring	Age 1	43
	Spring Creek Tule (WA) (SPR) ⁴	Spring Creek National Fish Hatchery	Fall Tule	Age 0	44
	Hanford Wild (HAN)	Wild	Fall Bright	Age 0	45

Stock/Area	Exploitation Rate Indicator Stock	Hatchery	Run Type	Smolt Age	Map No.
Upper Columbia River	Okanagan (SMK)	Similkameen and Omak Pond	Summer	Age 1	46
	Columbia Summers (WA) (SUM)	Wells	Summer	Age 0/1	48
	Columbia Upriver Brights (URB) ⁴	Priest Rapids	Fall Bright	Age 0	49
Snake River	Lyons Ferry Fingerling (LYF) ⁸	Lyons Ferry	Fall Bright	Age 0	47
	Lyons Ferry Yearling (LYY) ⁴	Lyons Ferry	Fall Bright	Age 1	
North Oregon Coast	Salmon (SRH)	Salmon	Fall	Age 0	50
Mid Oregon Coast	Elk River (ELK)	Elk River	Fall	Age 0	51

¹ Tagged releases for the Nanaimo Fall stock were discontinued after the 2004 brood.

² Historical releases with double index tags (DIT); not currently maintained.

³ Hatchery production of the Dome Creek stock was discontinued after the 2002 brood.

⁴ DIT releases associated with this stock.

⁵ Though stock is composed of both summer and fall-run components, references to both summer-run and fall-run stocks are used interchangeably throughout document.

⁶ No longer adipose fin clipped.

⁷ The name for the Sooes River and hatchery was changed to Tsoo-Yess in 2015.

⁸ Subyearlings have been CWT-tagged since BY 1986, except for BYs 1993–1997.

⁹ Does not include Macaulay Hatchery, which is located in Juneau

Table 2.2—Coded-wire tag (CWT) exploitation rate indicator stocks used in the exploitation rate analysis (ERA) and data derived from them: fishery, individual stock-based management (ISBM) and survival indices, brood year exploitation rates (BYER), and stock catch distribution (Dist) with escapement estimates (Esc) and base period (1979–1982) tag recoveries.

Exploitation Rate Indicator Stock	Fishery Index	ISBM Index	Survival Index	BYER ¹	Dist	Esc	Base Recoveries
Alaska Spring (AKS)	Yes ²	—	Yes	Ocean	Yes	Yes	Yes
Northern Southeast Alaska (NSA)	Yes ³	—	Yes	Ocean	Yes	Yes	Yes
Southern Southeast Alaska (SSA)	Yes ³	—	Yes	Ocean	Yes	Yes	Yes
Chickamin (CHM)	—	—	Yes	Total	Yes	Yes	—
Chilkat (CHK)	—	—	Yes	Total	Yes	Yes	—
Taku (TAK)	—	—	Yes	Total	Yes	Yes	Yes
Stikine (STI)	—	—	Yes	Total	Yes	Yes	—
Unuk (UNU)	—	—	Yes	Total	Yes	Yes	—
Kitsumkalum (KLM/KLY)	—	—	Yes	Total	Yes	Yes	—
Atnarko (ATN/ATS)	Yes	No	Yes	Total	Yes	Yes	Yes
Robertson Creek (RBT)	Yes	Yes	Yes	Ocean	Yes	Yes	Yes
Quinsam (QUI)	Yes	Yes	Yes	Total	Yes	Yes	Yes
Phillips River Fall (PHI)	—	—	—	—	Yes	—	—
Puntledge (PPS)	Yes	—	Yes	Total	Yes	Yes	Yes
Big Qualicum (BQR)	Yes	Yes	Yes	Total	Yes	Yes	Yes
Nanaimo (NAN)	—	Yes	Yes	Total	Yes	Yes	Yes
Cowichan (COW)	Yes	Yes	Yes	Total	Yes	Yes	—
Chilliwack (CHI)	Yes	Yes	Yes	Total	Yes	Yes	—
Chilko (CKO)	—	—	Yes	Total	Yes	Yes	Yes
Dome (DOM)	—	—	Yes	Total	Yes	Yes	—
Harrison (HAR)	—	—	Yes	Total	Yes	Yes	—
Lower Shuswap (SHU)	Yes	—	Yes	Total	Yes	Yes	Yes
Middle Shuswap (MSH)	—	—	Yes	Total	Yes	Yes	—
Nicola (NIC)	—	—	Yes	Total	Yes	Yes	—
Nooksack Spring Fingerling (NSF)	—	—	Yes	Ocean	Yes	Yes	Yes
Nooksack Spring Yearling (NKS)	—	Yes	Yes	Ocean	Yes	Yes ⁴	—

Exploitation Rate Indicator Stock	Fishery Index	ISBM Index	Survival Index	BYER ¹	Dist	Esc	Base Recoveries
Samish Fall Fingerling (SAM) ⁵	Yes	—	Yes	Ocean	Yes	Yes ⁴	Yes
Skagit Spring Fingerling (SKF)	—	—	Yes	Ocean	Yes	Yes	—
Skagit Spring Yearling (SKS)	—	—	Yes	Ocean	Yes	Yes ⁴	—
Skagit Summer Fingerling (SSF)	—	—	Yes	Ocean	Yes	Yes	—
Skykomish Summer Fingerling (SKY)	—	—	Yes	Ocean	Yes	Yes	—
Stillaguamish Summer Fingerling (STL)	—	Yes	Yes	Ocean	Yes	Yes	—
Nisqually Fall Fingerling (NIS)	—	—	Yes	Ocean	Yes	Yes	Yes
South Puget Sound Fall Fingerling (SPS)	Yes	Yes	Yes	Ocean	Yes	Yes ⁴	Yes
South Puget Sound Fall Yearling (SPY) ⁵	Yes	—	Yes	Ocean	Yes	Yes ⁴	Yes
Squaxin Pens Fall Yearling (SQP)	—	—	—	—	Yes	—	—
University of WA Accelerated (UWA)	—	—	—	—	Yes	—	Yes
White River Spring Yearling (WRY)	—	—	Yes	Ocean	Yes	Yes ⁴	Yes
George Adams Fall Fingerling (GAD)	Yes	— ³	Yes	Ocean	Yes	Yes ⁴	Yes
Elwha Fall Fingerling (ELW)	—	—	Yes	Ocean	Yes	—	—
Hoko Fall Fingerling (HOK)	—	—	Yes	Total	Yes	Yes	—
Queets Fall Fingerling (QUE)	—	Yes	Yes	Total	Yes	—	Yes
Tsoo-Yess Fall Fingerling (SOO)	—	—	Yes	Total	Yes	Yes	—
Columbia Lower River Hatchery (LRH) ⁵	Yes	—	Yes	Total	Yes	Yes	Yes
Cowlitz Tule (CWF)	Yes	—	Yes	Ocean	Yes	Yes	Yes
Lewis River Wild (LRW)	Yes	Yes	Yes	Total	Yes	Yes	Yes
Spring Creek Tule (SPR) ⁵	Yes	—	Yes	Total	Yes	Yes	Yes
Willamette Spring (WSH)	Yes	—	Yes	Ocean	Yes	Yes	Yes
Columbia Summers (SUM)	Yes	Yes	Yes	Total	Yes	Yes	Yes
Columbia Upriver Brights (URB)	Yes	Yes	Yes	Total	Yes	Yes	Yes
Hanford Wild (HAN)	—	—	Yes	Total	Yes	Yes	—
Okanagan (SMK)	—	—	Yes	Total	Yes	Yes	—
Lyons Ferry Fingerling (LYF)	—	—	Yes	Total	Yes	Yes	—
Lyons Ferry Yearling (LYY)	—	—	Yes	Total	Yes	Yes	—
Salmon River (SRH)	Yes	Yes	Yes	Ocean	Yes	Yes	Yes
Elk River (ELK)	Yes	Yes	Yes	Ocean	Yes	Yes	Yes

¹For stocks of hatchery origin and subject to terminal fisheries directed at harvesting surplus hatchery production, ocean fisheries do not include terminal net fisheries. Otherwise, total fishery includes terminal net fisheries.

² Alaska Spring (AKS) was used in stratified proportional fishery index in the 9806 model. AKS was composed of CWT data from five SEAK hatcheries and collectively were used to represent the Alaska Southern Southeast model stock in the previous version of the PSC Chinook Models (CTC *in prep.*).

³ Northern Southeast Alaska (NSA) and Southern Southeast Alaska (SSA) was used in the stratified proportional fishery index for the Phase II PSC Chinook Model.

⁴ Only hatchery rack recoveries are included in escapement.

⁵ Stock of hatchery origin not used to represent naturally spawning stock.

2.1 OVERVIEW OF CODED-WIRE TAG-BASED EXPLOITATION RATE ANALYSES

2.1.1 Description of Incidental Mortality

For AABM fisheries, fishery indices are presented for both reported catch and total mortality; for ISBM fisheries, only total mortality fishery indices are presented. The difference between reported catch and total mortality is that incidental mortality (IM) is included in the latter. IM includes drop-off mortality of legal-sized fish in retention fisheries, mortality of legal-size fish in Chinook non-retention (CNR) fisheries, and mortality of sublegal-size fish in both retention and CNR fisheries. Management strategies have changed considerably for fisheries of interest to the PSC since 1985. Regulatory changes have included size limit changes, extended periods of CNR

in troll fisheries, and mandatory release of Chinook salmon caught in some net fisheries. Estimates of IM are essential for assessment of total fishery impacts, yet they cannot be determined directly from CWT recovery data. There are four categories of IM that are estimated in the ERA:

1. Shakers: Chinook salmon below the legal size limit that are encountered, brought to the boat, and released during a Chinook salmon retention fishery.
2. Sublegal CNR: Chinook salmon below the legal size limit that are encountered, brought to the boat, and released during a CNR fishery. The mortality rate per encounter applied to sublegal CNR is the same as applied to shakers.
3. Legal CNR: Chinook salmon above the legal size limit that are encountered, brought to the boat, and released during a CNR fishery.
4. Drop-off: Chinook salmon above or below the legal size limit that are encountered during either retention or non-retention fisheries, but lost from the gear before they reach the boat. Drop-off mortality is assumed the same for legal and sublegal fish, but can vary by gear type.

Additional details about the methods used to estimate IM have been described by the CTC Analytical Working Group (AWG)³ and CTC (2004).

2.1.2 ISBM Indices

The CTC (1996) proposed a non-ceiling fishery index as a measure of the pass-through provision specified in the 1985 PST Agreement. This index compares an *expected adult equivalent* (AEQ) mortality (assuming base period exploitation rates and current stock abundance) with the observed AEQ mortality on a stock within a calendar year (CY), over all non-AABM fisheries of a Party (Table 2.3). Index values less than 1.0 indicate that the exploitation rates have decreased relative to the base period. Paragraph 8(d), Chapter 3 of the 2009 PST Agreement directs the CTC to use these ISBM indices to measure the performance of ISBM fisheries:

“(d) unless otherwise recommended by the CTC and approved by the Commission, the nonceiling index defined in CTC (2005) where data are available for the required time periods, the average total annual AEQ mortality rate that occurred in 1991 to 1996, or an alternative metric recommended by the CTC and approved by the Commission will be used to monitor performance of ISBM fisheries relative to the obligations set forth in this paragraph;”

³ Chinook Technical Committee Analytical Work Group. Unpublished. Draft 1991 PSC Chinook Model Documentation.

Table 2.3—Fisheries included in the individual stock-based management (ISBM) index by nation.

Fisheries Included in ISBM Index	
United States	Canada
Washington/Oregon Ocean Troll	Central B.C. Troll
Puget Sound Northern Net	Strait of Georgia Troll
Puget Sound Southern Net	North B.C. Net
Washington Coastal Net	Central B.C. Net
Freshwater Terminal Net	West Coast Vancouver Island Net
Washington/Oregon Ocean Sport	Strait of Juan de Fuca Net
Puget Sound Northern Sport	Johnstone Strait Net
Puget Sound Southern Sport	Fraser Net
Freshwater Terminal Sport	Freshwater B.C. Net
	Strait of Georgia Sport
	Strait of Juan de Fuca Sport
	Freshwater B.C. Sport

2.1.3 Assumptions of the CWT Exploitation Rate Analyses

Assumptions for the procedures used in the ERA are summarized below and are discussed in more detail in a previous publication (CTC 1988):

1. CWT recovery data are obtained in a consistent manner from year to year or can be adjusted to make them comparable.
2. Use of ratios may reduce or eliminate the effect of data biases that are consistent from year to year. Many of the analyses rely upon indices that are computed as the ratio of a statistic in a particular year to the value associated with a base period.
3. For ocean age-2 and older fish, natural mortality varies by age but is constant across years. Natural mortality rates applied by age are: age 1→age 2, 40%; age 2→age 3, 30%; age 3→age 4, 20%; and age 4→5 and older 10% (i.e., after fishing mortality and maturation of the age 4 cohort, 10% of the remaining immature fish die due to natural causes before moving to the next age class and before the commencement of fishing the next year).
4. All stocks within a fishery have the same size distribution at age, and the distribution of any individual stock across fisheries is constant across years.
5. The spatial and temporal catch distribution of sublegal-size fish of a given stock and age is the same as that for legal-size fish of that stock and age.
6. IM rates per encounter are constant among years. The rates vary by fish size (legal or sublegal) and fishery, and rates for troll and sport fisheries were published by the CTC (1997).
7. The procedures for estimating the mortality of CWT fish of legal size during periods of CNR assume that for any year the stock distribution during CNR periods is the same as during legal catch retention periods. To account for this in Canadian fisheries, the number of legal encounters during the CNR fishery was adjusted by a selectivity factor. A factor of 0.34 was used for the West Coast Vancouver Island (WCVI) and Strait of Georgia troll fisheries. This value was the average selectivity factor calculated from

three years of observer data in the Alaska troll fishery. A factor of 0.20 was used in the North/Central British Columbia (B.C.) troll fishery. This factor corresponds to the proportion of fishing areas that remain open during CNR periods. A selectivity factor of 0.34 exists for the Southeast Alaska (SEAK) troll fishery but is not used since an independent estimate of legal and sublegal encounters is provided annually.

8. Maturation rates for BYs in which all ages have not matured (incomplete broods) are equal to the most recent six-year average of completed BYs. Maturation rates are stock- and age-specific.
9. Age-4 (age-5 for spring stocks) and older Chinook salmon recovered in ocean net fisheries are assumed to be mature fish.
10. When using the fishery indices as a measure of change in fishery harvest rates between years, the temporal and spatial distribution of stocks in and among fisheries and years is assumed to be stable.
11. CWT recoveries used in the ERA are from adipose-clipped fish. There is no adjustment to the estimate of mortality in the ERA on adipose-intact fish that must be released in fisheries under adipose-clipped mark-selective regulations.

An exploitation rate indicator stock estimates are not used in the ERA in the following instances:

1. The number of CWT recoveries is limited (i.e., fewer than 10 estimated recoveries for a given brood stock–age combination).
2. There are no CWT recoveries in the spawning escapement.
3. There are fewer than four BYs with CWT recoveries.

Indicator stocks used for ERA and the estimates derived from the analysis for each stock are shown in Table 2.2. Relationships between the exploitation rate indicator stocks, model stocks, and escapement indicator stocks are provided in Appendix A. The general assumption used for assessment, termed the “gorilla assumption” by the CWT Expert Panel (Hankin et al. 2005), is that the vulnerability to and distribution amongst fisheries of each CWT indicator stock is the same as the associated model or wild stock that it represents.

2.1.3.1 Terminal Area Adjustments

Attachment I of Chapter 3 of the 2019 PST Agreement identifies 11 CWT exploitation rate indicator stocks for which adjustments to CWT recoveries in terminal fisheries are needed to more accurately represent the fishery impacts on the associated escapement indicator stock. Terminal area adjustments can substantially change the estimated CYER in ISBM fisheries (CYER Work Group 2019), especially when differences in the return location, run timing, or other factors result in a different harvest rate on the CWT indicator stock than the associated escapement indicator stock (CTC 2019a). In such cases, the adjusted CWT recoveries in terminal fisheries more accurately reflect the harvest rate on the associated escapement indicator stock (Appendix H).

Terminal adjustment methods (TAM) rely on auxiliary information or assumptions of differing fishery harvest of indicator stocks relative to associated wild stocks to adjust the CWT

recoveries, which is accomplished by switching out the actual CWT recoveries and switching in new terminal harvest and escapement recoveries that aligns with the harvest rate on the escapement indicator stock (CYER Work Group 2021).

3. EXPLOITATION RATE ANALYSIS RESULTS

In this section, key ERA results are reviewed on a region-by-region basis and discussed briefly in terms of general patterns and trends at the stock and stock group level. Results are presented for the following ERA metrics: brood year exploitation rate (total or ocean, depending on stock), early marine survival rate, and mortality distribution. Although some of this content is germane to assessments on the effectiveness of the PST, such evaluations necessitate that other information also be considered (e.g., performance of escapement indicator stocks, AABM and ISBM fisheries, etc.). Thus, the emphasis of this section is on pattern description only, not on drawing inferences about cause-effect relationships due to changing management regimes.

3.1 SOUTHEAST ALASKA STOCKS

There are five wild, one wild aggregate, and three hatchery aggregate CWT indicator stocks in SEAK. The five wild stocks are the Chilkat River (CHK), Chickamin River (CHM), Stikine River (STI), Taku River (TAK), and Unuk River (UNU). The one wild aggregate stock is the Taku and Stikine Rivers (TST). The TST indicator stock is used to represent the Taku and Stikine River PSC Chinook Model stock. The CHK, CHM, and UNU CWT indicator stocks are not currently used to represent SEAK stocks in the PSC Chinook Model; however, these data are used to ground truth the PSC Chinook Model and evaluate the efficacy of the hatchery indicator stock assumption. The three SEAK hatchery indicator stocks are comprised of CWT data from multiple hatcheries. Alaska Spring (AKS) is composed of CWT data from five SEAK hatcheries (Little Port Walter, Crystal Lake, Neets Bay, Deer Mountain, and Whitman Lake), and collectively were used to represent the Alaska Southern Southeast model stock in the previous version of the PSC Chinook Model. Southern Southeast Alaska Spring (SSA) is composed of CWT data from four SEAK hatcheries (Little Port Walter, Neets Bay, Deer Mountain, and Whitman Lake) and Northern Southeast Alaska Spring (NSA) is composed of CWT data from two SEAK hatcheries (Crystal Lake and Macaulay). The SSA and NSA CWT indicator stocks are used by the Phase II of the PSC Chinook Model. SEAK wild and hatchery stocks enter the ocean as yearlings; age 3 is the youngest age at which CWTs are recovered.

3.1.1 Brood Year Exploitation Rates

The BYERs computed for CHK, CHM, STI, TAK, TST, and UNU include recoveries from ocean and terminal fisheries. The BYERs computed for AKS, NSA, and SSA do not include terminal recoveries because the exploitation rate on hatchery fish in the terminal areas is not representative of the exploitation rate on SEAK wild stocks. The AKS and SSA BYER estimates have usually exceed 30%; since 1976, only BYs 1996–1999, 2004–2007, and 2013 were less than 30% (Table 3.1; Appendix F1). NSA BYER estimates usually exceed 30% as well, since 1979, only BYs 1987, 1995–1997, and 2012–2013 were less than 30% (Table 3.1; Appendix F1). The BYERs for SEAK wild stocks CHK and TAK are usually less than 20% which includes recent BYs. BYERs are usually less than 30% for STI and UNU but have exceeded 40% in four of the last five complete BYs for the UNU stock (Table 3.1; Appendix F2).

Table 3.1—Summary of statistics generated by the 2020 coded-wire tag (CWT) cohort analysis for Southeast Alaska and transboundary river indicator stocks. Statistics include total mortality (catch plus incidental mortality), brood year exploitation rate (BYER), cohort survival rate to age 3, and calendar year (CY) percent distribution of the total mortality in escapement.

Stock	Indicator Stock Name	BYER (total mortality)		Survival rate		CY % Escapement ¹		
						1999–2008	2009–present	
		Mean (range)	Last complete BY	Mean (range)	Last complete BY	Mean (range)	Mean (range)	Last CY % (year)
AKS	Alaska Spring ²	39% (24%-62%)	27% (2013)	7.95% (2.37-25.33%)	3.53% (2013)	47% (31-59%)	52% (36-66%)	57% (2019)
SSA	Southern Southeast Alaska Spring ²	39% (23%-62%)	26% (2013)	8.37% (2.37-26.00%)	4.55% (2013)	46% (29-59%)	52% (35-66%)	64% (2019)
NSA	Northern Southeast Alaska Spring ²	39% (19%-65%)	19% (2013)	5.79% (1.02-23.98%)	1.74% (2013)	48% (40-59%)	52% (31-76%)	45% (2019)
CHM	Chickamin River	33% (22%-42%)	39% (2005)	4.34% (3.31-5.26%)	5.26% (2005)	66% (59-83%)	61% (NA; n = 1)	61% (2009)
CHK	Chilkat River	18% (6%-31%)	6% (2013)	3.38% (1.45-8.04%)	2.39% (2013)	79% (69-88%)	86% (72-96%)	96% (2019)
STI	Stikine River	37% (10%-81%)	10% (2013)	3.90% (1.01-7.09%)	1.01% (2013)	47% (29-69%)	74% (57-96%)	96% (2018)
TAK	Taku River	17% (5%-37%)	7% (2013)	7.42% (1.23-26.45%)	1.23% (2013)	78% (54-90%)	84% (61-97%)	96% (2019)
TST	Taku and Stikine Rivers	21% (5%-50%)	8% (2013)	6.88% (1.12-26.45%)	1.12% (2013)	73% (49-90%)	79% (59-97%)	95% (2019)
UNU	Unuk River	30% (15%-53%)	23% (2013)	4.57% (1.05-13.24%)	3.97% (2013)	73% (60-80%)	67% (41-86%)	81% (2019)

¹ % Escapement is not a measure of performance for the escapement indicator stock(s) associated with a given CWT indicator stock. See CTC (2013) for these details.

² BYER is ocean exploitation rate only.

3.1.2 Survival Rates

Survival rates for SEAK and transboundary (TBR) stocks (Table 3.1; Appendix G1 and Appendix G2) were computed at age 3 because these stocks enter the ocean predominately as yearlings. The CHK survival rates ranged from 1% to 8% since BY 1999, including 2.4% for the last complete BY (2013). The STI survival rates ranged from 1% to 7% since BY 1998, including 1.0% for the last complete BY (2013). The TAK historically has shown extremely high survival rates since BY 1991 (average 13%) but has been less than its long-term average (8.2%; BYs 1975–1981, 1991–2013) for the last 13 complete BYs (average 4.5% for BYs 2001–2013). The UNU survival rates have been as high as 13% (BY 1982), but the last 13 complete BYs have been below the long-term average (average 3.9% for BYs 2001–2013). The survival rates for the AKS stock have ranged from 25% for BY 1976 to 2% for BY 1977, and the last nine complete BYs for AKS have been less than the long-term average (average 8.0% for BYs 2005–2013), including the last complete BY (2013) survival rate of 3.5% (Appendix G1).

3.1.3 Mortality Distributions

The ocean distribution of fishing mortalities for SEAK wild and SEAK hatchery stock groups are illustrated in Table 3.1 and Figure 3.1. A high percentage of the mortality distributions for CHK (2004–2019 average of 83%; Appendix C6), STI (2003–2019 average of 65%; Appendix C61), TAK (1999–2019 average of 81%; Appendix C64), and UNU (1999–2019 average of 70%; Appendix C66) were within the escapement, with most of the remaining mortality occurring in the SEAK AABM sport, troll, and net fisheries. Within the SEAK AABM fisheries in the 1999–2019 time period, the SEAK troll fishery caught a higher percentage of STI fish (average of 6%), TAK fish (average of 4%), and UNU fish (average of 14%), whereas the SEAK net fishery caught a higher percentage of CHK fish (average of 6%). Outside of SEAK AABM fisheries, a few STI and UNU mortalities have occurred in the Canadian net and NBC troll and sport fisheries in some years. Approximately 49% of AKS mortalities occurred within escapement in the 1999–2019 period, with the remaining mortalities occurring in the SEAK AABM and terminal fisheries. The SEAK AABM troll fishery accounted for an average of 19% of the AKS total mortalities for the 1999–2019 period, whereas the SEAK AABM terminal troll averaged 10%, and the SEAK AABM net and sport averaged 6% and 5% respectively (Appendix C1).

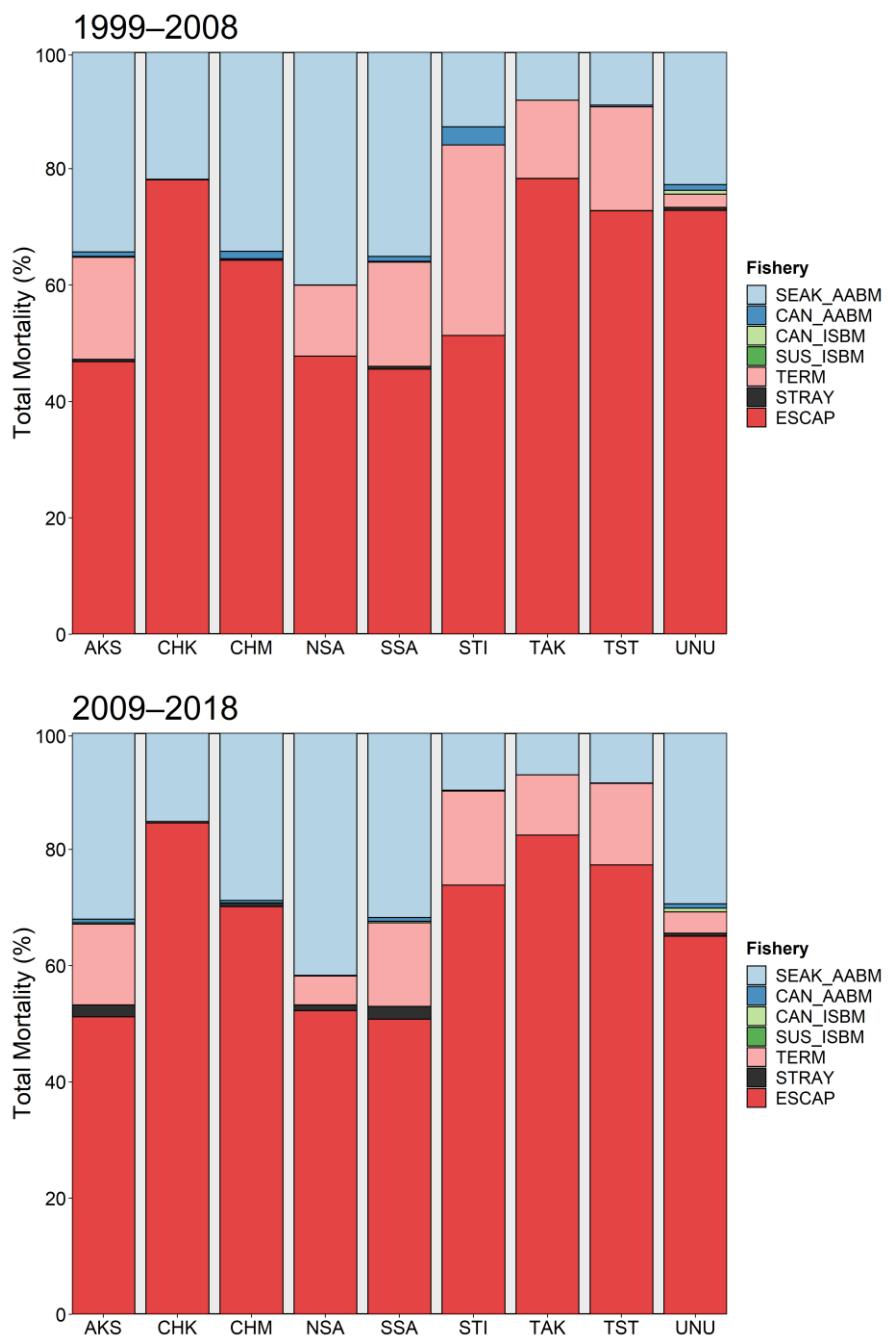


Figure 3.1—Distribution of total mortality for Southeast Alaska indicator stocks from the 1999 (1999–2008) and 2009 (2009–2018) PST Agreement periods.

3.2 NORTH AND CENTRAL BRITISH COLUMBIA STOCKS

There are two hatchery CWT indicator stocks for North and Central B.C.: Kitsumkalum and Atnarko. The North/Central B.C. stock (NTH) was split into North (NBC) and Central (CBC) model stocks in the Phase II PSC Chinook Model. NBC is a result of Nass and Skeena escapements

being split from the rest of NTH, and is represented by the Kitsumkalum hatchery indicator stock (KLM), which is composed of tagged fish from the Deep Creek Hatchery. The main systems for CBC are the Atnarko, Bella Coola, and Dean Rivers, and this stock is represented by the Atnarko stock (ATN), which is composed of tag recoveries from the Snootli Hatchery. Kitsumkalum Chinook enter the ocean as yearlings and age 3 is the youngest age at which CWTs are recovered, whereas Atnarko Chinook enter the ocean as subyearlings and age 2 is the youngest age recovered. The KLM time series begins in BY 1979, and the ATN time series begins in BY 1986. There were no KLM CWT releases in 1982, and no ATN CWT releases in 2003 and 2004.

3.2.1 Brood Year Exploitation Rates

The BYERs computed for KLM and ATN include recoveries from both ocean and terminal fisheries. The total BYER for KLM has been generally decreasing from levels greater than 60% for BYs 1979–1980 to approximately 38% for BY 2013. The pattern of ER shows a general downward trend with several oscillations of varying period. The BYER for ATN increased from approximately 34% for BY 1986 to approximately 61% for BY 2006 and then declined to approximately 31% for BYs 2010 to 2012, increasing to 40% for BYs 2013 and 2014 (Appendix F3). KLM BYER averaged 46% and ranged from 31% for BY 2004 to 69% for BY 1989, whereas ATN BYER averaged 41% and ranged from 29% for BY 1990 to 61% for BY 2006. Incidental mortalities within the total KLM BYER range from 4 to 10% and average 7%. KLM incidental mortalities for BY 2013 were 7%. In the case of ATN, the IM portion of BYER averaged 3.2% with values increasing from 2.1 % in BY 2011 to 3.1% in BY 2014.

3.2.2 Survival Rates

The survival rate of KLM is survival to age 3 because the fish enter the ocean as yearlings, whereas the survival rate of ATN is survival to age 2 because the fish enter the ocean as subyearlings. Brood years included in the survival rate analyses of KLM were 1979 to 1981 and 1983 to 2015. Brood years included for the analyses of ATN were 1986 to 2002 and 2005 to 2015. The KLM survival rates have averaged about 0.8% and ranged from 0.1–1.9% with a rate of 0.6% for the last complete BY, 2013. The ATN survival rates have averaged 2.3% and ranged from around 0.5–6.1% with a survival rate of 1.6% for the last complete BY, 2014 (Appendix G3).

3.2.3 Mortality Distributions

Escapement accounted for an average of 55% of the KLM total mortality (Appendix C20 and Appendix C21) and 59% of the ATN total mortality (Appendix C2 and Appendix C3) across the entire mortality distribution time series which began in catch years 1985 for KLM and 1990 for ATN. Average mortality in the escapement was 62% for KLM and 57% for ATN during 2009–2019 (Figure 3.2). Most of the remaining mortalities for KLM were associated with catch and IM in the SEAK AABM troll (2009–2019 average: 11%) and the NBC AABM sport (2009–2019 average: 4%) fisheries. NBC AABM troll and ISBM Canada net fisheries were important mortality components for KLM during 1985–1995 with 10% (AABM troll) and 14% (ISBM terminal net) of the total mortality, but their relevance diminished to approximately 3% (AABM troll) and 1%

(ISBM terminal net) during 1999–2019. In the case of ATN, most of the fishing mortality was associated with catch and IM in the SEAK AABM troll (2009–2019 average: 7%), the NBC AABM sport (2009–2019 average: 2%), the NBC AABM troll (2009–2018 average: 2%), and the ISBM terminal fisheries (2009–2019 average: 13%). There are essentially no strays for KLM and ATN.

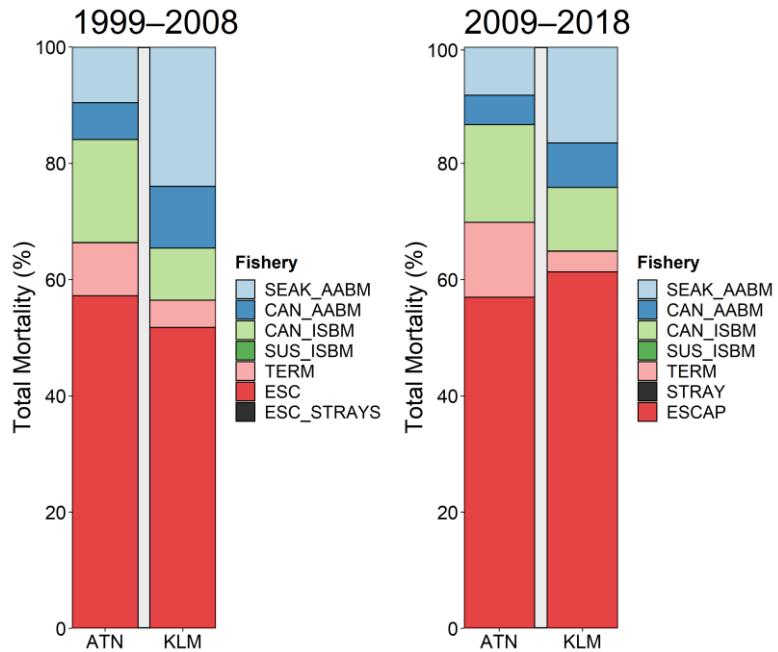


Figure 3.2—Distribution of total mortality for North and Central B.C. indicator stocks for the 1999–2008 and 2009–2018 PST Agreement periods.

3.3 WEST COAST VANCOUVER ISLAND STOCKS

There is one hatchery CWT indicator stock to represent wild and hatchery WCVI Chinook: Robertson Creek Fall. The Robertson Creek Fall (RBT) indicator stock is composed of tag recoveries from the Robertson Creek hatchery, and it is used to represent the WCVI model stocks RBH (hatchery) and RBT (natural). WCVI Chinook enter the ocean as subyearlings and age 2 is the youngest age recovered. The RBT time series begins in BY 1973 and the latest complete BY is 2014 (Appendix F4).

3.3.1 Brood Year Exploitation Rates

The BYER computed for RBT includes only recoveries from ocean fisheries. The BYER for RBT has been decreasing from approximately 67% for BY 1973 to approximately 35% for BY 2014 (Appendix F4). Not including BY 1992, which was characterized by zero recoveries in the catch as a result of the poorest survival to age 2 observed for this stock (see section 3.3.2), BYER for RBT averaged 43% and ranged from 23% for BY 1998 to 67% for BY 1973. The 18% IM experienced by BY 1992 is entirely attributed to CWT recoveries of sublegal fish. The percentage of the RBT BYER that is IM increased during the first 10 years of the time series from approximately 10% for BY 1973 to 21% for BY 1983. It then decreased substantially to

approximately 6% for BY 1985, then increased exponentially again for the following six BYs to approximately 30% for BY 1991. The variation in the percentage of the RBT BYER that is IM subsided after BY 1992 and has ranged from approximately 3% to 10% since 1999. The percentage of the RBT BYER that is attributed to IM averages approximately 10% for the entire time series.

3.3.2 Survival Rates

The survival rate of RBT is survival to age 2 because the fish enter the ocean as subyearlings. The RBT survival rates show a general declining trend, averaging 4.5% and ranging from around 0.03% for BY 1992 to 20.1% for BY 1974, with a survival rate of 3.0% for the last complete BY in 2014 (Appendix G4). In addition to BY 1992, BYs 1983, 1995–1997, 2004, 2006, 2009, and 2011 have also experienced extremely low survival rates (< 1%).

3.3.3 Mortality Distributions

An average of 38% of the RBT total mortality (Figure 3.3; Appendix C41) occurred in the escapement during 1979–2019. The RBT average mortality in the escapement increased to 42% during 2009–2019. Most of the remaining mortalities in this stock are associated to catch and IM in the SEAK AABM troll (2009–2019 average: 10%), Canada terminal net (2009–2019 average: 13%) and sport (2009–2019 average: 9%) fisheries. The NBC AABM troll fishery used to be an important mortality component for RBT during 1979–1995, averaging 10% of the total mortality during this period, but its relevance diminished to approximately 2% during 2009–2019. The ISBM Northern and Central B.C. net fisheries were also an important RBT mortality component during 1979–1984 averaging 4% of the total mortality, but its contribution effectively became 0% during 2009–2019.

Strays make only a small percentage (0.1% during 1979–2019) of the total mortality in RBT. The largest percentage of the total mortality represented by strays in RBT was 1.3% in 2017.

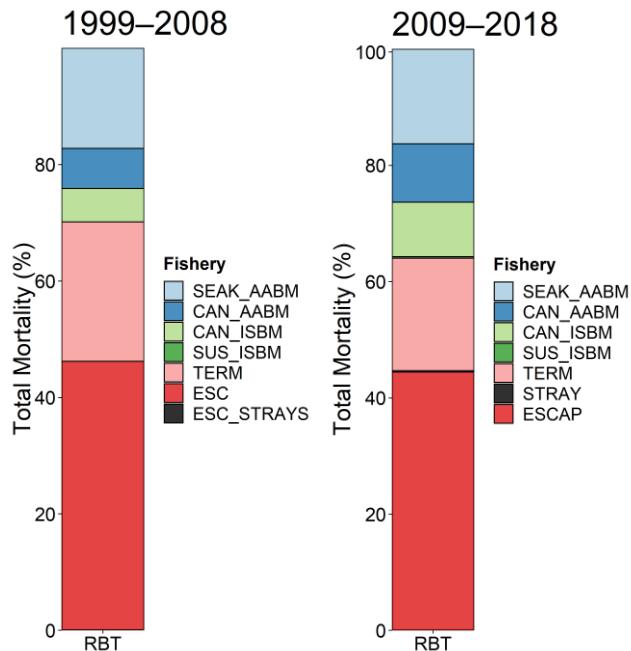


Figure 3.3—Distribution of total mortality for the West Coast Vancouver Island indicator stock (Robertson Creek Fall) for the 1999–2008 and 2009–2018 PST Agreement periods.

3.3.4 Terminal Area Adjustments

The CTC (2016) described the terminal area adjustment for the Robertson Creek CWT indicator stock as:

“Unadjusted and adjusted mortality estimates are given for the RBT CWT indicator to bound the likely range of ISBM (and other) fishery impacts applicable to the escapement indicator stocks comprising the aggregate. The adjusted estimates were obtained by subtracting the terminal fishery CWT estimates specific to RBT from the ISBM fishery total and adding them to the escapement. Recalculation of the percentage distribution of mortality results in some adjustment to each category.”

However, the ISBM indices calculated in both the performance review report (CTC 2016) and the most recent exploitation rate analysis (CTC 2019a) did not include any switch-in fishery impacts. Recent WCVI terminal fishery assessments provide estimates of the catch of natural-origin stocks for a number of terminal fisheries along the WCVI (Luedke et al. 2019), however the analysis was not conducted at the scale of the Southwest Vancouver Island (SWVI; Appendix C43) and Northwest Vancouver Island (NWVI; Appendix C42). Natural WCVI origin stocks are not targeted in the terminal areas.

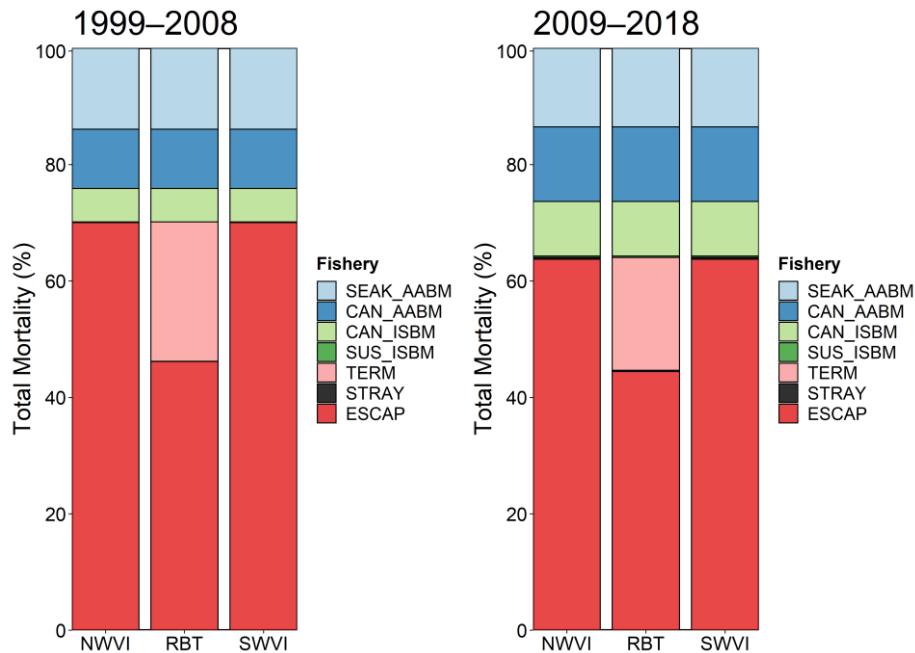


Figure 3.4—Distribution of total mortality for the West Coast Vancouver Island hatchery indicator stock before applying the terminal area adjustment (Robertson Creek Fall [RBT]) and after the terminal area adjustments for the escapement indicator stocks (Northwest Vancouver Island [NWVI] and Southwest Vancouver Island [SWVI]) for the 1999–2008 and 2009–2018 PST Agreement periods.

3.4 STRAIT OF GEORGIA STOCKS

Strait of Georgia model stocks are segregated into Upper Strait of Georgia (GST; now UGS in Phase II of the PSC Chinook Model) and Lower Strait of Georgia (GST for wild Chinook, now LGS in Phase II of the PSC Chinook Model, and GSH for hatchery Chinook, now MGS [Middle Strait of Georgia] in the Phase II PSC Chinook Model). There is one hatchery CWT indicator stock for Upper GST (Quinsam [QUI]), two for Lower GST (Cowichan [COW] and Nanaimo [NAN]), and two for Lower GSH (Puntledge [PPS] and Big Qualicum [BQR]). QUI is composed of tag recoveries from the Quinsam Hatchery. COW and NAN are composed of tag recoveries from the Cowichan and Nanaimo hatcheries, whereas PPS and BQR are composed of tag recoveries from the Puntledge and Big Qualicum hatcheries. GST Chinook enter the ocean as subyearlings and age 2 is the youngest age at which CWTs are recovered. The QUI time series begins in brood year 1974, COW in 1985, NAN in 1979, PPS in 1975, and BQR in 1973. The NAN stock was terminated after BY 2004.

3.4.1 Brood Year Exploitation Rates

The BYERs computed for GST stocks include recoveries from ocean fisheries and terminal fisheries. There is a general declining trend for BYERs of the indicator stock for Upper GST as well as for most of the indicator stocks for Lower GST (Appendix F5). The BYER for QUI has been

generally decreasing from about 71% in 1974 to approximately 48% in 2014, averaging 54% and ranging from 29% for brood year 1997 to 85% for brood year 1977 (Appendix F5). The percentage of the QUI BYER that is incidental mortality increased consistently during the first 17 years of the time series reaching 43% for brood year 1991, and then decreased substantially to average levels for subsequent brood years averaging 11% for the entire time series. Similar exploitation rate patterns occurred for all Lower GST indicator stocks, except for COW (Appendix F5) for which BYERs generally decreased from brood year 1985 to brood year 1995, and then increased for subsequent brood years. COW BYER averaged about 67% and ranged from 36% for brood year 1995 to 89% for brood year 1985. The percentage of the COW BYER that is incidental mortality increased during the first 5 years of the time series reaching 33% for brood year 1990 and averaged about 19% for the entire time series. BYERs in Lower GST also include indicator stocks BQR, NAN, and PPS. BQR decreased from exploitation rate levels of 88% in 1973 to exploitation rate levels of 29–57% since 1994. The lowest BYERs for these stocks were experienced by brood year 2014 in BQR (29%), by brood year 2001 and 2004 in NAN (35%), and by brood years 1998 and 2004 in PPS (13%). The exploitation rates due to incidental mortality in these three stocks increased consistently during the first 15–20 years of the time series but recently decreased to approximately 10% in BQR, 12% in NAN (during last year of 2004), and 16% in PPS.

3.4.2 Survival Rates

The survival rates of GST CWT indicator stocks represent survival to age 2 because fish enter the ocean as subyearlings. All of these stocks show a clear declining trend in survival rates (Appendix G5). The QUI survival rates have averaged 2.0% and ranged from around 0.2% for brood years 1989 and 2006 to 9.1% for brood years 1974 and 1976 (Appendix G5). In the case of Lower GST CWT indicator stocks, BQR survival rates have averaged 2.3% and ranged from around 0.1% to 25.4% (the highest observed for GST stocks), COW survival rates have averaged 1.7% and ranged from around 0.1% to 6.8%, NAN survival rates have averaged 3.0% and ranged from around 0.5% to 13.6%, and PPS survival rates have averaged 1.1% and ranged from around 0.1% to 12.8% (Appendix G5). The survival rate for the last completed brood of the time series (2014 for QUI, BQR, COW and 2004 for NAN) was 1.1% for QUI, 1.2% for BQR, 1.3% for COW, 3.1% for NAN, and 0.9% for PPS.

3.4.3 Mortality Distributions

An average of 47% of the total mortality in the Upper GST indicator stock QUI (Figure 3.5; Appendix C39) occurred in the escapement during 1979–2019. The QUI average mortality in the escapement remained relatively the same from the 1999–2008 period (61%) to the 2009–2019 period (58%). Most of the fishing mortalities on this stock are associated with catch and IM in the SEAK AABM troll (1999–2008 average: 15%, 2009–2019 average: 11%), NBC and CBC ISBM sport (1999–2008 average: 8%, 2009–2019 average: 10%) and Southern B.C. sport (1999–2008 average: 6%, 2009–2019 average: 11%) fisheries. The NBC AABM troll and ISBM NBC, CBC and Southern B.C. troll and net fisheries used to be important mortality components for QUI during 1979–1995 with 4–15% of the total mortality in NBC AABM troll, 0–17% in ISBM Canada troll, and 2–19% in ISBM Canada net. Average mortality in these fisheries diminishes during 1999–

2019 to about 1% (NBC AABM troll), 0% (ISBM NBC, CBC and Southern B.C. troll), and 0.2% (ISBM NBC, CBC and Southern B.C. net).

Strays make only a small percentage (average approximately 0.1% during 1979–2019) of the total mortality in QUI. The largest percentage of the total mortality represented by strays in QUI was 0.8% in 2014. In BQR, strays averaged 0.6% of the total mortality between 1979–2019. The largest percentage of the total mortality represented by strays in BQR was 2.4% in 1998 and 2002 (Appendix C4). Out of all the GST indicator stocks, COW had the largest percentage of the total mortality represented by strays (average 2.8% during 1990–2019; Appendix C8). The highest observed contribution of strays to the COW total mortality was 11.3% in 2009. Strays also represented a significant percentage of the total mortality in NAN (1.3% during 1991–2006; Appendix C27) with the largest percentage of the total mortality represented by strays of 4.6% in 2004. In PPS, strays comprise only a small percentage (average 0.3% during 1979–2019) of the total mortality. The greatest percentage of the total mortality represented by strays at PPS was 6.5% in 2003 (Appendix C34).

Among the Lower GST indicator stocks, an average of 44% of the BQR total mortality (Figure 3.5; Appendix C4), 34% of the COW total mortality (Figure 3.5; Appendix C8), 41% of the NAN total mortality (Figure 3.5; Appendix C27), and 53% of the PPS total mortality (Figure 3.5; Appendix C34) occurred in the escapement during 1979–2019 (note that COW mortality distribution time series begins in 1990 and that of NAN is truncated to 1991–2006). After the 1979–2008 period, the average percent of total mortality represented by escapement from 2009–2019 increased to 58% in BQR, to 38% in COW, and to 64% in PPS. Most of the remaining mortalities in BQR are associated with catch and incidental mortality in the ISBM Southern B.C. sport (1999–2008 average: 16%, 2009–2019 average: 27%) and the SEAK AABM troll (1999–2008 average: 9%, 2009–2019 average: 4%) fisheries. The ISBM Southern B.C. troll and net fisheries used to be important mortality components for BQR during 1979–1995 with an average of 8% and 7% of the total mortality but their relevance diminishes to less than 1% during 1999–2019. In the case of COW, total fishing mortality is dominated by the ISBM Southern B.C. sport fishery (1999–2019 average: 33%), but the WCVI AABM troll (1999–2008 average: 10%, 2009–2019 average: 4%), the ISBM Puget Sound sport (1999–2008 average: 3%, 2009–2019 average: 5%), the Canada terminal net (1999–2008 average: 5%, 2009–2019 average: 5%) and Southern U.S. terminal net (1999–2008 average: 7%, 2009–2019 average: 4%) fisheries are also important COW mortality components. The ISBM Southern B.C. troll fishery used to be an important mortality component for COW during 1990–1995, averaging 10% of the total mortality but its contribution becomes effectively 0% during 1999–2019. Similar to COW, most of NAN fishing mortality has been dominated by the ISBM Southern B.C. sport fishery (1991–2006 average: 40%). ISBM Canada troll and net fisheries were important mortality components for NAN in the past with 14% and 19% of the total mortality in 1984 but their relevance diminished to mortality levels of 0% during 1999–2006. Lastly, most of PPS fishing mortality is associated to catch and incidental mortality in the ISBM Southern B.C. sport (1999–2008 average: 12%, 2009–2019 average: 23%), the SEAK AABM troll (1999–2019 average: 5%), and the ISBM NBC & CBC sport (1999–2019 average: 2%) fisheries. ISBM Canada troll and net fisheries used to be important mortality components for PPS during 1979–1984 with 12% of the total mortality associated to ISBM NBC, CBC and Southern B.C. troll and 6% to

ISBM NBC, CBC and Southern B.C. net but their relevance diminishes to mortality levels of less than 1% during 1999–2019.

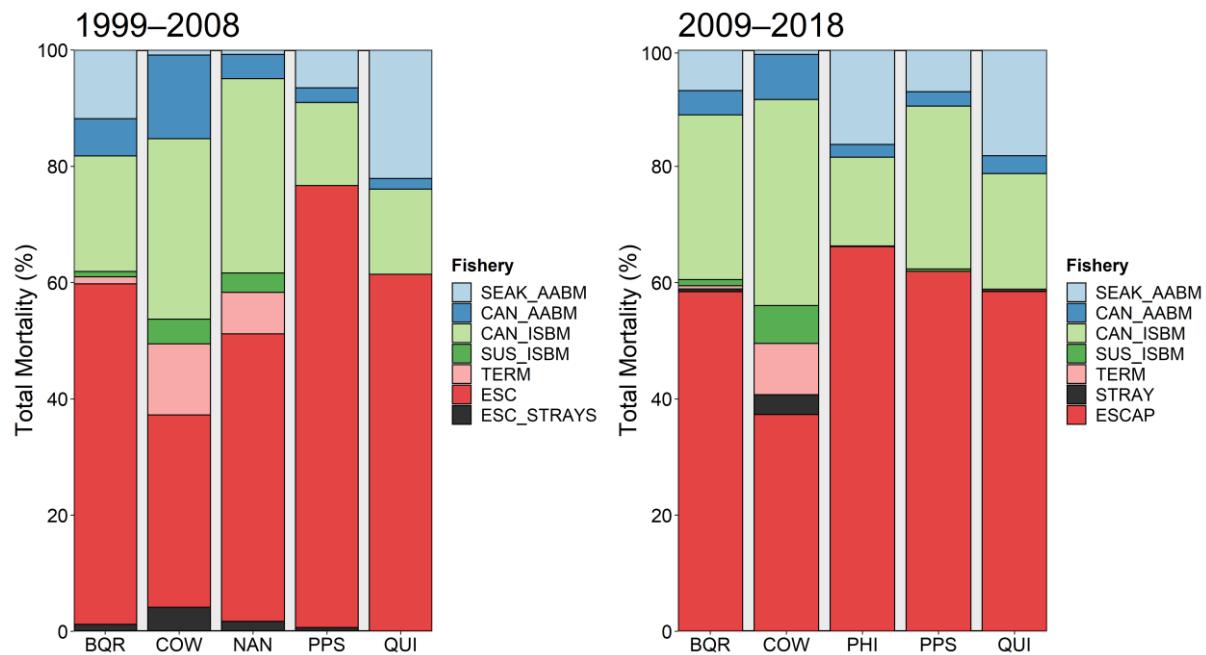


Figure 3.5—Distribution of total mortality for Strait of Georgia indicator stocks for the 1999–2008 and 2009–2018 PST Agreement periods.

3.4.4 Terminal Area Adjustments

Terminal area adjustments for the Strait of Georgia stocks only occur on the Quinsam stock to adjust for the East Vancouver Island North (EVIN; Appendix C40) escapement indicator stock. Work is ongoing to identify the most suitable escapement indicator stock for the EVIN area (Figure 3.6).

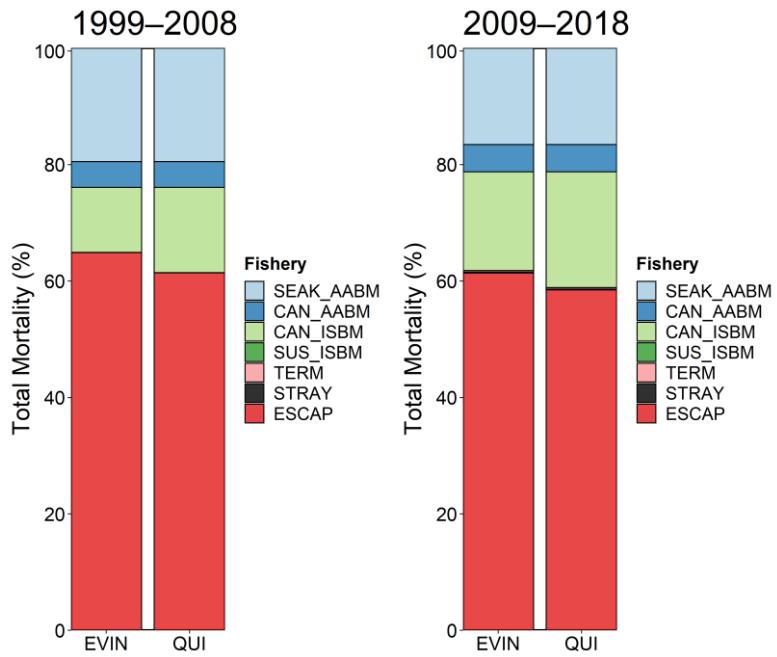


Figure 3.6—Distribution of total mortality for upper Strait of Georgia hatchery indicator stock before applying terminal area adjustment (Quinsam [QUI]) and after the terminal area adjustment for the escapement indicator stock (East Vancouver Island North (EVIN) for the 1999–2008 and 2009–2018 PST Agreement periods.

3.5 FRASER STOCKS

Fraser River Chinook have been represented by 2 model stocks, Fraser Early (FRE), and Fraser Late (FRL). The CWT indicator stocks for Fraser Early represent different combinations of run type and life history. There are 2 hatchery CWT indicator stocks for Fraser Late (Chilliwack [CHI] and Harrison [HAR]), 2 for Fraser Early Spring-run type (Nicola [NIC; age 1.2] and Dome [DOM; age 1.3]), and 2 for Fraser Early subyearling Summer-run type (Lower Shuswap [SHU; age 0.3]; Middle Shuswap [MSH; age 0.3]). Currently, there is no CWT indicator for Fraser Early yearling Summer-run type (age 1.3 and DOM was discontinued after the 2002 BY). CHI is composed of tag recoveries of the Chilliwack River fall stock released from the Chilliwack Hatchery whereas HAR is composed of tag recoveries of the Harrison River stock released from the Chehalis Hatchery. NIC is composed of tag recoveries of the Nicola River stock released from the Spius Creek hatchery and DOM was composed of releases of Dome Creek stock reared at the Penny Hatchery. SHU is composed of tag recoveries of Lower Shuswap River Chinook and MSH is composed of tag recoveries of Middle Shuswap River Chinook, both of which are produced at the Shuswap Falls Hatchery. Fraser Late (Fall) enter the ocean as subyearlings and age 2 is the youngest age at which CWTs are recovered. Fraser Early includes stocks that enter the ocean as subyearlings and stocks that enter the ocean as yearlings. The SHU stock is a summer-run, entering the ocean as subyearlings, whereas the NIC and DOM stocks are spring-runs, entering the ocean as yearlings with age 3 as the youngest age at which CWTs are recovered. The time

series of recoveries for Fraser Late stocks CHI and HAR starts with BY 1981, the time series of DOM begins with BY 1986, NIC with BY 1985, SHU with BY 1984 and MSH with BY 2008. Unlike the other Fraser River stocks with time series ending with BY 2013, the last completed BY for DOM is 2002.

3.5.1 Brood Year Exploitation Rates

The BYERs computed for Fraser River stocks include recoveries from ocean fisheries and terminal fisheries within the Fraser River and tributaries. BYERs for the Fraser Late indicator stocks have a declining tendency over their time series (Appendix F6). In the Fraser Early indicator stocks, BYER was increasing for DOM when that program was discontinued (last completed BY 2002); however, no clear trend is apparent for NIC (Appendix F7). Since BY 2001, BYER was decreasing for SHU, and since BY 2008 there is no trend apparent for MSH. From BY 1981 to BY 2014, the BYERs decreased from approximately 66% to 30% for CHI and from approximately 70% to 34% for HAR. CHI BYER averaged 41% and ranged from 22% for BY 1995 to 83% for BY 1982, whereas HAR BYERs averaged 46% and ranged from 19% for BY 1995 to 86% for BY 1982.

Within BYERs, the percentage of the BYER represented by IM for CHI averaged 20% over the entire time series, and increased during the first 15 years, reaching 31% for BY 1995, and then decreased substantially to average levels for subsequent BYs. Similarly, the percentage of the HAR BYER that results from IM averaged 21% and also increased during the first 15 years of the time series, reaching 37% for BY 1994, followed by fluctuations around the average level from 12% in 2001 and 31% in 1999.

Exploitation rate patterns differed for the three indicator stocks representing Fraser Early. DOM BYER averaged approximately 55% and ranged from 15% for BY 1986 to 78% for BY 1996. The percentage of the DOM BYER that is attributed to IM remained relatively stable, averaging approximately 5% for the entire time series, and reached its lowest values for BYs in 2000 at (<0.01%). Excluding BY 1992, for which there were no recoveries in the catch, likely as a result of the poorest survival observed for this stock (see section 3.5.2), NIC BYERs are the lowest among Fraser River and all other Canadian CWT indicator stocks. Estimated BYERs for NIC averaged approximately 26% and ranged from approximately 10% for BY 2006 to approximately 60% for BY 2003. The estimates of IM remained relatively stable, averaging approximately 14% for the entire time series, and ranging from 3% for BY 2003 to 24% for BY 1991. Estimated BYERs for MSH averaged approximately 45% and ranged from 36% to 56%. The percentage of MSH BYER attributed to IM averaged 13% and ranged from 10% to 17%. Lastly, BYER for SHU averaged approximately 51%, and ranged from 29% for BY 1997 to 80% for BY 1989. SHU BYER IM percentages have remained relatively stable, averaging approximately 18% for the entire time series and ranging from 12% for BY 1998 to 34% for BY 1992.

3.5.2 Survival Rates

Estimated survival rates for CHI, HAR, MSH and SHU represent survival to age 2 because juveniles from those stocks enter the ocean as subyearlings. Estimated survival rates for DOM and NIC represent survival to age 3 because smolts from those stocks enter the ocean as yearlings and age 3 is the youngest age recovered. If the first BY of the time series for CHI and

HAR is removed, there is no apparent trend for the survival rates of Fraser River indicator stocks.

For CHI, survival averaged 11.6%, with a range of 1.7% for BY 1991 to 30.6% for BY 1981 (the highest observed for any Fraser River stock). Estimated survival rates for HAR averaged 3.6% and ranged from 24.0% in BY 1981 to a low of 0.4% for BY 1991 (Appendix G6). For the Fraser Early indicator stocks, DOM survival rates averaged 1.1% and ranged from a low of 0.1% for BY 1994 to 2.5% for BY 1993. NIC survival rates averaged 2.6% with a range of 0.1–15.5%, and the SHU survival rates averaged 3.0% with a range of 0.5–8.1% (Appendix G7). The survival rate for the last completed brood of the time series was 8.8% for CHI, 3.6% for HAR, 0.6% for NIC, 1.0% for MSH and 0.5% for SHU. DOM has been discontinued, and survival for the last completed BY (2002) was 0.4%.

3.5.3 Mortality Distributions

For the Fraser Late indicator stocks, escapement represented an average of 58% of the CHI total mortality (Figure 3.7; Appendix C5) and 54% of the HAR mortality (Figure 3.7; Appendix C18) between 1985 and 2018 (mortality distribution time series for both stocks began in 1985). The CHI average mortality in the escapement remained approximately the same from the 1999–2008 period (70%) to the 2009–2018 period (69%). The HAR average mortality in the escapement increased from the 1999–2008 period (60%) to the 2009–2018 period (73%). For CHI, fishing mortality was attributed to catch and IM in the Canadian terminal sport (1999–2008 and 2009–2018 averages: 6% and 6% respectively), the ISBM Southern B.C. sport (1999–2008 average: 5%; 2009–2018 average: 11%) the ISBM north of Falcon troll (1999–2008 average: 6%; 2009–2018 average: 4%), and the WCVI AABM troll (1999–2008 average: 6%; 2009–2018: 2%) fisheries. Between 1985 and 1995, the ISBM Southern B.C. (Strait of Georgia) troll fishery was an important component of the total mortality for CHI (average 6%); however, that fishery for Chinook salmon ceased from 1996 onward. For HAR, most of the fishing mortality from 1999–2008 was associated with catch and IM in the WCVI AABM troll fishery (average: 13%), which declined to 2% during 2009–2018; other important components of the total mortality were the North Falcon troll ISBM fishery (1999–2008 average: 9%; 2009–2018 average: 4%) and the Southern B.C. sport ISBM fishery (1999–2008 average: 6%; 2009–2018 average: 11%). The ISBM Southern B.C. sport fishery used to be an important mortality component for HAR during 1985–1998 ranging from 3% to 32% of the total mortality. There is only limited terminal recreational fishing opportunity on HAR.

Among the Fraser Early indicator stocks, escapement represented a larger amount of the total mortality distribution during the 2009–2018 period than the 1999–2008 period for NIC (77% vs 73%, respectively; Figure 3.7; Appendix C28), 53% of the MSH total mortality (Figure 3.7; Appendix C26), and SHU (56% and 54% respectively; Figure 3.7; Appendix C45) During 2009 to 2018, the largest components of the total fishing mortality for SHU occurred in the SEAK AABM troll fishery (average: 9%), followed by the ISBM Southern B.C. sport (average: 9%), NBC AABM troll fishery (average: 7%) and the Terminal net fishery (average: 6%). MSH is part of the same stock group as SHU, however for MSH the largest component of the total fishing mortality during 2009–2018 occurred in the ISBM Southern B.C. sport (average: 14%), followed by the NBC AABM troll fishery (average: 6%), SEAK troll fishery (average: 5%) and the Terminal net

fishery (average: 6%; Figure 3.7; Appendix C26). During 2009 to 2018, the largest components of the total fishing mortality for NIC occurred in the Terminal net fishery (average: 10%), followed by the ISBM Southern B.C. sport (average: 5%).

Strays make an average 1.0% of the total mortality in CHI during 1985–2018. The largest percentage of the total mortality represented by strays in CHI was 5.6% in 2003. In HAR, strays make 0.4% of the total mortality during 1985–2017. The largest percentage of the total mortality represented by strays in HAR was 4.6% in 1995. In DOM, strays make only a small percentage (0.2% during 1991–2006), but strays were only reported in one year, (2.6% of the total mortality that year). Strays also represented a very small percentage of the total mortality in NIC (~0% during 1989–2018). The largest percentage of the total mortality represented by strays in NIC was 1.7% in 1990. Similarly, strays make up only a small percentage of the total mortality in SHU (1988–2018 average: 0.4%) and MSH (2012–2018 average: 2.1%). The largest percentage of the total mortality represented by strays in SHU was 1.4% in 2015 and it was 4.8% and 4.9% for MSH in 2015 and 2016 respectively.

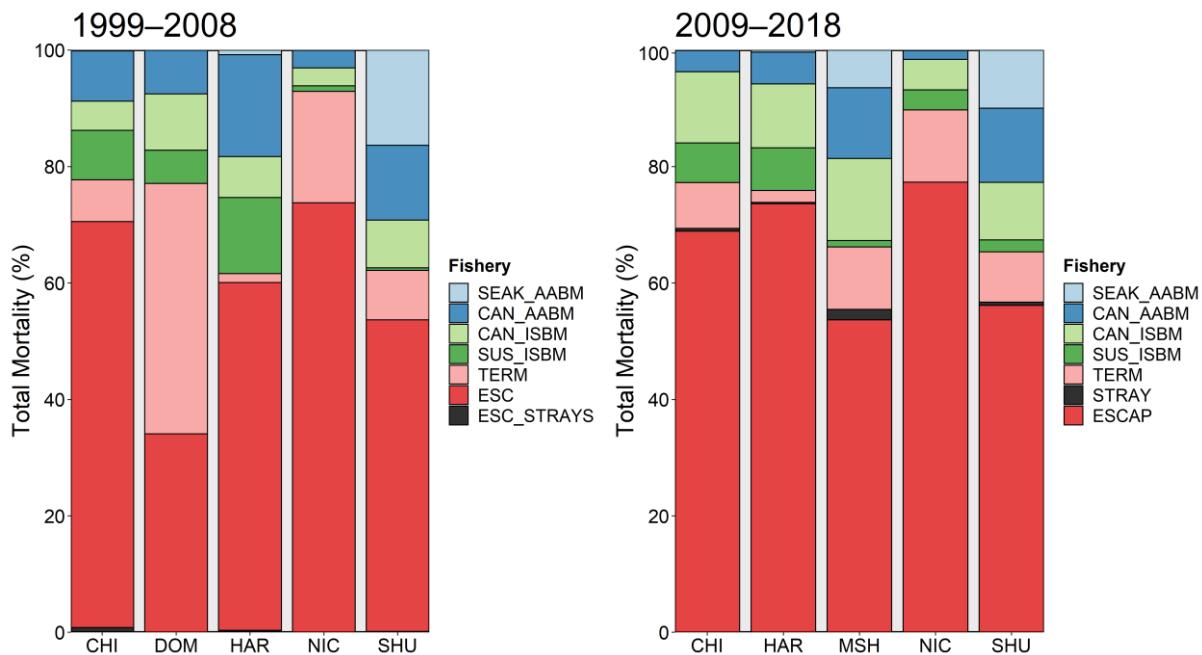


Figure 3.7—Distribution of total mortality for the Fraser River indicator stocks for the 2009–2018 and 1999–2008 PST Agreement periods.

3.6 REGIONAL SUMMARY FOR CANADIAN STOCKS

With exception of the RBT indicator stock, for which BYER represents ocean fishing mortality, BYERs in Canadian indicator stocks represent fishing mortality in both ocean and terminal fisheries. BYERs of most Canadian indicator stocks have been generally declining. Notwithstanding, Strait of Georgia stocks have experienced the largest BYERs among Canadian indicator stocks with Lower Strait of Georgia natural stocks COW and NAN experiencing average BYERs greater than 60%. Except for DOM (for which 2002 was the last complete BY reported),

BYERs for the last complete BY of all Canadian stocks were lower than their long-term averages (Table 3.2). Fraser Early indicator stock NIC has experienced the lowest BYERs among Canadian indicator stocks with an average of 27% across all complete BYs and 25% for its last complete BY.

Average survival rates to age 2 (to age 3 for KLM and DOM) are lower than 5% for all Canadian indicator stocks, except for CHI, which has the largest average survival rate at 11.7% (Table 3.2). CHI also experienced the largest estimated survival rate (30.6% in 1981) for any given BY among all Canadian stocks. Other stocks that have experienced BY survival rates greater than 20% are RBT, BQR, and HAR. These high survival rates occurred in all cases in the first few years of the time series. Survival rates for these stocks have clearly subsided relative to those high values. The lowest survival rate for the last complete BY (2013 or 2014) among all Canadian indicator stocks was 0.56% for KLM.

In terms of calendar year statistics for 1999–2008 and 2009–2019, the average percentage of total mortality occurring in the escapement was greater than 50% for most Canadian indicator stocks. RBT and COW experienced average escapement percentages of the total mortality below 50% in both time periods: 46–42% (RBT) and 33–38% (COW). The percentage of total mortality occurring through escapement during the 1999–2008 time period for DOM was 34%. Escapement percentages by calendar year lower than 20% have occurred only in COW, and DOM. These low escapement percentages of the total mortality took place in 2009 for COW and 2003 for DOM. The largest escapement percentages of the total mortality in 2019 occurred in NIC (95%) and PHI (83%). Differences in average escapement percentages of the total mortality between PST Agreement periods 1999–2008 and 2009–2019 were small in most cases (Table 3.2). Important differences occurred only for PPS and HAR, where average escapement percentages decreased from 76% in 1999–2008 to 64% in 2009–2019 for PPS, and it increased from 60% to 73% for HAR.

Table 3.2—Summary of statistics generated by the 2020 CWT cohort analysis for Canadian indicator stocks by region. Statistics include total mortality (catch plus incidental mortality) brood year exploitation rate (BYER), cohort survival rate to age 2 (age 3 for KLM and DOM), and calendar year (CY) percent distribution of the total mortality and the escapement.

Region	Indicator Stock	BYER (total mortality)		Survival rate		CY % Escapement ¹	
		Mean (range)	Last complete BY	Mean (range)	Last complete BY	Mean (range)	Mean (range)
North/ Central B.C.	Kitsumkalum (KLM)	46% (31%-69%)	38% (2013)	0.81% (0.14-1.95%)	0.56% (2013)	52% (35-63%)	62% (50-87%)
	Atnarko (ATN)	41% (29%-61%)	40% (2014)	2.32% (0.50-6.11%)	1.56% (2014)	55% (41-72%)	57% (37-73%)
WCVI	Robertson Creek (RBT) ^{3, 4}	43% (23%-67%)	35% (2014)	4.5% (0.03-20.1%)	3.02% (2014)	46% (57-89%)	43% (56-70%)
Strait of Georgia	Quinsam (QUI) ⁴	54% (29%-85%)	48% (2014)	2.02% (0.16-9.11%)	1.14% (2014)	61% (52-78%)	58% (50-71%)
	Big Qualicum (BQR)	59% (29%-88%)	29% (2014)	2.37% (0.12-25.44%)	1.16% (2014)	59% (49-74%)	58% (43-73%)

Region	Indicator Stock	BYER (total mortality)		Survival rate		CY % Escapement ¹		
		BYER (total mortality)		Survival rate		1999–2008	2009–current	
		Mean (range)	Last complete BY	Mean (range)	Last complete BY	Mean (range)	Mean (range)	Last CY % (year)
	Cowichan (COW)	67% (36%-89%)	57% (2014)	1.82% (0.33-6.83%)	1.28% (2014)	33% (21-59%)	38% (18-51%)	39% (2019)
	Nanaimo (NAN)	67% (35%-94%)	35% (2004)	2.99% (0.48-13.63%)	3.09% (2004)	50% (34-76%)	ND	ND
	Phillips (PHI)	51% (13%-88%)	45% (2014)	4.50% (1.00-9.79%)	1.00% (2014)	ND	71% (60-83%)	83% (2019)
	Puntledge (PPS)	51% (13%-88%)	45% (2014)	1.17% (0.10-12.76%)	0.91% (2014)	76% (68-90%)	68% (52-83%)	82% (2019)
Fraser River	Chilliwack (CHI)	41% (22%-83%)	39% (2014)	11.65% (1.68-30.55%)	7.59% (2014)	70% (51-83%)	70% (58-80%)	79% (2019)
	Harrison (HAR)	46% (19%-86%)	36% (2014)	3.36% (0.40-23.97%)	2.36% (2014)	60% (42-84%)	73% (56-84%)	71% (2019)
	Dome (DOM)	55% (15%-78%)	55% (2002)	1.11% (0.14-2.46%)	0.35% (2002)	26% (15-42%)	ND	ND
	Nicola (NIC)	27% ² (10%-60%)	25% (2014)	2.78% (0.10-12.51%)	1.48% (2013)	74% (39-89%)	79% (45-95%)	95% (2019)
	Lower Shuswap (SHU)	52% (29%-80%)	40% (2014)	2.96% (0.73-8.13%)	2.80% (2014)	54% (35-75%)	58% (50-81%)	81% (2019)

¹ % Escapement is not a measure of performance for the escapement indicator stock(s) associated with a given CWT indicator stock. See CTC (2013) for these details.

² Does not include BY 1992 from which there were no CWT recoveries in the catch due to extremely low survival rates.

³ BYER based on ocean exploitation rate.

⁴ Terminal adjustments to CYER applied because fishing mortality on the hatchery stock does not represent fishing mortality on wild stocks.

⁵ ND = No data available.

3.7 WASHINGTON COAST STOCKS

Three facilities on the Washington Coast currently release coded-wire tagged Chinook salmon which are used by the CTC to represent natural fall Chinook salmon production in the rivers between the Columbia River in the south to the Strait of Juan de Fuca in the north. Indicator stocks include the Queets River (QUE, released from Quinault Division of Natural Resources Salmon River Hatchery) and Tsoo-Yess River (SOO, released from the U.S. Fish and Wildlife Service Makah National Fish Hatchery) on the coast, and the Hoko River at the western end of the Strait of Juan de Fuca (HOK, released from Makah's Hoko Falls Hatchery). Chinook salmon releases from the WDFW Elwha Hatchery (ELW) were formerly used in the annual ERA, but releases of adipose-clipped and CWT Chinook salmon have been insufficient for analysis since BY 1994. Queets, Tsoo-Yess, and Hoko indicator stocks share a common life history—they are ocean type (fingerling releases), fall-timed fish with a maximum age at maturity of 6. These 3 stocks also have extensive historical tagging and recovery coverage (20+ completed BYs), with Hoko and Tsoo-Yess records starting in 1985 and Queets records starting in 1977.

3.7.1 Brood Year Exploitation Rates

BYER patterns for Hoko, Queets, and Tsoo-Yess are considered in terms total exploitation (ocean and terminal; Table 3.3; Appendix F8). BYERs for Hoko and Tsoo-Yess indicator stocks have tracked closely for the entirety of their time series (series mean: Hoko 0.33, Tsoo-Yess 0.38) with relatively higher values (*ca.* 0.60) being observed for the first 2 BYs on record (1985–1986), and BYERs varying between *ca.* 0.10 and 0.50 thereafter (most recent complete BY [2011]: Hoko 0.30, Tsoo-Yess 0.21). Approximately one quarter of all fishery-related mortality for HOK and SOO is in the form of non-landed, incidental impacts. Across its 34 complete BYs, the total BYER for the Queets indicator stock has averaged 0.57, ranging between 0.33 and 0.81, and displaying no discernible temporal trend. The BYER for the last complete Queets BY (2011) is 0.50.

Table 3.3—Summary of statistics generated by the 2020 CWT cohort analysis for Washington Coast indicator stocks. Statistics include total mortality (catch plus incidental mortality) brood year exploitation rate (BYER), cohort survival rate to age 2, and calendar year (CY) percent distribution of the total mortality in the escapement.

Stock Abbrev.	Indicator Stock Name	BYER (total mortality)		Survival rate		CY % Escapement ¹		
		Mean (range)	Last complete BY	Mean (range)	Last complete brood year	1999–2008	2009–current	
						Mean (range)	Mean (range)	Last CY % (year)
HOK	Hoko Fall Fingerling	34% (16%-64%)	30% (2013)	1.35% (0.11-3.14%)	0.95% (2013)	66% (30-89%)	69% (47-85%)	47% (2018)
QUE	Queets Fall Fingerling	59% (37%-82%)	64% (2013)	2.59% (0.59-5.65%)	1.50% (2013)	54% (24-75%)	38% (20-51%)	35% (2018)
SOO	Tsoo-Yess Fall Fingerling	38% (17%-61%)	40% (2013)	0.62% (0.01-1.92%)	0.19% (2013)	55% (27-83%)	72% (63-84%)	72% (2018)

¹ % Escapement is not a measure of performance for the escapement indicator stock(s) associated with a given CWT indicator stock. See CTC (2013) for these details.

3.7.2 Survival Rates

CWT data indicate that release-to-age-2 survival for Chinook salmon on the Washington Coast indicator stocks is highly variable across stocks and years (Appendix G8; Table 3.3). Tsoo-Yess Chinook salmon, for instance, consistently experience some of the lowest survivals of any CWT indicator stock evaluated by the CTC. The series-wide mean survival from release to age 2 for this stock is 0.61%, but it has ranged more than 2 orders of magnitude (0.01–2.11%). The Queets Chinook indicator stock exhibits the highest survival rates among the 3 indicator stocks, with a range of 0.59–5.65%, and a mean of 2.61%. Hoko Chinook survival rates lie between these extremes with a mean of 1.37% and a range of 0.11–3.04%. Across their time series, there is little evidence of a long-term trend in early marine survival. In terms of more recent performance, the survival rates of the Hoko and Queets stocks have declined considerably from the highs observed for the 1999 BY with some rebounding in the past couple of years. In contrast, the highest observed survival for the Tsoo-Yess was in BY 2011.

3.7.3 Mortality Distributions

Washington coastal indicator stocks exhibit a mortality distribution consistent with a far north migration pattern. On average, 86% of all fishery-related mortality, which accounts for approximately a third of total mortality, results from fisheries occurring north of the southern border between U.S. and Canada. The majority of these fishery-related mortalities occur in the SEAK and NBC AABM troll fisheries (Figure 3.8; Appendix C19, Appendix C35, Appendix C50). In the 2017 calendar year (CY2017), Southern U.S. fisheries accounted for 9.4% of total mortalities for the Hoko indicator stock and 2.4% for the Tsoo-Yess indicator. Terminal net fisheries targeting Queets River fall-run Chinook account for 24.6% of the annual mortality distribution in CY2017. Escapement recoveries for the 3 stocks have averaged between *ca.* 20% (Queets) and 86% (Hoko) of the total distribution in recent years (Table 3.3). Lastly, aside from increases in escapement (all 3 stocks, Appendix C19, Appendix C35, Appendix C50), there is limited evidence of a systematic shift in mortality distributions for these stocks between the 2009 and 1999 PST Agreement periods (Figure 3.8).

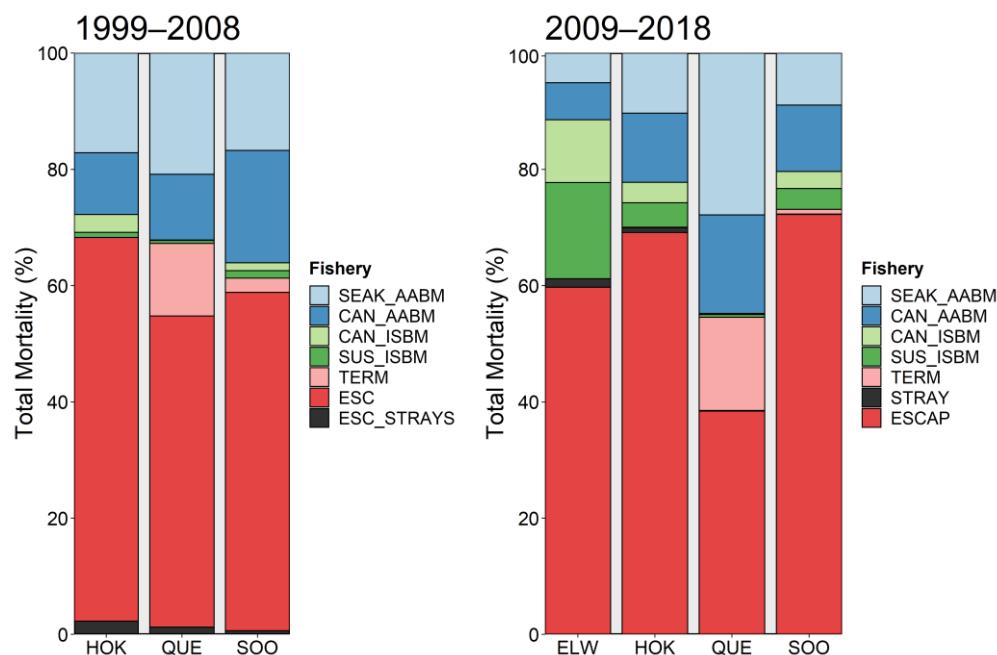


Figure 3.8—Distribution of total mortality for Washington Coast indicator stocks for the 1999–2008 and 2009–2018 PST Agreement periods.

3.7.4 Terminal Area Adjustments

The terminal harvest rate for Queets River is adjusted for the Grays Harbor Fall escapement indicator stock reported by the CTC (2019a), which includes all net and sport fisheries in the Grays Harbor basin (Figure 3.9; Appendix C36). The reported harvest rate is a composite of the rates on natural- and hatchery-origin Chinook salmon because the stock origin of the catches was not distinguished in the source data obtained from the Pacific Fishery Management Council (PFMC).

Queets River terminal harvest rate is also adjusted for the Quillayute Fall and Hoh Fall escapement indicator stocks reported by the CTC (2019a), and includes the net, sport, and Ceremonial and Subsistence fisheries in each river (Appendix C37, Appendix C38). Estimates of terminal run and escapement were obtained from PFMC reports, the same estimates are used by the CTC.

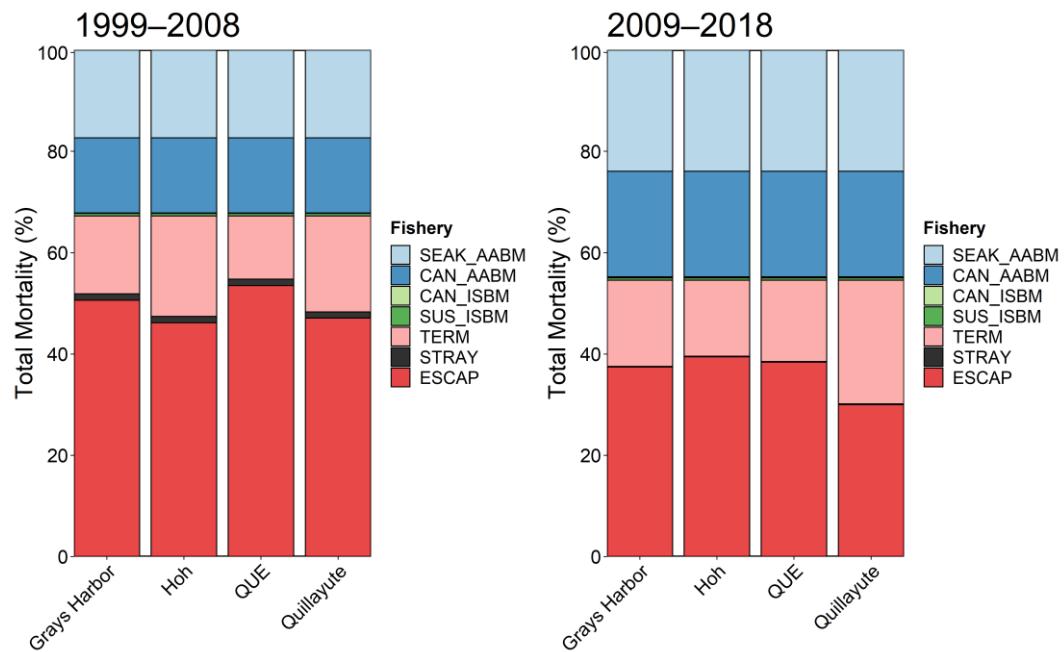


Figure 3.9—Distribution of total mortality for the Washington Coast hatchery indicator stock before applying the terminal area adjustment (Queets [QUE]) and after the terminal area adjustments for the escapement indicator stocks (Grays Harbor, Hoh, and Quillayute) for the 1999–2008 and 2009–2018 PST Agreement periods.

3.8 WASHINGTON SALISH SEA STOCKS

There are 14 CWT indicator stocks analyzed within the Washington Salish Sea. The indicator stocks are a mixture of traditional hatchery production for harvest purposes, and natural stock supplementation programs from brood stock collected on the spawning grounds. Current non-tribal sport fisheries for Chinook within Puget Sound are almost exclusively under MSF regulations. Except for one stock, White River Spring Yearlings, these CWT indicator groups are adipose-clipped (marked), and therefore available for retention in MSFs. Consequently, estimates of fishing mortality from these adipose-clipped CWT recoveries will likely overestimate the fishing mortality and, in turn, the BYER estimates of unmarked natural-origin fish that must be released. MSFs or directed fisheries on hatchery surplus create a differential terminal fishery structure for these indicator groups; hence, BYERs are expressed in terms of ocean fisheries for all of these indicators. Details on the CWT indicator stock groups and influence of mark-selective and terminal fisheries on the estimates are presented in the regional subsections below.

3.8.1 Northern Puget Sound

Indicator stocks in Northern Puget Sound include Fingerling and Yearling Spring tag groups from Nooksack River (NSF, NKS) and Skagit River (SKF, SKS) and Summer/Fall Fingerling groups from Samish (SAM) and Skagit (SSF) rivers. The Nooksack Spring (NSF), Skagit Spring (SKF), and Skagit Summer/Fall (SSF) stocks are included in Chapter 3 Attachment I of the 2019 PST Agreement, each of which have associated ISBM fishery limits. Releases of Yearling Spring Chinook salmon into the Nooksack River were discontinued following the 1996 BY. The Nooksack Spring hatchery program's primary purpose is natural supplementation and supporting a small tribal subsistence fishery in the river. The SAM indicator does not represent an associated natural production but is important for evaluating the large hatchery production program from the Samish Hatchery. The Skagit Spring program's primary purpose is harvest augmentation; the returning fish are subjected to an MSF in the area near the hatchery. The Skagit Summer Fingerling (SSF) group's purpose is evaluation of fishery impacts to the natural stock in the system. Spawning ground recoveries are the source of brood stock for the SSF program. The yearling program in the Skagit River was discontinued with the 2010 BY, released in spring of 2012.

3.8.1.1 Brood Year Exploitation Rates

The time series of BYERs for the NSF group spans BYs 1988 to 2013, missing only 1990 and 1991 (Appendix F9). The average BYER for the period is 40%, ranging from a low of 24% to a high of 61%. The BYER for the most recent complete brood (2013) was 27%. BYERs for NKS are available for broods from 1981 to 1996, minus BYs 1983, 1985 and 1991 (Appendix F9).

Exploitation rates for the years of available NKS data ranged from 34% to 76%, with an average of 51%. Data to estimate BYERs for the SAM group were available for the 1974, 1975, 1979, and 1985 to 2013 broods (Appendix F9). The average BYER across the time series was 43%, ranging between 27% and 68%. The BYER for the most recent complete brood (2013) was 38%. BYERs are available for SKF for 1985 and 1993 through 2013 (Appendix F9). The average BYER for these years was 28% with a range from 13% in 2006 to 49% in 1985. The BYER for the most recent complete brood (2013) was 20%. Tagging information is available for SKS to estimate ERs for BYs 1981 to 1987, 1990, and 1993 to 2010 (Appendix F9). The average ER across all BYs is 42%, with a low of 18% (BY 2007) and a high of 78% for BY 1982. The last year of tagging data for SKS is BY 2010, which had an ER of 29%. Consistent BY tagging of Skagit Summer Fingerlings (SSF) has been conducted from BY 1994 to 2013 (Appendix F9). Exploitation rates for these broods have averaged 34% and ranged between 21% and 56%. The BYER for the most recent complete brood (2013) was 56%.

3.8.1.2 Survival Rates

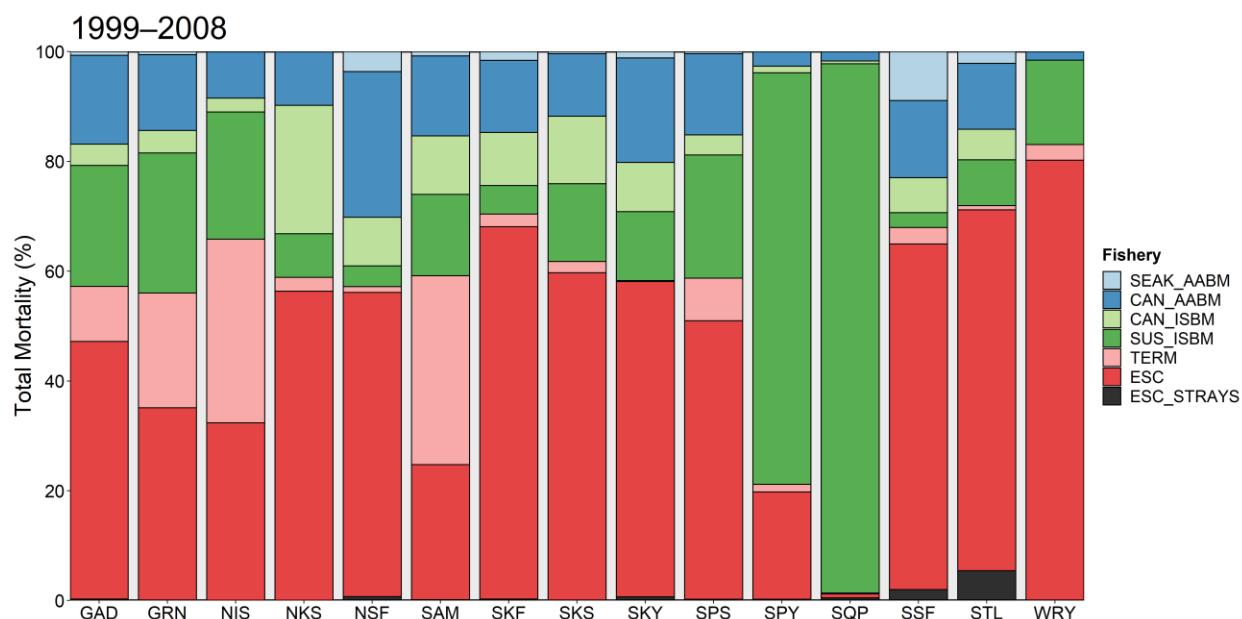
Since the mid-1990s, survival rates from release to age 2 (fingerlings) or age 3 (yearlings) for northern Puget Sound indicator stocks have no obvious trends (Appendix G9). More recently (during the last 5 complete brood years), survival rates have ranged from 0.4% to 3.0% and averaged 1.4%.

3.8.1.3 Mortality Distributions

As a percentage of total AEQ mortality for the North Puget Sound stocks during 1999–present, fishery related mortality averaged 46% for NKS (Appendix C30; one year only, 1999), 43% for NSF (Appendix C32), 73% for SAM (Appendix C44), 37% for SKF (Appendix C46), 41% for SKS (Appendix C47) and 43% for SSF (Appendix C60; Figure 3.10).

Because of their location and northerly ocean migration, the majority of fishing mortality on Northern Puget Sound stocks is in Canadian and Puget Sound fisheries. Mortality in Canadian fisheries has averaged 23% since 1999 and occurs primarily in WCVI and in Southern B.C. sport fisheries. In Puget Sound, mortality has averaged 19% since 1999 and occurs mostly in terminal net fisheries and in marine sport fisheries (which are now almost exclusively under mark-selective regulations). A sizeable state and tribal net fishery within Bellingham Bay targets SAM, contributing the majority of the percentage value shown under Southern U.S. net in Appendix C35. The remaining portion of mortality associated with Puget Sound net for SAM results from the San Juan Islands net fishery, which is under Fraser Panel control in the late summer and fall. With the exception of SAM, mortality in Puget Sound marine and freshwater net fisheries was low through 2007. Since then, mortalities in freshwater net fisheries have been higher, primarily due to higher abundances of Skagit Summer/Fall Chinook and a corresponding directed river net fishery. Although SSF experienced the highest fishery mortality in SEAK among all Salish Sea stocks (9%) during 1999–present, for the combined Northern Puget Sound stock group, the percent mortality in fisheries in SEAK and along the Washington and Oregon Coast is low, averaging approximately 3% (SEAK) and 2% (WA/OR) for these years.

For the aggregate group, the distribution of fishing mortality between fisheries north or south of the U.S. and Canada border has shifted slightly during 1999–present, with a greater proportion of impacts occurring in U.S. waters in more recent years. The increase for southern U.S. fisheries is primarily due to the implementation of MSFs beginning in 2003 and a terminal net fishery in the Skagit River starting in the late 2000s.



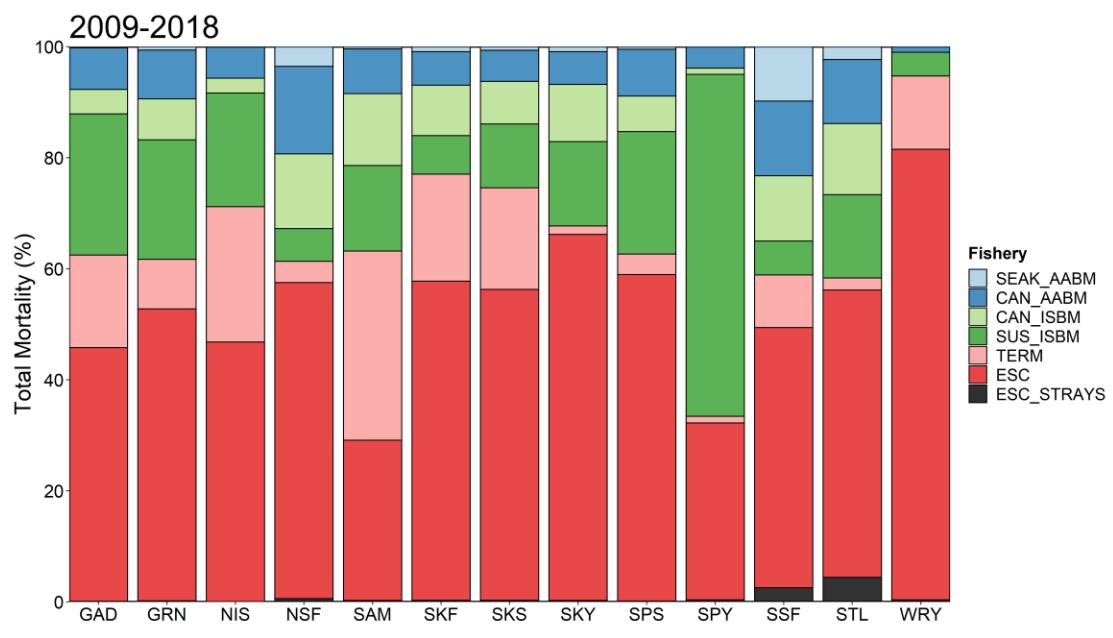


Figure 3.10—Distribution of total mortality for Washington Salish Sea indicator stocks for the 1999–2008 and 2009–2018 PST Agreement periods.

3.8.2 Central Puget Sound

Indicator stocks in Central Puget Sound, from north to south, include fingerling tag groups from the Stillaguamish River (STL) and the Skykomish River (SKY), a tributary in the Snohomish Basin. The Stillaguamish and Snohomish stocks are listed as indicator stocks with ISBM fishery limits in Chapter 3 Attachment I of the 2019 PST Agreement. The Stillaguamish Fall CWT program’s primary purpose is for the evaluation of fishery impacts, and some natural supplementation. Brood stock for this program is captured on the spawning grounds. The Skykomish program’s primary purpose, which uses returns of summer-run fish to the Wallace Salmon Hatchery for brood stock, is for fishery evaluation, providing some limited harvest in the inriver mark-selective sport fishery when abundance is favorable.

3.8.2.1 Brood Year Exploitation Rates

Between BY 1980 at BY 2009, ocean fishery BYERs declined dramatically for STL—from 91% for BY 1980 to 31% in 2009. Estimates of BYERs have increased since 2009 with the BYER for the most recent complete brood (2013) being 42% (Appendix F10). The increase in BYERs for 2010–2013 could be attributable to low escapement and few CWT recoveries in recent years. The average BYER for STL across the time series was 48%. The rates for SKY have only been available starting with the 2000 BY and have ranged from a high of 43% (2001) to a low of 21% (2006) with a recent 3-year average of 37%, and an average of 35% across all years (Appendix F10).

3.8.2.2 Survival Rates

Survival rates to age 2 for STL ranged from a high of 7.0% in 1990 to a low of 0.3% in BY 1980 (Appendix G10). Cohort survival to age 2 for SKY ranged from 0.4% in BY 2005 to 2.9% BY 2013 (Appendix G10).

3.8.2.3 Mortality Distributions

Fishery mortality, as a percentage of total AEQ mortality, for the Central Puget Sound stocks during 1999–present averaged 35% for SKY (2004–present; Figure 3.10; Appendix C48), and 39% for STL (1999–2001 and 2006–present; Figure 3.10; Appendix C62). Similar to Northern Puget Sound stocks, the percentage of fishing mortality is very low in SEAK (1% and 2% for SKY and STL, respectively) and highest in Canadian fisheries, averaging 20% for SKY and 22% for STL. The average percent mortality in Puget Sound fisheries of 13% for both SKY and STL is lower than that for the Northern Puget Sound group because of the limited terminal fisheries for these stocks. In recent years, the majority of the fishery mortalities in Puget Sound have occurred in marine area mark-selective sport fisheries.

Since 1999, the two combined stocks experienced an increase in the percentage of mortality in fisheries south of the U.S. and Canada border. The increase in the southern U.S. fisheries since 2007 is primarily due to mark-selective sport fisheries and may not correctly represent impacts on natural stocks. The percentage of mortality in fisheries in SEAK and Canada has also increased for STL in recent years.

3.8.3 South Puget Sound

Indicator stocks in Southern Puget Sound include South Puget Sound Fall Fingerling (SPS), South Puget Sound Fall Yearling (SPY), Nisqually Fall Fingerling (NIS), and White River Spring Yearling (WRY). The SPS indicator group is an aggregate of several CWT indicator programs, which is now composed of tag releases from Soos Creek Hatchery in the Green River Basin and Grovers Creek Hatchery on the western shore of Puget Sound across from Seattle. The SPS indicator is the best representative of mixed stock fishery impacts that occur on the Green River and Lake Washington stocks. However, it should not be used to represent terminal fisheries due to the varying intensity with which they occur on stocks within the SPS aggregate and on those the aggregate is intended to represent. In addition, because stocks originating in South Puget Sound are exposed to a number of MSFs, exploitation rates measured from marked tag recoveries may overestimate the impacts on unmarked natural stocks. The NIS and SPY stocks are the southernmost indicator tag groups in Puget Sound. The SPY indicator represents hatchery production where the intent of the program is to release yearling Chinook salmon that have a higher tendency to remain within Puget Sound and benefit the Puget Sound sport fishery. This hatchery program has been reduced substantially since Chinook salmon were listed in 1999 as threatened status under the U.S. Endangered Species Act. The WRY indicator has not been adipose-clipped since the 2002 BY and all tag recoveries result from electronic tag detection sampling. The migration range of WRY is almost exclusively within the Salish Sea where all fisheries are sampled with electronic tag detectors.

3.8.3.1 Brood Year Exploitation Rates

The ocean fishery BYERs for SPS have ranged between a high of 75% for the 1975 BY to a low of 23% for the 1996 BY, with a mean of 47% across all BYs (Appendix F11). The average BYER for SPY was 74% and ranged from 52% (BY 2005) to 95% (BY 2000). The relatively high BYER for SPY reflects the intent of full harvest on this hatchery stock with achievement of egg-take goals as the only escapement objective. The BYERs in the 1980s for NIS ranged between about 50–80%. Since BY 2000, ocean BYERs averaged 28% for NIS and 9% for WRY (Appendix F11). A total fishery BYER for SPS and NIS would include additional mortalities from freshwater fisheries, which can be significant for these indicators.

3.8.3.2 Survival Rates

Survival rates from release to age 2 for SPS ranged from a low of 0.4% for 1989 BY to a high of 9.5% for 1975 BY (Appendix G11). With the exception of the 1985 BY where the survival rate was 14.4%, the rates for SPY have been low and often less than 1% (Appendix G11). Survival for NIS ranged from a low of 0.1% for 1987 BY to a high of 4.3% for 2003 BY (Appendix F11). Survival for WRY ranged from a low of 0.1% for 1975 BY to a high of 5.7% for the 2002 BY (Appendix G11).

3.8.3.3 Mortality Distributions

Fishery mortality as a percentage of total AEQ mortality for the South Puget Sound stocks during 1999–present averaged 45% for SPS (Figure 3.10; Appendix C52), 77% for SPY (Figure 3.10; Appendix C53), 60% for NIS (Figure 3.10; Appendix C29) and 18% for WRY (Figure 3.10; Appendix C69). The fishery mortality distribution for SPS and NIS north of the U.S. and Canada border is similar to the other Puget Sound Fall Fingerling stocks, with a very low percentage (<0.5%) in SEAK and much higher rates (approximately 13%), in Canadian fisheries (primarily WCVI). The fall fingerling stocks (SPS and NIS) have a higher mortality in Puget Sound fisheries than the North and Central Puget Sound indicators. The higher rates are the result of exposure to mark-selective sport fisheries throughout Puget Sound and to significant terminal net fisheries in most years that can target large-scale hatchery production. Fishing mortality for WRY is predominantly within Puget Sound. Since 1999, the distribution of fishing mortality for SPS and NIS has remained stable.

3.8.4 Juan De Fuca and Hood Canal

Tagging of Elwha River (ELW) Fall Fingerling stock in Juan de Fuca was discontinued with the 1994 BY. A hatchery program continues using brood stock collected from the spawning grounds and to the hatchery rack. The Elwha Hatchery program has now shifted to a stock restoration and recovery program with the removal of the Elwha River dams that began in September 2011. Marking and tagging of this stock resumed with the 2012 BY as part of monitoring and evaluation of the restoration project. The George Adams (GAD) stock indicator is used to represent fishery and escapement distribution of natural fall fingerlings in Hood Canal tributaries, primarily the Skokomish River at the southern end of the Hood Canal.

3.8.4.1 Brood Year Exploitation Rates

For the BYs available for ELW, the ocean fishery BYER ranged from a high of 78% for BY 1982 to a low of 34% for the 2012 BY (Appendix F12). While the 2013 BY is complete, only two CWTs from this release were recovered, both in escapement, suggesting very poor survival and resulting in insufficient sample sizes for calculating a BYER. The ocean fishery BYER for GAD ranged from a high of 83% in 1989 to a low of 22% in 1994 (Appendix F12). A total fishery BYER for GAD would include additional mortality associated with the significant freshwater fisheries that occur in most years.

3.8.4.2 Survival Rates

Survival rates of ELW were initially approximately 2% in the first three years of tagging (1982–1984), then decreased in 1985 to less than 1% and remained there until the program was discontinued (Appendix G12). Since the reinstatement of the Elwha program survival rates have been similar to the later years of the initial program, with particularly poor survival in the most recent complete brood, BY 2013. Survival rates for GAD averaged 1.5% during 1985–2013 and ranged from a low of 0.04% for BY 1990 to a high of 5.0% for BY 2009 (Appendix G12).

3.8.4.3 Mortality Distributions

For GAD during 1999–present, fisheries in Alaska made up less than 1% of the fishery and escapement mortality distribution, Canada 16%, Washington and Oregon coast 5%, and Puget Sound 32% (Figure 3.10; Appendix C15). Escapement of GAD during 1999–present averaged 46%.

Distribution of fishing mortality for GAD during 1999–present between Alaska, Canada and the southern U.S. was shifted slightly south by a reduction in impacts in fisheries north of the U.S. and Canada border, but proportion of escapement of GAD has remained relatively unchanged.

In recent years, fishing morality on ELW has been about 4% in Alaska, 18% in Canada, and 10% in the Southern United States (SUS) (Appendix C14; Figure 3.8).

3.8.5 Regional Summary for Washington Salish Sea Stocks

For Washington Salish Sea stocks, BYER is measured in terms of ocean mortality only because terminal fisheries may not properly reflect the impacts on the natural stock represented by the CWT indicator. Some terminal fisheries are designed as hatchery fish target zones which would exceed the impacts on any natural stocks in the basin. Additionally, some river sport fisheries are now managed under MSF regulations that likely overestimate impacts on natural stocks. The ocean fishery BYERs contain estimates of exploitation in the Puget Sound marine area mark-selective sport fisheries which have grown significantly since 2003. Consequently, these BYERs for Puget Sound stocks, especially those from Central and Southern Puget Sound, will tend to overestimate the exploitation relative to that of the natural stocks they are intended to represent. Therefore, because of the exclusion of terminal fisheries and the inclusion of Puget Sound marine area MSFs, the ocean fishery BYERs for Washington Salish Sea stocks will not reflect total fishery impacts on natural stocks.

The BYERs for Washington Salish Sea Stocks averaged 44% (per stock average range of 34–56%) for the fall fingerling stocks (SAM, SSF, STL, SKY, SPS, NIS, ELW, and GAD) and 36% (range 21–51%) for the spring fingerling and yearling stocks (NSF, NKS, SKF, SKS, and WRY; Table 3.4). Comparing the mean BYER to the rate in the last complete BY, the BYER was higher in the last complete BY for only one of the fall fingerling stocks (SSF).

Survival rates to age 2 for Washington Salish Sea stocks averaged between 0.7–2.7%, which is similar to the rates commonly observed for fall-run fingerling type stocks (Table 3.4). Survival rates to age 3 for spring-run yearling stocks were 1.1-2.7% and were at the lower end of rates usually observed for yearling type releases that should accrue some survival benefit from an extra year of rearing in the hatchery. The trend in survival rates for those stocks with a long continuous time series of analysis (e.g., SAM, SPS, GAD) shows the lowest survival rates occurring for the late 1980s to early 1990s broods, with somewhat improved survivals beginning in the early 2000s.

CY escapement for fall fingerling stocks varies between the stocks with significant terminal fisheries that have 2009–present average escapements of 29–59% (SAM, SPS, NIS, and GAD) and stocks that do not have significant terminal fisheries where escapement is 47-66% (SSF, STL, and SKY; Table 3.4). The mean escapement for spring stocks has ranged from 57-84%.

Table 3.4—Summary of statistics generated by the 2020 CWT cohort analysis for Washington Salish Sea indicator stocks by region. Statistics include total ocean fishery mortality (adult equivalent catch plus incidental mortality) brood year exploitation rate (BYER), cohort survival rate to age 2 (age 3 for yearling stocks), and calendar year (CY) percent of total mortality in escapement.

Subregion	Stock Abbrev	Indicator Stock Name	BYER (total mortality)		Survival rate		CY % Escapement ^{1,3}		
			Mean (range)	Last complete BY	Mean (range)	Last complete BY	1999–2008	2009–present	
North Puget Sound	NSF	Nooksack Spring Fingerling ²	40% (24%-61%)	27% (2013)	1.38% (0.27-4.60%)	1.14% (2013)	55% (38-82%)	57% (37-76%)	62% (2018)
	NKS	Nooksack Spring Yearling ²	51% (34%-76%)	45% (1996)	1.07% (0.10-3.60%)	0.61% (1996)	54% (NA; n=1)	ND	ND
	SAM	Samish Fall Fingerling ²	43% (27%-68%)	38% (2013)	2.51% (0.31-14.47%)	0.38% (2013)	25% (14-32%)	29% (18-39%)	33% (2018)
	SKF	Skagit Spring Fingerling ²	28% (13%-49%)	20% (2013)	1.53% (0.67-4.11%)	1.55% (2013)	68% (58-78%)	57% (46-70%)	49% (2018)
	SKS	Skagit Spring Yearling ²	42% (18%-78%)	29% (2010)	2.69% (0.58-7.50%)	2.66% (2010)	60% (48-68%)	58% (54-65%)	57% (2013)
	SSF	Skagit Summer Fingerling ²	34% (21%-56%)	56% (2013)	1.17% (0.22-3.35%)	1.21% (2013)	63% (55-76%)	47% (30-72%)	50% (2018)

Subregion	Stock Abbrev	Indicator Stock Name	BYER (total mortality)		Survival rate		CY % Escapement ^{1,3}		
			Mean (range)	Last complete BY	Mean (range)	Last complete BY	1999–2008	2009–present	
							Mean (range)	Mean (range)	Last CY % (year)
Central Puget Sound	STL	Stillaguamish Fall Fingerling ²	48% (21%-91%)	42% (2013)	1.75% (0.28-6.97%)	0.74% (2013)	66% (43-82%)	52% (29-68%)	55% (2018)
	SKY	Skykomish Fall Fingerling ²	35% (21%-43%)	30% (2013)	1.07% (0.44-3.00%)	3.00% (2013)	62% (57-72%)	66% (57-76%)	69% (2018)
South Puget Sound	SPS	South Puget Sound Fall Fingerling ²	47% (23%-75%)	40% (2013)	2.29% (0.41-9.51%)	1.49% (2013)	51% (34-71%)	59% (46-70%)	46% (2018)
	SPY	South Puget Sound Fall Yearling ²	74% (52%-95%)	56% (2011)	1.65% (0.01-14.41%)	0.08% (2013)	20% (2-49%)	32% (1-67%)	67% (2016)
	NIS	Nisqually Fall Fingerling ²	42% (23%-84%)	24% (2013)	1.66% (0.11-4.29%)	1.63% (2013)	32% (11-59%)	47% (38-72%)	38% (2018)
	WRY	White Spring Yearling ²	21% (2%-91%)	2% (2013)	1.45% (0.14-5.68%)	0.66% (2013)	78% (73-85%)	84% (68-95%)	95% (2017)
Juan de Fuca/Hood Canal	ELW	Elwha ²	57% (34%-78%)	34% (2012)	0.67% (0.01-2.32%)	0.01% (2013)	ND	66% (44-80%)	80% (2018)
	GAD	George Adams Fall Fingerling ²	47% (22%-83%)	30% (2013)	1.63% (0.04-5.87%)	2.55% (2013)	47% (39-64%)	46% (24-55%)	45% (2018)

¹ % Escapement is not a measure of performance for the escapement indicator stock(s) associated with a given CWT indicator stock. See CTC (2013) for these details.

² BYER is ocean exploitation rate only.

³ ND = No data available.

3.9 COLUMBIA RIVER STOCKS

The Columbia River stocks are split into those from the Willamette River tributary, the Lower Columbia, the Upper Columbia, and the Snake River tributary. The Willamette River spring Chinook CWT indicator (WSH) is a conglomeration of yearling releases from several Willamette basin hatcheries.

There are three tule fall Chinook CWT indicator stocks from Lower Columbia River hatcheries, and one wild stock tagging program on the only bright Chinook stock below Bonneville Dam: Lower River Hatchery (LRH, now released from Big Creek/Bonneville Hatchery), Cowlitz Hatchery (CWF), Spring Creek Hatchery (SPR), and Lewis River Wild (LRW). There are two bright fall and one summer Chinook CWT indicator stocks for the Upper Columbia River: Columbia Upriver Brights (URB, from Priest Rapids Hatchery), Hanford Wild (HAN, from Hanford Reach), and Mid-Columbia Summers (SUM, from Wells Hatchery, including subyearling and yearling releases). Lyons Ferry Hatchery is currently the only CWT indicator stock for the Snake River tributary. Lyons Ferry Hatchery releases both subyearlings (LYF) and yearlings (LYY), but only the subyearlings are representative of the natural production.

3.9.1 Brood Year Exploitation Rates

BYERs for WSH appear much lower than for summer and fall run stocks (Appendix F13), but due to fairly high exploitation in mark-selective terminal fisheries, only ocean exploitation is presented. Ocean BYERs ranged from 10% to 29% prior to 1990 (averaging 17%) and remained under 13% (averaging 7%) until recently increasing to about 15%. IM rates for WSH in the ocean have averaged 1.6% since 1990.

The three hatchery stocks in the lower Columbia River (CWF, LRH, and SPR) showed a decline in BYERs from high levels during the late 1970s (over 65%) to lower levels during the early to mid-1990s (Appendix F13). The ocean BYER for CWF increased slightly while remaining 30-40%, while BYERs for LRH and SPR were about 70%. Incidental mortality rates for CWF, LRH and SPR have averaged 4-7%.

The LRW and SUM stock BYERs reached highs in the early 1980s (70%, 81%), lows in the 1990s (17–18%) and returned to higher rates in the 2000s. However, their recent BYERs have declined to about 30-40%. Incidental mortality for both stocks average about 6%. URB BYERs also reached a high in the 1980s (80%), hit a low in 1978 (24%), and were high in the 2000s, but recent broods have shown declines to about 30%. Coded-wire tagging of the wild component of upriver brights in the Hanford Reach (HAN) and of LYF both began in 1984. BYERs for HAN are typically about 8 points higher than for URB, but the difference increased even more as the recent URB BYER declined and that for HAN showed little change. BYERs for LYF averaged 23% for the 1998 through 2007 broods. The next three broods averaged 54%, similar to URB. The 2011 brood year exploitation rate appears to have increased to 72%, but this recent increase is likely due to passing tagged hatchery fish over Lower Granite Dam, where they cannot be recovered in escapement, thus inflating BYERs. This practice has increased with run size, due to hatchery brood stock needs being met and more frequent crowding at the fish trap. In following years, escapement recoveries will be adjusted to account for this practice. LYF BYERs remained around 40%. IM rates for HAN, LYF, and URB have averaged 3-7% since 2000.

3.9.2 Survival Rates

Columbia River stocks typically have survival rates from 0–3%, with the most successful broods surviving at 6–8% (Appendix G13). Currently, recent survival rates are showing substantial declines to well under 2% for all stocks except LRW, WSH, and LYY.

Lower Columbia River stocks, specifically both CWF and LRH have suffered from persistently low survival throughout the time series available for CWT survival analysis (1977–1978 through 2018). Recent survival rates remain below 1%. Survival rates for SPR were 0-1% for 17 of 18 broods before 1998, but nine of the 14 broods since had improved survivals including six broods (1998–2001, 2007 and 2011) with rates of 3-4%, but recent survival rates have declined to under 2%. Survival rates for LRW declined from an average of 2.8% for the 1982–1992 broods, to under 2% for 15 of the next 17 broods. However, the most recent broods show survival rates quickly increasing to almost 4%.

Survival rates for WSH have been somewhat cyclical, with 13 of 15 broods from 1975–1989 above 3% (averaging 4%), 1-2% for the next seven, 3-7% (averaging 4%) for the next four, and back down to 1-2 % for most broods since 2000 (Appendix G13).

In the Upper Columbia River, SUM had survival rates less than 1.3% until 1997, except for 1985 (2.2%), averaging only 0.7%. Since then, survival rates improved to 1.0–5.4. A 5.4% survival for 2011 is the highest value for SUM, while it was the 2010 brood that excelled for URB (7.9%), HAN (5.8%) and LYY (5.9%). From 1975–1985, URB survival rates were 2–7% for 1975–1985 broods (averaging 4%), below 3% from 1986–2008 (averaging 1%), 3–8% (averaging 5%) for 2009–2011 broods but show declines to under 2% for recent broods. HAN survival rates were 0–2% for 20 of 21 broods from 1986–2006, (averaging 1%), and then averaged 3% for five broods, before declining to well under 1% for recent broods. LYF has data gaps through the 2000 brood, and highly variable survival rates since, with 11 broods under 2% and seven broods at 2–6% (averaging 2.2%). Like HAN and URB, LYF shows a recent decline to under 1%. Since 1995, LYY, which are yearlings, have had 4–5% survival rates for 12 of 16 broods (averaging 5%), and are currently at about 3% survival.

3.9.3 Mortality Distributions

The distribution of mortality for each stock can be found in Appendix C. For Columbia River stocks, sport data take two years to complete, so the most recent numbers are for 2017. For most stocks, about 20–30% of mortality attributable to fisheries occurs in AABM fisheries; primarily in SEAK for WSH, LRW, URB, HAN, and SUM, and in WCVI for SPR and LRH tules. It is lower for CWF (14%), which is widely distributed, and SPR (8%) which was only in fisheries from WCVI south. WSH mortality in SEAK during 2016 was much higher than average (5%) at 18%. Impacts in SUS fisheries were low (14%) for LRW, about 30–60% for other Lower Columbia River and Snake River stocks, and 20–30% for Upper Columbia River stocks.

Figure 3.11 demonstrates changes in the proportion of CY total mortality in fisheries and escapement. The proportion of escapement for most Lower Columbia River stocks declined except CWF, where escapement proportion increased due to reductions in SUS and Canadian (CDN) AABM fisheries. The other Lower Columbia tule stocks, LRH and SPR, both showed reductions in escapement and CDN AABM, and increases in SUS fisheries. For LRW, there were smaller reductions in escapement and SEAK, and increases in CDN AABM and terminal fisheries. Above Bonneville, URB proportions changed little, while for HAN, terminal impacts increased (6 points) and escapement dropped (8 points). SUM impacts declined in SEAK and CDN AABM fisheries, while terminal impacts increased. LYF and LYY showed similar increases in terminal areas and SUS fisheries but showed declines in escapement. In the Willamette Basin, terminal impacts increased, while escapement declined.

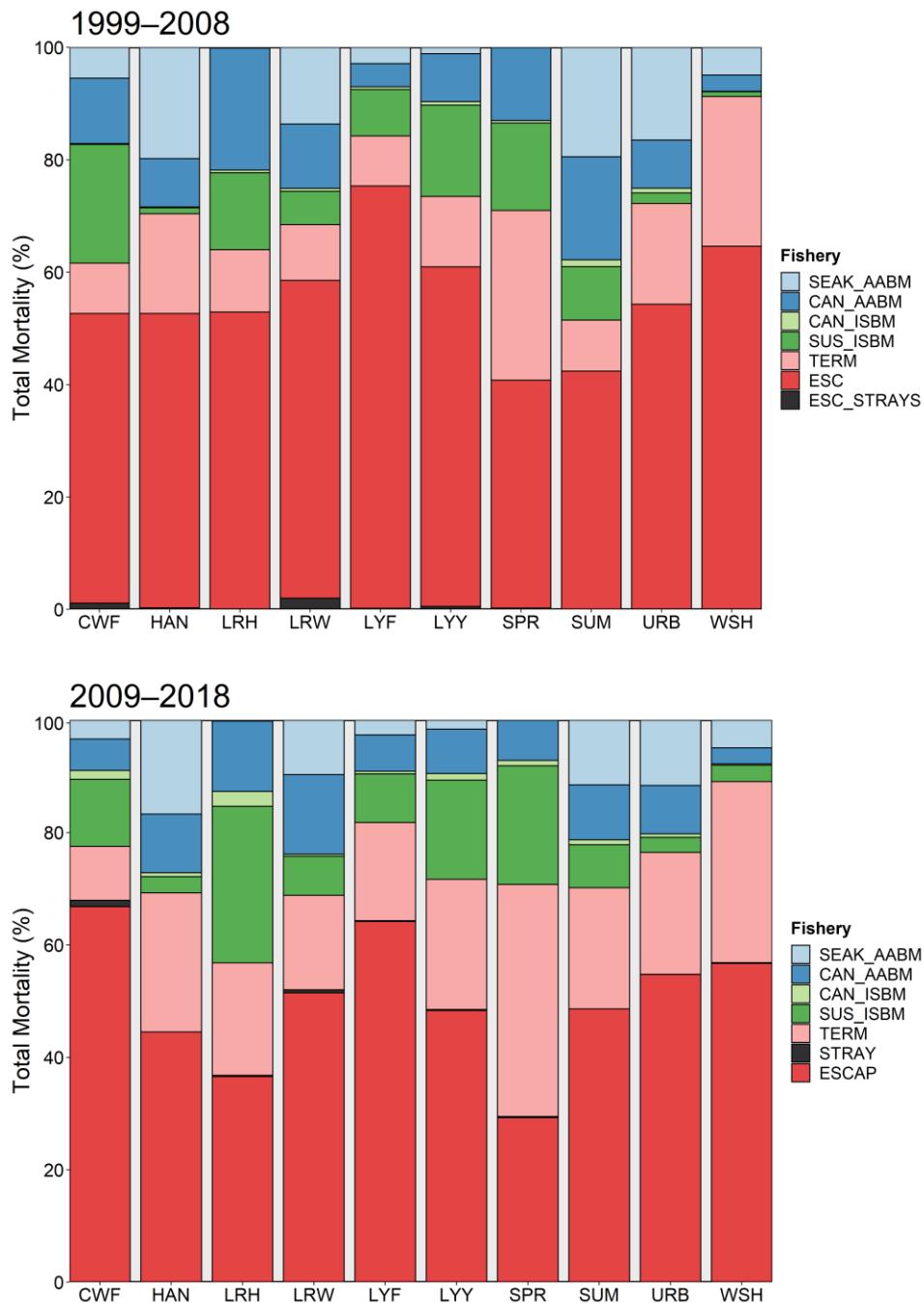


Figure 3.11—Distribution of total mortality for Columbia River indicator stocks for the 1999–2008 and 2009–2018 PST Agreement periods.

3.9.4 Regional Summary for Columbia River Stocks

LRW typically has much in common with URB, HAN, and SUM stocks, whereas LYF and LYY share several attributes with LRH and SPR tule stocks. CWF and WSH are also similar in many ways.

Except for WSH, with a BYER about 15%, and LRH and SPR, with higher rates of about 70%, Columbia River stocks had BYERs of about 30–45%. BYER for WSH and CWF are ocean exploitation rates that do not include terminal harvest impacts (Table 3.5). Therefore, WSH and CWF show a higher percentage of escapement, compared to escapement proportions of about 50% for URB and LRW, and 30–40% for other stocks.

Except for LRW, WSH, and LYY, Columbia River stocks are showing lower survival rates for recent broods

Table 3.5—Summary of statistics generated by the 2020 CWT cohort analysis for Columbia River indicator stocks. Statistics include total mortality (catch plus incidental mortality) brood year exploitation rate (BYER), cohort survival rate to age 2, and calendar year (CY) percent distribution of the total mortality in the escapement.

Stock Abbrev	Indicator Stock Name	BYER (total mortality)		Survival rate		CY % Escapement ¹		
						1999–2008	2009–present	Mean (range)
		Mean (range)	Last complete BY	Mean (range)	Last complete BY	Mean (range)	Mean (range)	Last CY % (year)
CWF	Cowlitz Fall Tule ²	37% (11%-68%)	38% (2013)	0.68% (0.06-3.54%)	0.14% (2013)	52% (26-68%)	67% (48-90%)	69% (2018)
HAN	Hanford Wild Brights	51% (35%-72%)	45% (2013)	1.12% (0.09-5.81%)	0.84% (2013)	52% (28-70%)	45% (11-68%)	68% (2018)
LRH	Lower River Hatchery Tule	58% (20%-82%)	69% (2013)	1.10% (0.02-9.58%)	0.30% (2013)	52% (38-70%)	37% (28-44%)	36% (2018)
LRW	Lewis River Wild	43% (17%-70%)	30% (2013)	1.06% (0.11-3.45%)	0.26% (2013)	54% (37-81%)	48% (31-67%)	37% (2018)
LYF	Lyons Ferry Fingerling	35% (8%-67%)	41% (2013)	2.25% (0.08-7.88%)	1.42% (2013)	79% (69-92%)	64% (41-89%)	68% (2018)
SPR	Spring Creek Tule	72% (46%-94%)	70% (2013)	1.98% (0.12-8.26%)	0.74% (2013)	41% (31-54%)	29% (22-46%)	34% (2018)
LYY	Lyons Ferry Yearling	46% (24%-75%)	57% (2012)	4.51% (0.96-14.70%)	3.47% (2012)	60% (40-76%)	48% (32-72%)	46% (2018)
SUM	Columbia Summer	52% (18%-78%)	43% (2013)	1.70% (0.01-5.58%)	2.48% (2013)	42% (24-60%)	49% (44-56%)	48% (2018)
URB	Columbia River Upriver Brights	52% (24%-80%)	31% (2013)	2.22% (0.08-8.03%)	1.92% (2013)	54% (43-70%)	55% (34-67%)	67% (2018)
WSH	Willamette Spring Hatchery ²	12% (3%-29%)	18% (2012)	2.86% (0.73-7.15%)	1.33% (2012)	65% (54-75%)	57% (43-67%)	67% (2018)

¹ % Escapement is not a measure of performance for the escapement indicator stock(s) associated with a given CWT indicator stock. See CTC (2013) for these details.

² BYER is ocean exploitation rate only.

3.10 NORTH OREGON COAST STOCKS

There are two hatchery-origin CWT indicator stocks representing the production of Chinook salmon on the Oregon coast, the Salmon River Hatchery (SRH) release group and the Elk River Hatchery (ELK) release group. Both groups are fall ocean type subyearling stocks which are

recovered earliest at the total age of 2. The SRH release group represents the Northern Oregon Coast aggregate, whereas the ELK release group represents the Mid-Oregon Coast aggregate. There have been consistent releases of CWT groups of Chinook salmon from the SRH every year since 1976, with the exception of 1981. There have been consistent, if sometimes small (prior to 1989) releases from the ELK since 1977. Release group size for the ELK was somewhat normalized to higher levels after 1990. Average CWT release group size between 1977 and 1989 was approximately 37,000, and between 1990 and 2007 this increased to an average of approximately 184,000. Since 2007, after a two-year decline of coded-wire tagged ELK releases in 2008–2009 (average 40,000), the release size increased to an average of 284,000 in 2010–2016. The recent Elk CWT release totals benefitted from the Coded-Wire Tag Improvement Program's (CWTIP) implementation initiatives between 2010 through 2015. Since the sunset of this bilateral program, additional implementation funding has been sought and secured to support adequate CWT release group sizes. Consistent support into the future is needed to maintain this CWT group and model stock representation.

3.10.1 Brood Year Exploitation Rates

BYERs for both the SRH and ELK exploitation rate indicator stocks include only those mortalities attributable to ocean fisheries (Appendix F14; Table 3.6). The BYER has averaged 35% (range 23–63%) for the SRH releases. BYER for the ELK has averaged 21% (range 10–32%) for the time series, excluding BY 1977 and 1978. There is no discernible trend through time regarding the percentage of IM occurring in ocean fisheries for either SRH or ELK River hatchery releases.

Table 3.6—Summary of statistics generated by the 2020 CWT cohort analysis for Oregon Coast indicator stocks. Statistics include total mortality (catch plus incidental mortality) brood year exploitation rate (BYER), cohort survival rate to age 2, and calendar year (CY) percent distribution of the total mortality.

Stock Abbrev.	Indicator Stock Name	BYER (total mortality)		Survival rate		CY % Escapement ¹		
		Mean (range)	Last complete BY	Mean (range)	Last complete BY	1999–2008	2009–present	Last CY % (year)
ELK	Elk River ²	21% (10%-31%)	21% (2013)	8.01% (1.04-32.90%)	1.51% (2013)	47% (38-62%)	52% (42-65%)	47% (2018)
SRH	Salmon River ²	36% (24%-63%)	35% (2013)	6.69% (0.63-18.68%)	5.76% (2013)	40% (18-58%)	44% (22-57%)	22% (2018)

¹ % Escapement is not a measure of performance for the escapement indicator stock(s) associated with a given CWT indicator stock. See CTC (2013) for these details.

² BYER is ocean exploitation rate only.

3.10.2 Survival Rates

Survival rates for both SRH and ELK Hatchery stocks are to age 2. Generally, survival rates for ELK have been variable, yet robust, and averaged 8% (range of 1–33; Appendix G14; Table 3.6), among the highest average survival tracked coastwide by the CTC, exceeded only by the average survival displayed by CHI (12%). Since 2012, the last year with complete broods to calculate survival from, the survival rates for the ELK stock have been in decline. Survival rates

for SRH had been generally increasing through 2012 with a long-term average of 6%, with survival from the first three BYs averaging 7%, and the last three complete BY survivals averaged 13%. Recently, there has been rapidly declining survival with the SRH stock demonstrating a range of 19 to 1% from the last three analyzed brood years.

3.10.3 Mortality Distributions

An average of 41% of SRH (Appendix C55) mortality, and 48% of the ELK (Appendix C11) mortality, is attributed to escapement for the 1985–present time series (Table 3.6). *Mortality to escapement* is the proportion of AEQ mortalities in a CY attributable to spawning escapement. Both stocks exhibit slight variation in the proportion which escapes to spawn through the time series, but there is no visible trend. According to the 1999–2008 CY data, the largest impacts on the SRH stock occur in terminal sport (25%), SEAK troll fisheries (19%), NBC troll (7%), and NBC sport (4%). During the same time period, the largest impacts on the ELK stock occur in terminal troll (15%), terminal sport fisheries (15%), SEAK troll (8%), and NBC troll (4%). WCVI troll used to be a larger component of the impacts on the ELK stock (6%: 1979–1984) but has impacted this stock less in more recent years (2%: 2009–2018). These impact distributions are displayed graphically in Figure 3.12.

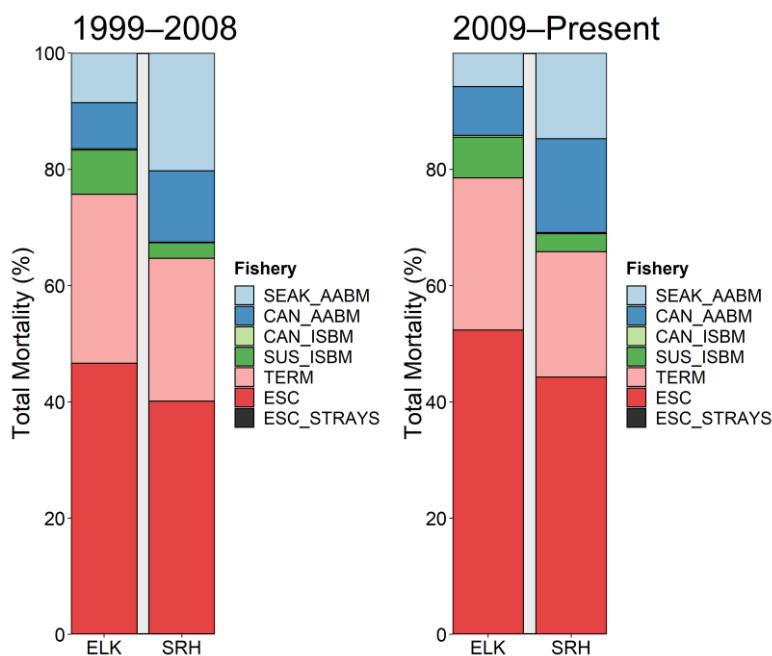


Figure 3.12—Distribution of total mortality for Oregon Coast indicator stocks for 1999–2008 and 2009–2018 PST Agreement periods.

3.10.4 Terminal Area Adjustments

Given expectations for sufficient terminal area returns within a return year, a sport fishery generally occurs in Nehalem (Appendix C56), Siletz (Appendix C57), and Siuslaw (Appendix C58) Rivers and the catch in the sport fishery is included in the harvest rate used by the CTC (2019a) (Figure 3.13;). As seen in Figure 3.13, the intensity of the terminal fishery in these stocks is

generally less than that experienced by their exploitation rate indicator stock (ERIS), the Salmon River Hatchery stock, and consequently the need for terminal area adjustments is called for to adequately depict the harvest in these areas. The CTC has not previously reported the impact of ISBM fisheries on the Coquille (Appendix C12) or South Umpqua (Appendix C13) stocks. A sport fishery occurs in these rivers when returns are sufficiently large. Estimates of the natural-origin terminal run and spawners for the Coquille River are reported by the CTC in the annual catch and escapement report (e.g., CTC (2020) Table B-11) (Figure 3.14). Those observed differences between the ERIS stock and the attendant escapement indicator stocks (EIS) in the NOC aggregate are mirrored between the ERIS and EIS in the MOC as well; terminal harvest intensity is generally lower in those basins outside the ERIS stocks.

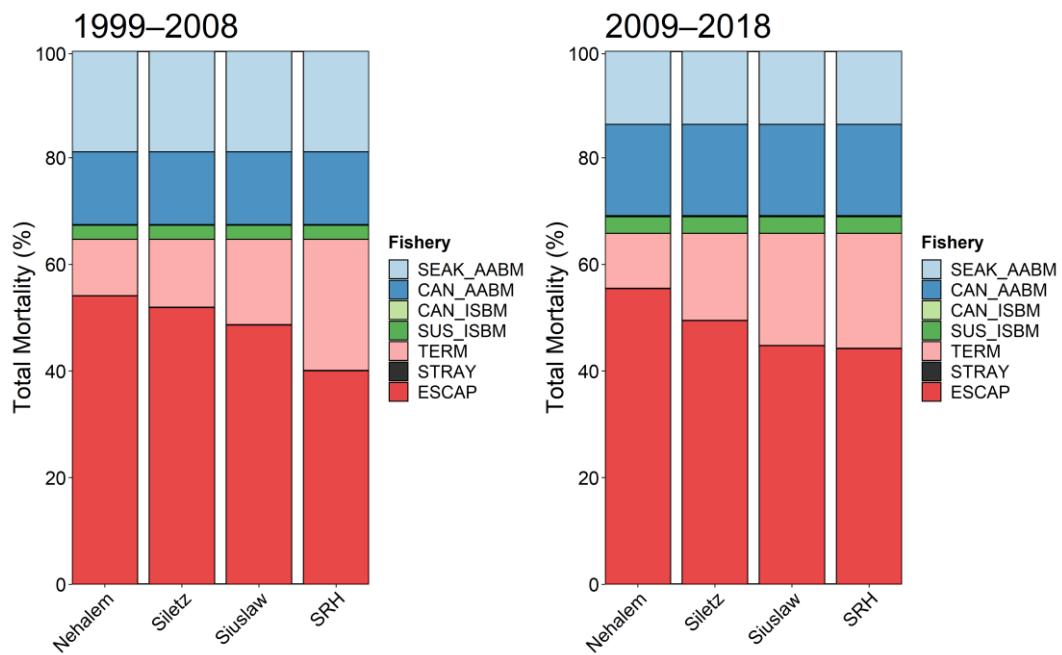


Figure 3.13—Distribution of total mortality for the northern Oregon Coast hatchery indicator stock before applying the terminal area adjustment (Salmon River [SRH]) and after the terminal area adjustments for the escapement indicator stocks (Nehalem, Siletz, Siuslaw) for the 1999–2008 and 2009–2018 PST Agreement periods.

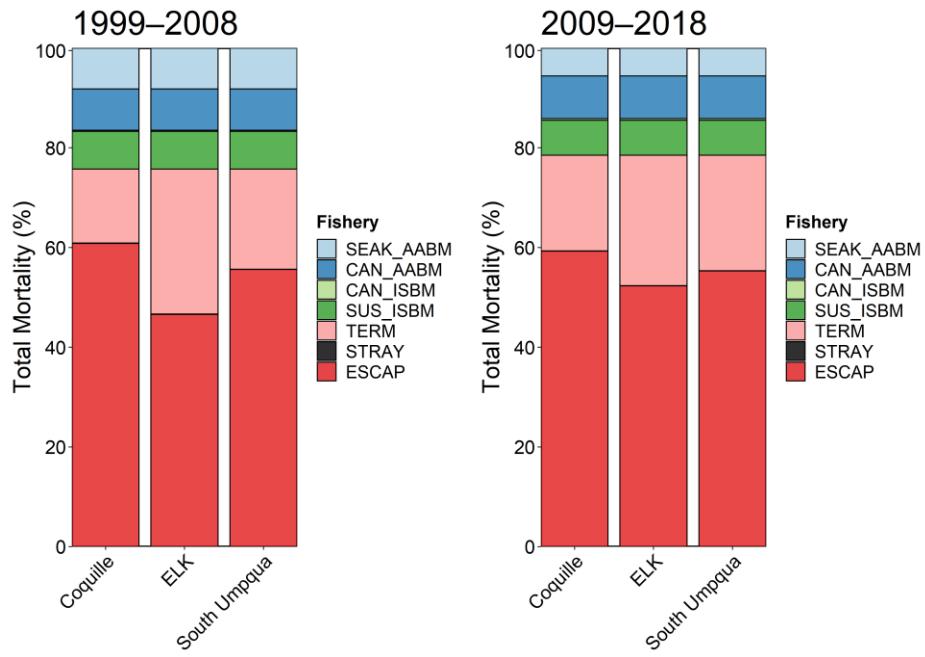


Figure 3.14—Distribution of total mortality for the middle Oregon Coast hatchery indicator stock before applying the terminal area adjustment (Elk River [ELK]) and after the terminal area adjustments for the escapement indicator stocks (Coquille and South Umpqua) for the 1999–2008 and 2009–2018 PST Agreement periods.

4. ISBM FISHERY PERFORMANCE

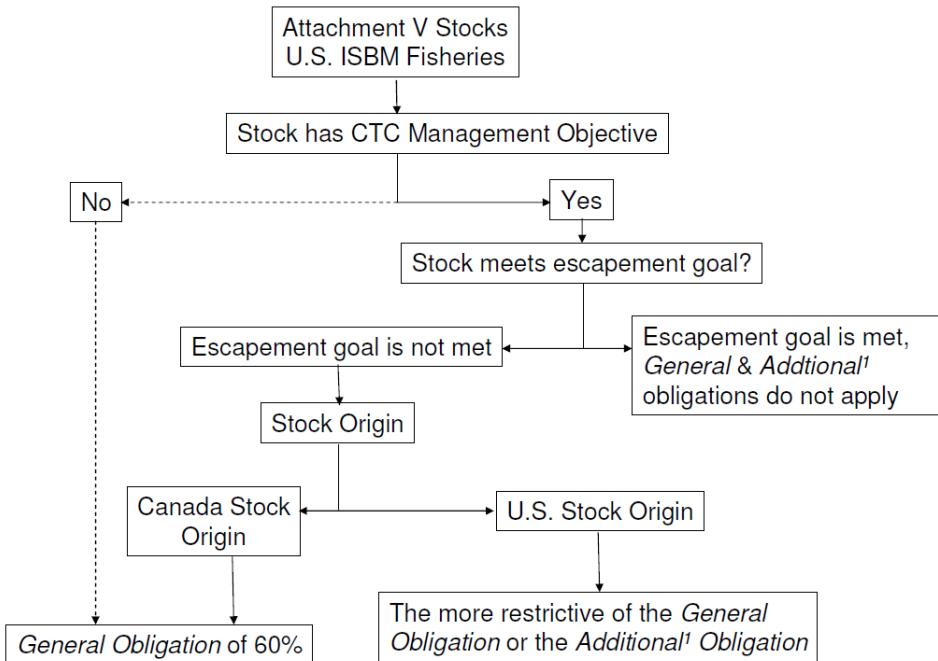
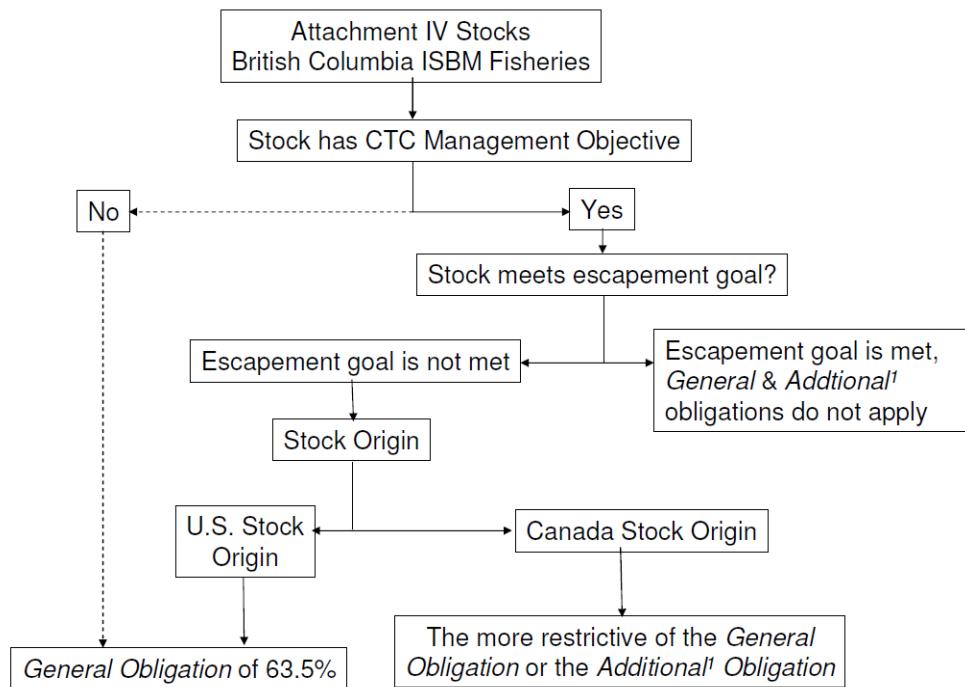
4.1 ISBM FISHERY PERFORMANCE UNDER 2009 PST AGREEMENT

The 2009 PST Agreement specifies that Canada and the U.S. will reduce base period exploitation rates on specified stocks harvested in ISBM fisheries by 36.5% (Canada) and 40% (U.S.), equivalent to ISBM indices of 63.5% (Canada) and 60% (U.S.). This requirement is referred to as the *general obligation* and does not apply to stocks that achieve their PSC-agreed escapement goal. The Treaty also specifies that for those stocks in which the general obligation is insufficient to meet the escapement goal, the Party in whose waters the stock originates shall further constrain its fisheries to an extent that is not greater than the average ISBM exploitation rate that occurred in the years 1991 to 1996. This requirement is referred to as the *additional obligation*. Figure 4.1 shows how the lesser of the two rates (general obligation or additional obligation), would be used as reference to evaluate performance of ISBM fisheries for the Party in which a stock with an accepted escapement goal originates, whereas only the general obligation would be used as reference for stocks not meeting their accepted escapement goals or not having escapement goals.

The 2009 PST Agreement specifies that post-season assessment of ISBM fisheries use CWT-based indices; 2018 is the most recent analysis available for all stocks. Estimated ISBM fishery indices are shown in Table 4.1 for Canadian fisheries and in Table 4.3 and for U.S. fisheries. CWT-based ISBM indices for 1999–2018 are presented in Appendix B of this report. Several inconsistencies in the way these indices were computed in the past were recently corrected. Details regarding corrections and improvements to the ISBM program and calculations can be found in ISBM Subgroup (CTC 2019b).

One of the limitations of the post-season CWT-based ISBM indices is that the catch and CWT expansion data needed to calculate the indices for several stocks caught in U.S. ISBM fisheries are not available at the time the index must be computed for use (CTC 2011). For example, sport harvest estimates are based on punch cards filled in by the fishers and returned by mail once the fishing year has ended, delaying estimates by more than a year from when catch occurred. Sport catch estimates are needed to estimate cohort sizes; thus, ISBM indices for both countries may not be computed within a timeframe for ISBM evaluations to inform fishing plans for the upcoming season. Each agency's procedures for sampling fisheries for CWTs, decoding CWTs, and data management, generally meet the timelines necessary for the CTC to develop the ISBM indices on time. However, the catch estimates that are necessary to expand the CWT sample data as well as some of the escapement CWT samples are less timely for some Washington and Oregon sport and net fisheries.

This is the final year of ISBM reporting requirements under the 2009 PST Agreement as CWT data for U.S. ISBM fisheries are now available through 2018. For Canadian ISBM fisheries, ISBM indices could be calculated for 7 of 14 stocks across the 10-year PST Agreement period. Of these, the Treaty obligation was not met in 9 out of 70 occasions or 13% (Table 4.2). For U.S. ISBM fisheries, ISBM indices could be calculated for 15 of 20 stocks. Of these, the Treaty obligation was not met in 27 of 150 occasions or 18% (Table 4.4).



¹ The additional obligation is the average ISBM exploitation rate during 1991-1996

Figure 4.1—Flow diagrams depicting the sequence of decisions leading to the implementation of individual stock-based management (ISBM) general and additional obligations for stocks in Attachments IV and V of Chapter 3 of the 2009 PST Agreement according to paragraph 8 of the Chinook Chapter.

4.1.1 Canadian ISBM Indices

Of the seven Canadian ISBM indices that could be calculated for 2018 from the CWT data, six of seven were subject to ISBM limitation (Cowichan escapement exceeded the goal, thus the obligations did not apply). Of the remaining six, five had ISBM indices there were below the general obligation rate of 0.635 (Table 4.1). Only the Green River ISBM index was above the general obligation rate. WCVI Falls (0.430) does not have a CTC-agreed escapement goal and was below the additional obligation rate (0.475). Harrison (0.235) did not meet its escapement goal and was below its additional obligation rate (0.268). In the case of Lower Strait of Georgia, Nanaimo was dropped from the CWT-based index because of concern about the method of estimating the terminal fishery rates. Nanaimo and Cowichan stocks are no longer reported separately in the model-based index because a way to split the two stocks in the base period has not yet been developed.

Table 4.1—Review of performance in the Canadian individual stock-based management (ISBM) fisheries, 2018.

Stock Group	Escapement Indicator Stock	CTC Goal	2018 Escapement	Goal met?	Obligation ¹	2018 CWT Index	Treaty Obligations Met? ²
North/ Central B.C.	Yakoun, Nass, Skeena, Area 8		NA ³	NA	0.635	N.A.	N.A.
WCVI Falls	Artlish, Burman, Kauok, Tahsis, Tashish, Marble		NA	NA	0.475	0.430	Yes
Upper Strait of Georgia	Klinaklini, Kakweikan, Wakeman, Kingcome, Nimpkish		NA	NA	0.635	0.197	Yes
Lower Strait of Georgia	Cowichan Nanaimo	6,500	14,773 NA	Yes NA	0.635 0.635	0.806 N.A.	Yes N.A.
Fraser Late	Harrison	75,100	46,094	No	0.268	0.235	No
Fraser Early (spring & summers)	Upper Fraser, Mid Fraser, Thompson		NA	NA	0.635	N.A.	N.A.
Puget Sound Spring	Nooksack Skagit		NA NA	NA NA	0.635 0.635	0.102 N.A.	Yes N.A.
Puget Sound Fall	Skagit Stillaguamish Snohomish Lake Washington Green		NA NA NA NA	NA NA NA NA	0.635 0.635 0.635 0.635	0.192 N.A. N.A. N.A.	N.A. Yes N.A. N.A.
						1.148	No

¹ General obligation (0.635) or additional obligation (1991–1996 ISBM rate average for the Party in whose waters the stock not meeting escapement goal originates), whichever is lower, for stocks listed in Annex 4, Chapter 3, Attachment IV.

² Annex 4, Chapter 3, Paragraph 8.

³ No data available.

During the 2009 PST Agreement period (2009–2018), Canadian ISBM indices exceeded the general obligation or additional obligation on 9 of 70 possible occasions (13%) for the indices that could be calculated (Table 4.2). The additional obligation rate of 0.475 for WCVI Falls was exceeded five times (2009, 2011, 2012, 2015, and 2017). The additional obligation rate of 0.268 for Harrison was exceeded once in 2017 and the stock did not meet its escapement goal that year. The general obligation rate for Green River was exceeded three times (2015, 2016, and 2018).

Table 4.2—Review of performance in the Canadian individual stock-based management (ISBM) fisheries under the 2009 PST Agreement.

Cases wherein the fishery met the obligation are colored in green whereas cases where the obligation was exceeded are colored in red. Cells are not colored in cases where a stock-year ISBM statistic cannot be calculated. The ISBM performance metrics reflect the combination of presence of an escapement goal and if so, whether or not it was met, and the CWT-based evaluation of exploitation rate as compared to the base years.

Stock Group	Stock (CTC agreed goal year)	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018 ¹
North/ Central B.C.	Yakoun, Nass, Skeena, Atnarko, Dean (no goal)	N.A.									
WCVI Falls	Artlish, Burman, Kauok, Tahsis, Tashish, Marble, Gold (no goal)	0.489	0.207	0.633	0.625	0.333	0.313	0.610	0.409	0.629	0.430
L. Georgia Strait	Cowichan (2005)	0.469	0.372	0.181	0.409	0.387	0.431	0.297	0.456	0.281	0.806
	Nanaimo (no goal)	N.A.									
U. Georgia Strait	Klinaklini, Kakweikan, Wakeman, Kingcome, Nimpkish (no goal)	0.200	0.365	0.091	0.143	0.086	0.079	0.211	0.207	0.235	0.197
Fraser Late	Harrison (2001)	0.062	0.083	0.069	0.125	0.138	0.185	0.142	0.182	0.272	0.235
Fraser Early (spring & summers)	Upper Fraser, Mid- Fraser, Thompson	N.A.									
Puget Sound Spring	Nooksack (no goal) ¹	0.147	0.029	0.134	0.056	0.069	0.086	0.084	0.095	0.082	0.102
	Skagit (no goal)	N.A.									
Puget Sound Falls	Skagit (no goal)	N.A.									
	Stillaguamish (no goal) ²	0.210	0.138	0.209	0.241	0.170	0.451	0.275	0.238	0.189	0.192
	Snohomish (no goal)	N.A.									
	Lake Wash. (no goal)	N.A.									
	Green River (no goal) ²	0.275	0.135	0.275	0.310	0.301	0.413	1.024	0.771	0.353	1.148

¹ 2018 ISBM indices for Canadian stock groups were calculated using 2019 ERA results and U.S. stock groups were calculated using 2020 ERA results.

4.1.2 U.S. ISBM Indices

Of the 15 U.S. ISBM indices that could be calculated from CWT data for 2018, 9 met the Treaty obligation (Table 4.3). Twelve of the 15 stocks have PSC-agreed escapement goals. Six of the stocks have PSC-agreed escapement goals that were met or exceeded, thus the general obligation did not apply in 2018 under the terms of the 2009 PST Agreement. Six stocks have PSC-agreed escapement goals that were not met, Harrison, Queets, Deschutes, Lewis, Nehalem, and Siuslaw; thus, either the general obligation or the additional obligation applies. In four of these six cases (Deschutes, Lewis, Nehalem, and Siuslaw), the treaty obligation was not met. The Canadian Harrison River stock has a PSC-agreed escapement goal which was not met in 2018, but the ISBM index (0.361) was below the general obligation for this stock. Of the three stocks without escapement goals, the general obligation was exceeded for two—the Nooksack and Green rivers.

A considerable proportion of the recoveries in the U.S. fisheries for Puget Sound stocks as well as the Fraser Late stock, the only Canadian stock included in Attachment V corresponding to U.S. ISBM fisheries, have occurred in mark-selective fisheries in which only clipped hatchery-origin fish are retained. Hence, CWT-based ISBM indices for these stocks should be viewed as maximum estimates because unmarked (wild) fish cannot be legally retained.

Table 4.3—Review of performance in the U.S. individual-stock based management (ISBM) fisheries, 2018.

Cases wherein the fishery met the obligation are colored in green whereas cases where the obligation was exceeded are colored in red. Cells are not colored in cases where a stock-year ISBM statistic cannot be calculated.

Stock Group	Escapement Indicator Stock	CTC Goal	2018 Escapement	Goal met?	Obligation ¹	2018 CWT Index	Treaty Obligation Met? ²
Fraser Late	Harrison	75,100	46,094	No	0.600	0.361	Yes
Puget Sound Spring	Nooksack	NA ³	NA	NA	0.600	0.958	No
	Skagit	NA	NA	NA	0.600	NA	NA
Puget Sound Natural Summer/ Falls	Skagit	NA	NA	NA	0.600	NA	NA
	Stillaguamish	NA	NA	NA	0.600	0.129	Yes
	Snohomish	NA	NA	NA	0.600	NA	NA
	Lake Washington	NA	NA	NA	0.600	NA	NA
	Green	NA	NA	NA	0.600	0.819	No
Washington Coastal Fall Naturals	Hoko	NA	NA	NA	0.600	NA	NA
	Grays Harbor	13,326	20,741	Yes	0.600	0.508	Yes
	Queets	2,500	2,095	Yes	0.600	0.600	Yes
	Hoh	1,200	1,638	Yes	0.600	0.380	Yes
	Quillayute	3,000	4,031	Yes	0.600	1.671	Yes
Columbia River Falls	Brights	40,000	74,994	Yes	0.600	1.069	Yes
	Deschutes	4,532	4,158	No	0.433	0.715	No
	Lewis	5,700	5,499	No	0.583	0.936	No
Columbia R. Summers	Col. R. Summers	12,143	38,816	Yes	0.600	7.237	Yes
	Nehalem	6,989	6,420	No	0.600	1.726	No

Stock Group	Escapement Indicator Stock	CTC Goal	2018 Escapement	Goal met?	Obligation¹	2018 CWT Index	Treaty Obligation Met? ²
Far North Migrating OR Coastal Falls	Siletz	2,944	4,929	Yes	0.600	3.804	Yes
	Siuslaw	12,925	4,481	No	0.600	4.138	No

¹ General obligation (0.600) or additional obligation (1991–1996 ISBM rate average for the Party in whose waters the stock not meeting escapement goal originates), whichever is lower, for stocks listed in Annex 4, Chapter 3, Attachment V.

² Annex 4, Chapter 3, Paragraph 8.

³ NA = Not available

During the 2009 PST Agreement period (2009–2018), ISBM indices for U.S. ISBM fisheries did not meet Treaty obligations in 27 out of a possible 150 occasions (18%) that could be calculated (Table 4.4). The general obligation was met for the Canadian Harrison River stock in all ten years. The general obligation for Nooksack spring was exceeded in 6 of 10 years (2010–2014 and 2018). For Puget Sound fall stocks, the general obligation was not met once in the Stillaguamish River (2014) and twice in the Green River (2015 and 2018); neither of these stocks have PSC-agreed escapement goals. For Washington Coast fall stocks, the general obligation was exceeded 7 of 10 years for Grays Harbor, which improved once the PSC-agreed escapement goal was put in place in 2014; and on one occasion in the Queets (2013) and Quillayute (2014) rivers. For the North Oregon Coast stock group, the general obligation was exceeded on three times for the Nehalem (2010, 2017, 2018), once for the Siletz (2009), and twice for the Siuslaw (2017 and 2018); all occasions when the escapement goal for these stocks were not met.

Table 4.4—Review of performance in the U.S. individual stock-based management (ISBM) fisheries under the 2009 PST Agreement.

Cases wherein the fishery met the obligation are colored in green whereas cases where the obligation was exceeded are colored in red. Cells are not colored in cases where a stock-year ISBM statistic cannot be calculated. The ISBM performance metrics reflect the combination of presence of an escapement goal and if so, whether or not it was met, and the CWT-based evaluation of exploitation rate as compared to the base years.

Stock Group	Stock (CTC agreed goal in year)	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Fraser Late	Harrison (2001)	0.136	0.295	0.285	0.351	0.442	0.380	0.283	0.173	0.285	0.361
Puget Sound Spring	Nooksack (no goal)	0.585	0.757	0.890	1.859	0.871	1.286	0.556	0.262	0.506	0.958
	Skagit (no goal)	N.A.									
Puget Sound Fall	Skagit (no goal)	N.A.									
	Stillaguamish (no goal)	0.210	0.192	0.199	0.168	0.236	0.753	0.279	0.176	0.188	0.129
WA Coast Falls	Snohomish (no goal)	N.A.									
	Lake Wash. (no goal)	N.A.									
WA Coast Falls	Green (no goal)	0.486	0.289	0.417	0.521	0.301	0.409	0.621	0.320	0.292	0.819
	Hoko (no goal)	N.A.									
	Grays (2014)	0.689	0.624	0.741	0.943	0.781	0.750	0.983	0.637	0.546	0.508
	Queets (2004)	0.662	0.482	0.701	1.030	0.926	0.518	0.278	0.416	0.739	0.600
	Hoh (2004)	1.003	0.839	1.753	1.590	2.642	1.257	1.211	0.254	1.227	0.380
Columbia Fall	Quillayute (2004)	1.821	1.377	1.693	1.961	1.782	2.579	2.034	1.080	2.179	1.671
	Brights (2002)	2.601	1.643	2.293	1.736	1.933	1.737	1.375	1.366	1.425	1.069
	Deschutes (2010)	0.816	0.695	0.770	0.772	0.794	0.758	0.698	0.785	1.026	0.715
Columbia Summers	Lewis (1999)	0.217	0.554	1.370	0.865	1.110	0.813	0.570	0.506	0.501	0.936
	Summers (1999)	4.063	6.056	9.148	5.050	5.373	6.313	5.633	6.764	6.301	7.237
	Nehalem (1999)	0.340	1.030	2.085	1.787	2.299	2.909	3.456	1.743	2.043	1.726
	Siletz (1999)	1.345	0.637	3.069	1.689	1.781	1.807	3.559	1.874	2.732	3.804
N. Oregon Coast	Siuslaw (1999)	1.389	1.395	2.244	1.522	2.388	1.882	2.519	2.630	2.616	4.138

N.A. = Not available

4.1.3 Paragraph 13 ISBM Analysis

An evaluation of ISBM performance under paragraphs 13(d) and 13(e) of the 2009 PST Agreement was first conducted by the CTC and reported in TCCHINOOK (11)-4 (CTC 2011). Because there is a 2-year time lag for when CWT data are available for some Southern U.S. stocks, this marks the final year where Paragraph 13 will be evaluated.

Paragraph 13(d) describes a situation when a stock can be identified as meeting the criteria to trigger additional management action, even if escapement exceeded the threshold, whereas Paragraph 13(e) describes a situation when a stock can be excluded from triggering additional management action, even when escapement is below the threshold (Figure 4.2). Paragraph 13(d) is evaluated only for the jurisdiction in which the stock originates. Paragraph 13(e) prevents a stock from being incorrectly identified as having not achieved its escapement-based management objective because a jurisdiction's ISBM fisheries exceeded the general obligation. The evaluation demonstrated that paragraphs 13(d) and 13(e) can be quantitatively evaluated using a common method since both require estimation of the spawning escapement that would have occurred if a jurisdiction's ISBM fishery impact was the same as the general obligation level.

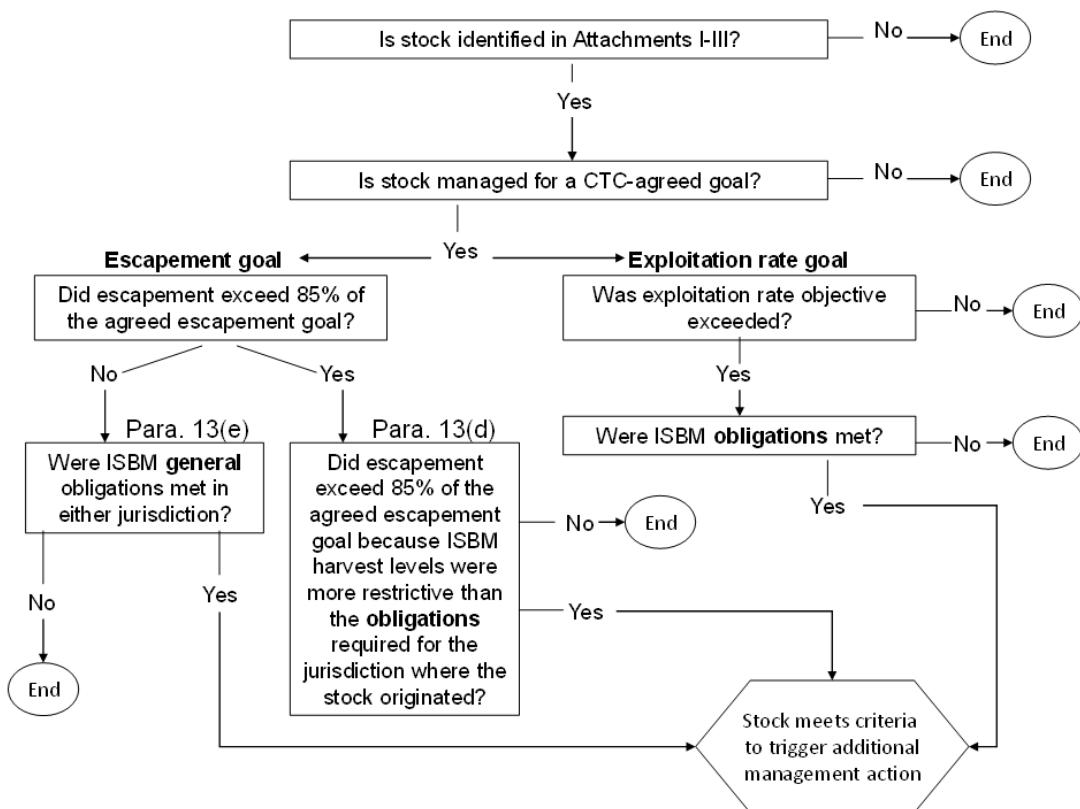


Figure 4.2—Diagram outlining the steps involved in a single-year evaluation of Paragraph 13(d) and 13(e) provisions in the 2009 PST Agreement pertaining to criteria for adjustment of individual stock-based management (ISBM) fisheries.

Accordingly, in 2012 the CTC developed a computer program (Paragraph13Evaluation.exe) to evaluate these provisions. The program uses CWT-based AEQ total mortality, external terminal harvest rates, CTC-agreed escapement goals, and age-specific escapement if available (if not, it derives average age-specific escapement from CWT recoveries). After computing average exploitation rates for the two base periods, 1979–1982 (i.e., general obligation, required for either jurisdiction) and 1991–1996 (i.e., additional obligation, required for the jurisdiction where the stock originated if it is more restrictive than the general obligation), the program estimates escapement that may have occurred if fishing were at the applicable obligation level. It provides detailed quantitative output for each stock and year and a summary for all stocks with CTC-agreed goals showing whether stocks were flagged under 13(d) or 13(e) and whether additional management action was needed. Equations and methods are described in detail in TCCHINOOK (11)–4 (CTC 2011). This program will enable the CTC to fulfill, if needed, Paragraph 13(f). The data needed for the program has three main limitations. First, the program can only perform post-season evaluations since it requires CWT data. Second, only six of the 12 stock groups can be evaluated on the basis of CTC-agreed escapement goals. Third, even when escapement data are available, the necessary AEQ total mortality data can be more than two years out of date, which prevents implementing Paragraph 13. For example, the evaluation for Paragraph 13(d) and (e) in this report will cover four of the eight stock groups in Attachments I–II (North Oregon Coastal Falls, Washington Coastal Fall Naturals, Columbia River Summers, and Columbia River Falls) through 2018. Management entities have not presented escapement goals meeting CTC-agreed data standards for the other stock groups (Upper Strait of Georgia, WCVI, NBC, and Fraser Early).

The evaluations of Paragraph 13(d) and (e) are shown in Table 4.5. This evaluation found that none of the indicator stocks or stock groups met the conditions requiring additional management actions. The evaluation for all four stock groups (North Oregon Coastal Falls, Columbia River Summers, Columbia River Falls, and Washington Coastal Falls) showed that annual evaluations were based on 13(d) because escapements all exceeded 85% of the corresponding escapement goals except Siuslaw River in 2017 and 2018.

Table 4.5—Evaluation of paragraphs 13(d) and 13(e) provisions for stock groups and indicator stocks listed in Attachments I and II of the 2009 PST Agreement. The last column shows if criteria were met for additional management actions (AMA) based on the evaluation for the last two years with data.

Stock Group	Indicator Stock	CTC Goal	13(d) or 13(e)	2016	2017	2018	AMA (last 2 years)
North Oregon Coastal Falls							
Nehalem	Nehalem	Yes	>85% Goal & 13(d)	No	No	No	
			<85% Goal & 13(e)	NA	NA	NA	
	Siletz	Yes	>85% Goal & 13(d)	No	No	No	
			<85% Goal & 13(e)	NA	NA	NA	
	Siuslaw	Yes	>85% Goal & 13(d)	No	NA	NA	
			<85% Goal & 13(e)	NA	No	No	
Columbia River Summers							
Mid-Col	Mid-Col	Yes	>85% Goal & 13(d)	No	No	No	
			<85% Goal & 13(e)	NA	NA	NA	
Columbia River Falls							
Up River Brights	Up River Brights	Yes	>85% Goal & 13(d)	No	No	No	
			<85% Goal & 13(e)	NA	NA	NA	
	Deschutes	Yes	>85% Goal & 13(d)	No	No	No	
			<85% Goal & 13(e)	NA	NA	NA	
	Lewis	Yes	>85% Goal & 13(d)	No	No	ND	
			<85% Goal & 13(e)	NA	NA	ND	
Washington Coastal Falls ^{2,3}							
Hoko	Hoko	No		ND	ND	ND	
	Grays Harbor	Yes	>85% Goal & 13(d)	No	No	ND	
			<85% Goal & 13(e)	NA	NA	NA	
	Queets	Yes	>85% Goal & 13(d)	No	No	ND	
			<85% Goal & 13(e)	NA	NA	NA	
	Quillayute	Yes	>85% Goal & 13(d)	No	No	ND	
			<85% Goal & 13(e)	NA	NA	NA	
Hoh	Hoh	Yes	>85% Goal & 13(d)	No	No	ND	
			<85% Goal & 13(e)	NA	NA	NA	

ND= No data available. NA= Not applicable.

4.2 ISBM FISHERY PERFORMANCE UNDER 2019 PST AGREEMENT

Under the 2019 PST Agreement paragraph 5(a), “U.S. and Canadian ISBM fisheries shall be managed to limit the total adult equivalent mortality for stocks listed in Attachment I that are not meeting agreed biologically-based management objectives, or that do not have agreed management objectives, to no more than the limits identified in Attachment I.” The calendar year exploitation rate (CYER) is the metric the PSC uses to monitor total mortality in ISBM fisheries and for limiting total AEQ mortality (paragraph 5(e)). The ISBM management framework is diagrammed in Figure 4.3. The CTC is tasked with evaluating ISBM fishery performance relative to the obligations set forth in paragraph 5 and 7 annually. Because the computation of the CYER metric is reliant on CWT recoveries, ISBM fishery performance is evaluated on a postseason basis when CWT data are available per paragraph 5(d).

4.2.1 ISBM Management Framework

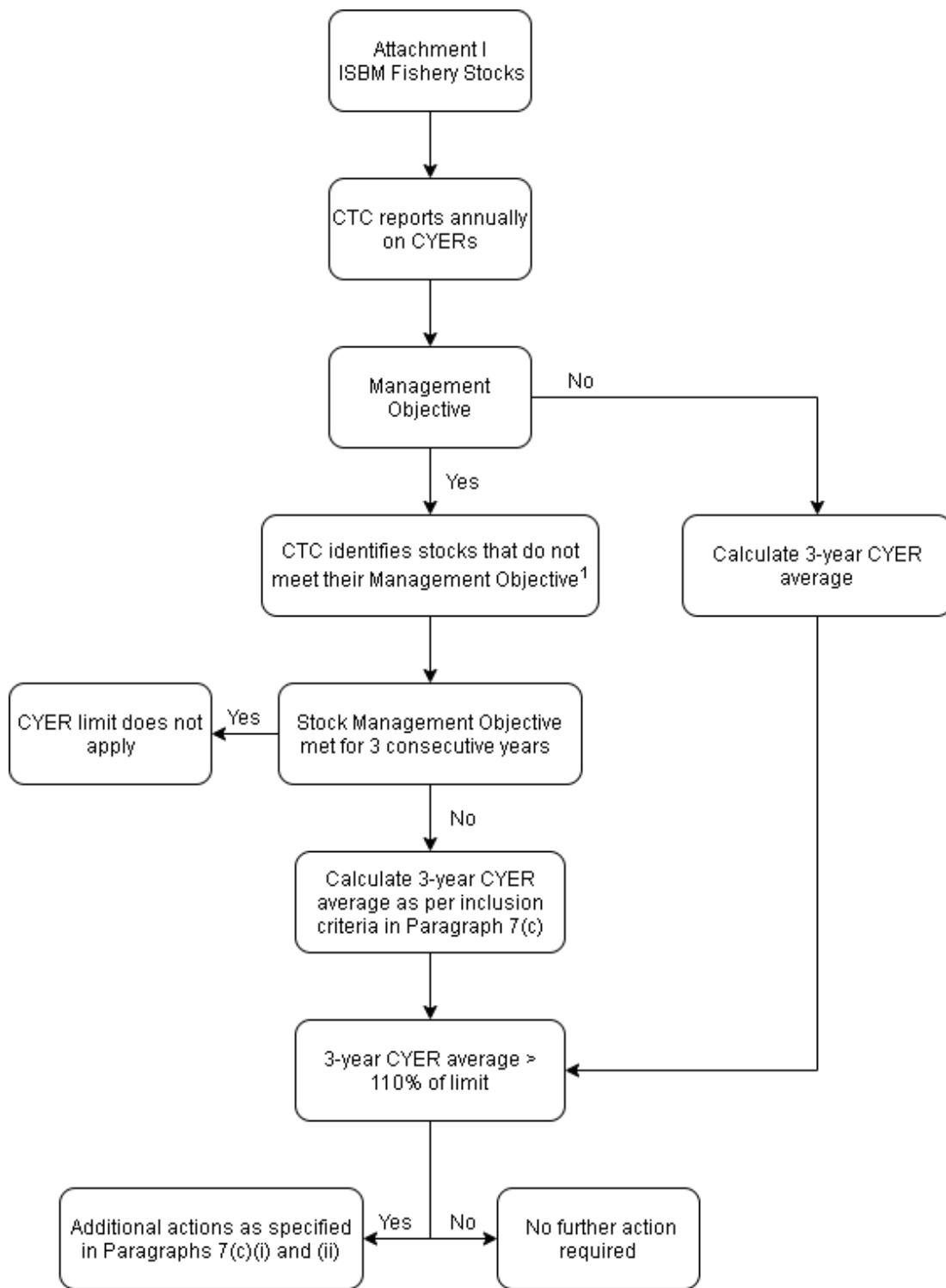
The CTC is required to annually compute and report the CYERs using the best available post-season data and analysis. Per paragraph 7(c), “[i]f a Party anticipates that there is a risk that it may exceed its CYER limit in a given year, that Party shall advise the Commission before the fishing season, provide supporting rationale and explain how the CYER limit shall be achieved on average over a three-year period.” Attachment I indicator stocks, management objectives, and CYER limits are shown in Table 4.6. SEAK and transboundary river stocks are not included in Table 4.6, as they are not subject to ISBM obligations. Transboundary river stocks are assessed under Chapter 1 of the PST Agreement.

Beginning with the 2019–2021 catch years, the CTC will calculate a 3-year running average of CYER for each stock listed in Attachment I (paragraph 7(c)). For stocks without an agreed management objective set out in Attachment I, the average includes all 3 past years. For stocks with an agreed management objective set out in Attachment I, the average uses the past 3 years during which the objective was either not met or the objective was met with a CYER less than the CYER limit. A stock is not meeting its management objective if the escapement is less than 85% of the point goal or lower end of its escapement goal range, or has a CYER that exceeds 115% of its CYER limit for stocks with an exploitation rate management objective. There are currently no exploitation rate management objectives set out in Attachment I.

If the 3-year running average CYER exceeds 110% of the CYER limit for stocks without an exploitation rate management objective, the Commission “shall request that the management entities responsible for the management of the ISBM fishery take necessary actions to minimize the deviation between the three-year CYER average and the CYER limits in Attachment I” (subparagraph 7(c)(i)). The Commission will discuss proposals from the management entities regarding actions that will be taken and expected outcomes prior to implementation.

Meanwhile, the CTC “shall provide to the Commission a plan to improve the performance of pre-season, in-season and other management tools so that the deviations between the CYERs and the CYER limits are narrowed to a maximum level of 10% when limits apply (Attachment I)” (subparagraph 7(c)(ii)).

In 2022, the PSC will review the CYER metric per paragraph 5(e) “to make a decision on its continued application or the use of an alternative metric. In the absence of a Commission decision to use an alternative metric, the use of the CYER metric continues.”



|Figure 4.3—Flow diagram depicting the sequence of steps for individual stock-based management (ISBM) fisheries management framework under the 2019 PST Agreement.

¹A stock is not meeting its management objective if the escapement is less than 85% of the point goal or lower end of its escapement goal range, or has a CYER that exceeds the management objective by more than 15% for stocks with an exploitation rate management objective.

Table 4.6—Attachment I indicator stocks, management objectives, and individual stock-based management (ISBM) limits applicable to ISBM obligations specified in paragraphs 1, 5, and 7.

Management objective of “TBD” is “to be determined” after CTC review (subparagraph 2(b)(iv)). To represent naturally spawning stocks, some exploitation rate indicators require adjustment (“adj”) for impacts of terminal fisheries targeting hatchery-origin fish.

Escapement Indicator	Exploitation Rate Indicator ¹	CDN ISBM CYER Limit	U.S. ISBM CYER Limit	Management Objective
Skeena	KLM	100% avg 2009-2015		TBD
Atnarko ^{2,3}	ATN	100% avg 2009-2015		5,009
NWVI Natural ⁴	RBT adj	95% avg 2009-2015		TBD
SWVI Natural ⁵	RBT adj	95% avg 2009-2015		TBD
E. Vancouver Is. N.	TBD, QUI adj	95% avg 2009-2015		TBD
Phillips	PHI	100% avg 2009-2015		TBD
Cowichan	COW	95% avg 2009-2015	95% avg 2009-2015	6,500
Nicola	NIC	95% avg 2009-2015	95% avg 2009-2015	TBD
Chilcotin	TBD	95% avg 2009-2015		TBD
Chilko	CKO	95% avg 2009-2015		TBD
Lower Shuswap ²	SHU	100% avg 2009-2015		12,300
Harrison	HAR	95% avg 2009-2015	95% avg 2009-2015	75,100
CDN Okanagan	SUM adj	NA ⁶	TBD	TBD
Nooksack Spring	NSF	87.5% avg 2009-2015	100% avg 2009-2015	TBD
Skagit Spring ²	SKF	87.5% avg 2009-2015	95% avg 2009-2015	690
Skagit Sum/Fall ²	SSF	87.5% avg 2009-2015	95% avg 2009-2015	9,202
Stillaguamish	STL	87.5% avg 2009-2015	100% avg 2009-2015	TBD
Snohomish	SKY	87.5% avg 2009-2015	100% avg 2009-2015	TBD
Hoko	HOK		10% CYER ⁷	TBD
Grays Harbor Fall	QUE adj		85% avg 2009-2015	13,326
Queets Fall	QUE		85% avg 2009-2015	2,500
Quillayute Fall	QUE adj		85% avg 2009-2015	3,000
Hoh Fall	QUE adj		85% avg 2009-2015	1,200
Upriver Brights	URB, HAN		85% avg 2009-2015	40,000
Lewis	LRW		85% avg 2009-2015	5,700
Coweeman	CWF		100% avg 2009-2015	TBD
Mid-Columbia Summers	SUM		85% avg 2009-2015	12,143
Nehalem	SRH adj		85% avg 2009-2015	6,989
Siletz	SRH adj		85% avg 2009-2015	2,944
Siuslaw	SRH adj		85% avg 2009-2015	12,925
South Umpqua	ELK adj		85% avg 2009-2015	TBD
Coquille	ELK adj		85% avg 2009-2015	TBD

¹ List of acronyms for exploitation rate indicators can be found in Table 2.1

² Agency escapement goal has the same status as CTC agreed escapement goal.

³ Atnarko escapement is in number of natural-origin spawners.

⁴ NWVI Natural Aggregate consists of Colonial-Cayeagle, Tashish, Artlish, and Kaouk.

⁵ SWVI Natural Aggregate consists of Bedwell-Ursus, Megin, and Moyeha.

⁶ Not Applicable since less than 15% of the recent total mortality was in these fisheries.

⁷ ISBM limit set at 10% in recognition of closure of the Hoko River to Chinook salmon fishing in 2009-2015

4.2.2 ISBM Performance Evaluation

Implementation of the newly revised PST Agreement began with fishing year 2019. As noted above, CWT recovery data were not available at the time of this analysis for some component sport fisheries that occurred during fishing year 2019. Thus, the CTC will begin fulfilling its annual reporting requirements regarding CYERs for evaluating ISBM fisheries performance per Chapter 3, paragraph 5 of the 2019 PST Agreement after the 2021 ERA is completed, which will allow the computation of 2019 CYERs for all stocks. Attachment I identifies CYER limits applicable to ISBM obligations for 31 stocks; of those 16 have management objectives⁴. The CTC conducted its evaluation of status towards achieving PSC-agreed management objectives for the 16 stocks in Attachment I with identified management goals for which CYER limits are applicable (CTC 2020). In 2019, 3 of the 16 stocks were below their escapement goals; of these 2 stocks (Harrison, Siuslaw) were more than 85% below and 1 stock (Atnarko) was within 85% of its escapement goals. Thus, for stocks with management objectives, CYER limits only apply to the Harrison and Siuslaw for 2019 per paragraph 7(c). After the 2023 ERA is completed, the CTC will compute 3-year average CYERs per paragraph 7(c).

⁴ Attachment I of the 2019 PST Agreement has a total of 38 stocks of which 31 are subject to ISBM obligations. There are currently 22 with management objectives and 16 of those are subject to ISBM obligations.

5. CWT ANALYSIS AND MARK-SELECTIVE FISHERIES

Chinook salmon released from Puget Sound hatcheries and spring-run hatchery Chinook salmon in the Columbia River have been mass marked since BY 1998. Mass marking of Columbia River fall Chinook salmon started with BY 2005, and for BY 2009 onwards most of the Chinook salmon production intended for harvest released in Washington and Oregon has been mass marked (SFEC 2009). Mark-selective fisheries have been in place on the Columbia River since 2001, in Puget Sound (including U.S. Strait of Juan de Fuca) since 2003, in some terminal fishing areas along the Oregon coast between 2002 and 2018 and Washington coast since 2006, and in B.C. Strait of Juan de Fuca since 2008. Additionally, small mark-selective Chinook salmon fisheries occurred in the ocean sport fishery off the Washington Coast (Areas 1–4) between 2010 and 2015 and in the Alaska troll fishery (during periods that would have otherwise been non-retention) during 2016 and 2017.

5.1 CATCH IN MSFs

Regulations for MSFs allow for the retention of salmon missing a fin (i.e., fish that are marked; usually the adipose fin is clipped to identify marked hatchery fish, but ventral fin clips have been used in B.C.) and require the release of fish with an intact adipose fin (i.e., fish that are unmarked). As a consequence, exploitation rates from MSFs are different between marked and unmarked Chinook salmon. The benefits of MSF regulations to reduce impacts on unmarked (e.g., natural) stocks relative to a non-selective fishery of equivalent effort depend on the proportion of the total number of fish available to the fishery that are marked (though not necessarily tagged).

Coded-wire tag analysis based on recoveries of marked and tagged Chinook salmon will only reflect the exploitation on the marked fish in an MSF. Because unmarked fish are not retained, and their CWTs not recovered, the exploitation rate of this group must be inferred using other analytical techniques. One method of estimating exploitation rates on unmarked fish is to express it as a function of the release mortality (RM) rate and encounter events of adipose fin clipped CWT fish in an MSF. As a stock is exposed to more MSFs, the difference in exploitation rate between marked and unmarked fish increases, and CWT analysis of marked Chinook salmon recoveries will likely overestimate the exploitation rate on the unmarked fish.

Subsequently, the assumption that marked and tagged hatchery fish can properly represent the exploitation rate on associated natural stocks has an increasing amount of error as the MSF exploitation rate increases on marked fish. Differences in return-to-escapement proportions between marked and unmarked components of a double index tag (DIT) release group can be tested for significance for stocks susceptible to all MSFs in aggregate.

As mass marking of hatchery production increased in Washington and Oregon, so did the gradual implementation of MSFs. Implementation of MSF regulations began in 2001 on the Columbia River. Landed catch in sport fisheries during the spring run migration period are now almost entirely under MSF regulations, with a lower proportion during the summer and fall run migrations (Figure 5.1). In 2012, the first fall period MSF occurred in the mainstem Columbia River sport fishery, although MSFs occurred in the tributaries prior to 2012. MSFs have

gradually increased during the summer/fall fisheries on the Columbia River, though the majority of the catches still occur under non-selective regulations.

Puget Sound sport fisheries (including U.S. Strait of Juan de Fuca) began implementing MSF regulations in 2003. Since then, the landed catch under MSF regulations has increased to equal nearly all the total landed catch of Chinook salmon in Puget Sound marine sport fisheries and a majority in freshwater fisheries (Figure 5.2).

In Oregon, an MSF occurred within the 15-fathom curve of Tillamook Bay from March through July. The sport MSF in this area began in 2002 and the commercial MSF began in 2011. These limitations ended after 2018. At time of landing, catch from both the mark-selective “Tillamook bubble” fishery and the nonselective fishery outside of the bubble is combined. Therefore, although numbers of landed catch and released Chinook are recorded, they cannot be assigned specifically to the individual MSFs occurring within the bubble.

In Canada, the Strait of Juan de Fuca MSF has occurred from about the beginning of March to about mid-June since 2008. These management measures were implemented for the protection of spring run Fraser Chinook. In 2019, the MSF opening from March 1 to April 19 allowed retention of marked Chinook only above 67 cm (nose-to-fork length) in subareas 19-1 to 19-4; and, in subareas 20-4 to 20-7 (those waters near Victoria between Cadboro Point to Sombrio Point, southern Vancouver Island). Between 45-67 cm, both marked and unmarked fish could be retained. The MSF ended on April 19, when a period of Chinook non-retention began in these areas. During these periods 1236 marked Chinook were retained, as well as 126 unmarked Chinook.

Beginning in 2010 and continuing through 2015, small-scale MSF fisheries for Chinook salmon on the Washington and Oregon coast (north of Cape Falcon, Oregon) occurred prior to the traditional summer period sport fishery. These 2-week sport MSFs north of Cape Falcon have started as early as May 30 and as late as June 18. From 2010–2015, landed catch was highest in 2012, with 7,382 hatchery Chinook salmon landed in Washington, and 290 landed in Oregon. Catch was lowest in 2015, with 1,135 hatchery Chinook salmon landed in Washington, and 36 landed in Oregon. In Washington, the number of released Chinook ranged from a low of 1,361 in 2015 to a high of 7,852 in 2012. In Oregon, the number of released Chinook ranged from a low of 11 in 2015 to a high of 1,039 in 2011. No Washington or Oregon mark-selective Chinook fisheries have occurred north of Cape Falcon since 2015.

Alaska held its first experimental Chinook MSF in a coho-directed troll fishery from September 4–30, 2016. During this fishery, 457 marked Chinook salmon were retained. In 2017, Alaska conducted a second experimental MSF from July 5–21, also occurring during a coho-directed troll fishery. In 2017, 2,680 marked Chinook salmon were retained. No MSFs have occurred in Alaska since 2017.

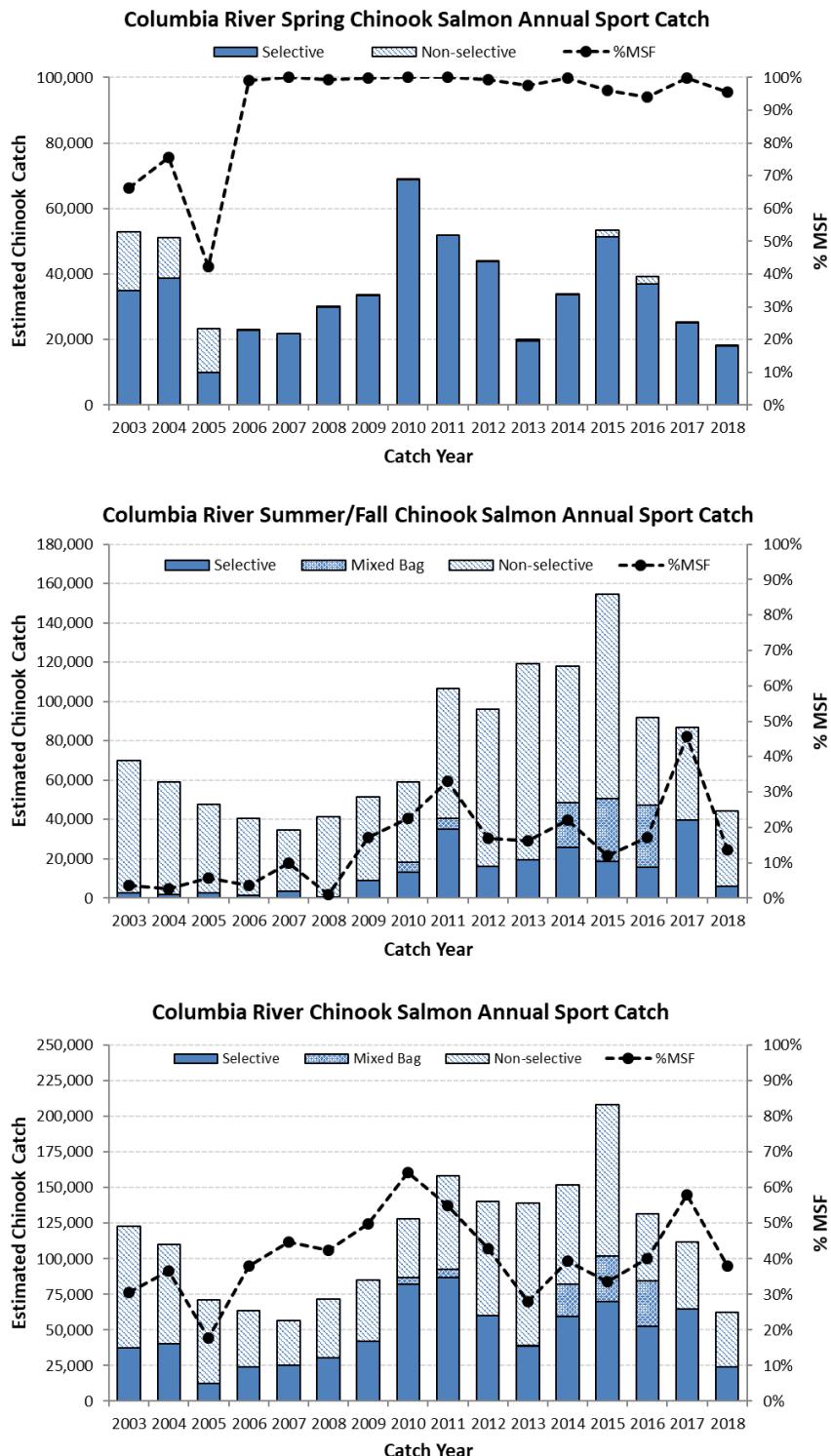


Figure 5.1—Estimated total Chinook catch in Columbia River mark-selective and non-selective sport fisheries during spring (May–Jun) and summer-fall (Jul–Dec) seasons (left y-axis) and percent of catch in mark-selective fisheries (MSFs) (right y-axis) for catch years 2003–2018.

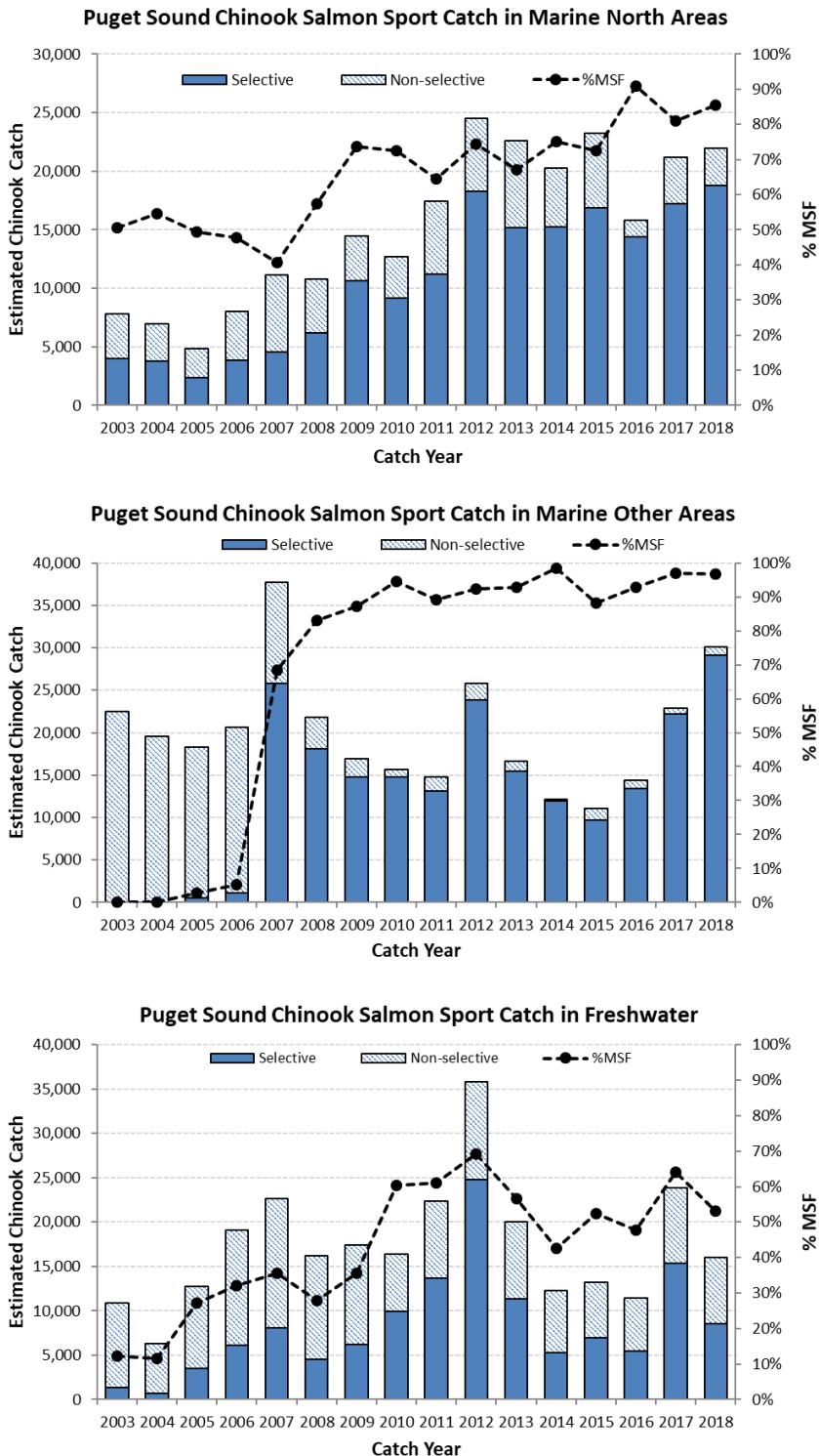


Figure 5.2—Estimated total Chinook catch in mark-selective and non-selective Puget Sound sport fisheries (left y-axis) and percent of catch in mark-selective fisheries (MSFs) (right y-axis) for catch years 2003–2018.

As an alternative to pure MSFs, some agencies have implemented “mixed” bag limit regulations whereby different proportions of marked to unmarked fish are allowed in the landed catch. In the most common configuration, mixed bag limits allow no more than 1 unmarked fish to be retained as part of the total bag limit. Since 2006, mixed bag MSFs have occurred in some terminal fishing areas along the Oregon and Washington coasts and in the B.C. portion of the Strait of Juan de Fuca. In 2011 and 2013, sport fisheries in the upper Columbia River for summer Chinook salmon were implemented under mixed-bag limit regulations. In recent years, Canada has implemented a variation of a mixed bag limits in the marine areas around the southern tip of Vancouver Island by allowing only hatchery-marked fish to be retained above a certain fork length measurement. The benefits of reduced exploitation on unmarked (e.g., natural) stocks is usually minor (e.g., Figure 5.3) for mixed bag limit fisheries but mixed bag limits do allow for additional retention of hatchery origin fish (R. Houtman, personal communication, August 16, 2021).

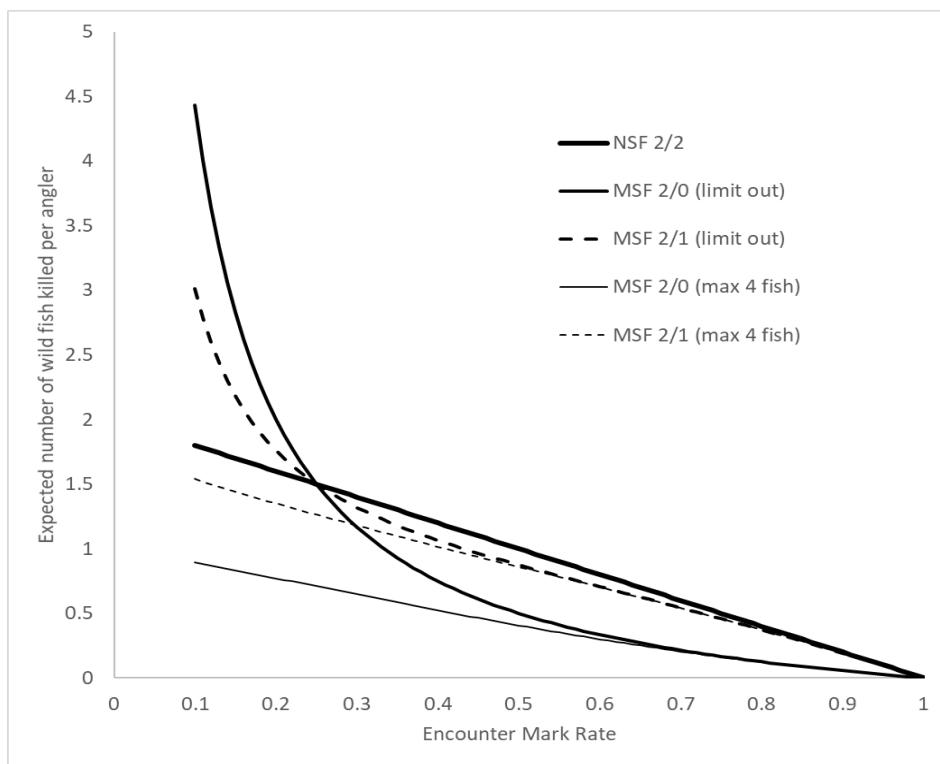


Figure 5.3—Average number of wild fish killed under alternative mark-selective fishery (MSF) regulations, with release mortality rate equal to 0.25.

Regulation notations show total Chinook daily bag limits / total daily limit of wild Chinook (i.e., unmarked). For example, a notation of 2/1 means fishers can retain up to 2 Chinook of which a maximum of 1 can be unmarked. Lines described as “limit out” are for cases when fishers keep fishing until their bag limit is reached. Lines described as “max 4 fish” are for cases where fishers encounter four fish maximum and end their fishing trip, regardless of meeting bag limits. There is minor savings of the 2/1 regulation over the 2/2 regulation.

5.2 METHODS TO ESTIMATE THE IMPACT OF MSFs ON UNMARKED CHINOOK SALMON STOCKS

The magnitude of impact of an MSF relative to the total exploitation of a stock can be measured using the percentage of the total landed catch in net, sport, and troll fisheries of tagged and marked PSC indicator stocks that occurs in MSFs. Percentages were calculated for the PSC indicator stocks (Table 5.1) by summarizing CWT recovery records obtained through a query of the Regional Mark Information System (RMIS) database according to three code values present in the adclip_selective_fishery data field – “N” for recoveries caught under non-selective fishery regulations, “S” for recoveries caught under MSF regulations, and “M” for recoveries caught under mixed-bag regulations. Figure 5.4 shows that, for stocks originating in Puget Sound, the proportion of marked harvest in MSFs for regional groupings of CWT indicator stocks increased from 2003 to 2012, then made a moderate decline. Use of the adclip_selective_fishery recovery field was the only feasible means of calculating the percentages, however, the accuracy of this field likely varies regionally. For example, CWT recoveries from the B.C. Juan de Fuca sport fishery have all been assigned the code “N” (for non-selective) regardless of whether MSF or mixed-bag regulations were in effect when and where individual recoveries were obtained. Thus, for stocks intercepted in the B.C. Juan de Fuca sport fishery, the percentages presented in Table 5.1 and Figure 5.4 are likely biased low.

5.2.1 Double Index Tag Methods

PSC indicator stocks that have been double index tagged may be used to evaluate the impact of MSFs on the unmarked stocks represented by the unmarked tag group in a DIT pair. A DIT group consists of at least two tag groups, one with the mass mark (or adipose fin clip) and one without the mark. These two tag groups are treated identically except for the mark, and differences in mortality should be due to the MSFs—assuming there is no mark mortality occurring prior to recruitment to the fisheries. A comparison of the unmarked-to-marked ratio, referred to as lambda (λ), at release and at escapement can be used in a test of the null hypothesis that there is no difference in proportional return of marked and unmarked groups. A positive test statistic occurs when a statistically higher proportion of unmarked fish return to hatchery escapement; this is consistent with the larger harvest of marked fish compared to unmarked fish through MSFs. A negative test statistic occurs when an equal or higher proportion of marked fish return, which could be indicative of sampling problems in the hatchery (i.e., the sampling procedure fails to detect all CWTs from unmarked fish present in the sample), or incorrect assumptions about release mortality rates, multiple encounters, or mark recognition errors. This is a concern when patterns occur over many BYs for a stock or hatchery. If stock-specific MSF impacts are small, then random variation in the CWT sampling procedures or simply random variability in processes, like survival, could result in both positive and negative test statistics in a random pattern across broods.

Table 5.1—Estimated landed catch of tagged and marked Pacific Salmon Commission (PSC) Chinook indicator stocks in B.C., Washington, and Oregon, in all net, troll, and sport fisheries for catch years 2009–2018 and the percent of the total tagged and marked catch landed in MSFs.

Note: percentages are based off the regional mark information system (RMIS) ‘adclip_selective_fishery’ field and do not include recoveries in mixed-bag fisheries.

STOCK	2009		2010		2011		2012		2013		2014		2015		2016		2017		2018	
AK Hatcheries	2,945	0%	2,134	0%	2,381	0%	2,364	0%	3,035	0%	2,559	0%	3,563	0%	2,481	0%	2,598	4%	1,250	0%
Chilkat	31	0%	61	0%	63	0%	41	0%	17	0%	36	0%	42	0%	3	0%	10	0%	17	0%
Stikine	58	0%	43	0%	73	0%	82	0%	45	0%	65	0%	46	0%	33	0%	51	0%	2	0%
Taku	73	0%	18	0%	39	0%	28	0%	20	0%	16	0%	51	0%	17	0%	19	0%	8	0%
Unuk	79	0%	90	0%	79	0%	80	0%	61	0%	67	0%	69	0%	64	0%	17	0%	63	0%
SOUTHEAST ALASKA Total	3,187	0%	2,347	0%	2,635	0%	2,596	0%	3,178	0%	2,743	0%	3,770	0%	2,597	0%	2,694	4%	1,340	0%
Atnarko Spring	0	0%	1	0%	42	0%	411	0%	666	0%	502	0%	466	0%	156	0%	17	0%	0	0%
Atnarko Summer	330	0%	238	0%	323	0%	312	0%	746	0%	1,006	0%	2,004	0%	1,303	0%	737	2%	665	0%
Big Qualicum	163	2%	156	0%	130	0%	211	2%	214	2%	844	1%	591	0%	504	2%	148	0%	71	0%
Chilliwack	689	4%	1,469	6%	1,003	9%	1,256	12%	3,675	7%	2,816	5%	1,572	4%	1,385	1%	1,767	2%	1,447	1%
Cowichan Fall	280	0%	476	3%	766	7%	1,551	5%	1,456	5%	1,400	3%	542	2%	864	4%	1,049	5%	2,035	1%
Nicola River Spring	88	4%	200	4%	98	0%	215	0%	158	0%	25	0%	248	0%	226	0%	139	0%	227	1%
Puntledge Summer	116	0%	129	0%	99	0%	64	0%	66	0%	131	0%	82	7%	127	0%	155	0%	155	0%
Quinsam Fall	140	0%	201	0%	309	0%	266	0%	164	0%	116	0%	395	0%	941	0%	984	0%	823	0%
Robertson Creek	800	0%	342	0%	1,513	0%	1,113	0%	412	0%	793	1%	1,555	0%	2,569	0%	3,901	0%	6,014	0%
Lower Shuswap River Summers	724	0%	862	0%	746	1%	695	2%	2,543	1%	1,917	1%	1,465	1%	752	1%	1,145	5%	1,457	1%
Chehalis (Harrison Fall Stock)	280	8%	442	7%	591	6%	321	12%	646	13%	635	5%	358	3%	385	2%	727	4%	566	2%
Kitsumkalum Summer	174	0%	241	0%	186	0%	75	0%	65	0%	91	0%	163	0%	216	0%	119	3%	22	0%
BRITISH COLUMBIA Total	3,790	2%	4,757	3%	5,806	3%	6,489	4%	10,811	4%	10,276	2%	9,441	1%	9,427	1%	10,888	2%	13,482	1%
Nooksack Spring Fingerling	305	6%	410	5%	219	4%	250	8%	404	6%	748	7%	456	6%	470	2%	830	3%	628	3%
Samish Fall Fingerling	866	10%	1,191	9%	819	4%	1,425	6%	1,160	7%	988	12%	563	7%	439	7%	984	4%	591	5%
Skagit Spring Fingerling	457	34%	615	23%	556	29%	804	25%	551	5%	526	12%	264	18%	643	17%	964	10%	850	8%
Skagit Spring Yearling	216	37%	202	42%	343	52%	465	43%	178	17%	229	8%	30	34%	0	0%	0	0%	0	0%
Skagit Summer Fingerling	505	4%	220	1%	288	11%	101	3%	143	5%	187	6%	273	8%	403	7%	604	8%	551	15%
Skykomish Summer Fingerling	85	39%	76	26%	188	56%	382	16%	212	16%	115	34%	181	31%	490	26%	323	26%	173	26%
Stillaguamish Fall Fingerling	275	10%	355	12%	427	10%	214	15%	225	20%	589	26%	188	20%	237	14%	359	21%	461	14%
NORTH PUGET SOUND Total	2,711	16%	3,070	14%	2,840	20%	3,640	16%	2,871	9%	3,381	14%	1,955	12%	2,683	13%	4,064	9%	3,254	10%

-continued-

Table 5.1—Page 2 of 2.

STOCK	2009		2010		2011		2012		2013		2014		2015		2016		2017		2018	
George Adams Fall Fingerling	523	23%	961	18%	1,021	35%	1,717	32%	788	32%	739	22%	773	23%	906	24%	1,614	15%	1,953	14%
Green River Fall Fingerling	643	10%	289	19%	473	24%	360	29%	209	28%	119	17%	238	26%	266	32%	802	22%	991	19%
Grovers Creek Fall Fingerling	560	22%	590	33%	379	32%	940	30%	615	25%	641	33%	553	26%	510	44%	531	31%	780	38%
Nisqually Fall Fingerling	866	12%	999	18%	588	29%	748	44%	894	23%	507	23%	363	18%	528	26%	1,692	19%	926	21%
S. Puget Sound Fall Yearling	115	58%	53	61%	225	49%	180	45%	31	44%	6	100%	4	0%	2	0%	0	0%	0	0%
SOUTH PUGET SOUND Total	2,707	18%	2,892	22%	2,685	32%	3,945	34%	2,537	27%	2,012	26%	1,932	23%	2,213	30%	4,638	19%	4,650	21%
Hoko Fall Fingerling	84	5%	78	0%	209	4%	153	5%	175	19%	292	5%	301	14%	231	15%	275	6%	323	10%
Queets Fall Fingerling	941	0%	1,135	0%	1,460	0%	1,989	0%	1,135	0%	1,188	1%	907	0%	856	4%	344	4%	887	0%
Tsoo-Yess Fall Fingerling	163	0%	94	6%	281	2%	185	0%	78	3%	109	0%	265	14%	254	1%	81	13%	169	8%
WASHINGTON COAST Total	1,188	0%	1,307	0%	1,950	1%	2,326	0%	1,388	3%	1,588	1%	1,472	5%	1,341	5%	699	6%	1,379	3%
Columbia Lower River Hatchery	328	6%	1,056	4%	444	4%	513	12%	290	7%	1,676	5%	818	6%	227	5%	410	3%	387	2%
Columbia Summers	2,110	6%	3,340	5%	2,694	10%	3,219	10%	3,328	34%	5,597	35%	7,206	5%	6,412	17%	3,683	15%	3,121	8%
Cowlitz Fall Tule	128	5%	213	5%	126	2%	140	8%	110	10%	187	40%	154	25%	233	7%	190	12%	126	40%
Hanford Wild	202	0%	231	3%	317	0%	452	1%	892	1%	1,243	0%	945	2%	846	1%	462	14%	74	3%
Lewis River Wild	99	0%	54	7%	160	5%	128	0%	157	32%	114	1%	98	2%	63	0%	24	15%	78	3%
Lyons Ferry	542	12%	923	15%	752	13%	1,067	19%	1,320	18%	996	8%	809	3%	898	7%	589	7%	207	7%
Spring Creek Tule	1,268	5%	2,599	2%	1,536	2%	1,712	5%	1,840	5%	3,665	2%	5,054	2%	1,627	2%	1,874	2%	1,130	1%
Upriver Brights	737	1%	657	8%	1,649	0%	2,363	0%	7,611	1%	7,944	1%	4,988	2%	4,583	1%	2,385	12%	876	2%
Willamette Spring	1,403	52%	4,137	78%	3,880	82%	2,882	68%	2,314	76%	4,936	58%	7,234	57%	2,767	52%	1,468	41%	1,691	78%
COLUMBIA RIVER Total	6,816	15%	13,211	28%	11,558	31%	12,476	21%	17,862	19%	26,359	20%	27,307	18%	17,657	15%	11,085	14%	7,688	22%
Elk River	990	0%	1,223	0%	925	0%	1,257	1%	2,916	1%	2,096	0%	2,686	0%	2,432	1%	953	2%	651	0%
Salmon River	1,417	0%	2,445	0%	2,742	0%	2,321	0%	3,514	2%	4,581	0%	5,439	0%	4,281	0%	1,615	3%	749	0%
OREGON COAST Total	2,407	0%	3,667	0%	3,668	0%	3,578	1%	6,430	2%	6,677	0%	8,125	0%	6,713	1%	2,568	3%	1,400	0%

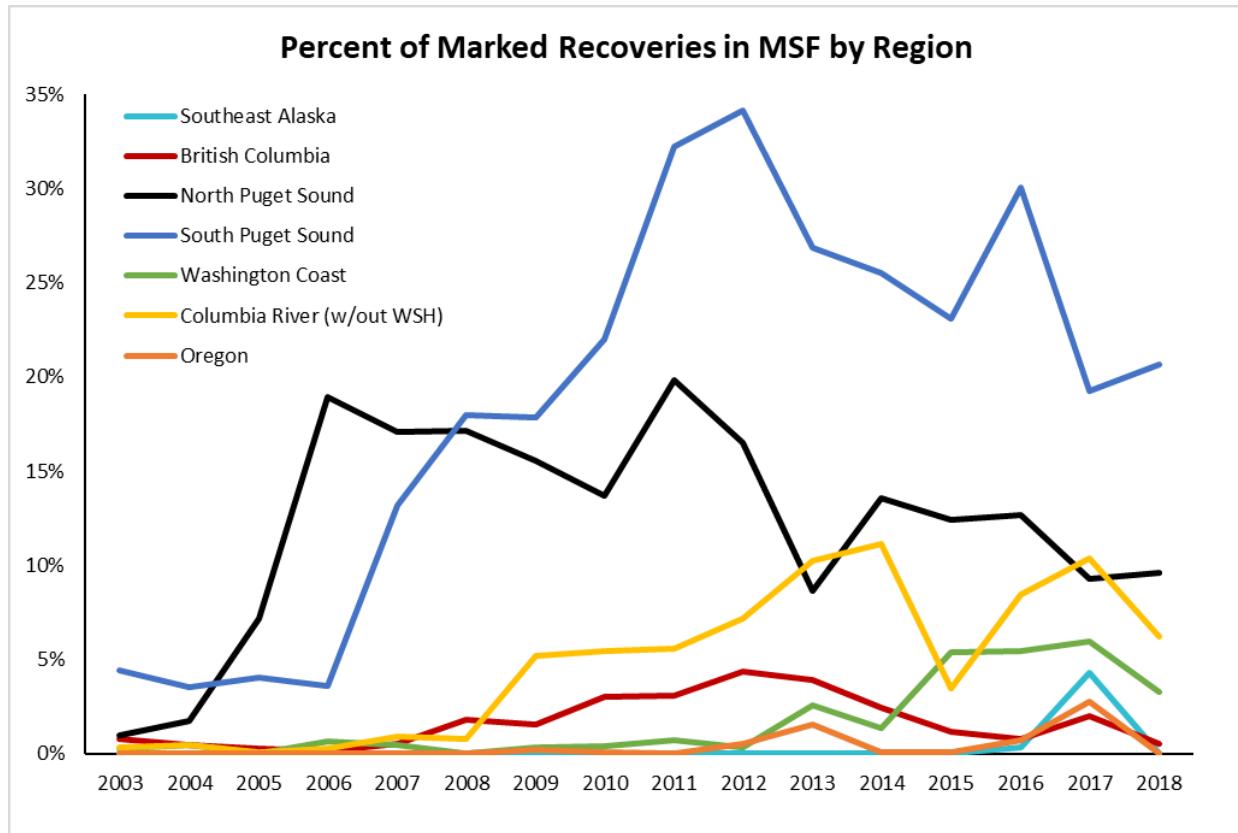


Figure 5.4—Percent of total fishery coded-wire tag (CWT) recoveries in mark-selective fisheries (MSFs) for regional groupings of Chinook indicator stocks, 2003–2018.

Note: percentages are based off the regional mark information system (RMIS) ‘adclip_selective_fishery’ field and do not include recoveries in mixed-bag fisheries. The Columbia River group does not include the Willamette River Spring stock.

5.2.2 Single Index Tag Methods

Techniques to estimate reduced fishing impacts of MSFs have largely involved DIT programs. However, this is a substantial issue for many of the stocks in B.C. or Alaska that do not currently have DIT programs, and for locations where DIT programs proved impractical (i.e., Chilliwack, Lower Shuswap, and Cowichan). Given these circumstances, an approach was developed in 2018 (CTC 2018) to estimate mortality distributions for natural stocks that have single index tag (SIT) indicator stocks under conditions where the MSF impacts mainly occur on mature SIT fish proximal to their terminal area. The method was applied to three SIT stocks from the Fraser River [Nicola (NIC), Lower Shuswap (SHU), and Middle Shuswap (MSH)].

The approach uses SIT CWT recoveries in MSFs to represent the number of unmarked pseudo-CWT fish encountered and released in the fishery and these pseudo-CWTs are multiplied by the survival rate ($Surv_{s,f} = 1 - RM_{s,f}$), where RM is the release mortality rate for legal-sized fish released in the fishery (e.g., 12.3% for ocean sport fisheries, CTC 2021b). The pseudo-CWT MSF survivors are subtracted from fishery-specific Total Mortality AEQ CWTs in the mortality

distribution tables (MDT) and then added to the terminal run fisheries and escapement, since these are assumed to be mature fish that are encountered on their return migration:

$$MSF\ Survivors_{s,f,CY} = (CWT\ Recoveries_{s,f,CY} * Surv_f) \quad \text{Equation 4.1}$$

The estimated incidental CWT mortalities in these fisheries were not adjusted because those values represent the sum of release mortalities based on the minimum size limit and drop-off mortalities, and these impacts would be the same for marked and unmarked fish. After passage through the MSFs, the pseudo-CWT survivors were assumed to not be encountered in subsequent ocean fisheries and they were assumed to survive to the river mouth. Further analysis would be needed to represent additional mortalities due to multiple encounters in ocean fisheries. The pseudo-CWT survivors were then distributed to the terminal fisheries and escapement by using the proportions from the original MDTs, thus some of the pseudo-CWT survivors were harvested in terminal fisheries. Additional adjustments would be needed for any terminal MSFs; however, all the Fraser River terminal fisheries were NSF from 2008–2019, and for the 2002 MSF at the mouth of the Nicola River, the pseudo-CWT survivors were added to the escapement.

The MSFs in marine waters of southern B.C. and Washington have occurred mainly during the period when Fraser spring and summer stocks return to the Fraser River and there have been very few CWT recoveries outside of this timeframe (CTC 2018). In comparison, the Fraser fall stocks have been encountered throughout the year in these areas and there are more frequent CWT recoveries of age-2 and -3 fish (CTC 2018; Table 5.2–Table 5.8). The differences in the CWT recovery patterns by age indicate the MSFs in these areas encounter both immature and mature fish from the Fraser fall stocks, but mainly mature fish from the Fraser spring and summer stocks. Accordingly, this approach for SIT stocks was not appropriate for or applied to the fall stocks.

The MSF CWT recoveries were identified using a different approach for U.S. fisheries than Canadian fisheries because each country identifies MSF CWT recoveries differently in the RMIS and Mark Recovery Program (MRP) databases. For U.S. fisheries, the RMIS *adclip_selective* field identified MSF CWT recoveries; however, the Canadian MSF CWT recoveries cannot be identified correctly using this field. Thus, for Canadian MSFs, the DFO annual fishing plans and DFO Fishery Notices were reviewed to identify when and where MSF regulations were used. All Canadian ocean MSFs occurred in the Juan de Fuca (JDF) sport fishery (2008–2019), or in the Nicola River mouth sport MSF in 2002. For the Fraser spring and summer stocks, all U.S. MSF CWT recoveries occurred in sport fisheries either in Puget Sound or the North of Falcon areas.

For the Canadian JDF sport fishery, both MSF and NSF regulations were used for specific dates, fishery management subareas, and fish length categories; this necessitated the review of date, area, and fish length data for every JDF Sport CWT recovery with respect to the regulations described in the DFO Fishery Notices. Some JDF Sport recoveries had incomplete date, location, or fish length data. One recovery was within the time period and size range of the MSF, but the area recorded (Pacific Fishery Management Area [PFMA] 20) omitted the subarea, and the MSF regulations occurred only in some subareas of PFMA 20. Two CWT recoveries were recorded in PFMA 20-7 (near Sooke, an area located west of Victoria, southern Vancouver Island), which was assumed to be part of the MSF area as described by points of land identifying the MSF

regulation area in the Fishery Notice although 20-7 was not one of the subareas listed in the Fishery Notice. Length was not recorded for 12 recoveries, 4 in 2017 and 3 in 2018, that were identifiable to the times and locations of the MSF regulations. Because these recoveries could not be accurately identified as caught in the MSF or NSF, the data analysis proceeded with two assumptions resulting in two MDTs. First all of the incomplete data recoveries were assumed to have been caught in the MSF. Second, all of these recoveries were assumed to be caught in the NSF. Reporting both sets of data provide a range of the MSF impacts and captures some of the uncertainty due to incomplete data recording. Among the CWT recoveries with dates during the MSF periods, 3 of 7 Nicola CWTs, 4 of 6 Middle Shuswap CWTs and 5 of 13 Lower Shuswap CWTs had incomplete data.

The percentages between the original MDTs (representing the marked fish) and new MDTs (representing unmarked fish) were used to estimate the reduction in fisheries impacts and increased escapement for unmarked fish (Table 5.2–Table 5.8). Mortality Distribution Table ERs did not change for other ocean NSFs. The average adjustments were minor, 0.5% or less, to the MDTs for these stocks in the MSFs, terminal fisheries, and escapement (Table 5.8). These minor adjustments reflect the relatively small proportion of the total mortality that was measured in MSFs, similar to the findings for the analysis of several of the DIT stocks in Section 4.2.1 (Table 5.3). The largest adjustments occurred when the CWT recoveries with incomplete data were assumed to have been caught in MSFs (Table 5.8).

Table 5.2—Percent distribution of Nicola River adult equivalent (AEQ) total fishing mortalities and escapement to represent unmarked fish when recoveries with incomplete data were assumed to have been caught in non-selective fisheries (NSFs).

Note: Troll, Net, and Sport (T, N, S) were combined for Southeast Alaska (SEAK), Northern B.C. (NBC), and West Coast Vancouver Island (WCVI) aggregate abundance-based management (AABM) fisheries; South of Falcon individual stock-based management (ISBM); and SEAK and Southern U.S. Terminal. The green shading identifies the calendar year exploitation rates (CYER) values where mark-selective fisheries (MSFs) did not change from the original mortality distribution tables (MDTs) for the marked stock and the yellow shading identifies revised CYERs.

Catch Year	Est # of CWT	Ages	AABM Fishery			ISBM Fishery								Terminal Fishery			Escapement	
			SEAK T,N,S	NBC T,S	WCVI T,S	NBC & CBC T,N,S	Southern B.C. T N S	N Falcon T S	S Falcon T & S	WAC N	Puget Sd N S	SEAK T,N,S	Canada N S	U.S. South T,N,S	Stray	Esc.		
2002	2319	3,4,5,6	0.0	1.8	0.6	0.2	0.0 0.0	1.1	0.7 0.2	0.1	0.0 0.0	0.0	0.0 4.0	0.6	0.0	0.0	90.6	
2008	624	3,4,5,6	0.0	2.1	0.0	0.0	0.0 0.0	4.0	2.2 0.3	0.0	0.0 0.0	0.0	0.0 11.4	3.5	0.5	0.0	76.0	
2009	293	3,4,5,6	0.0	0.3	0.0	0.0	0.0 0.0	8.2	3.4 0.0	0.0	0.0 0.0	0.0	0.0 19.0	20.4	0.0	0.0	45.9	
2010	2328	3,4,5,6	0.4	1.7	0.1	0.0	0.0 0.0	1.8	0.8 0.0	0.0	0.0 0.0	0.0	0.0 4.6	0.0	0.0	0.0	90.5	
2011	683	3,4,5,6	0.0	0.9	0.4	0.0	0.0 0.4	4.4	2.0 0.3	0.0	0.0 0.0	0.0	0.0 3.8	2.5	0.0	0.0	83.7	
2012	724	3,4,5,6	0.0	1.4	0.0	0.0	0.0 0.6	4.3	8.1 0.0	0.6	0.0 0.0	0.0	0.0 17.1	0.8	0.0	0.0	67.1	
2013	1466	3,4,5,6	0.0	1.2	0.2	0.2	0.0 0.5	4.6	3.3 0.3	0.0	0.0 0.0	1.0	0.0 1.6	0.0	0.0	0.0	87.0	
2014	436	3,4,5,6	0.0	0.0	2.1	0.0	0.0 1.6	0.9	1.6 0.0	0.0	0.0 0.0	0.0	0.0 9.2	0.9	0.0	0.0	83.7	
2015	1549	3,4,5,6	0.0	0.5	0.3	0.0	0.0 0.9	3.1	0.9 0.2	0.0	0.0 0.2	0.6	0.0 10.0	0.0	0.0	0.0	83.4	
2016	974	3,4,5,6	0.2	1.7	0.9	0.0	0.0 0.7	10.3	1.0 0.0	0.0	0.0 0.0	0.0	0.0 10.1	0.0	0.0	0.0	75.1	
2017	1086	3,4,5,6	0.0	1.0	1.2	0.0	0.0 0.2	2.4	1.8 0.0	0.0	0.0 0.0	0.0	0.0 7.7	0.0	0.0	0.0	85.6	
2018	927	3,4,5,6	0.0	0.3	1.1	0.0	0.0 1.2	3.1	1.5 0.0	0.0	0.0 0.3	0.4	0.0 17.3	0.0	0.0	0.0	74.8	
2019	1263	3,4,5,6	0.0	0.0	0.0	0.0	0.0 0.6	1.0	0.8 1.0	0.0	0.0 0.0	0.1	0.0 2.0	0.0	0.0	0.0	94.7	
99-08	1259	3,4,5,6	0.0	1.4	1.6	0.0	0.0 0.0	3.1	0.8 0.1	0.1	0.0 0.0	0.0	0.0 12.1	6.9	0.0	0.0	73.9	
09-19	1066	3,4,5,6	0.1	0.8	0.6	0.0	0.0 0.6	4.0	2.3 0.2	0.1	0.0 0.0	0.6	0.0 9.3	2.2	0.0	0.0	79.2	

Table 5.3—Percent distribution of Nicola River adult equivalent (AEQ) total fishing mortalities and escapement to represent unmarked fish when recoveries with incomplete data were assumed to have been caught in mark-selective fisheries (MSFs).

Note: Troll, Net, and Sport (T, N, S) were combined for Southeast Alaska (SEAK), Northern B.C. (NBC), and West Coast Vancouver Island (WCVI) aggregate abundance-based management (AABM) fisheries; South of Falcon individual stock-based management (ISBM); and SEAK and Southern U.S. Terminal. The green shading identifies the calendar year exploitation rate (CYER) values where MSFs did not change from the original mortality distribution tables (MDTs) for the marked stock and the yellow shading identifies revised CYERs.

Catch Year	Est # of CWT	Ages	AABM Fishery			ISBM Fishery								Terminal Fishery			Escapement				
			SEAK T,N,S	NBC T,S	WCVI T,S	NBC & CBC T,N,S	Southern B.C.			N Falcon T	S Falcon S	WAC T & S	Puget Sd N	SEAK T,N,S	Canada N	U.S. South S	Stray	Esc.			
2002	2319	3,4,5,6	0.0	1.8	0.6	0.2	0.0	0.0	1.1	0.7	0.2	0.1	0.0	0.0	0.0	4.0	0.6	0.0	0.0	90.6	
2008	624	3,4,5,6	0.0	2.1	0.0	0.0	0.0	0.0	4.0	2.2	0.3	0.0	0.0	0.0	0.0	11.4	3.5	0.5	0.0	76.0	
2009	293	3,4,5,6	0.0	0.3	0.0	0.0	0.0	0.0	8.2	3.4	0.0	0.0	0.0	0.0	0.0	19.0	20.4	0.0	0.0	45.9	
2010	2328	3,4,5,6	0.4	1.7	0.1	0.0	0.0	0.0	1.5	0.8	0.0	0.0	0.0	0.0	0.2	0.0	4.6	0.0	0.0	90.7	
2011	683	3,4,5,6	0.0	0.9	0.4	0.0	0.0	0.4	4.4	2.0	0.3	0.0	0.0	0.0	1.5	0.0	3.8	2.5	0.0	0.0	83.7
2012	724	3,4,5,6	0.0	1.4	0.0	0.0	0.0	0.6	4.3	8.1	0.0	0.6	0.0	0.0	0.0	0.0	17.1	0.8	0.0	0.0	67.1
2013	1466	3,4,5,6	0.0	1.2	0.2	0.2	0.0	0.5	3.9	3.3	0.3	0.0	0.0	0.0	1.0	0.0	1.6	0.0	0.0	0.0	87.7
2014	436	3,4,5,6	0.0	0.0	2.1	0.0	0.0	1.6	0.9	1.6	0.0	0.0	0.0	0.0	0.0	0.0	9.2	0.9	0.0	0.0	83.7
2015	1549	3,4,5,6	0.0	0.5	0.3	0.0	0.0	0.9	3.1	0.9	0.2	0.0	0.0	0.2	0.6	0.0	10.0	0.0	0.0	0.0	83.4
2016	974	3,4,5,6	0.2	1.7	0.9	0.0	0.0	0.7	8.7	1.0	0.0	0.0	0.0	0.0	0.0	0.0	10.2	0.0	0.0	0.0	76.4
2017	1086	3,4,5,6	0.0	1.0	1.2	0.0	0.0	0.2	2.4	1.8	0.0	0.0	0.0	0.0	0.0	0.0	7.7	0.0	0.0	0.0	85.6
2018	927	3,4,5,6	0.0	0.3	1.1	0.0	0.0	1.2	3.1	1.5	0.0	0.0	0.0	0.3	0.4	0.0	17.3	0.0	0.0	0.0	74.8
2019	1263	3,4,5,6	0.0	0.0	0.0	0.0	0.0	0.6	1.0	0.8	1.0	0.0	0.0	0.0	0.1	0.0	2.0	0.0	0.0	0.0	94.7
99-08	1259	3,4,5,6	0.0	1.4	1.6	0.0	0.0	0.0	3.1	0.8	0.1	0.1	0.0	0.0	0.0	0.0	12.1	7.1	0.0	0.0	73.8
09-19	1066	3,4,5,6	0.1	0.8	0.6	0.0	0.0	0.6	3.8	2.3	0.2	0.1	0.0	0.0	0.6	0.0	9.3	2.2	0.0	0.0	79.4

Table 5.4—Percent distribution of Lower Shuswap River adult equivalent (AEQ) total fishing mortalities and escapement to represent unmarked fish when recoveries with incomplete data were assumed to have been caught in non-selective fisheries (NSFs).

Note: Troll, Net, and Sport (T, N, S) were combined for Southeast Alaska (SEAK), Northern B.C. (NBC), and West Coast Vancouver Island (WCVI) aggregate abundance-based management (AABM) fisheries; South of Falcon individual stock-based management (ISBM); and SEAK and Southern U.S. Terminal. The green shading identifies the calendar year exploitation rate (CYER) values where mark-selective fisheries (MSFs) did not change from the original mortality distribution tables (MDTs) for the marked stock and the yellow shading identifies revised CYERs.

Catch Year	Est # of CWT	Ages	AABM Fishery			ISBM Fishery						Terminal Fishery				Escapement				
			SEAK T,N,S	NBC T,S	WCVI T,S	NBC & CBC T,N,S	Southern B.C.			N Falcon T	S Falcon S	WAC T & S	Puget Sd N	SEAK T,N,S	Canada N	U.S. South S	Stray T,N,S	Esc.		
2008	1771	2,3,4,5	9.4	15.8	1.6	0.0	0.0	0.0	7.2	0.0	0.0	0.0	0.0	0.0	2.9	3.0	0.0	0.0	60.1	
2009	1691	2,3,4,5	10.5	9.8	3.1	0.6	0.0	0.0	8.9	0.1	0.0	0.0	0.0	0.0	10.0	6.2	0.0	0.2	50.5	
2010	2026	2,3,4,5	11.4	13.6	0.5	0.3	0.0	0.0	9.1	0.2	0.1	0.1	0.0	1.2	0.0	9.5	1.9	0.3	1.2	50.7
2011	1856	2,3,4,5	10.0	12.1	2.0	0.0	0.0	1.2	8.4	0.5	0.0	0.0	0.0	0.3	0.3	9.3	2.9	0.0	0.1	53.1
2012	1945	2,3,4,5	9.4	11.9	2.3	0.8	0.0	0.4	9.9	0.2	0.1	0.2	0.0	0.1	1.9	4.5	5.0	0.0	0.0	53.4
2013	8225	2,3,4,5	8.0	11.0	1.2	0.3	0.0	1.6	10.2	0.6	0.0	0.0	0.0	0.3	0.4	2.5	2.1	0.0	0.9	60.9
2014	4669	2,3,4,5	12.1	9.8	4.9	0.2	0.0	3.0	4.9	1.9	0.4	0.1	0.0	0.5	0.5	8.1	1.8	0.0	0.9	50.8
2015	5012	2,3,4,5	7.2	5.2	1.8	0.7	0.0	0.5	8.0	2.4	0.5	0.0	0.0	0.8	0.7	2.9	3.1	0.1	1.4	64.8
2016	2152	2,3,4,5	12.1	11.7	2.8	0.5	0.0	0.4	5.8	0.3	0.0	0.0	0.0	0.0	0.2	2.6	2.0	0.3	0.0	61.4
2017	3053	2,3,4,5	14.1	11.2	3.6	0.0	0.0	0.2	10.8	0.2	0.3	0.0	0.0	0.0	0.8	2.5	1.7	0.1	0.5	54.0
2018	5118	2,3,4,5	5.2	6.0	2.9	0.1	0.0	1.4	8.6	0.2	0.2	0.0	0.0	0.5	0.8	5.0	2.9	0.0	0.2	66.2
2019	6926	2,3,4,5	3.3	1.6	0.6	1.0	0.0	0.4	4.3	0.1	0.0	0.0	0.0	0.4	0.4	3.4	2.9	0.0	0.9	80.7
99-08	1259	2,3,4,5	16.3	11.9	0.9	1.3	0.0	0.1	6.8	0.1	0.0	0.0	0.0	0.3	0.0	6.1	2.4	0.0	0.2	53.5
09-19	3879	2,3,4,5	9.4	9.4	2.3	0.4	0.0	0.8	8.1	0.6	0.1	0.0	0.0	0.4	0.6	5.5	2.9	0.1	0.6	58.8

Table 5.5—Percent distribution of Lower Shuswap River adult equivalent (AEQ) total fishing mortalities and escapement to represent unmarked fish when recoveries with incomplete data were assumed to have been caught in mark-selective fisheries (MSFs).

Note: Troll, Net, and Sport (T,N,S) were combined for Southeast Alaska (SEAK), Northern B.C. (NBC), and West Coast Vancouver Island (WCVI) aggregate abundance-based management (AABM) fisheries; South of Falcon individual stock-based management (ISBM); and SEAK and Southern U.S. Terminal. The green shading identifies the calendar year exploitation rate (CYER) values where MSFs did not change from the original mortality distribution tables (MDTs) for the marked stock and the yellow shading identifies revised CYERs.

Catch Year	Est # of CWT	Ages	AABM Fishery			ISBM Fishery						Terminal Fishery			Escapement	
			SEAK T,N,S	NBC T,S	WCVI T,S	NBC & CBC T,N,S	Southern B.C. T N S	N Falcon T S	S Falcon T & S	WAC N	Puget Sd N S	SEAK T,N,S	Canada N S	U.S. South T,N,S	Stray	Esc.
2008	1771	2,3,4,5	9.4	15.8	1.6	0.0	0.0	0.0	7.2	0.0	0.0	0.0	0.0	0.0	0.0	60.1
2009	1691	2,3,4,5	10.5	9.8	3.1	0.6	0.0	0.0	8.9	0.1	0.0	0.0	0.0	0.1	0.0	50.5
2010	2026	2,3,4,5	11.4	13.6	0.5	0.3	0.0	0.0	8.8	0.2	0.1	0.1	0.0	1.2	0.0	50.9
2011	1856	2,3,4,5	10.0	12.1	2.0	0.0	0.0	1.2	8.4	0.5	0.0	0.0	0.0	0.3	0.3	0.0
2012	1945	2,3,4,5	9.4	11.9	2.3	0.8	0.0	0.4	9.9	0.2	0.1	0.2	0.0	0.1	1.9	0.0
2013	8225	2,3,4,5	8.0	11.0	1.2	0.3	0.0	1.6	10.2	0.6	0.0	0.0	0.0	0.3	0.4	0.0
2014	4669	2,3,4,5	12.1	9.8	4.9	0.2	0.0	3.0	4.9	1.9	0.4	0.1	0.0	0.5	0.5	0.0
2015	5012	2,3,4,5	7.2	5.2	1.8	0.7	0.0	0.5	8.0	2.4	0.5	0.0	0.0	0.8	0.7	0.0
2016	2152	2,3,4,5	12.1	11.7	2.8	0.5	0.0	0.4	5.8	0.3	0.0	0.0	0.0	0.0	0.2	0.0
2017	3053	2,3,4,5	14.1	11.2	3.6	0.0	0.0	0.2	10.6	0.2	0.3	0.0	0.0	0.0	0.8	0.0
2018	5118	2,3,4,5	5.2	6.0	2.9	0.1	0.0	1.4	8.3	0.2	0.2	0.0	0.0	0.5	0.8	0.0
2019	6926	2,3,4,5	3.3	1.6	0.6	1.0	0.0	0.4	4.3	0.1	0.0	0.0	0.0	0.4	0.4	0.0
99-08	1259	2,3,4,5	16.3	11.9	0.9	1.3	0.0	0.1	6.8	0.1	0.0	0.0	0.0	0.3	0.0	0.0
09-19	3879	2,3,4,5	9.4	9.4	2.3	0.4	0.0	0.8	8.0	0.6	0.1	0.0	0.0	0.4	0.6	0.0

Table 5.6—Percent distribution of Middle Shuswap River adult equivalent (AEQ) total fishing mortalities and escapement to represent unmarked fish when recoveries with incomplete data were assumed to have been caught in non-selective fisheries (NSFs).

Note: Troll, Net, and Sport (T,N,S) were combined for Southeast Alaska (SEAK), Northern B.C. (NBC), and West Coast Vancouver Island (WCVI) aggregate abundance-based management (AABM) fisheries; South of Falcon individual stock-based management (ISBM); and SEAK and Southern U.S. Terminal. The green shading identifies the calendar year exploitation rate (CYER) values where mark-selective fisheries (MSFs) did not change from the original mortality distribution tables (MDTs) for the marked stock and the yellow shading identifies revised CYERs.

Catch Year	Est # of CWT	Ages	AABM Fishery			ISBM Fishery						Terminal Fishery			Escapement						
			SEAK T,N,S	NBC T,S	WCVI T,S	NBC & CBC T,N,S	Southern B.C.			N Falcon T S	S Falcon T,S	WAC N	Puget Sd N S	SEAK T,N,S	Canada N S	U.S. South T,N,S	Stray	Esc.			
2011	58	2,3	8.6	10.3	0.0	0.0	0.0	1.7	5.2	0.0	0.0	0.0	0.0	0.0	25.9	1.7	0.0	0.0	46.6		
2012	283	2,3,4	10.2	19.8	2.5	0.4	0.0	0.7	14.1	2.1	0.0	0.0	0.0	0.0	0.0	8.2	2.9	0.0	1.4	37.8	
2013	1700	2,3,4,5	2.9	11.5	0.9	0.1	0.0	1.1	14.7	0.1	0.0	0.0	0.0	0.0	0.0	3.1	3.7	0.0	1.3	60.6	
2014	1225	2,3,4,5	10.2	12.3	5.2	0.4	0.0	1.5	7.7	0.8	0.0	0.0	0.0	0.0	0.0	3.8	4.8	0.0	0.5	52.8	
2015	2080	2,3,4,5	4.7	3.8	2.7	0.3	0.0	0.7	13.5	1.7	0.1	0.0	0.0	0.2	0.6	0.0	1.7	3.4	0.0	4.8	61.7
2016	406	2,3,4,5	4.2	11.8	0.7	2.5	0.0	0.5	13.8	0.7	0.0	0.0	0.0	0.0	0.0	8.9	1.0	0.0	4.9	51.0	
2017	475	2,3,4,5	9.7	8.0	1.5	0.8	0.0	0.0	15.4	0.4	0.0	0.0	0.0	0.4	0.0	0.0	4.6	3.8	0.0	0.8	54.5
2018	1325	2,3,4,5	1.2	2.9	3.1	0.0	0.0	1.2	15.7	0.3	0.0	0.0	0.0	0.1	0.0	0.0	6.7	1.8	0.0	0.8	66.1
2019	1040	2,3,4,5	0.5	1.0	0.8	0.8	0.0	0.5	2.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.8	3.8	0.0	5.1	84.4
09–19	955	2,3,4,5	5.8	9.1	1.9	0.6	0.0	0.9	11.3	0.7	0.0	0.0	0.0	0.1	0.1	0.0	7.1	3.0	0.0	2.2	57.3

Table 5.7—Percent distribution of Middle Shuswap River adult equivalent (AEQ) total fishing mortalities and escapement to represent unmarked fish when recoveries with incomplete data were assumed to have been caught in mark-selective fisheries (MSFs).

Note: Troll, Net, and Sport (T,N,S) were combined for Southeast Alaska (SEAK), Northern B.C. (NBC), and West Coast Vancouver Island (WCVI) aggregate abundance-based management (AABM) fisheries; South of Falcon individual stock-based management (ISBM); and SEAK and Southern U.S. Terminal. The green shading identifies the calendar year exploitation rate (CYER) values where MSFs did not change from the original mortality distribution tables (MDTs) for the marked stock and the yellow shading identifies revised CYERs.

Catch Year	Est # of CWT	Ages	AABM Fishery			ISBM Fishery						Terminal Fishery			Escapement	
			SEAK T,N,S	NBC T,S	WCVI T,S	NBC & CBC T,N,S	Southern B.C. T N S	N Falcon T S	S Falcon T,S	WAC N	Puget Sd N S	SEAK T,N,S	Canada N S	U.S. South T,N,S	Stray	Esc.
2011	58	2,3	8.6	10.3	0.0	0.0	0.0	1.7	5.2	0.0	0.0	0.0	0.0	0.0	25.9	1.7
2012	283	2,3,4	10.2	19.8	2.5	0.4	0.0	0.7	12.7	2.1	0.0	0.0	0.0	0.0	8.4	2.9
2013	1700	2,3,4,5	2.9	11.5	0.9	0.1	0.0	1.1	14.7	0.1	0.0	0.0	0.0	0.0	3.1	3.7
2014	1225	2,3,4,5	10.2	12.3	5.2	0.4	0.0	1.5	7.7	0.8	0.0	0.0	0.0	0.0	3.8	4.8
2015	2080	2,3,4,5	4.7	3.8	2.7	0.3	0.0	0.7	13.5	1.7	0.1	0.0	0.0	0.0	1.7	3.4
2016	406	2,3,4,5	4.2	11.8	0.7	2.5	0.0	0.5	13.8	0.7	0.0	0.0	0.0	0.0	8.9	1.0
2017	475	2,3,4,5	9.7	8.0	1.5	0.8	0.0	0.0	14.3	0.4	0.0	0.0	0.0	0.0	4.7	3.9
2018	1325	2,3,4,5	1.2	2.9	3.1	0.0	0.0	1.2	15.1	0.3	0.0	0.0	0.0	0.0	6.8	1.8
2019	1040	2,3,4,5	0.5	1.0	0.8	0.8	0.0	0.5	2.0	0.0	0.0	0.0	0.0	0.0	0.8	3.8
09–19	955	2,3,4,5	5.8	9.1	1.9	0.6	0.0	0.9	11.0	0.7	0.0	0.0	0.0	0.0	7.1	3.0
															2.2	57.5

Table 5.8—Average absolute changes in Nicola, Lower Shuswap and Middle Shuswap calendar year exploitation rates (CYERs) (2002, 2008–2019) when coded-wire tag (CWT) recoveries with incomplete data were assumed to have been caught in non-selective fisheries (NSFs) or mark-selective fisheries (MSFs).

Indicator Stock	Southern B.C. Sport	Puget Sound Sport	North of Falcon Sport	Terminal Net	Terminal Sport	Escapement
Caught in NSF						
Nicola	-0.3%	-0.1%	0.0%	+0.1%	~0.0%	+0.3%
Lower Shuswap	-0.2%	-0.2%	~0.0%	~0.0%	~0.0%	+0.4%
Middle Shuswap	-0.1%	-0.1%	-0.1%	~0.0%	~0.0%	+0.2%
Caught in MSF						
Nicola	-0.5%	-0.1%	0.0%	+0.1%	~0.0%	+0.5%
Lower Shuswap	-0.3%	-0.2%	~0.0%	~0.0%	~0.0%	+0.4%
Middle Shuswap	-0.4%	-0.1%	-0.1%	+0.1%	~0.0%	+0.5%

6. REFERENCES CITED

- CTC (Chinook Technical Committee). 1988. 1987 annual report. Pacific Salmon Commission Joint Chinook Technical Committee Report TCCHINOOK (88)-2. Vancouver, BC.
- CTC. 1996. 1994 annual report. Pacific Salmon Commission Joint Chinook Technical Committee Report TCCHINOOK (96)-1. Vancouver, BC.
- CTC. 1997. Incidental fishing mortality of Chinook salmon: Mortality rates applicable to Pacific Salmon Commission fisheries. Pacific Salmon Commission Joint Chinook Technical Committee Report TCCHINOOK (97)-1. Vancouver, BC.
- CTC. 2004. Estimation and application of incidental fishing mortality in the Chinook salmon management under the 1999 Agreement of the Pacific Salmon Treaty, April 8, 2004. TCCHINOOK (04)-1. Vancouver, BC.
- CTC. 2005. Annual exploitation rate analysis and model calibration. Pacific Salmon Commission Joint Chinook Technical Committee Report TCCHINOOK (05)-03. Vancouver, BC.
- CTC. 2011. Methodologies to monitor the performance of individual stock-based management fisheries. Pacific Salmon Commission Joint Chinook Technical Committee Report TCCHINOOK (11)-4. Vancouver, BC.
- CTC. 2013. Annual report of catch and escapement. Pacific Salmon Commission Joint Chinook Technical Committee Report TCCHINOOK (13)-1. Vancouver, BC.
- CTC. 2016. Chapter 3 Performance Evaluation Report. Pacific Salmon Commission, Joint Chinook Technical Committee Report TCCHINOOK (16)-2, Vancouver, BC.
- CTC 2018. 2017 Exploitation rate analysis and model calibration Volume II- Appendix Supplement. Pacific Salmon Commission Joint Chinook Technical Committee Report TCCHINOOK (18)-3 V.2. Vancouver, BC.
- CTC. 2019a. 2018 Exploitation rate analysis and model calibration. Volume One. Pacific Salmon Commission, Joint Chinook Technical Committee Report TCCHINOOK (19)-2, Vancouver, BC.
- CTC. 2019b. CTC postseason ISBM index and mortality distribution table (CYER) program updates. Pacific Salmon Commission Joint Chinook Technical Committee ISBM Workgroup Technical Note. Vancouver, BC.
- CTC. 2021a. 2020 Model Calibration. Pacific Salmon Commission Joint Chinook Technical Committee Report TCCHINOOK (21)-04. Vancouver, BC.
- CTC. 2021b. 2019 Exploitation Rate Analysis and Model Calibration Volume I. Pacific Salmon Commission Joint Chinook Technical Committee Report TCCHINOOK (21)-01 V1. Vancouver, BC.
- CTC. *In prep.* Pacific Salmon Commission Chinook Model Base Period Re-Calibration, Volume II: Stocks. Pacific Commission Joint Chinook Technical Committee Report TCCHINOOK (21)-02 V2. Vancouver, BC.

CYER WG (Pacific Salmon Commission Calendar Year Exploitation Rate Work Group). 2019. Collaborative improvements in calendar year exploitation rates. Pacific Salmon Commission unpublished report. 4p.

CYER WG (Pacific Salmon Commission Calendar Year Exploitation Rate Work Group). 2021. A Review of Indirect Methods Used in Estimation of Chinook Salmon Exploitation Rates and Recommendations for Improvement. Pacific Salmon Comm. Tech. Rep. No. 46: 50p.

Luedke, W., Dobson, D., and Mathias, K. 2019. 2017 Terminal Abundance of WCVI Chinook Salmon. Report to the Northern Endowment Fund, Pacific Salmon Commission, Vancouver BC.

SFEC (Selective Fishery Evaluation Committee). 2009. Review of 2009 mass marking and mark selective fishery proposals. Pacific Salmon Commission Selective Fisheries Evaluation Committee Report SFEC (09)-1.

LIST OF APPENDICES

<i>List of Appendices</i>	82
<i>Appendix A: Relationship between exploitation rate indicator stocks, escapement indicator stocks, and model stocks in the Pacific Salmon Treaty</i>	84
<i>Appendix B: Individual Stock-Based Management Indices</i>	93
<i>Appendix C: Percent distribution of landed catch and total mortality and escapement for exploitation rate indicator stocks by calendar year</i>	96
<i>Appendix D: Fishery exploitation rate indices by stock, age and fishery, based on Coded-Wire Tag (CWT) data.....</i>	171
<i>Appendix E: Issues with and Changes to the Exploitation Rate Analysis</i>	182
<i>Appendix F: Brood Year Exploitation Rate Plots</i>	186
<i>Appendix G: Survival Rate Plots</i>	208
<i>Appendix H: Terminal Area Adjustment Data.....</i>	230
<i>Appendix I: Parameters Used in the 2020 Exploitation Rate Analysis</i>	236

Note: Product names used in this publication are included for completeness but do not constitute product endorsement.

APPENDIX A: RELATIONSHIP BETWEEN EXPLOITATION RATE INDICATOR STOCKS, ESCAPEMENT INDICATOR STOCKS, AND MODEL STOCKS IN THE PACIFIC SALMON TREATY

LIST OF APPENDIX A TABLES

<i>Appendix A1– Indicator stocks for Transboundary (TBR) Rivers and Southeast Alaska (SEAK).</i>	85
<i>Appendix A2– Indicator stocks for Northern British Columbia (NBC), Central British Columbia (CBC), and West Coast Vancouver Island (WCVI).</i>	86
<i>Appendix A3– Indicator stocks for Fraser River and Strait of Georgia.</i>	87
<i>Appendix A4– Indicator stocks for Puget Sound.</i>	88
<i>Appendix A5– Indicator stocks for the Washington Coast.</i>	90
<i>Appendix A6– Indicator stocks for Columbia River and Oregon Coast.</i>	91

Appendix A1—Indicator stocks for Transboundary (TBR) Rivers and Southeast Alaska (SEAK).

Region	Run	Attachment I stock	Escapement Indicator (PSC Management Objective)	Exploitation Rate Indicator/Acronym		Model Stock/Acronym	
Transboundary Rivers (TBR)	Spring	Yes	Taku (19,000–36,000)	Taku	TAK	Taku and Stikine	TST
		Yes	Stikine (14,000–28,000)	Stikine	STI		
		Yes	Alsek (3,500–5,300)			Alsek	ALS
		Yes	Situk (500–1,000)			Yakutat Forelands	YAK
		Yes	Chilkat (1,750–3,500)	Chilkat Northern Southeast Alaska	CHK, NSA ¹	Northern Southeast Alaska	NSA
		Yes	Unuk (1,800–3,800)	Unuk Chickamin Southern Southeast Alaska	UNU, CHM, SSA ²	Southern Southeast Alaska	SSA

¹NSA is an aggregate of Crystal Lake (ACI) and Douglas Island Pink and Chum (DIPAC)/Macaulay (AMC) hatcheries.

²SSA is an aggregate of Little Port Walter (ALP), Neets Bay (ANB), Whitman Lake (AHC), and Deer Mountain (ADM) hatcheries.

Appendix A2– Indicator stocks for Northern British Columbia (NBC), Central British Columbia (CBC), and West Coast Vancouver Island (WCVI).

Region	Run	Attachment I stock	Escapement Indicator (PSC Management Objective)	Exploitation Rate Indicator/Acronym		Model Stock /Acronym	
Northern BC (NBC)	Summer	No	Nass	Kitsumkalum (Deep Creek Hatchery)	KLM	Northern B.C.	NBC
		Yes	Skeena (TBD)				
Central BC (CBC)	Fall	No	Wannock	Atnarko (Snootli Hatchery)	ATN	Central B.C.	CBC
	Summer		Chuckwalla and Killbella				
	Yes	Atnarko					
West Coast Vancouver Island (WCVI)	Fall	Yes	North West Vancouver Island Aggregate (Colonial-Cayeagle, Tashish, Artlish, Kaouk)	Robertson Creek Hatchery	RBT (adj) ¹	West Coast Vancouver Island Natural	WVN
		Yes	South West Vancouver Island Aggregate (Bedwell/Ursus, Megin, Moyeha)				
		No	West Coast Vancouver Island Aggregate (14 Streams)	Robertson Creek Hatchery	RBT	West Coast Vancouver Island Hatchery	WVH

¹CWT indicator stocks and fishery adjustments described in CTC (2016), CTC (2019; ISBM Subgroup Technical Note) and CTC (2021b).

Appendix A3– Indicator stocks for Fraser River and Strait of Georgia.

Region	Run	Attachment I stock	Escapement Indicator (PSC Management Objective)	Exploitation Rate Indicator/Acronym		Model Stock /Acronym	
Fraser River	Spring	Yes	Fraser Spring 1.2	Nicola (Spius Creek Hatchery)	NIC	Fraser Spring 1.2	FS2
		No	Fraser Spring 1.3	Dome (Penny Creek Hatchery)	DOM	Fraser Spring 1.3	FS3
		Yes		Lower Chilcotin (<i>in development</i>)	LCT		
	Summer	Yes	Fraser Summer 0.3	Lower Shuswap (Shuswap Falls Hatchery)	SHU	Fraser Ocean 0.3	FSO
		No		Middle Shuswap (Shuswap Falls Hatchery)	MSH		
		Yes	Fraser Summer 1.3	Chilko (Multiple Hatcheries)	CKO	Fraser Summer 1.3	FSS
	Fall	No	Harrison River	Chilliwack Hatchery	CHI	Fraser Chilliwack Fall Hatchery	FCF
		Yes		Harrison (Chehalis Hatchery)	HAR	Fraser Harrison Fall	FHF
North Strait of Georgia	Fall	No	TBD	Quinsam Hatchery	QUI	Upper Strait of Georgia	UGS
		Yes	East Vancouver Island North (TBD)		QUI (adj) ¹		
		Yes	Phillips		PHI		
South Strait of Georgia	Fall	No	Lower Strait of Georgia	Big Qualicum Hatchery	BQR	Middle Strait of Georgia	MGS
		Yes		Cowichan Hatchery	COW	Lower Strait of Georgia	LGS
		No		Nanaimo Hatchery	NAN		
	Summer	No		Puntledge Hatchery	PPS	Puntledge Hatchery	PPS

¹CWT indicator stocks and fishery adjustments described in CTC (2016), CTC (2019; ISBM Subgroup Technical Note) and CTC (2021b).

Appendix A4—Indicator stocks for Puget Sound.

Region	Run	Attachment I stock	Escapement Indicator (PSC Management Objective)	Exploitation Rate Indicator/Acronym		Model Stock /Acronym		
Northern Puget Sound	Spring	Yes	Nooksack Spring	Nooksack Spring Fingerling (Kendall Creek Hatchery)	NSF	Nooksack Spring	NKS	
		No		Nooksack Spring Yearling (Kendall Creek Hatchery)	NKS			
		Yes	Skagit Spring (690)	Skagit Spring Fingerling (Marblemount Hatchery)	SKF			
		No		Skagit Spring Yearling (Marblemount Hatchery)	SKS			
	Fall			Samish Fall Fingerling (Samish Hatchery)	SAM	Nooksack Fall	NKF	
	Summer/Fall	Yes	Skagit Summer/Fall (9,202)	Skagit Summer Fingerling (Marblemount Hatchery)	SSF	Skagit Summer/Fall	SKG	
	Fall	Yes	Stillaguamish	Stillaguamish Fall Fingerling (Whitehorse Hatchery)	STL	Stillaguamish	STL	
	Summer	Yes	Snohomish	Skykomish Fingerling (Wallace Hatchery)	SKY	Snohomish	SNO	
Central Puget Sound	Fall	No	Lake Washington			Puget Sound Natural Fingerling	PSN	
Hood Canal		No	Green	Green River Fingerling ¹ (Soos Creek Hatchery)	GRN ¹			
Southern Puget Sound (SPS)				George Adams Hatchery Fall Fingerling	GAD	Puget Sound Hatchery Fingerling	PSF	
				SPS Fall Fingerling ¹	SPS ¹			
				Nisqually Fall Fingerling (Clear Creek Hatchery)	NIS			
				SPS Fall Yearling (Tumwater Hatchery)	SPY	Puget Sound Hatchery Yearling	PSY	
				Squaxin Pens Fall Yearling	SQP			
				University of Washington Accelerated ²	UWA			
Spring			White River Hatchery Spring Yearling	WRY				

¹SPS is aggregate from Soos Creek (Green R), Grovers, and Issaquah hatcheries. The Soos Creek (GRN tag group) are included in the SPS exploitation rate indicator.

²Production and tagging discontinued.

Appendix A5– Indicator stocks for the Washington Coast.

Region	Run	Attachment I stock	Escapement Indicator (PSC Management Objective)	Exploitation Rate Indicator/Acronym		Model Stock /Acronym	
Juan de Fuca	Washington Coast (WAC)			Elwha Fall Fingerling (Lower Elwha Hatchery)	ELW		
Washington Coast (WAC)	Fall	Yes	Hoko	Hoko Fall Fingerling (Hoko Falls Hatchery)	HOK		
		Yes	Queets Fall (2,500)	Queets Fall Fingerling (Salmon River brood stock)	QUE	WA Coastal Wild	WCN
		Yes	Grays Harbor Fall (13,326)		QUE (adj)		
		Yes	Quillayute Fall (3,000)				
		Yes	Hoh Fall (1,200)			WA Coastal Hatchery	WCH
				Tsoo-Yess Fall Fingerling (Makah National Fish Hatchery)	SOO		
	Spring	No	Grays Harbor Spring ¹				
	Spring/Summer	No	Queets Spring/Summer (700) ¹				
	Summer	No	Quillayute Summer ¹				
	Spring/Summer	No	Hoh Spring/Summer (900) ¹				

¹Escapement indicator stock is not included in the Washington Coastal model stocks.

Appendix A6– Indicator stocks for Columbia River and Oregon Coast.

Region	Run	Attachment I stock	Escapement Indicator (PSC Management Objective)	Exploitation Rate Indicator/Acronym		Model Stock /Acronym	
Columbia River	Spring					Cowlitz Spring Hatchery	CWS
			Willamette Spring (Hatchery Complex)	WSH	Willamette River Hatchery	WSH	
	Summer	Yes	Mid-Columbia Summers (12,143)	Columbia Summers (Wells Hatchery)	SUM	Columbia River Summers	SUM
	Fall		Upriver Brights (40,000)	Columbia Upriver Brights (Priest Rapids Hatchery)	URB	Mid-Columbia Brights	MCB
		Yes				Columbia Upriver Brights	URB
			Hanford Wild	HAN			
			Lyons Ferry Fingerling	LYF	Lyons Ferry Hatchery	LYF	
	Fall		Lyons Ferry Year	LYY			
		Yes	Lewis (5,700)	Lewis River Wild	LRW	Lewis River	LRW
		Yes	Ceweeman	Cowlitz Hatchery Fall Tule	CWF	Cowlitz Hatchery	CWF
				Spring Creek National Fish Hatchery	SPR	Spring Creek	SPR
				Lower River Hatchery (Big Creek Hatchery)	LRH	Bonneville Hatchery	BON
North Oregon Coast (NOC)	Fall	Yes	Nehalem (6,989)	Salmon River Hatchery (adj)	SRH (adj)	North Oregon Coast	NOC
		Yes	Siletz (2,944)				
		Yes	Siuslaw (12,925)				
		Yes	Coquille	Elk River Hatchery (adj)	ELK (adj)	Mid-Oregon Coast	MOC
Mid-Oregon Coast (MOC)		Yes	South Umpqua				

APPENDIX B: INDIVIDUAL STOCK-BASED MANAGEMENT INDICES

LIST OF APPENDIX B TABLES

<i>Appendix B1—Individual stock-based management (ISBM) indices for all British Columbia ISBM fisheries based on coded-wire tag (CWT)-based exploitation rate analysis (1999–2018). The stock groups correspond to Annex 4, Chapter 3, Attachment IV of the 2009 PST Agreement.</i>	94
<i>Appendix B2—Individual stock-based management (ISBM) indices for all southern United States (U.S.) fisheries based on coded-wire tag (CWT)-based exploitation rate analysis (1999–2018). The stock groups correspond to Annex 4, Chapter 3, Attachment V of the 2009 PST Agreement.</i>	95

Appendix B1—Individual stock-based management (ISBM) indices for all British Columbia ISBM fisheries based on coded-wire tag (CWT)-based exploitation rate analysis (1999–2018). The stock groups correspond to Annex 4, Chapter 3, Attachment IV of the 2009 PST Agreement.

Stock Group	Stock (CTC agreed goal year)	Base Per. Data ¹	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018 ²	
North/ Central B.C.	Yakoun, Nass, Skeena, Atnarko, Dean (no goal)	-	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.		
WCVI Falls	Artlish, Burman, Kauok, Tahsis, Tashish, Marble, Gold (no goal)	100%	0.707	0.126	0.100	0.396	0.459	0.558	0.287	0.433	0.493	0.523	0.489	0.207	0.633	0.625	0.333	0.313	0.610	0.409	0.629	0.430	
L. Georgia Strait	Cowichan (2005) Nanaimo (no goal)	0% 0%	0.480 0.163	0.250 0.154	0.376 0.260	0.542 0.247	0.414 N.A.	0.303 N.A.	0.196 N.A.	0.275 N.A.	0.271 N.A.	0.372 N.A.	0.469 N.A.	0.372 N.A.	0.181 N.A.	0.409 N.A.	0.387 N.A.	0.431 N.A.	0.297 N.A.	0.456 N.A.	0.281 N.A.	0.806 N.A.	
U. Georgia Strait	Klinaklini, Kakweikan, Wakeman, Kingcome, Nimpkish (no goal)	100%	0.241	0.101	0.052	0.122	0.072	0.114	0.208	0.129	0.182	0.086	0.200	0.365	0.091	0.143	0.086	0.079	0.211	0.207	0.235	0.197	
Fraser Late	Harrison (2001)	0%	0.134	0.060	0.128	0.053	0.036	0.046	0.089	0.055	0.055	0.042	0.062	0.083	0.069	0.125	0.138	0.185	0.142	0.182	0.272	0.235	
Fraser Early (spring & summers)	Upper Fraser, Mid-Fraser, Thompson	-	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	
Puget Sound Spring	Nooksack (no goal) ¹ Skagit (no goal)	0% -	0.034 N.A.	0.089 N.A.	0.042 N.A.	0.020 N.A.	0.060 N.A.	0.059 N.A.	0.109 N.A.	0.068 N.A.	0.059 N.A.	0.122 N.A.	0.147 N.A.	0.029 N.A.	0.134 N.A.	0.056 N.A.	0.069 N.A.	0.086 N.A.	0.084 N.A.	0.095 N.A.	0.082 N.A.		
Puget Sound Falls	Skagit (no goal)	-	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	
	Stillaguamish (no goal) ²	6%	0.110	0.072	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.264	0.126	0.210	0.138	0.209	0.241	0.170	0.451	0.275	0.238	0.189	0.192
	Snohomish (no goal)	-	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	
	Lake Wash. (no goal)	-	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	
	Green River (no goal) ²	56%	0.205	0.116	0.200	0.318	0.233	0.203	0.281	0.188	0.143	0.161	0.275	0.135	0.275	0.310	0.301	0.413	1.024	0.771	0.353	1.148	

Note: NA means not available because of insufficient data (i.e., lack of specific tag codes, base period CWT recoveries, etc.)

¹ This column contains the percentage of the maximum possible age-year combinations available for calculating the 1979–1982 base period average total mortality (landed catch and incidental mortality) which is the denominator of the post-season ISBM index. The base period average total mortality is based on data contributed from four possible age classes in each year of four possible base period years for a total of 16 possible age-year combinations. In practice, the post-season ISBM index is calculated for a CWT indicator stock when fewer than the maximum number of age-year combinations with data are available (<100%). When actual CWT data are not available for the majority of ages in all of the base period years (0%–6%), the base period average is calculated from values found in the PSC Chinook Model's STK input file for the Model stock corresponding to the CWT indicator stock; in these cases, the ISBM index should be interpreted judiciously (see TCCHINOOK (11)-04 for details).

² 2018 ISBM indices for Canadian stock groups were calculated using 2019 ERA results and U.S. stock groups were calculated using 2020 ERA results.

Appendix B2– Individual stock-based management (ISBM) indices for all southern United States (U.S.) fisheries based on coded-wire tag (CWT)-based exploitation rate analysis (1999–2018). The stock groups correspond to Annex 4, Chapter 3, Attachment V of the 2009 PST Agreement.

Stock Group	Stock (CTC agreed goal in year)	Base Per. Data ¹	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018 ²
Fraser Late	Harrison (2001)	0%	0.662	0.210	0.383	0.369	0.348	0.473	0.360	0.398	0.147	0.467	0.136	0.295	0.285	0.351	0.442	0.380	0.283	0.173	0.285	0.361
Puget Sound Spring	Nooksack (no goal)	0%	0.257	0.117	0.328	0.225	0.443	0.434	0.476	0.831	0.929	1.609	0.585	0.757	0.890	1.859	0.871	1.286	0.556	0.262	0.506	0.958
	Skagit (no goal)	-	N.A.																			
Puget Sound Fall	Skagit (no goal)	-	N.A.																			
	Stillaguamish (no goal)	6%	0.072	0.060	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.139	0.454	0.210	0.192	0.199	0.168	0.236	0.753	0.279	0.176	0.188	0.129
	Snohomish (no goal)	-	N.A.																			
	Lake Wash. (no goal)	-	N.A.																			
	Green (no goal)	56%	0.287	0.333	0.473	0.559	0.595	0.734	0.358	0.521	0.658	0.536	0.486	0.289	0.417	0.521	0.301	0.409	0.621	0.320	0.292	0.819
WA Coast Falls	Hoko (no goal)	-	N.A.																			
	Grays (2014)	63%	0.330	0.774	1.103	0.536	0.232	0.525	0.272	0.515	0.667	0.314	0.689	0.624	0.741	0.943	0.781	0.750	0.983	0.637	0.546	0.508
	Queets (2004)	63%	0.240	0.073	0.375	0.637	0.364	0.301	0.457	0.487	0.851	0.591	0.662	0.482	0.701	1.030	0.926	0.518	0.278	0.416	0.739	0.600
	Hoh (2004)	63%	1.465	1.283	1.587	0.974	1.298	1.208	0.978	1.511	1.614	0.952	1.003	0.839	1.753	1.590	2.642	1.257	1.211	0.254	1.227	0.380
	Quillayute (2004)	63%	1.194	0.808	1.266	1.439	0.907	1.554	0.979	1.093	1.157	1.209	1.821	1.377	1.693	1.961	1.782	2.579	2.034	1.080	2.179	1.671
Columbia Fall	Brights (2002)	94%	1.129	2.058	1.102	1.386	1.369	1.491	1.470	1.497	1.721	1.592	2.601	1.643	2.293	1.736	1.933	1.737	1.375	1.366	1.425	1.069
	Deschutes (2010)	94%	0.457	0.569	0.415	0.592	0.495	0.631	0.634	0.548	0.608	0.655	0.816	0.695	0.770	0.772	0.794	0.758	0.698	0.785	1.026	0.715
	Lewis (1999)	56%	0.045	0.334	0.333	0.312	0.533	0.183	0.745	1.288	0.663	0.551	0.217	0.554	1.370	0.865	1.110	0.813	0.570	0.506	0.501	0.936
Columbia Summers	Summers (1999)	56%	1.383	0.923	3.666	4.820	7.069	2.945	9.314	4.726	6.529	4.561	4.063	6.056	9.148	5.050	5.373	6.313	5.633	6.764	6.301	7.237
N. Oregon Coast	Nehalem (1999)	81%	1.708	1.366	2.341	1.516	1.545	2.833	2.605	3.362	1.239	1.479	0.340	1.030	2.085	1.787	2.299	2.909	3.456	1.743	2.043	1.726
	Siletz (1999)	81%	1.237	1.152	1.189	0.983	1.313	3.598	2.181	2.128	1.504	1.880	1.345	0.637	3.069	1.689	1.781	1.807	3.559	1.874	2.732	3.804
	Siuslaw (1999)	81%	1.089	2.301	2.035	1.311	1.254	1.243	1.743	1.860	2.071	1.270	1.389	1.395	2.244	1.522	2.388	1.882	2.519	2.630	2.616	4.138

Note: NA means not available because of insufficient data (i.e., lack of specific tag codes, base period CWT recoveries, etc.)

¹ This column contains the percentage of the maximum possible age-year combinations available for calculating the 1979–1982 base period average total mortality (landed catch and incidental mortality) which is the denominator of the post-season ISBM index. The base period average total mortality is based on data contributed from four possible age classes in each year of four possible base period years for a total of 16 possible age-year combinations. In practice, the post-season ISBM index is calculated for a CWT indicator stock when fewer than the maximum number of age-year combinations with data are available (<100%). When actual CWT data are not available for the majority of ages in all of the base period years (0%–6%), the base period average is calculated from values found in the PSC Chinook Model's STK input file for the Model stock corresponding to the CWT indicator stock; in these cases, the ISBM index should be interpreted judiciously (see TCCHINOOK (11)-04 for details).

² 2018 ISBM indices for Canadian stock groups were calculated using 2019 ERA results and U.S. stock groups were calculated using 2020 ERA results.

APPENDIX C: PERCENT DISTRIBUTION OF LANDED CATCH AND TOTAL MORTALITY AND ESCAPEMENT FOR EXPLOITATION RATE INDICATOR STOCKS BY CALENDAR YEAR

Mortality distribution tables show the percent of estimated landed catch or total mortality for individual stocks attributed to specific fisheries. Landed catch mortalities are calculated from catch estimation and CWT sampling programs. Total mortality includes landed catch and incidental mortality (i.e., release mortality) which occurs in both retention and nonretention fisheries; incidental mortalities are estimated based on sampling data and/or internal algorithms (i.e., size-at-age vulnerability algorithms and gear-specific mortality rates). Mortality distribution within a calendar year sums to 100%.

Minimum criteria for reporting of distributions were applied to each calendar year and data that did not meet the minimum criteria (at least 3 ages and 105 estimated CWT recoveries) were either omitted or shaded. If only 1 age class was present in a calendar year, data from that year were omitted. If 2 age classes or less than 105 estimated CWTs were present in a calendar year, data from that year were shaded, but excluded from the calculation of the time period averages found at the bottom rows of the table. Where relevant, escapement includes interdam loss mortalities (i.e., Columbia River stocks). A complete time series of mortality distribution can be found on the PSC webpage: <https://www.psc.org/publications/technical-reports/technical-committee-reports/chinook>

The distributions of mortalities (reported catch and total) among fisheries and escapement in a catch year were calculated for each stock to determine the exploitation patterns. The distributions were computed if at least two BYs contributed to the CWT recoveries for a catch year. Distributions were computed for each fishery across all ages present in the catch year as

$$CYDist_{CY,F} = \frac{\sum_{a=Minage}^{Maxage} \sum_{f \in \{F\}} Morts_{CY,a,f} * AEQ_{BY=CY-a,a,f}}{\sum_{a=Minage}^{Maxage} \left(\sum_{f=1}^{Numfisheries} Morts_{CY,a,f} * AEQ_{BY=CY-a,a,f} + Esc_{CY,a} \right)}$$
Equation C.1

Calculated mortality distributions may not indicate the true distribution of an indicator stock. For example, no CWTs will be recovered if a fishery area is closed but this would not necessarily indicate zero abundance of a given stock in that fishing area.

Mortality distribution tables for stocks with terminal area adjustments are also included in this appendix. These tables, along with their source mortality distribution table, are denoted in the table caption.

LIST OF APPENDIX C FIGURES

- Appendix C1— Percent distribution of Alaska Spring AEQ total fishing mortalities and escapement. 100*
- Appendix C2— Percent distribution of Atnarko River AEQ total fishing mortalities and escapement. 101*

<i>Appendix C3—Percent distribution of Atnarko Yearling AEQ total fishing mortalities and escapement.</i>	102
<i>Appendix C4—Percent distribution of Big Qualicum River Fall AEQ total fishing mortalities and escapement.</i>	103
<i>Appendix C5—Percent distribution of Chilliwack River Fall AEQ total fishing mortalities and escapement.</i>	104
<i>Appendix C6—Percent distribution of Chilkat River AEQ total fishing mortalities and escapement.</i>	105
<i>Appendix C7—Percent distribution of Chickamin River AEQ total fishing mortalities and escapement.</i>	106
<i>Appendix C8—Percent distribution of Cowichan River Fall AEQ total fishing mortalities and escapement.</i>	107
<i>Appendix C9—Percent distribution of Cowlitz Fall Tule AEQ total fishing mortalities and escapement.</i>	108
<i>Appendix C10—Percent distribution of Dome Creek Spring AEQ total fishing mortalities and escapement.</i>	109
<i>Appendix C11—Percent distribution of Elk River AEQ total fishing mortalities and escapement.</i>	110
<i>Appendix C12—Percent distribution of Coquille AEQ total fishing mortalities and escapement based on Elk River CWT recoveries with terminal adjustments for basin-specific terminal fishery performance.</i>	111
<i>Appendix C13—Percent distribution of South Umpqua AEQ total fishing mortalities and escapement based on Elk River CWT recoveries with terminal adjustments for basin-specific terminal fishery performance.</i>	112
<i>Appendix C14—Percent distribution of Elwha River AEQ total fishing mortalities and escapement.</i>	113
<i>Appendix C15—Percent distribution of George Adams Fall Fingerling AEQ total fishing mortalities and escapement.</i>	114
<i>Appendix C16—Percent distribution of Green River AEQ total fishing mortalities and escapement.</i>	115
<i>Appendix C17—Percent distribution of Hanford Wild Brights AEQ total fishing mortalities and escapement.</i>	116
<i>Appendix C18—Percent distribution of Harrison River AEQ total fishing mortalities and escapement.</i>	117
<i>Appendix C19—Percent distribution of Hoko Fall Fingerling AEQ total fishing mortalities and escapement.</i>	118
<i>Appendix C20—Percent distribution of Kitsumkalum River Summer AEQ total fishing mortalities and escapement.</i>	119
<i>Appendix C21—Percent distribution of Kitsumkalum Yearling AEQ total fishing mortalities and escapement.</i>	120
<i>Appendix C22—Percent distribution of Columbia Lower River Hatchery Tule AEQ total fishing mortalities and escapement.</i>	121
<i>Appendix C23—Percent distribution of Lewis River Wild AEQ total fishing mortalities and escapement.</i>	122
<i>Appendix C24—Percent distribution of Lyons Ferry AEQ total fishing mortalities and escapement.</i>	123
<i>Appendix C25—Percent distribution of Lyons Ferry Yearling AEQ total fishing mortalities and escapement.</i>	124
<i>Appendix C26—Percent distribution of Middle Shuswap River Summer AEQ total fishing mortalities and escapement.</i>	125
<i>Appendix C27—Percent distribution of Nanaimo River Fall AEQ total fishing mortalities and escapement.</i>	126

<i>Appendix C28—Percent distribution of Nicola River Spring AEQ total fishing mortalities and escapement.</i>	127
<i>Appendix C29—Percent distribution of Nisqually Fall Fingerling AEQ total fishing mortalities and escapement.</i>	128
<i>Appendix C30—Percent distribution of Nooksack Spring Yearling AEQ total fishing mortalities and escapement.</i>	129
<i>Appendix C31—Percent distribution of Northern Southeast Alaska Spring AEQ total fishing mortalities and escapement.</i>	130
<i>Appendix C32—Percent distribution of Nooksack Spring Fingerling AEQ total fishing mortalities and escapement.</i>	131
<i>Appendix C33—Percent distribution of Phillips River Fall AEQ total fishing mortalities and escapement.</i>	132
<i>Appendix C34—Percent distribution of Puntledge River Summer AEQ total fishing mortalities and escapement.</i>	133
<i>Appendix C35—Percent distribution of Queets Fall Fingerling AEQ total fishing mortalities and escapement.</i>	134
<i>Appendix C36—Percent distribution of Quillayute AEQ total fishing mortalities and escapement based on Queets River CWT recoveries adjusted to terminal impact specific information available for Quillayute.</i>	135
<i>Appendix C37—Percent distribution of Grays Harbor AEQ total fishing mortalities and escapement based on Queets River CWT recoveries adjusted to terminal impact specific information available for Grays Harbor.</i>	136
<i>Appendix C38—Percent distribution of Hoh AEQ total fishing mortalities and escapement based on Queets River CWT recoveries adjusted to terminal impact specific information available for Hoh.</i>	137
<i>Appendix C39—Percent distribution of Quinsam River Fall AEQ total fishing mortalities and escapement.</i>	138
<i>Appendix C40—Percent distribution of East Vancouver Island North AEQ total fishing mortalities and escapement based on Quinsam River CWT recoveries adjusted for basin-specific terminal impacts.</i>	139
<i>Appendix C41—Percent distribution of Robertson Creek Fall AEQ total fishing mortalities and escapement.</i>	140
<i>Appendix C42—Percent distribution of Northwest Vancouver Island AEQ total fishing mortalities and escapement based on Robertson Creek Fall CWT recoveries terminally adjusted for basin-specific terminal impacts.</i>	141
<i>Appendix C43—Percent distribution of Southwest Vancouver Island AEQ total fishing mortalities and escapement based on Robertson Creek Fall CWT recoveries terminally adjusted for basin-specific terminal impacts.</i>	142
<i>Appendix C44—Percent distribution of Samish Fall Fingerling AEQ total fishing mortalities and escapement.</i>	143
<i>Appendix C45—Percent distribution of Lower Shuswap River Summer AEQ total fishing mortalities and escapement.</i>	144
<i>Appendix C46—Percent distribution of Skagit Spring Fingerling AEQ total fishing mortalities and escapement.</i>	145
<i>Appendix C47—Percent distribution of Skagit Spring Yearling AEQ total fishing mortalities and escapement.</i>	146
<i>Appendix C48—Percent distribution of Skykomish Fall Fingerling AEQ total fishing mortalities and escapement.</i>	147

<i>Appendix C49—Percent distribution of Similkameen Summer Yearling AEQ total fishing mortalities and escapement.....</i>	148
<i>Appendix C50—Percent distribution of Tsoo-Yess Fall Fingerling AEQ total fishing mortalities and escapement.....</i>	149
<i>Appendix C51—Percent distribution of Spring Creek Tule AEQ total fishing mortalities and escapement.....</i>	150
<i>Appendix C52—Percent distribution of South Puget Sound Fall Fingerling AEQ total fishing mortalities and escapement.....</i>	151
<i>Appendix C53—Percent distribution of South Puget Sound Fall Yearling AEQ total fishing mortalities and escapement.....</i>	152
<i>Appendix C54—Percent distribution of Squaxin Pens Fall Yearling AEQ total fishing mortalities and escapement.....</i>	153
<i>Appendix C55—Percent distribution of Salmon River AEQ total fishing mortalities and escapement.....</i>	154
<i>Appendix C56—Percent distribution of Nehalem AEQ total fishing mortalities and escapement based on Salmon River Hatchery CWT recoveries with terminal adjustments for basin-specific terminal fishery performance.....</i>	155
<i>Appendix C57—Percent distribution of Siletz AEQ total fishing mortalities and escapement based on Salmon River Hatchery CWT recoveries with terminal adjustments for basin-specific terminal fishery performance.....</i>	156
<i>Appendix C58—Percent distribution of Siuslaw AEQ total fishing mortalities and escapement based on Salmon River Hatchery CWT recoveries with terminal adjustments for basin-specific terminal fishery performance.....</i>	157
<i>Appendix C59—Percent distribution of Southern Southeast Alaska Spring AEQ total fishing mortalities and escapement.....</i>	158
<i>Appendix C60—Percent distribution of Skagit Summer Fingerling AEQ total fishing mortalities and escapement.....</i>	159
<i>Appendix C61—Percent distribution of Stikine River AEQ total fishing mortalities and escapement.....</i>	160
<i>Appendix C62—Percent distribution of Stillaguamish Fall Fingerling AEQ total fishing mortalities and escapement.....</i>	161
<i>Appendix C63—Percent distribution of Columbia River Summers AEQ total fishing mortalities and escapement.....</i>	162
<i>Appendix C64—Percent distribution of Taku River AEQ total fishing mortalities and escapement.....</i>	163
<i>Appendix C65—Percent distribution of Taku And Stikine Rivers AEQ total fishing mortalities and escapement.....</i>	164
<i>Appendix C66—Percent distribution of Unuk River AEQ total fishing mortalities and escapement.....</i>	165
<i>Appendix C67—Percent distribution of Columbia River Upriver Bright AEQ total fishing mortalities and escapement.....</i>	166
<i>Appendix C68—Percent distribution of University of Washington Accelerated AEQ total fishing mortalities and escapement.....</i>	167
<i>Appendix C69—Percent distribution of White River Spring Yearling AEQ total fishing mortalities and escapement.....</i>	168
<i>Appendix C70—Percent distribution of Willamette Spring AEQ total fishing mortalities and escapement.....</i>	169

Appendix C1— Percent distribution of Alaska Spring AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery									Terminal Fishery						Escapement									
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.
			T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	N	S	T	N	S	T	N	S					
2009	8020	3,4,5,6	17.3	4.3	2.5	0.5	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	63.1			
2010	6102	3,4,5,6	18.1	4.7	7.1	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	56.8			
2011	6306	3,4,5,6	13.3	8.8	3.6	0.4	0.2	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	57.1			
2012	3987	3,4,5,6	27.2	9.7	4.1	0.5	0.3	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	35.8			
2013	6290	3,4,5,6	15.2	13.6	2.2	0.2	0.7	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	46.9			
2014	5190	3,4,5,6	24.9	8.1	2.5	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	53.5			
2015	6043	3,4,5,6	25.3	12.8	2.7	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6	40.6			
2016	3952	3,4,5,6	26.5	8.1	3.7	0.4	0.6	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	38.0			
2017	4488	3,4,5,6	20.5	9.0	4.0	0.0	0.8	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	54.3			
2018	2866	3,4,5,6	9.2	8.5	2.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	65.8			
2019	2937	3,4,5,6	5.2	29.0	0.5	0.0	0.3	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	56.6			
79–84	5688		33.5	2.7	8.9	1.1	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	47.8			
85–95	14008		27.3	12.8	8.1	0.7	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	39.5			
96–98	5703		25.0	7.3	10.0	0.0	0.4	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	31.9			
99–08	8872		21.4	4.3	8.6	0.4	0.4	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	46.8			
09–18	5324		19.8	8.8	3.5	0.3	0.3	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	51.2			
19–28	2937		5.2	29.0	0.5	0.0	0.3	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	56.6			

Appendix C2— Percent distribution of Atnarko River AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement								
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.
			T	N	S	T	N	S	T	S	T	N	S	T	N	S	T	S	N	S	T	S	T	N	S	T	N	S	T	N	S		
2009	683	2,3,4	9.4	0.0	0.0	3.2	3.4	0.0	0.0	0.0	22.8	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.4	3.5	0.0	0.0	0.0	0.0	45.7		
2010	831	2,3,4,5	11.2	0.1	0.6	2.9	1.7	0.0	0.0	0.0	13.1	6.5	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.6	2.6	0.0	0.0	0.0	0.0	50.2	
2011	568	2,3,4,5	14.1	0.0	0.5	8.5	3.2	0.0	0.0	0.0	21.7	7.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.4	0.9	0.0	0.0	0.0	0.0	36.6	
2012	873	2,3,4,5	12.6	0.6	0.8	2.3	2.2	0.0	0.0	0.0	16.2	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.8	0.0	0.0	0.0	0.0	0.0	49.9	
2013	3016	2,3,4,5	4.4	0.4	0.4	1.5	2.6	0.0	0.0	0.0	9.1	1.3	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	9.4	3.4	0.0	0.0	0.0	0.0	67.5	
2014	3345	2,3,4,5	6.2	0.5	0.4	2.7	2.0	0.2	0.2	0.0	6.8	3.9	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.2	3.8	0.0	0.0	0.0	0.0	62.1	
2015	8545	2,3,4,5	3.8	0.0	0.7	1.0	2.5	0.2	0.0	0.0	7.8	3.5	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	0.7	0.0	0.0	0.0	0.0	72.8	
2016	4857	2,3,4,5	4.7	1.3	0.9	1.1	3.0	0.3	0.0	0.0	4.2	3.8	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.9	2.1	0.0	0.0	0.0	0.0	66.9	
2017	2080	2,3,4,5	5.6	0.1	0.8	2.1	2.0	0.2	0.0	0.0	12.0	3.1	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.4	2.7	0.0	0.0	0.0	0.0	53.8	
2018	2216	2,3,4,5	2.7	0.0	0.5	0.7	1.0	0.1	0.0	0.0	17.2	1.1	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.5	0.5	0.0	0.0	0.0	0.0	64.3	
2019	2385	3,4,5	1.3	0.0	0.6	0.0	2.2	0.0	0.7	0.0	16.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.9	8.7	0.0	0.0	0.0	0.0	56.2	
79–84	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
85–95	1215		9.9	0.8	0.3	2.1	1.7	0.3	0.0	2.4	16.5	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	2.0	0.0	0.0	0.0	0.0	59.8	
96–98	1429		4.8	0.0	0.8	0.1	2.9	0.0	0.0	0.1	11.2	1.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0	4.5	0.0	0.0	0.0	0.0	66.6	
99–08	884		7.4	0.1	1.0	2.8	4.3	0.2	0.0	0.0	14.6	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.2	3.1	0.0	0.0	0.0	0.0	55.2	
09–18	2701		7.5	0.3	0.5	2.6	2.3	0.1	0.0	0.0	13.1	3.6	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.8	2.0	0.0	0.0	0.0	0.0	57.0	
19–28	2385		1.3	0.0	0.6	0.0	2.2	0.0	0.7	0.0	16.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.9	8.7	0.0	0.0	0.0	0.0	56.2	

Appendix C3— Percent distribution of Atnarko Yearling AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery								Terminal Fishery						Escapement											
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.	
			T	N	S	T	N	S	T	S	T	N	S	T	N	S	T	S	N	S	T	N	S	T	N	S	N	S	T	N	S			
2009	2	2	Failed Criteria						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
2010	36	2,3	25.0	2.8	5.6	8.3	13.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2011	98	2,3,4	21.4	5.1	2.0	5.1	5.1	0.0	0.0	0.0	0.0	2.0	11.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2012	951	2,3,4,5	9.7	0.7	1.3	5.2	2.9	0.0	0.0	0.0	0.0	17.5	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2013	2979	2,3,4,5	3.7	0.2	0.5	1.6	3.5	0.2	0.0	0.0	0.0	9.2	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2014	1375	3,4,5	7.9	0.2	0.7	4.4	3.6	0.0	0.0	0.0	0.0	9.4	2.3	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2015	1982	4,5	3.1	0.2	0.7	0.3	2.7	0.2	0.0	0.0	8.9	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2016	454	5	Failed Criteria						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2017	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2018	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
79-84	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
85-95	348		8.9	0.0	0.0	3.2	3.4	0.0	0.0	0.0	0.0	24.7	1.4	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
96-98	671		4.9	0.4	0.1	0.3	0.6	0.0	0.0	0.0	0.0	13.7	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
99-08	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
09-18	1768		7.1	0.4	0.8	3.7	3.3	0.1	0.0	0.0	0.0	12.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
19-28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

Appendix C4— Percent distribution of Big Qualicum River Fall AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement								
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.
			T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	N	S	T	N	S	N	S	T	N	S	T	N	S			
2009	557	2,3,4,5	4.7	5.6	0.0	2.0	0.0	1.4	2.5	0.0	0.0	1.6	0.0	0.0	16.2	0.5	0.0	0.0	0.0	0.4	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	1.6	62.3		
2010	476	2,3,4,5	6.3	0.2	1.5	1.7	0.0	1.1	3.8	0.0	0.0	1.5	0.0	0.0	20.6	1.9	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.8	59.2			
2011	523	2,3,4,5	7.8	1.7	2.1	0.0	1.3	1.1	0.0	0.0	0.0	3.8	0.0	0.0	13.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	1.0	65.6			
2012	554	2,3,4,5	7.6	1.6	0.0	3.1	1.4	2.9	0.0	0.0	0.0	4.3	0.0	0.0	26.5	0.5	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.7	49.1		
2013	903	2,3,4,5	1.9	1.8	0.0	1.3	1.4	0.4	2.0	0.0	0.0	1.2	0.0	0.0	26.8	0.2	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.3	0.0	0.6	0.0	0.0	0.2	60.8		
2014	1938	2,3,4,5	3.2	2.0	0.3	1.2	0.8	0.4	2.4	0.0	0.0	0.9	0.0	0.0	43.0	0.4	0.1	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.1	44.3		
2015	2059	2,3,4,5	4.9	0.6	0.5	0.9	0.2	1.1	0.6	0.0	0.1	1.9	0.0	0.0	23.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	65.2		
2016	1129	2,3,4,5	6.7	2.8	0.5	0.7	0.0	0.0	1.0	0.0	0.0	3.9	0.0	0.0	40.1	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	42.7		
2017	694	2,3,4,5	1.7	0.6	0.0	1.7	0.6	0.0	0.1	0.0	0.0	3.0	0.0	0.0	18.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	73.3		
2018	262	2,3,4,5	1.1	1.9	0.0	1.5	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	32.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	61.8	
2019	370	2,3,4,5	1.4	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.9	0.0	0.0	38.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.8	
79–84	1930		3.6	0.6	0.6	3.2	0.0	2.7	0.0	8.4	4.8	0.3	15.0	9.8	27.9	0.0	0.0	0.0	0.0	0.1	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	22.3		
85–95	683		4.5	2.2	0.4	2.9	0.3	2.5	0.0	3.3	4.5	0.3	4.2	5.7	37.4	0.2	0.0	0.0	0.0	0.5	0.4	0.1	0.0	0.1	0.6	0.0	0.1	0.0	0.5	29.4			
96–98	271		4.8	0.2	0.0	1.3	0.0	0.1	0.7	1.1	0.8	1.5	0.3	1.1	40.1	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	46.6		
99–08	437		8.7	2.0	1.1	2.3	1.5	1.5	1.1	0.4	0.2	2.5	0.0	0.5	16.2	0.1	0.2	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0	1.2	58.5		
09–18	910		4.6	1.9	0.5	1.4	0.6	1.0	1.2	0.0	0.0	2.2	0.0	0.0	26.1	0.4	0.0	0.0	0.0	0.1	0.5	0.0	0.0	0.0	0.2	0.0	0.3	0.0	0.5	58.4			
19–28	370		1.4	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.9	0.0	0.0	38.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.8	

Appendix C5— Percent distribution of Chilliwack River Fall AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement							
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC	Puget Sd	SEAK			Canada		Southern US			Stray	Esc.	
			T	N	S	T	N	S	T	S	T	N	S	T	N	S	T	S	N	S	T	N	S	N	S	T	N	S	T	N	S	
2009	2986	2,3,4,5	0.0	0.0	0.0	0.0	0.0	1.7	2.4	0.0	0.0	0.0	0.0	0.0	4.7	0.7	0.3	0.0	0.0	0.0	0.6	3.2	0.0	0.0	0.0	3.3	14.0	0.0	0.2	0.0	1.3	67.5
2010	6393	2,3,4,5	0.3	0.0	0.0	0.0	0.0	2.6	2.4	0.0	0.0	0.0	0.0	0.0	6.2	3.1	1.0	0.4	0.0	0.0	0.4	1.5	0.0	0.0	0.0	1.4	6.2	0.0	0.4	0.0	0.6	73.5
2011	5881	2,3,4,5	0.0	0.0	0.0	0.1	0.0	3.7	2.4	0.0	0.0	0.2	0.0	0.9	3.8	1.3	0.6	0.0	0.0	0.0	0.3	2.7	0.0	0.0	0.0	0.7	3.0	0.0	0.5	0.0	0.0	79.8
2012	5613	2,3,4,5	0.0	0.0	0.0	0.0	0.0	1.0	1.4	0.0	0.0	0.0	0.0	0.2	11.6	5.1	0.7	0.1	0.1	0.0	0.1	7.4	0.0	0.0	0.0	0.3	5.4	0.0	0.4	0.0	0.0	66.2
2013	13046	2,3,4,5	0.0	0.0	0.0	0.1	0.0	2.4	2.3	0.0	0.0	0.0	0.0	1.0	10.3	5.4	1.0	0.1	0.0	0.0	0.5	3.0	0.0	0.0	0.0	1.3	5.7	0.0	0.2	0.0	0.3	66.3
2014	11961	2,3,4,5	0.1	0.0	0.0	0.0	0.0	1.4	1.2	0.0	0.0	0.0	0.1	2.3	11.6	3.5	0.6	0.1	0.0	0.0	0.6	2.0	0.0	0.0	0.0	1.3	3.8	0.0	0.2	0.0	0.3	70.8
2015	6333	2,3,4,5	0.0	0.0	0.0	0.0	0.1	0.5	0.5	0.0	0.0	0.0	0.0	1.1	10.4	3.1	0.5	0.0	0.0	0.2	0.3	1.5	0.0	0.0	0.0	3.2	5.9	0.0	0.0	0.0	1.0	71.6
2016	6948	2,3,4,5	0.1	0.0	0.0	0.0	0.0	1.1	1.8	0.0	0.0	0.0	0.0	0.2	12.5	1.9	0.4	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.8	6.8	0.0	0.2	0.0	0.3	73.5
2017	5652	2,3,4,5	0.0	0.0	0.0	0.1	0.0	1.8	3.4	0.0	0.0	0.0	0.4	19.0	4.6	0.6	0.1	0.1	0.0	0.2	1.0	0.0	0.0	0.0	0.6	8.8	0.0	0.1	0.0	1.0	58.3	
2018	6017	2,3,4,5	0.2	0.0	0.0	0.3	0.0	0.5	1.0	0.0	0.0	0.2	0.0	0.8	24.7	5.1	0.3	0.0	0.0	0.0	0.3	1.1	0.0	0.0	0.0	1.4	2.6	0.0	0.0	0.0	0.0	61.4
2019	10540	2,3,4,5	0.1	0.1	0.0	0.2	0.0	0.4	0.8	0.0	0.0	0.1	0.0	0.3	7.6	1.2	0.2	0.0	0.0	0.0	0.5	1.3	0.0	0.0	0.0	0.2	7.7	0.0	0.0	0.0	0.1	79.2
79-84	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
85-95	2270		0.3	0.1	0.0	0.3	0.0	17.9	0.4	0.6	0.7	0.0	6.3	3.3	14.6	5.1	0.2	0.2	0.0	0.0	2.8	4.0	0.0	0.0	0.0	0.9	1.7	0.0	0.3	0.0	1.9	38.4
96-98	2458		0.4	0.0	0.0	0.0	0.0	5.0	0.4	0.1	0.6	0.1	0.0	0.3	14.2	2.8	0.1	1.2	0.0	0.0	0.8	3.1	0.0	0.0	0.0	1.2	2.1	0.0	0.3	0.0	0.2	67.1
99-08	3971		0.1	0.0	0.0	0.1	0.0	6.0	2.5	0.0	0.0	0.1	0.0	0.0	4.9	5.8	0.6	0.2	0.0	0.0	0.1	1.7	0.0	0.0	0.0	0.9	6.0	0.0	0.3	0.0	0.8	69.7
09-18	7083		0.1	0.0	0.0	0.1	0.0	1.7	1.9	0.0	0.0	0.0	0.0	0.7	11.5	3.4	0.6	0.1	0.0	0.0	0.3	2.4	0.0	0.0	0.0	1.4	6.2	0.0	0.2	0.0	0.5	68.9
19-28	10540		0.1	0.1	0.0	0.2	0.0	0.4	0.8	0.0	0.0	0.1	0.0	0.3	7.6	1.2	0.2	0.0	0.0	0.0	0.5	1.3	0.0	0.0	0.0	0.2	7.7	0.0	0.0	0.0	0.1	79.2

Appendix C6— Percent distribution of Chilkat River AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery								Terminal Fishery						Escapement											
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.	
			T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S		
2009	567	3,4,5,6	3.5	1.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	94.5
2010	303	3,4,5,6	4.6	10.6	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	75.6
2011	355	3,4,5,6	7.3	7.0	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	79.2
2012	239	3,4,5,6	7.5	11.3	7.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	72.4
2013	339	3,4,5,6	1.5	10.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	87.9
2014	229	3,4,5,6	0.0	21.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	79.0
2015	297	3,4,5,6	2.4	8.1	5.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	83.8
2016	125	3,4,5,6	3.2	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	95.2
2017	208	3,4,5,6	3.8	2.9	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90.9
2018	212	3,4,5,6	0.0	10.4	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	86.8
2019	254	4,5,6	3.5	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	96.1
79–84	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
85–95	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
96–98	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
99–08	451		4.6	5.7	11.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	78.5
09–18	287		3.4	8.5	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	84.5
19–28	254		3.5	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	96.1

Appendix C7— Percent distribution of Chickamin River AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery								Terminal Fishery						Escapement											
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.	
			T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	N	N	S	T	N	S	T	N	S	T	N	S					
2009	358	4,5,6	23.2	12.8	2.5	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	60.6
2010	320	5,6	15.6	2.2	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	79.7
2011	82	6	Failed Criteria						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2012	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2013	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2014	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2015	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2016	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2017	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2018	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
79–84	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
85–95	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
96–98	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
99–08	439		18.1	2.9	10.8	0.3	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	66.5
09–18	358		23.2	12.8	2.5	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	60.6
19–28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

Appendix C8— Percent distribution of Cowichan River Fall AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery								Terminal Fishery						Escapement									
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray
			T	N	S	T	N	S	T	N	S	T	N	S	T	S	T	S	N	S	T	N	S	T	N	S	T	N	S			
2009	603	2,3,4	0.0	0.0	0.5	0.0	0.0	5.8	6.0	0.0	0.0	0.2	0.0	0.0	42.8	0.7	0.0	0.0	0.0	0.0	5.3	0.0	0.0	0.0	5.6	0.0	0.0	4.1	0.0	11.3	17.7	
2010	1249	2,3,4,5	0.2	0.1	0.0	0.0	0.0	8.5	2.2	0.0	0.0	0.3	0.0	0.0	40.8	1.2	0.0	0.0	0.0	0.1	0.6	3.8	0.0	0.0	0.0	1.4	0.0	0.0	5.3	0.0	2.4	33.1
2011	1929	2,3,4,5	0.7	0.2	0.0	0.2	0.2	5.7	3.9	0.0	0.0	1.3	0.0	0.0	21.2	1.5	0.3	0.0	0.0	0.0	0.7	6.3	0.0	0.0	0.0	1.8	0.0	0.0	4.3	0.0	1.8	50.2
2012	3380	2,3,4,5	0.7	0.1	0.1	0.5	0.0	3.6	3.0	0.0	0.0	0.6	0.0	0.1	24.9	2.7	0.4	0.0	0.0	0.0	0.0	9.2	0.0	0.0	0.0	12.0	0.1	0.0	3.6	0.0	1.7	36.8
2013	3658	2,3,4,5	0.3	0.1	0.0	0.0	0.2	2.5	3.6	0.0	0.0	0.2	0.0	0.1	34.4	2.1	0.4	0.0	0.0	0.0	1.0	5.6	0.0	0.0	0.0	2.0	0.0	0.0	5.0	0.0	4.3	38.3
2014	2704	2,3,4,5	1.2	0.0	0.2	0.7	0.0	6.0	5.7	0.0	0.0	0.6	0.0	0.0	44.4	1.4	0.1	0.0	0.0	0.0	0.2	4.3	0.0	0.0	0.0	4.4	0.0	0.0	1.1	0.0	1.2	28.5
2015	1313	2,3,4,5	0.8	0.5	0.0	0.2	0.0	0.5	2.5	0.0	0.0	2.1	0.0	0.0	35.6	1.3	0.0	0.0	0.0	0.0	0.2	2.0	0.0	0.0	0.0	3.7	0.0	0.0	1.3	0.0	7.8	41.7
2016	3360	2,3,4,5	0.3	0.1	0.0	0.1	0.0	1.0	1.3	0.0	0.0	0.7	0.0	0.0	36.3	0.7	0.2	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	2.6	0.0	0.0	3.6	0.0	1.5	50.2
2017	3005	2,3,4,5	0.3	0.1	0.5	0.3	0.0	4.5	4.5	0.0	0.0	0.7	0.0	0.0	24.5	1.0	0.1	0.0	0.0	0.0	0.3	3.5	0.0	0.0	0.0	3.7	0.0	0.0	3.9	0.0	1.1	51.2
2018	3796	2,3,4,5	0.7	0.1	0.0	0.2	0.0	1.0	3.3	0.0	0.3	0.4	0.0	0.0	42.0	0.6	0.0	0.0	0.0	0.0	0.2	5.8	0.0	0.0	0.0	14.6	0.0	0.0	4.3	0.0	1.0	25.5
2019	1348	2,3,4,5	0.4	0.5	0.1	0.6	0.0	2.0	3.0	0.0	0.0	4.5	0.0	0.0	36.7	0.2	0.3	0.0	0.0	0.0	0.0	5.4	0.0	0.0	0.0	0.3	0.0	0.0	6.1	0.0	0.4	39.5
79–84	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
85–95	3009		0.2	0.0	0.0	0.2	0.0	5.3	0.5	0.5	1.4	0.0	9.5	4.0	52.0	0.4	0.0	0.0	0.0	0.0	0.8	1.0	0.0	0.0	0.0	1.5	0.1	0.0	1.1	0.0	0.5	20.8
96–98	923		1.7	0.0	0.0	0.0	0.0	1.3	1.2	0.0	0.3	0.4	0.0	0.6	37.7	0.0	0.0	0.0	0.0	0.0	0.6	2.8	0.0	0.0	0.0	4.5	0.3	0.0	1.5	0.0	1.9	45.2
99–08	484		0.6	0.1	0.1	0.5	0.5	10.4	3.0	0.0	0.3	0.4	0.0	0.0	30.4	0.9	0.3	0.0	0.0	0.0	0.5	2.5	0.0	0.0	0.0	4.8	0.6	0.0	6.8	0.0	4.2	33.1
09–18	2500		0.5	0.1	0.1	0.2	0.0	3.9	3.6	0.0	0.0	0.7	0.0	0.0	34.7	1.3	0.1	0.0	0.0	0.0	0.3	4.7	0.0	0.0	0.0	5.2	0.0	0.0	3.7	0.0	3.4	37.3
19–28	1348		0.4	0.5	0.1	0.6	0.0	2.0	3.0	0.0	0.0	4.5	0.0	0.0	36.7	0.2	0.3	0.0	0.0	0.0	0.0	5.4	0.0	0.0	0.0	0.3	0.0	0.0	6.1	0.0	0.4	39.5

Appendix C9— Percent distribution of Cowlitz Fall Tule AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement									
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC	Puget Sd		SEAK			Canada		Southern US			Stray	Esc.		
			T	N	S	T	N	S	T	N	S	T	N	S	T	S	T	S	N	WAC	N	S	T	N	S	N	S	T	N	S				
2009	463	2,3,4,5	2.6	0.0	2.2	0.0	1.1	1.5	1.7	0.0	0.0	0.0	0.0	0.0	3.2	6.3	3.9	0.0	0.0	0.0	0.0	2.8	0.0	0.0	0.0	0.0	0.0	0.0	1.3	6.7	1.1	65.7		
2010	630	2,3,4,5	3.3	0.5	0.0	1.1	0.3	3.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	10.0	10.3	1.7	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	1.3	1.3	63.5	
2011	1377	2,3,4,5	1.2	0.1	0.1	0.3	0.4	1.2	0.4	0.0	0.0	0.3	0.0	0.0	0.0	1.5	2.4	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.7	0.1	90.5
2012	596	2,3,4,5	0.0	0.0	0.0	1.2	0.3	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	3.9	6.2	1.2	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	6.0	0.0	75.2
2013	735	2,3,4,5	1.6	0.0	0.0	0.0	0.0	0.7	1.2	0.0	0.0	0.0	0.0	0.0	0.0	4.2	4.5	1.2	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	2.0	1.1	82.2
2014	541	2,3,4,5	4.1	0.0	0.4	2.0	0.0	2.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	3.0	1.8	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	18.5	1.5	62.5
2015	402	2,3,4,5	4.2	5.2	0.0	2.5	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	5.5	8.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	16.7	4.0	47.5
2016	556	2,3,4,5	4.1	0.0	0.0	2.5	1.1	2.3	3.2	0.0	0.0	0.0	0.0	0.0	0.0	8.1	3.2	6.1	3.2	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	3.1	8.1	1.3	52.2	
2017	545	2,3,4,5	4.0	0.0	0.0	2.2	1.5	2.2	5.5	0.0	0.0	2.9	0.0	0.0	0.0	3.5	8.8	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	7.3	0.2	59.8	
2018	452	2,3,4,5	0.0	0.0	0.0	4.6	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.1	4.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	13.1	0.9	69.2	
2019	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
79–84	574		4.9	0.0	0.1	4.6	0.0	19.6	0.0	1.7	1.0	0.2	0.0	1.4	2.0	8.4	10.5	2.9	0.1	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.7	1.5	2.0	28.9
85–95	654		3.9	0.9	0.1	2.8	0.0	10.8	0.7	0.8	1.0	0.0	0.0	0.5	0.2	6.4	4.1	4.6	0.2	0.2	0.2	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.2	5.6	2.1	45.2
96–98	222		5.3	0.0	5.3	1.4	0.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0	2.3	1.0	0.0	4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	2.2	0.0	73.9		
99–08	296		4.0	1.2	0.5	1.6	0.8	6.4	1.8	0.0	0.0	0.0	0.0	0.1	8.4	7.2	5.0	0.4	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	5.6	1.2	52.1	
09–18	630		2.5	0.6	0.3	1.6	0.9	1.6	1.5	0.0	0.0	0.3	0.0	0.0	1.3	4.6	5.7	0.9	0.2	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	1.5	8.0	1.1	66.8		
19–28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Appendix C10— Percent distribution of Dome Creek Spring AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery					ISBM Fishery								Terminal Fishery					Escapement											
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon	S Falcon	WAC	Puget Sd	SEAK			Canada		Southern US			Stray	Esc.			
			T	N	S	T	S	T	S	T	N	S	T	N	S	T	S	N	S	T	N	S	T	N	S	T	N	S				
2009	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2010	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2011	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2012	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2013	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2014	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2015	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2016	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2017	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2018	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
79–84	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
85–95	297		0.1	0.0	0.0	0.2	0.3	2.1	0.0	0.0	0.0	0.0	0.8	0.0	6.4	0.9	0.0	0.0	0.1	0.0	0.0	4.2	0.0	0.0	0.0	29.1	2.9	0.0	0.0	0.0	0.5	52.5
96–98	303		0.0	0.0	0.0	0.2	0.0	0.3	0.1	0.0	0.0	0.0	0.0	0.0	7.2	0.4	0.0	0.0	0.0	0.0	0.4	0.7	0.0	0.0	0.0	38.5	3.9	0.0	0.0	0.0	0.0	48.2
99–08	204		0.0	0.0	0.0	5.3	0.0	3.4	1.8	0.0	0.0	0.0	0.0	0.0	10.9	1.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	49.0	2.5	0.0	0.0	0.0	0.0	25.8
09–18	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
19–28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

Appendix C11— Percent distribution of Elk River AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement										
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.		
			T	N	S	T	N	S	T	N	S	T	N	S	T	S	T	S	N	S	T	N	S	N	S	T	N	S	T	N	S				
2009	3011	2,3,4,5	7.3	0.0	0.1	4.8	0.7	1.7	0.9	0.0	0.0	0.0	0.0	0.0	0.4	1.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	17.2	0.0	64.3				
2010	3795	2,3,4,5	5.9	0.0	0.4	4.7	0.2	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	4.0	0.7	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.1	0.0	11.7	0.0	64.8			
2011	1971	2,3,4,5	6.6	0.0	0.5	4.4	0.4	2.0	1.1	0.0	0.0	0.0	0.0	0.0	0.1	5.1	0.5	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.0	0.0	18.1	0.1	43.5	
2012	2781	2,3,4,5	2.2	0.3	0.0	2.2	0.1	3.2	2.7	0.0	0.0	0.3	0.0	0.0	0.6	6.6	0.7	3.8	0.6	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.5	0.0	15.9	0.0	47.9	
2013	5653	2,3,4,5	3.2	0.0	0.2	4.6	1.2	0.8	1.1	0.0	0.0	0.0	0.0	0.0	0.2	9.7	0.4	5.7	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.6	0.0	13.7	0.0	42.3
2014	4501	2,3,4,5	8.2	0.0	0.2	5.9	0.8	2.9	0.0	0.0	0.0	0.0	0.0	0.3	3.9	0.2	5.4	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.7	0.0	12.9	0.0	47.5	
2015	6487	2,3,4,5	3.2	0.0	0.2	1.0	0.2	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.4	1.9	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.3	0.0	16.3	0.1	53.5
2016	5760	2,3,4,5	8.8	0.2	0.3	10.1	0.5	1.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.3	2.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	0.0	13.8	0.4	54.7		
2017	2444	2,3,4,5	2.9	0.0	0.0	7.7	0.9	1.9	0.4	0.0	0.0	0.0	0.0	0.0	1.2	1.5	0.2	1.2	0.2	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	9.2	0.0	15.2	0.0	57.3		
2018	1378	2,3,4,5	6.9	0.3	0.0	4.8	1.7	1.7	2.9	0.0	0.0	0.4	0.0	0.0	0.0	3.5	0.3	1.1	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.2	0.0	13.4	0.0	47.2	
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
79–84	2504		3.2	0.1	0.0	5.1	0.1	6.3	0.0	0.9	0.1	0.0	0.0	0.0	0.1	1.4	0.1	2.9	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.8	0.0	24.8	0.0	49.0
85–95	1437		1.5	0.4	0.1	1.8	0.1	4.4	0.2	0.3	0.1	0.0	0.0	0.0	0.1	0.8	0.1	9.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.3	0.0	30.0	0.2	43.6
96–98	5036		8.0	0.0	0.0	2.1	0.1	0.5	0.0	0.0	0.1	0.0	0.0	0.0	0.3	0.0	8.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.0	0.0	13.3	0.2	54.9	
99–08	4666		8.2	0.0	0.4	4.3	0.9	2.2	0.5	0.0	0.0	0.1	0.0	0.0	0.1	2.7	0.4	4.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	0.0	14.7	0.1	46.6	
09–18	3778		5.5	0.1	0.2	5.0	0.7	1.7	1.0	0.0	0.0	0.1	0.0	0.0	0.3	3.9	0.4	2.4	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.3	0.0	14.8	0.1	52.3	
19–28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

Appendix C12— Percent distribution of Coquille AEQ total fishing mortalities and escapement based on Elk River CWT recoveries with terminal adjustments for basin-specific terminal fishery performance.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery								Terminal Fishery						Escapement											
			SEAK			NBC		WCVI	NBC & CBC			Southern BC			N Falcon		S Falcon		WAC	Puget Sd		SEAK			Canada		Southern US			Stray	Esc.			
			T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	N	S	T	N	S	N	S	T	N	S				
2009	3011	2,3,4,5	7.3	0.0	0.1	4.8	0.7	1.7	0.9	0.0	0.0	0.0	0.0	0.4	1.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6	0.0	77.1				
2010	3795	2,3,4,5	5.9	0.0	0.4	4.7	0.2	0.0	0.4	0.0	0.0	0.0	0.0	0.0	4.0	0.7	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.1	0.0	74.5		
2011	1971	2,3,4,5	6.6	0.0	0.5	4.4	0.4	2.0	1.1	0.0	0.0	0.0	0.0	0.1	5.1	0.5	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.5	0.1	59.2		
2012	2781	2,3,4,5	2.2	0.3	0.0	2.2	0.1	3.2	2.7	0.0	0.0	0.3	0.0	0.0	0.6	6.6	0.7	3.8	0.6	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.8	0.0	54.6
2013	5653	2,3,4,5	3.2	0.0	0.2	4.6	1.2	0.8	1.1	0.0	0.0	0.0	0.0	0.2	9.7	0.4	5.7	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.2	0.0	43.5
2014	4501	2,3,4,5	8.2	0.0	0.2	5.9	0.8	2.9	0.0	0.0	0.0	0.0	0.0	0.3	3.9	0.2	5.4	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.2	0.0	53.8	
2015	6487	2,3,4,5	3.2	0.0	0.2	1.0	0.2	0.5	0.2	0.0	0.0	0.0	0.0	0.0	2.1	0.4	1.9	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.0	0.1	62.0	
2016	5760	2,3,4,5	8.8	0.2	0.3	10.1	0.5	1.7	0.7	0.0	0.0	0.0	0.0	0.0	1.9	0.3	2.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.4	0.4	58.5	
2017	2444	2,3,4,5	2.9	0.0	0.0	7.7	0.9	1.9	0.4	0.0	0.0	0.0	0.0	0.0	1.2	1.5	0.2	1.2	0.2	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.7	0.0	64.0	
2018	1378	2,3,4,5	6.9	0.3	0.0	4.8	1.7	1.7	2.9	0.0	0.0	0.4	0.0	0.0	3.5	0.3	1.1	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.5	0.0	45.4	
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
79-84	2504		3.2	0.1	0.0	5.1	0.1	6.3	0.0	0.9	0.1	0.0	0.0	0.0	0.1	1.4	0.1	2.9	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.0	0.0	61.7	
85-95	1437		1.5	0.4	0.1	1.8	0.1	4.4	0.2	0.3	0.1	0.0	0.0	0.0	0.1	0.8	0.1	9.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.2	0.2	66.8
96-98	5036		8.0	0.0	0.0	2.1	0.1	0.5	0.0	0.0	0.1	0.0	0.0	0.0	0.3	0.0	8.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.7	0.2	66.4	
99-08	4666		8.2	0.0	0.4	4.3	0.9	2.2	0.5	0.0	0.0	0.1	0.0	0.1	2.7	0.4	4.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.8	0.1	60.8	
09-18	3778		5.5	0.1	0.2	5.0	0.7	1.7	1.0	0.0	0.0	0.1	0.0	0.0	0.3	3.9	0.4	2.4	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.2	0.1	59.3	
19-28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

Appendix C13— Percent distribution of South Umpqua AEQ total fishing mortalities and escapement based on Elk River CWT recoveries with terminal adjustments for basin-specific terminal fishery performance.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery								Terminal Fishery						Escapement										
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.
			T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	N	S	T	N	S	T	N	S					
2009	3011	2,3,4,5	7.3	0.0	0.1	4.8	0.7	1.7	0.9	0.0	0.0	0.0	0.0	0.4	1.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.9	0.0	61.8		
2010	3795	2,3,4,5	5.9	0.0	0.4	4.7	0.2	0.0	0.4	0.0	0.0	0.0	0.0	0.0	4.0	0.7	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.6	0.0	57.1	
2011	1971	2,3,4,5	6.6	0.0	0.5	4.4	0.4	2.0	1.1	0.0	0.0	0.0	0.0	0.1	5.1	0.5	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.2	0.1	48.4	
2012	2781	2,3,4,5	2.2	0.3	0.0	2.2	0.1	3.2	2.7	0.0	0.0	0.3	0.0	0.0	0.6	6.6	0.7	3.8	0.6	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.9	0.0	49.5
2013	5653	2,3,4,5	3.2	0.0	0.2	4.6	1.2	0.8	1.1	0.0	0.0	0.0	0.0	0.0	0.2	9.7	0.4	5.7	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.1	0.0	48.5
2014	4501	2,3,4,5	8.2	0.0	0.2	5.9	0.8	2.9	0.0	0.0	0.0	0.0	0.0	0.3	3.9	0.2	5.4	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.5	0.0	50.5	
2015	6487	2,3,4,5	3.2	0.0	0.2	1.0	0.2	0.5	0.2	0.0	0.0	0.0	0.0	0.0	2.1	0.4	1.9	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.7	0.1	72.4	
2016	5760	2,3,4,5	8.8	0.2	0.3	10.1	0.5	1.7	0.7	0.0	0.0	0.0	0.0	0.0	1.9	0.3	2.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.2	0.4	47.7	
2017	2444	2,3,4,5	2.9	0.0	0.0	7.7	0.9	1.9	0.4	0.0	0.0	0.0	0.0	0.0	1.2	1.5	0.2	1.2	0.2	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.3	0.0	61.3	
2018	1378	2,3,4,5	6.9	0.3	0.0	4.8	1.7	1.7	2.9	0.0	0.0	0.4	0.0	0.0	0.0	3.5	0.3	1.1	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.2	0.0	55.7
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
79-84	2504		3.2	0.1	0.0	5.1	0.1	6.3	0.0	0.9	0.1	0.0	0.0	0.0	0.1	1.4	0.1	2.9	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	0.0	72.6
85-95	1437		1.5	0.4	0.1	1.8	0.1	4.4	0.2	0.3	0.1	0.0	0.0	0.0	0.1	0.8	0.1	9.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.7	0.2	70.2
96-98	5036		8.0	0.0	0.0	2.1	0.1	0.5	0.0	0.0	0.1	0.0	0.0	0.0	0.3	0.0	8.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.3	0.2	62.8	
99-08	4666		8.2	0.0	0.4	4.3	0.9	2.2	0.5	0.0	0.0	0.1	0.0	0.0	0.1	2.7	0.4	4.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.1	0.1	55.6	
09-18	3778		5.5	0.1	0.2	5.0	0.7	1.7	1.0	0.0	0.0	0.1	0.0	0.0	0.3	3.9	0.4	2.4	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.2	0.1	55.3	
19-28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

Appendix C14— Percent distribution of Elwha River AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery								Terminal Fishery						Escapement											
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.	
			T	N	S	T	N	S	T	N	S	T	N	S	T	S	T	S	N	S	T	N	S	N	S	T	N	S	T	N	S			
2009	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2010	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2011	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2012	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2013	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2014	16	2	Failed Criteria						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2015	76	2,3	1.3	6.6	0.0	9.2	0.0	0.0	0.0	0.0	0.0	3.9	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	35.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.1
2016	297	2,3,4	5.1	1.0	0.3	5.7	1.7	0.3	0.0	0.0	0.0	0.7	0.0	0.0	5.7	0.3	2.0	0.0	0.0	0.0	0.0	4.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	72.4
2017	276	2,3,4,5	2.2	0.0	2.9	0.4	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.1	0.0	0.7	0.0	0.0	0.0	0.0	18.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	44.2
2018	534	2,3,4,5	1.1	0.0	0.0	0.2	1.1	0.7	3.9	0.0	0.0	1.5	0.0	0.0	3.9	0.6	0.2	0.0	0.0	0.0	0.0	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	80.1
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
79–84	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
85–95	376		9.7	1.6	0.1	2.7	0.8	17.1	2.0	2.0	2.8	0.0	0.8	0.4	7.0	2.5	0.1	0.1	0.0	1.2	0.9	16.7	0.8	0.0	0.0	0.0	0.0	0.0	4.7	0.0	0.0	26.2		
96–98	254		9.3	0.0	0.3	1.3	0.0	2.9	1.6	0.0	3.5	0.0	0.0	0.0	5.3	0.8	0.0	0.0	0.0	0.0	0.0	10.6	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	63.9	
99–08	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
09–18	369		2.8	0.3	1.1	2.1	1.7	0.4	1.3	0.0	0.0	0.7	0.0	0.0	11.9	0.3	1.0	0.0	0.0	0.0	0.0	8.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	65.6	
19–28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

Appendix C15— Percent distribution of George Adams Fall Fingerling AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement								
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.
			T	N	S	T	N	S	T	N	S	T	N	S	T	S	T	S	N	S	T	N	S	T	N	S	N	S					
2009	1600	2,3,4,5	0.0	0.0	0.0	0.2	0.0	5.6	4.8	0.0	0.0	0.0	0.0	0.0	7.6	2.4	0.4	0.0	0.0	0.0	2.9	18.1	0.0	0.0	0.0	0.0	0.0	0.0	2.7	0.0	0.0	55.1	
2010	1940	2,3,4,5	0.2	0.0	0.0	0.0	0.0	9.5	5.5	0.0	0.0	0.0	0.0	0.0	1.8	4.7	0.4	0.2	0.0	0.2	5.1	12.4	0.0	0.0	0.0	0.0	0.0	0.0	12.6	5.5	0.1	41.9	
2011	2762	2,3,4,5	0.0	0.0	0.0	0.0	0.0	3.0	2.4	0.0	0.0	0.0	0.0	0.0	1.7	2.1	0.3	0.3	0.0	0.0	4.9	16.3	0.0	0.0	0.0	0.0	0.0	0.0	9.7	6.6	0.0	52.6	
2012	3139	2,3,4,5	0.2	0.1	0.0	0.1	0.0	2.5	3.3	0.0	0.0	0.0	0.0	0.3	2.6	5.4	1.4	0.2	0.0	0.0	7.6	15.3	0.0	0.0	0.0	0.0	0.0	0.0	14.5	6.9	0.3	39.2	
2013	1946	2,3,4,5	0.0	0.5	0.0	0.2	0.0	3.4	4.4	0.0	0.0	0.0	0.0	0.0	4.5	5.1	1.0	0.3	0.0	0.0	3.1	8.0	0.0	0.0	0.0	0.0	0.0	0.0	6.4	8.3	0.2	54.6	
2014	1063	2,3,4,5	0.3	0.4	0.0	1.6	0.0	4.0	5.7	0.0	0.0	0.2	0.0	0.0	4.7	1.7	1.3	0.0	0.0	0.0	12.7	17.5	0.0	0.0	0.0	0.0	0.0	0.0	23.2	2.9	0.0	23.8	
2015	1431	2,3,4,5	0.0	0.0	0.0	0.0	0.0	1.0	0.8	0.0	0.0	0.3	0.0	0.0	3.8	6.5	0.6	0.0	0.0	0.0	5.9	11.4	0.0	0.0	0.0	0.0	0.0	0.0	24.2	7.0	0.3	38.2	
2016	2322	2,3,4,5	0.0	0.1	0.0	0.0	0.0	2.4	1.5	0.0	0.0	0.9	0.0	0.0	7.2	1.9	0.7	0.1	0.0	0.0	5.3	15.6	0.0	0.0	0.0	0.0	0.0	0.0	11.4	0.0	0.2	52.8	
2017	3730	2,3,4,5	0.1	0.0	0.0	0.1	0.0	2.9	4.6	0.0	0.0	0.0	0.0	0.0	4.5	2.5	0.9	0.1	0.0	0.0	12.4	8.6	0.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0	0.2	53.2	
2018	4038	2,3,4,5	0.1	0.0	0.0	0.2	0.0	1.6	3.7	0.0	0.0	0.1	0.0	0.0	3.9	4.3	0.7	0.0	0.0	0.0	14.1	11.5	0.0	0.0	0.0	0.0	0.0	0.0	14.5	0.0	0.1	45.2	
2019	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
79-84	908		0.0	0.0	0.0	0.2	0.0	17.6	0.0	1.8	0.7	0.0	0.5	1.6	4.0	1.8	0.5	0.1	0.0	2.5	14.6	27.0	0.0	0.0	0.0	0.0	0.0	0.0	11.3	0.0	0.5	15.4	
85-95	845		0.2	0.1	0.0	0.1	0.0	18.6	3.6	0.1	0.6	0.0	0.2	1.9	3.7	11.1	0.2	0.1	0.0	0.1	7.6	25.3	0.0	0.0	0.0	0.0	0.0	0.0	9.9	0.4	0.4	16.0	
96-98	449		0.9	0.1	0.0	0.0	0.0	2.1	2.4	0.0	0.8	0.0	0.0	0.2	6.0	3.1	0.2	0.2	0.0	0.0	0.3	22.4	0.0	0.0	0.0	0.1	0.0	0.0	0.4	0.0	0.3	60.6	
99-08	1225		0.5	0.2	0.0	0.2	0.0	10.8	5.1	0.0	0.1	0.0	0.0	0.0	3.8	4.6	0.6	0.7	0.0	0.0	4.0	12.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	5.1	0.3	46.9	
09-18	2397		0.1	0.1	0.0	0.2	0.0	3.6	3.7	0.0	0.0	0.2	0.0	0.0	4.2	3.7	0.8	0.1	0.0	0.0	7.4	13.5	0.0	0.0	0.0	0.0	0.0	0.0	12.9	3.7	0.1	45.7	
19-28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			

Appendix C16— Percent distribution of Green River AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement								
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.
			T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	N	S	T	N	S	N	S	T	N	S	N	S				
2009	1300	2,3,4,5	0.0	0.1	0.0	0.2	0.0	3.6	5.2	0.0	0.0	0.0	0.0	0.0	5.6	1.7	0.5	0.0	0.0	0.0	3.0	10.3	0.0	0.0	0.0	0.0	0.0	23.7	0.5	0.3	45.3		
2010	878	2,3,4,5	0.0	0.0	0.0	0.0	0.5	7.5	6.2	0.0	0.0	0.3	0.0	0.0	2.8	2.4	2.4	0.0	0.0	0.0	0.0	9.2	0.0	0.0	0.0	0.0	0.0	2.8	0.0	0.0	65.8		
2011	943	2,3,4,5	0.3	0.1	0.0	0.0	0.0	4.9	6.4	0.0	0.0	0.0	0.0	0.0	7.3	1.6	0.4	0.3	0.0	0.0	1.5	20.5	0.0	0.0	0.0	0.0	0.0	17.8	0.0	0.1	38.8		
2012	978	2,3,4,5	0.0	0.0	0.0	0.3	0.0	4.0	3.7	0.0	0.0	0.0	0.0	0.0	7.1	4.0	0.6	0.5	0.0	0.0	0.1	17.2	0.0	0.0	0.0	0.0	0.0	3.9	0.0	0.2	58.5		
2013	595	2,3,4,5	0.0	0.8	0.0	0.0	0.0	4.4	4.7	0.0	0.0	0.0	0.0	0.0	5.2	5.7	1.3	0.0	0.0	0.0	0.7	14.8	0.0	0.0	0.0	0.0	0.0	4.5	0.0	0.0	57.8		
2014	270	2,3,4,5	1.5	2.2	0.0	0.0	0.0	5.6	8.5	0.0	0.0	0.0	0.0	0.0	1.5	6.3	2.6	0.7	0.0	0.0	1.1	12.6	0.0	0.0	0.0	0.0	0.0	7.4	0.0	0.4	49.6		
2015	594	2,3,4,5	0.0	0.0	0.0	0.0	0.0	2.4	2.0	0.0	0.0	0.0	0.0	0.0	15.2	10.1	2.4	0.2	0.0	0.0	1.3	19.2	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.2	45.8		
2016	1209	2,3,4,5	0.0	0.0	0.0	0.0	0.0	1.4	1.6	0.0	0.0	0.0	0.0	0.0	12.5	2.4	0.2	0.0	0.0	0.0	0.7	12.4	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.4	67.7		
2017	2188	2,3,4,5	0.3	0.0	0.2	0.0	0.0	3.4	5.4	0.0	0.0	0.5	0.0	0.0	4.4	4.1	1.5	0.8	0.0	0.0	0.7	10.5	0.0	0.0	0.0	0.0	0.0	8.5	0.0	0.2	59.3		
2018	2006	2,3,4,5	0.2	0.0	0.2	0.1	0.3	2.3	3.3	0.0	0.0	0.3	0.0	0.0	11.0	5.8	0.9	0.0	0.0	0.0	0.9	18.9	0.0	0.0	0.0	0.0	0.0	17.9	0.0	0.0	37.5		
2019	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
79-84	1256		0.2	0.0	0.0	0.8	0.0	19.9	0.0	1.9	0.6	0.2	1.5	1.9	9.5	2.4	0.1	0.1	0.0	0.0	15.6	22.7	0.0	0.0	0.0	0.0	0.0	10.2	0.3	0.0	12.0		
85-95	1298		0.3	0.1	0.0	0.1	0.0	15.1	2.7	0.3	0.6	0.0	0.4	2.2	4.5	6.6	0.2	0.4	0.0	0.0	12.3	17.4	0.0	0.0	0.0	0.0	0.0	12.0	0.1	0.1	24.7		
96-98	888		1.2	0.0	0.0	1.0	0.0	2.6	2.3	0.0	0.8	0.1	0.0	0.2	4.2	1.8	0.0	0.3	0.0	0.0	8.4	17.1	0.0	0.0	0.0	0.1	0.0	7.0	0.5	0.1	52.4		
99-08	1004		0.5	0.0	0.0	0.5	0.0	9.9	3.4	0.0	0.0	0.1	0.0	0.0	4.0	4.6	0.5	0.4	0.0	0.0	6.3	13.6	0.0	0.0	0.0	0.0	0.0	20.8	0.1	0.1	35.0		
09-18	1096		0.2	0.3	0.0	0.1	0.1	3.9	4.7	0.0	0.0	0.1	0.0	0.0	7.3	4.4	1.3	0.3	0.0	0.0	1.0	14.6	0.0	0.0	0.0	0.0	0.0	8.9	0.1	0.2	52.6		
19-28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					

Appendix C17— Percent distribution of Hanford Wild Brights AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement									
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.	
			T	N	S	T	N	S	T	N	S	T	N	S	T	S	T	S	N	S	T	N	S	T	N	S	T	N	S					
2009	228	2,3,4,5	21.9	0.0	0.9	3.9	2.2	1.3	2.6	0.0	0.0	0.0	0.0	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	48.2	4.4	0.0	11.4		
2010	507	2,3,4,5	16.0	0.0	4.5	8.3	3.7	0.8	1.4	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.8	3.0	0.0	48.9		
2011	545	2,3,4,5	21.3	0.7	0.0	2.0	5.3	2.4	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.2	0.7	0.9	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.1	3.7	0.0	39.4		
2012	663	2,3,4,5	16.1	0.9	1.8	5.3	2.4	5.7	5.6	0.0	0.0	0.0	0.0	0.0	0.0	4.7	0.3	0.5	0.8	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.8	6.2	0.0	33.3	
2013	1692	2,3,4,5	7.4	0.0	0.8	4.5	2.8	1.4	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.2	0.5	1.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.0	4.3	0.0	49.8		
2014	2249	2,3,4,5	13.5	0.4	1.0	4.6	1.4	2.5	1.3	0.0	0.0	0.7	0.0	0.0	0.6	1.3	0.2	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.7	4.0	0.0	48.4	
2015	2124	2,3,4,5	13.9	1.7	1.6	2.4	3.9	0.6	1.0	0.0	0.0	0.1	0.0	0.0	0.3	1.8	0.9	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.7	3.3	0.0	51.0	
2016	1455	2,3,4,5	15.5	0.5	2.4	4.9	1.6	1.6	0.8	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.9	4.4	0.0	46.8	
2017	792	2,3,4,5	12.8	0.0	3.0	3.5	1.4	0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.0	7.2	0.0	48.5	
2018	188	2,3,4,5	5.3	0.0	3.2	5.3	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.8	0.0	0.0	67.6	
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
79–84	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
85–95	558		14.0	3.2	1.6	5.9	0.3	7.2	0.9	0.1	0.3	0.0	0.0	0.4	0.2	0.9	0.3	0.2	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.4	2.2	0.0	47.7
96–98	540		14.5	0.4	0.4	5.1	1.2	0.5	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	19.0	2.1	0.0	56.3		
99–08	683		17.7	0.3	1.8	4.6	1.7	1.8	0.5	0.0	0.1	0.0	0.0	0.0	0.5	0.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	3.5	0.3	52.4	
09–18	1044		14.4	0.4	1.9	4.5	2.8	1.7	1.5	0.0	0.0	0.1	0.0	0.0	0.6	1.4	0.3	0.9	0.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.7	4.0	0.0	44.5
19–28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Appendix C18— Percent distribution of Harrison River AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement									
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.	
			T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	S	N	S	T	N	S	T	N	S	T	N	S				
2009	2203	2,3,4	0.0	0.0	0.0	0.2	0.0	1.5	3.6	0.0	0.0	0.0	0.0	0.0	4.4	1.2	0.2	0.0	0.0	0.0	0.1	1.8	0.0	0.0	0.0	1.5	1.6	0.0	0.0	0.0	0.0	0.0	0.0	83.8
2010	2004	2,3,4,5	0.6	0.0	0.0	0.2	0.0	3.9	3.7	0.0	0.0	0.2	0.0	0.0	5.5	4.0	1.1	0.0	0.0	0.0	0.4	2.0	0.0	0.0	0.0	1.0	0.3	0.0	0.1	0.0	0.0	0.0	76.5	
2011	2728	2,3,4,5	0.3	0.0	0.0	0.1	0.4	3.3	5.3	0.0	0.0	0.1	0.0	0.8	5.1	3.1	0.6	0.0	0.0	0.0	0.4	2.1	0.0	0.0	0.0	1.4	0.0	0.0	0.1	0.0	0.0	0.0	76.9	
2012	2090	2,3,4,5	0.2	0.0	0.0	0.0	0.0	1.3	0.7	0.0	0.0	0.0	0.0	0.1	9.6	3.4	0.5	0.2	0.0	0.0	0.1	5.0	0.0	0.0	0.0	0.3	0.9	0.0	0.1	0.0	0.0	0.0	77.4	
2013	3475	2,3,4,5	0.0	0.1	0.1	0.0	0.1	2.0	2.3	0.0	0.0	0.1	0.0	1.0	7.5	5.1	0.9	0.3	0.0	0.0	0.3	3.8	0.0	0.0	0.0	0.0	0.5	0.0	0.4	0.0	1.3	74.3		
2014	2273	2,3,4,5	0.5	0.0	0.1	0.0	0.0	3.9	0.9	0.0	0.0	0.0	0.0	1.9	13.8	5.1	0.7	0.8	0.0	0.0	0.5	2.1	0.0	0.0	0.0	3.3	0.0	0.0	0.1	0.0	0.0	0.0	66.0	
2015	1836	2,3,4,5	0.2	0.1	0.0	0.4	0.0	0.9	1.0	0.0	0.0	0.0	0.0	1.2	10.3	3.5	0.0	0.9	0.0	0.3	0.3	1.6	0.0	0.0	0.0	2.1	0.3	0.0	0.0	0.0	0.0	0.0	76.9	
2016	2681	2,3,4,5	0.4	0.3	0.0	0.2	0.0	0.7	2.7	0.0	0.0	0.0	0.0	0.2	11.2	1.4	0.5	0.1	0.0	0.0	0.0	0.3	0.0	0.0	0.0	1.6	0.4	0.0	0.0	0.0	0.9	79.1		
2017	1730	2,3,4,5	0.0	0.0	0.0	0.5	0.0	2.2	7.5	0.0	0.0	0.1	0.0	0.6	21.8	8.2	0.5	0.2	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.7	0.0	0.0	0.3	0.0	0.0	0.0	56.5	
2018	2607	2,3,4,5	0.2	0.2	0.0	0.4	0.0	0.5	4.0	0.0	0.0	0.0	0.0	1.0	13.2	6.1	0.3	0.1	0.0	0.0	0.5	1.3	0.0	0.0	0.0	3.4	0.1	0.0	0.1	0.0	0.0	0.0	68.7	
2019	1834	2,3,4,5	0.3	0.2	0.0	0.0	0.0	1.4	0.8	0.0	0.0	0.2	0.0	0.8	14.5	2.9	0.3	0.0	0.0	0.0	1.2	2.7	0.0	0.0	0.0	2.1	0.5	0.0	0.0	0.0	1.0	71.2		
79–84	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
85–95	1457		0.4	0.0	0.1	0.3	0.0	18.1	0.7	0.7	1.0	0.0	8.3	3.4	17.8	5.5	0.1	0.6	0.0	0.0	2.8	4.1	0.0	0.0	0.0	0.8	0.4	0.0	0.3	0.0	0.4	34.2		
96–98	1080		0.8	0.1	0.0	0.0	0.0	5.1	1.2	0.0	0.4	0.0	0.0	0.3	15.3	4.8	0.0	1.6	0.0	0.0	1.0	4.9	0.0	0.0	0.0	0.9	0.1	0.0	0.1	0.0	0.3	63.2		
99–08	719		0.7	0.1	0.0	0.3	0.0	13.0	4.3	0.0	0.0	0.0	0.0	0.5	6.5	9.5	1.0	0.6	0.0	0.1	0.3	1.5	0.0	0.0	0.0	1.1	0.0	0.0	0.4	0.0	0.3	59.7		
09–18	2363		0.2	0.1	0.0	0.2	0.0	2.0	3.2	0.0	0.0	0.1	0.0	0.7	10.2	4.1	0.5	0.3	0.0	0.0	0.3	2.1	0.0	0.0	0.0	1.5	0.4	0.0	0.1	0.0	0.2	73.6		
19–28	1834		0.3	0.2	0.0	0.0	0.0	1.4	0.8	0.0	0.0	0.2	0.0	0.8	14.5	2.9	0.3	0.0	0.0	0.0	1.2	2.7	0.0	0.0	0.0	2.1	0.5	0.0	0.0	0.0	1.0	71.2		

Appendix C19— Percent distribution of Hoko Fall Fingerling AEQ total fishing mortalities and escapement.

Appendix C20—Percent distribution of Kitsumkalum River Summer AEQ total fishing mortalities and escapement.

Appendix C21— Percent distribution of Kitsumkalum Yearling AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery								Terminal Fishery						Escapement										
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.
			T	N	S	T	N	S	T	S	T	N	S	T	N	S	T	S	N	S	T	N	S	T	N	S	N	S	T	N	S		
2009	648	3,5,6	14.5	0.0	7.7	1.2	4.9	0.0	0.0	0.0	0.3	4.9	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	62.3
2010	393	3,4,6	13.0	0.3	2.8	2.5	3.3	0.0	0.0	0.0	2.5	10.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.4	0.0	0.0	0.0	0.0	0.0	0.0	58.5
2011	261	3,4,5	21.8	1.1	1.9	3.4	4.6	0.0	0.0	0.0	4.2	11.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	47.9
2012	340	3,4,5,6	28.2	0.0	2.1	0.9	2.6	0.0	0.0	0.0	2.1	16.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.5	0.0	0.0	0.0	0.0	0.0	0.0	41.2
2013	450	3,4,5,6	9.1	0.2	0.7	0.7	2.9	0.0	0.0	0.0	0.9	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3	0.0	0.0	0.0	0.0	0.0	0.0	75.8
2014	586	3,4,5,6	18.1	3.1	1.0	2.9	3.1	0.0	0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3	0.0	0.0	0.0	0.0	0.0	0.0	65.2
2015	1273	3,4,5,6	9.9	1.0	3.9	1.3	5.9	0.0	0.0	0.0	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.9	0.0	0.0	0.0	0.0	0.0	0.0	67.7
2016	592	3,4,5,6	5.2	6.8	4.2	3.4	5.9	0.0	0.0	0.0	0.0	6.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.8	0.0	0.0	0.0	0.0	0.0	0.0	56.9
2017	662	3,4,5,6	4.7	4.8	4.1	3.3	2.9	0.0	0.0	0.0	0.5	6.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.6	0.0	0.0	0.0	0.0	0.0	0.0	65.7
2018	1312	3,4,5,6	2.8	0.2	1.1	0.5	3.7	0.0	0.0	0.0	0.0	4.8	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	86.1
2019	477	4,5,6	4.2	8.0	0.8	0.0	4.4	0.0	0.0	0.0	0.0	11.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	70.9
79–84	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
85–95	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
96–98	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
99–08	725		19.6	2.0	5.4	2.7	6.9	0.0	0.0	0.0	7.9	5.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	46.2
09–18	652		12.7	1.8	2.9	2.0	4.0	0.0	0.0	0.0	1.0	7.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.5	0.0	0.0	0.0	0.0	0.0	0.0	62.7
19–28	477		4.2	8.0	0.8	0.0	4.4	0.0	0.0	0.0	0.0	11.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	70.9

Appendix C22— Percent distribution of Columbia Lower River Hatchery Tule AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement								
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.
			T	N	S	T	N	S	T	N	S	T	N	S	T	S	T	S	N	S	T	N	S	T	N	S	N	S					
2009	609	2,3,4,5	0.0	0.0	0.0	0.0	0.0	4.1	7.9	0.0	0.0	0.0	0.0	0.0	3.8	3.9	4.8	0.0	0.0	0.0	0.0	0.0	7.2	0.0	0.0	0.0	0.0	0.0	26.3	2.5	0.0	39.6	
2010	1597	2,3,4,5	0.3	0.0	0.0	0.3	0.0	6.6	6.3	0.0	0.0	0.0	0.0	0.0	2.9	14.8	5.4	3.8	0.0	0.3	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	26.7	3.1	0.0	29.2	
2011	840	2,3,4,5	0.0	0.0	0.0	0.0	0.0	9.4	6.4	0.0	0.0	1.0	0.0	0.0	0.5	4.8	7.5	2.3	0.4	2.3	0.0	2.9	0.0	0.0	0.0	0.0	0.0	0.0	17.4	3.1	0.0	42.3	
2012	865	2,3,4,5	0.0	0.0	0.0	0.5	0.0	3.0	8.1	0.0	0.0	0.0	0.0	0.0	1.3	9.2	13.1	6.8	1.5	0.2	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	15.1	2.7	0.0	35.5	
2013	713	2,3,4,5	0.0	0.0	0.0	0.0	0.0	2.2	3.2	0.0	0.0	0.6	0.0	0.0	3.1	6.7	6.0	2.1	0.0	0.0	0.0	12.2	0.0	0.0	0.0	0.0	0.0	0.0	15.1	4.2	0.0	44.5	
2014	2474	2,3,4,5	0.0	0.1	0.1	0.0	0.0	6.1	2.9	0.0	0.0	0.0	0.1	0.0	3.0	15.7	13.4	7.9	1.2	0.4	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	15.2	3.2	0.2	29.0	
2015	1469	2,3,4,5	0.3	0.0	0.0	0.2	0.6	5.2	2.1	0.0	0.0	0.0	0.0	0.0	2.2	17.3	9.0	5.4	0.4	0.0	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0	11.3	2.5	0.0	40.1	
2016	458	2,3,4,5	0.9	0.0	0.0	0.0	0.0	8.5	11.4	0.0	0.0	0.0	0.0	0.0	0.4	5.2	7.0	1.5	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	14.0	7.9	0.7	41.5	
2017	645	2,3,4,5	0.0	0.0	0.0	0.0	0.0	8.5	11.0	0.0	0.0	0.0	0.0	0.0	1.7	21.7	10.9	2.2	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.0	5.4	0.8	28.4		
2018	680	2,3,4,5	0.0	0.0	0.0	0.0	0.0	6.0	4.7	0.0	0.0	0.0	0.0	0.0	5.6	16.0	6.5	6.0	0.6	0.0	0.3	2.4	0.0	0.0	0.0	0.0	0.0	0.0	8.5	6.9	0.6	35.9	
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
79–84	2203		0.1	0.0	0.0	0.1	0.0	35.5	0.2	1.8	0.3	0.0	0.1	1.8	1.7	15.2	5.9	2.2	0.3	0.4	0.8	4.7	0.0	0.0	0.0	0.0	0.0	0.0	6.5	0.4	0.1	22.0	
85–95	1929		0.0	0.0	0.0	0.1	0.0	22.0	1.7	0.6	0.1	0.0	0.0	1.6	0.8	12.8	2.8	4.5	0.9	0.1	0.4	4.4	0.0	0.0	0.0	0.0	0.0	0.0	6.5	3.3	0.2	37.2	
96–98	167		0.0	0.0	0.0	0.0	0.0	11.4	7.2	0.0	0.0	2.3	0.0	0.0	1.1	2.0	2.5	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	13.9	1.3	54.2			
99–08	973		0.1	0.1	0.0	0.1	0.0	14.1	6.4	0.0	0.0	0.0	0.0	0.0	0.5	7.1	3.5	3.2	0.5	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	8.4	2.8	0.1	52.5	
09–18	1035		0.2	0.0	0.0	0.1	0.1	6.0	6.4	0.0	0.0	0.2	0.0	0.0	2.4	11.6	8.3	3.8	0.4	0.3	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0	15.9	4.1	0.2	36.6	
19–28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				

Appendix C23— Percent distribution of Lewis River Wild AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery								Terminal Fishery						Escapement											
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.	
			T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S		
2009	176	2,3,4,5	19.9	0.0	0.0	3.4	2.3	6.3	19.3	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	3.4	0.0	42.6	
2010	200	2,3,4,5	6.5	0.0	0.0	5.0	2.5	1.5	2.0	0.0	0.0	0.0	0.0	0.0	4.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	8.0	0.0	64.0	
2011	225	2,3,4,5	12.0	0.0	1.3	12.4	1.3	4.4	4.0	0.0	0.0	0.0	0.0	0.0	0.9	6.2	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	20.9	1.8	30.7	
2012	272	2,3,4,5	12.5	2.2	0.4	3.3	3.3	6.6	0.0	0.0	0.0	0.0	0.0	0.0	3.7	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.1	16.5	1.1	43.4	
2013	305	2,3,4,5	1.3	0.0	1.3	3.0	1.6	3.6	1.3	0.0	0.0	0.0	0.0	0.0	1.6	1.6	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	34.8	1.3	43.9
2014	271	2,3,4,5	8.1	0.4	0.0	6.6	0.0	4.4	0.0	0.0	0.0	0.0	0.0	0.0	2.6	7.4	1.5	8.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	0.4	57.2
2015	384	2,3,4,5	6.3	0.0	1.0	5.5	4.2	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.4	2.6	0.0	66.9	
2016	105	2,3,4,5	5.7	0.0	10.5	3.8	0.0	1.9	8.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	9.5	0.0	56.2		
2017	91	2,3,4,5	3.3	1.1	0.0	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4	1.1	72.5	
2018	137	2,3,4,5	2.9	0.0	0.0	6.6	0.0	0.0	8.0	0.0	0.0	0.0	0.0	0.0	2.9	1.5	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.7	0.0	37.2	
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
79–84	1079		7.7	0.4	0.1	3.5	0.0	9.1	0.0	1.6	0.4	0.0	0.2	0.7	1.1	2.7	5.3	0.8	0.0	0.4	0.4	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2	14.0	2.0	45.0	
85–95	806		5.6	0.1	0.3	4.2	0.2	8.0	0.4	0.7	0.3	0.1	0.0	0.5	0.2	1.7	0.6	1.2	0.1	0.1	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	11.0	10.0	2.7	51.7		
96–98	282		12.4	0.0	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	3.8	0.2	79.5		
99–08	575		12.8	0.0	0.8	3.9	1.5	6.1	1.5	0.0	0.0	0.4	0.0	0.0	0.3	3.0	1.3	1.9	0.1	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	5.6	1.4	54.2	
09–18	246		8.7	0.3	0.5	5.7	1.9	3.4	4.3	0.0	0.0	0.0	0.0	0.0	0.5	2.7	2.4	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.1	15.6	0.6	48.2	
19–28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			

Appendix C24— Percent distribution of Lyons Ferry AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement									
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.	
			T	N	S	T	N	S	T	N	S	T	N	S	T	S	T	S	N	S	T	N	S	N	S	T	N	S	T	N	S			
2009	4917	2,3,4,5	0.6	0.0	0.1	0.5	0.0	1.1	1.2	0.0	0.0	0.0	0.0	0.0	0.2	1.1	0.9	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	4.1	1.3	0.0	88.7	
2010	3104	2,3,4,5	0.3	0.1	0.0	0.8	0.1	3.6	2.5	0.0	0.0	0.0	0.0	0.0	0.4	5.4	4.5	0.6	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	9.8	1.6	0.0	69.8		
2011	2219	2,3,4,5	0.7	0.0	0.1	0.9	0.1	3.4	2.7	0.0	0.0	0.0	0.0	0.0	0.2	3.8	1.7	0.8	0.5	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.6	3.1	0.0	67.0
2012	2784	2,3,4,5	1.2	0.2	0.1	0.3	0.0	3.2	2.8	0.0	0.0	0.4	0.0	0.0	0.3	5.0	3.1	2.0	0.5	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.4	8.5	0.3	62.0
2013	3535	2,3,4,5	1.0	0.0	0.0	0.6	0.2	1.7	1.2	0.0	0.0	0.0	0.0	0.0	0.4	4.2	2.0	2.1	0.3	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.2	6.4	0.0	64.7
2014	2356	2,3,4,5	5.6	0.2	0.2	1.6	1.1	4.6	0.3	0.0	0.0	0.0	0.0	0.0	0.5	5.7	1.4	2.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.7	3.1	0.5	56.0
2015	2335	2,3,4,5	3.6	0.2	1.5	1.2	0.0	0.4	0.3	0.0	0.0	0.2	0.0	0.0	0.4	4.9	2.8	2.4	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.7	3.7	0.0	66.9
2016	2211	2,3,4,5	3.3	0.2	0.5	5.7	0.5	2.7	2.7	0.0	0.0	0.2	0.0	0.0	1.5	3.3	0.8	0.4	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.8	5.1	0.3	57.9
2017	1055	2,3,4,5	2.9	0.0	0.0	3.5	0.0	2.6	1.2	0.0	0.0	0.0	0.0	0.0	0.0	7.8	4.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.9	16.4	0.1	40.9
2018	735	2,3,4,5	2.9	0.1	0.7	3.9	1.0	1.9	2.6	0.0	0.0	0.0	0.0	0.0	0.0	2.0	1.5	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.8	6.1	0.4	67.6
2019	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
79–84	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
85–95	390		2.1	0.0	0.5	4.9	0.4	14.7	1.5	0.0	0.4	0.0	0.0	0.8	0.0	4.7	1.4	4.8	1.4	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	2.4	0.1	45.1
96–98	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
99–08	1123		2.6	0.1	0.0	0.9	0.3	2.5	0.5	0.0	0.0	0.5	0.0	0.0	0.1	2.8	1.4	1.2	0.1	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.2	1.1	0.1	79.1	
09–18	2525		2.2	0.1	0.3	1.9	0.3	2.5	1.8	0.0	0.0	0.1	0.0	0.0	0.4	4.3	2.2	1.6	0.2	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.9	5.5	0.2	64.2	
19–28	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Appendix C25— Percent distribution of Lyons Ferry Yearling AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement							
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC	Puget Sd	SEAK			Canada		Southern US			Stray	Esc.	
			T	N	S	T	N	S	T	N	S	T	N	S	T	S	N	S	T	N	S	N	S	T	N	S	T	N	S			
2009	13880	3,4,5,6	0.1	0.0	0.0	0.2	0.1	1.4	3.4	0.0	0.0	0.1	0.0	0.0	0.6	2.7	4.2	0.0	0.1	0.0	0.0	6.1	0.0	0.0	0.0	0.0	0.0	7.4	2.0	0.0	71.6	
2010	8007	3,4,5,6	0.8	0.1	0.0	1.0	0.2	5.4	2.8	0.0	0.0	0.2	0.0	0.0	0.3	8.6	7.9	2.9	0.2	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	20.8	2.1	0.3	46.0	
2011	6532	3,4,5,6	0.6	0.0	0.0	0.4	0.1	3.7	2.6	0.0	0.0	0.1	0.0	0.0	0.3	5.5	6.2	1.7	0.7	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	18.9	6.0	0.0	52.3	
2012	5251	3,4,5,6	0.8	0.2	0.0	0.4	0.0	2.4	3.1	0.0	0.0	0.2	0.0	0.0	0.8	8.4	5.5	5.3	1.2	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	13.7	6.6	0.0	50.9	
2013	7163	3,4,5,6	0.3	0.1	0.0	0.2	0.0	1.4	1.7	0.0	0.0	0.1	0.0	0.0	0.9	7.5	3.8	2.4	0.4	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	15.2	6.7	0.3	58.3	
2014	6246	3,4,5,6	1.0	0.1	0.3	0.9	0.1	3.9	1.4	0.0	0.0	0.3	0.0	0.0	0.9	13.2	4.4	6.9	0.6	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	20.8	7.5	0.2	37.2	
2015	5554	3,4,5,6	2.3	0.5	0.3	1.2	0.0	1.0	1.3	0.0	0.0	0.6	0.0	0.0	0.6	9.1	3.8	4.3	0.3	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	14.6	8.4	0.7	50.5	
2016	4007	3,4,5,6	3.5	0.5	0.4	4.3	0.3	6.5	2.8	0.0	0.0	0.4	0.0	0.0	0.7	7.3	5.1	2.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.3	8.6	0.0	38.6
2017	2885	3,4,5,6	1.3	0.2	0.2	5.3	1.5	4.9	2.4	0.0	0.0	1.5	0.0	0.0	0.7	9.7	3.8	3.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.4	16.6	0.6	31.7
2018	3405	3,4,5,6	1.9	0.2	0.1	4.5	0.9	3.0	2.5	0.0	0.0	0.9	0.0	0.0	1.5	12.5	2.6	1.5	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	12.6	8.5	0.0	46.1	
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
79–84	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
85–95	2731		0.6	0.0	0.0	1.4	0.0	19.5	2.6	0.3	0.7	0.1	0.1	0.5	0.6	12.2	2.7	7.7	0.7	0.0	0.2	2.4	0.0	0.0	0.0	0.0	0.0	12.9	1.4	0.3	33.0	
96–98	3558		1.7	0.1	0.1	1.5	0.4	2.2	0.6	0.2	0.6	0.3	0.0	0.1	0.2	1.4	0.3	5.9	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	14.4	5.1	1.2	63.5	
99–08	7973		0.9	0.1	0.1	0.5	0.2	6.0	1.9	0.0	0.0	0.2	0.0	0.0	0.4	6.3	3.7	5.0	0.7	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	9.7	2.8	0.5	60.4	
09–18	6293		1.3	0.2	0.1	1.8	0.3	3.4	2.4	0.0	0.0	0.4	0.0	0.0	0.7	8.5	4.7	3.0	0.4	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	15.9	7.3	0.2	48.3	
19–28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				

Appendix C26— Percent distribution of Middle Shuswap River Summer AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery								Terminal Fishery						Escapement												
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.		
			T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S						
2009	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
2010	3	2	Failed Criteria						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
2011	58	2,3	6.9	0.0	1.7	6.9	3.4	0.0	0.0	0.0	0.0	0.0	1.7	5.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.9	1.7	0.0	0.0	0.0	0.0	0.0	0.0	46.6	
2012	283	2,3,4	8.5	0.0	1.8	10.6	9.2	2.1	0.4	0.0	0.0	0.4	0.0	0.7	14.1	2.1	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.1	2.8	0.0	0.0	0.0	0.0	0.0	0.0	37.5
2013	1700	2,3,4,5	2.4	0.0	0.5	7.4	4.1	0.3	0.6	0.0	0.0	0.1	0.0	1.1	14.7	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.1	3.6	0.0	0.0	0.0	0.0	0.0	0.0	60.5
2014	1225	2,3,4,5	9.4	0.0	0.8	6.9	5.5	3.0	2.2	0.0	0.0	0.4	0.0	1.5	7.7	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	4.8	0.0	0.0	0.0	0.0	0.0	0.0	52.7
2015	2080	2,3,4,5	4.2	0.0	0.5	2.1	1.7	1.6	1.1	0.0	0.0	0.3	0.0	0.7	14.2	1.7	0.1	0.0	0.0	0.0	0.2	1.1	0.0	0.0	0.0	1.7	3.3	0.0	0.0	0.0	0.0	0.0	0.0	48.6	
2016	406	2,3,4,5	3.9	0.0	0.2	6.2	5.7	0.7	0.0	0.0	0.0	2.5	0.0	0.5	13.8	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.9	1.0	0.0	0.0	0.0	0.0	0.0	0.0	51.0	
2017	475	2,3,4,5	7.6	0.0	2.1	6.9	1.1	1.5	0.0	0.0	0.0	0.8	0.0	0.0	15.4	0.4	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	4.6	3.8	0.0	0.0	0.0	0.0	0.0	0.0	54.5	
2018	1325	2,3,4,5	0.9	0.0	0.3	1.7	1.3	1.5	1.6	0.0	0.0	0.0	0.0	1.2	15.7	0.3	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	6.7	1.8	0.0	0.0	0.0	0.0	0.0	0.0	66.1	
2019	1040	2,3,4,5	0.5	0.0	0.0	0.0	1.0	0.0	0.8	0.0	0.0	0.8	0.0	0.5	2.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.8	3.8	0.0	0.0	0.0	0.0	0.0	0.0	84.4	
79–84	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
85–95	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
96–98	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
99–08	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
09–18	1071		5.3	0.0	0.9	6.0	4.1	1.5	0.8	0.0	0.0	0.6	0.0	0.8	13.7	0.9	0.1	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	5.3	3.0	0.0	0.0	0.0	0.0	0.0	0.0	54.7	
19–28	1040		0.5	0.0	0.0	0.0	1.0	0.0	0.8	0.0	0.0	0.8	0.0	0.5	2.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.8	3.8	0.0	0.0	0.0	0.0	0.0	0.0	84.4	

Appendix C27— Percent distribution of Nanaimo River Fall AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement								
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.
			T	N	S	T	S	T	S	T	N	S	T	N	S	T	S	N	S	T	N	S	T	N	S	T	N	S	T	N	S		
2009	6	5	Failed Criteria						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2010	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2011	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2012	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2013	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2014	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2015	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2016	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2017	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2018	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
79–84	540		4.3	0.0	0.0	1.9	0.0	1.7	0.0	12.6	3.0	0.0	1.1	16.3	46.7	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	11.1	
85–95	1460		0.2	0.2	0.0	0.8	0.1	3.0	0.1	0.7	1.6	0.3	4.4	4.0	48.6	0.3	0.0	0.0	0.0	0.0	0.4	1.2	0.0	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.3	33.4	
96–98	499		2.5	1.9	0.0	3.4	0.0	0.5	0.3	0.9	1.3	0.6	0.0	1.0	51.0	0.1	0.0	0.0	0.0	0.3	0.8	2.5	0.0	0.0	0.0	1.2	0.0	0.0	0.7	0.0	1.9	29.1	
99–08	696		0.5	0.1	0.1	0.4	0.3	2.8	0.6	0.0	0.0	1.7	0.0	0.3	31.0	0.1	0.0	0.0	0.0	0.0	0.3	3.2	0.1	0.0	0.0	5.5	0.1	0.0	1.6	0.0	1.8	49.5	
09–18	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
19–28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Appendix C28— Percent distribution of Nicola River Spring AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement								
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.
			T	N	S	T	N	S	T	N	S	T	N	S	T	S	T	S	N	S	T	N	S	N	S	T	N	S	T	N	S		
2009	293	3,4,5,6	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	8.2	3.4	0.0	0.0	0.0	0.0	0.0	3.8	0.0	0.0	0.0	18.8	20.1	0.0	0.0	0.0	0.0	0.0	0.0	45.4		
2010	2328	3,4,5,6	0.4	0.0	0.0	1.5	0.2	0.0	0.1	0.0	0.0	0.0	1.8	0.8	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	4.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90.2		
2011	683	3,4,5,6	0.0	0.0	0.0	0.9	0.0	0.0	0.4	0.0	0.0	0.0	0.4	4.4	2.0	0.3	0.0	0.0	0.0	1.5	0.0	0.0	0.0	3.8	2.5	0.0	0.0	0.0	0.0	0.0	0.0	83.7	
2012	724	3,4,5,6	0.0	0.0	0.0	0.6	0.8	0.0	0.0	0.0	0.0	0.0	0.6	4.3	8.1	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	67.1	
2013	1466	3,4,5,6	0.0	0.0	0.0	1.2	0.0	0.2	0.0	0.0	0.0	0.2	0.0	0.5	4.6	3.3	0.3	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	87.0
2014	436	3,4,5,6	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.0	1.6	0.9	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.2	0.9	0.0	0.0	0.0	0.0	0.0	0.0	83.7
2015	1549	3,4,5,6	0.0	0.0	0.0	0.3	0.2	0.3	0.0	0.0	0.0	0.0	0.9	3.4	0.9	0.2	0.0	0.0	0.0	0.2	0.6	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	83.1
2016	974	3,4,5,6	0.2	0.0	0.0	1.7	0.0	0.9	0.0	0.0	0.0	0.0	0.7	10.3	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	75.1
2017	1086	3,4,5,6	0.0	0.0	0.0	1.0	0.0	1.2	0.0	0.0	0.0	0.0	0.2	3.4	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	84.7
2018	927	3,4,5,6	0.0	0.0	0.0	0.0	0.3	1.1	0.0	0.0	0.0	0.0	1.2	4.9	1.5	0.0	0.0	0.0	0.0	0.3	0.6	0.0	0.0	0.0	16.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	73.1
2019	1263	3,4,5,6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	1.0	0.8	1.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	94.7
79–84	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
85–95	1256		0.0	0.1	0.0	1.5	0.1	4.2	0.3	0.5	0.1	0.0	0.0	0.7	4.8	1.7	0.0	0.1	0.0	0.0	2.8	0.0	0.0	0.0	7.7	7.3	0.0	0.0	0.0	0.5	67.5		
96–98	321		0.0	0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.4	0.0	0.0	2.0	3.9	0.0	0.0	0.0	0.0	0.0	5.6	0.0	0.0	0.0	5.9	11.6	0.0	0.0	0.0	0.0	68.1		
99–08	1265		0.0	0.0	0.0	1.1	0.3	1.6	0.1	0.0	0.0	0.0	0.0	3.1	0.8	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	12.1	7.1	0.0	0.0	0.0	0.0	73.8		
09–18	1047		0.1	0.0	0.0	0.8	0.2	0.6	0.1	0.0	0.0	0.0	0.6	4.6	2.5	0.1	0.1	0.0	0.0	0.1	0.8	0.0	0.0	0.0	10.0	2.4	0.0	0.0	0.0	0.0	77.3		
19–28	1263		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	1.0	0.8	1.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	94.7

Appendix C29— Percent distribution of Nisqually Fall Fingerling AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement								
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.
			T	N	S	T	N	S	T	N	S	T	N	S	T	S	T	S	N	S	T	N	S	N	S	T	N	S	T	N	S		
2009	1645	2,3,4,5	0.0	0.0	0.0	0.0	0.0	2.1	3.6	0.0	0.0	0.0	0.0	0.0	1.2	2.2	0.3	0.0	0.0	0.0	0.5	15.4	0.0	0.0	0.0	0.0	0.0	0.0	35.4	0.0	0.0	39.2	
2010	1719	2,3,4,5	0.0	0.2	0.0	0.0	0.0	4.6	3.9	0.0	0.0	0.0	0.0	0.0	1.3	4.7	0.7	0.1	0.0	0.3	0.2	9.5	0.0	0.0	0.0	0.0	0.0	0.0	32.5	3.3	0.0	38.7	
2011	1455	2,3,4,5	0.0	0.0	0.0	0.3	0.0	2.9	3.2	0.0	0.0	0.0	0.0	0.0	0.8	3.4	0.6	0.5	0.0	0.0	1.3	14.4	0.0	0.0	0.0	0.0	0.0	0.0	17.5	3.7	0.0	51.5	
2012	1489	2,3,4,5	0.0	0.0	0.0	0.0	0.0	1.7	1.7	0.0	0.0	0.0	0.0	0.0	2.3	5.7	1.1	0.3	0.0	0.0	0.5	13.8	0.0	0.0	0.0	0.0	0.0	0.0	15.6	13.3	0.0	44.0	
2013	2218	2,3,4,5	0.0	0.0	0.0	0.0	0.0	2.3	1.8	0.0	0.0	0.0	0.0	0.0	3.0	3.2	0.2	0.2	0.0	0.0	1.2	10.7	0.0	0.0	0.0	0.0	0.0	0.0	19.9	4.4	0.0	53.2	
2014	898	2,3,4,5	0.3	0.0	0.0	0.0	0.0	4.3	4.7	0.0	0.0	0.7	0.0	0.0	2.2	5.9	1.8	0.0	0.0	0.0	0.1	18.5	0.0	0.0	0.0	0.0	0.0	0.0	23.8	0.0	0.1	37.5	
2015	916	2,3,4,5	0.0	0.1	0.0	0.3	0.0	1.6	2.3	0.0	0.0	0.0	0.0	0.0	2.0	6.2	0.2	0.0	0.0	0.0	0.3	16.8	0.0	0.0	0.0	0.0	0.0	0.0	18.1	0.0	0.0	52.0	
2016	2440	2,3,4,5	0.0	0.0	0.0	0.0	0.0	0.6	1.6	0.0	0.0	0.0	0.0	0.0	3.2	1.5	0.7	0.0	0.0	0.0	0.1	11.1	0.0	0.0	0.0	0.0	0.0	0.0	8.6	0.3	0.0	72.1	
2017	3159	2,3,4,5	0.0	0.0	0.0	0.2	0.0	2.8	6.1	0.0	0.0	0.0	0.0	0.0	2.6	4.5	1.8	0.0	0.0	0.0	0.2	12.4	0.0	0.0	0.0	0.0	0.0	0.0	27.2	0.0	0.0	42.2	
2018	2092	2,3,4,5	0.0	0.0	0.0	0.0	0.0	1.8	1.7	0.0	0.0	0.3	0.0	0.0	7.2	5.4	0.9	0.0	0.0	0.0	0.1	24.9	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	37.7	
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
79–84	258		0.0	0.0	0.0	0.9	0.0	22.8	0.0	0.0	0.0	0.9	3.8	4.4	1.6	0.0	0.6	0.0	0.0	10.0	42.1	0.0	0.0	0.0	0.0	0.0	0.0	9.9	0.0	0.2	2.9		
85–95	807		0.0	0.0	0.0	0.3	0.0	10.9	2.2	0.4	0.4	0.0	0.4	1.8	8.3	6.5	0.2	0.3	0.0	0.2	4.3	23.6	0.0	0.0	0.0	0.0	0.0	0.0	19.8	0.5	0.1	19.6	
96–98	1036		0.1	0.1	0.0	0.0	0.0	1.4	1.5	0.0	0.4	0.1	0.0	0.1	2.7	0.6	0.3	0.3	0.0	0.0	0.7	27.9	0.0	0.0	0.0	0.0	0.0	0.0	27.5	0.6	0.0	35.6	
99–08	1698		0.0	0.0	0.0	0.0	0.0	6.3	2.2	0.0	0.0	0.1	0.0	0.0	2.4	3.7	0.7	0.5	0.0	0.0	0.6	17.7	0.0	0.0	0.0	0.0	0.0	0.0	33.0	0.5	0.0	32.3	
09–18	1803		0.0	0.0	0.0	0.1	0.0	2.5	3.1	0.0	0.0	0.1	0.0	0.0	2.6	4.3	0.8	0.1	0.0	0.0	0.5	14.7	0.0	0.0	0.0	0.0	0.0	0.0	21.9	2.5	0.0	46.8	
19–28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			

Appendix C30— Percent distribution of Nooksack Spring Yearling AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery								Terminal Fishery						Escapement									
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon	S Falcon	WAC	Puget Sd	SEAK			Canada		Southern US			Stray	Esc.			
			T	N	S	T	S	T	S	T	N	S	T	N	S	T	S	N	S	T	N	S	T	N	S	T	N	S				
2009	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2010	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2011	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2012	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2013	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2014	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2015	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2016	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2017	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2018	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
79–84	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
85–95	443		0.3	0.3	0.0	0.0	0.0	4.8	1.6	0.2	0.2	0.0	1.9	2.1	23.8	0.6	0.0	0.0	0.0	0.0	2.3	8.4	0.0	0.0	0.0	0.5	0.0	0.0	2.4	0.0	0.0	50.5
96–98	164		0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.5	0.0	0.4	18.5	0.3	0.0	0.0	0.0	0.0	1.6	13.6	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	62.3
99–08	178		0.0	0.0	0.0	0.0	0.0	2.8	1.7	0.0	0.0	0.0	0.0	0.0	30.3	3.4	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	5.1	0.0	0.0	54.5
09–18	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
19–28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

Appendix C31— Percent distribution of Northern Southeast Alaska Spring AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement									
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC	Puget Sd		SEAK			Canada		Southern US			Stray	Esc.		
			T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	WAC	N	S	T	N	S	T	N	S	N	S	T	N	S			
2009	403	3,4,5,6	30.5	27.0	6.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.3
2010	389	3,4,5,6	20.8	24.9	9.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.6
2011	464	3,4,5,6	14.0	23.3	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	44.2	
2012	332	3,4,5,6	20.8	26.2	6.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	44.3	
2013	701	3,4,5,6	6.0	25.7	5.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	59.5	
2014	516	3,4,5,6	18.6	17.8	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	56.6	
2015	714	3,4,5,6	13.2	24.9	6.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	47.3	
2016	532	3,4,5,6	20.7	10.0	6.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.4	
2017	703	3,4,5,6	7.1	8.5	7.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	71.0	
2018	626	3,4,5,6	9.6	8.8	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	76.2	
2019	822	3,4,5,6	6.3	44.4	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	45.5	
79–84	2704		29.5	2.3	12.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	52.8	
85–95	1948		29.5	11.9	8.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	39.0	
96–98	1309		11.3	10.5	16.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40.0	
99–08	1116		15.3	12.0	12.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	47.8	
09–18	538		16.1	19.7	5.8	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	52.2	
19–28	822		6.3	44.4	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	45.5	

Appendix C32— Percent distribution of Nooksack Spring Fingerling AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement									
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.	
			T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	S	N	S	T	N	S	N	S	T	N	S	T	N	S		
2009	799	2,3,4,5	3.0	0.6	0.0	0.0	0.0	7.8	6.3	0.0	0.0	0.0	0.0	0.0	19.0	0.8	0.0	0.0	0.0	0.0	3.6	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	1.6	55.9			
2010	936	2,3,4,5	3.0	0.3	0.0	0.6	0.0	19.6	8.0	0.0	0.0	0.3	0.0	0.0	4.7	2.2	0.4	0.0	0.0	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.2	56.8			
2011	518	2,3,4,5	3.1	0.0	0.0	0.0	0.0	15.6	5.6	0.0	0.4	0.8	0.0	0.0	13.1	1.0	0.0	0.0	0.0	0.0	4.1	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.2	53.7			
2012	469	2,3,4,5	4.9	0.9	0.6	0.0	0.0	14.7	6.0	0.0	0.0	0.0	0.0	0.0	1.7	13.2	3.8	0.0	0.0	0.0	11.9	0.0	0.0	0.0	0.0	0.0	0.0	3.8	0.0	1.5	36.9			
2013	993	2,3,4,5	1.1	1.7	0.6	0.0	0.0	5.6	8.6	0.0	0.0	1.1	0.0	0.0	15.1	1.6	0.6	0.0	0.0	0.0	5.7	0.0	0.0	0.0	0.0	0.0	0.0	5.7	0.0	0.3	52.2			
2014	1768	2,3,4,5	3.7	0.6	0.0	0.2	0.2	7.6	7.1	0.0	0.0	2.5	0.0	0.0	15.8	1.8	0.8	0.0	0.0	0.0	4.7	0.0	0.0	0.0	0.0	0.0	0.0	6.2	0.0	0.2	48.4			
2015	2196	2,3,4,5	3.1	0.1	0.0	0.5	0.0	4.7	1.1	0.0	0.0	0.5	0.0	0.0	7.7	2.0	0.2	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.0	0.1	75.8			
2016	1814	2,3,4,5	4.0	0.3	0.0	1.3	0.0	5.9	2.0	0.0	0.0	0.1	0.0	0.0	10.3	0.4	0.1	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	3.6	0.0	0.7	70.1			
2017	2157	2,3,4,5	1.3	0.1	0.0	0.6	0.6	12.0	9.0	0.0	0.0	0.8	0.0	0.0	11.5	1.2	0.2	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.0	0.8	57.4			
2018	1933	2,3,4,5	1.6	0.8	0.0	0.0	0.0	3.3	2.9	0.0	0.4	1.9	0.0	0.0	13.5	0.7	0.1	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	10.3	0.0	0.1	62.3			
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
79–84	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
85–95	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
96–98	1555		5.4	0.2	0.3	0.1	0.0	1.7	3.4	0.3	2.0	0.3	0.0	0.4	10.7	0.5	0.0	0.0	0.0	0.0	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	1.0	67.3			
99–08	975		3.3	0.1	0.2	0.3	0.0	20.7	5.5	0.0	0.1	0.3	0.0	0.0	8.5	0.9	0.1	0.0	0.0	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.1	0.7	55.4			
09–18	1358		2.9	0.5	0.1	0.3	0.1	9.7	5.7	0.0	0.1	0.8	0.0	0.2	12.4	1.6	0.3	0.0	0.0	0.0	4.1	0.0	0.0	0.0	0.0	0.0	0.0	3.8	0.0	0.6	57.0			
19–28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				

Appendix C33— Percent distribution of Phillips River Fall AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement							
			SEAK			NBC		WCVI	NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.
			T	N	S	T	N	S	T	N	S	T	N	S	T	S	T	S	N	S	T	N	S	T	N	S	T	N	S	T	N	S
2009	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2010	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2011	20	2	Failed Criteria						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2012	56	2,3	16.1	5.4	3.6	0.0	1.8	0.0	0.0	0.0	0.0	7.1	0.0	0.0	14.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2013	646	2,3,4	6.3	6.5	2.8	0.0	1.2	0.0	0.0	0.0	0.0	3.6	0.0	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2014	1337	2,3,4,5	9.3	4.7	1.3	0.8	1.3	0.3	0.0	0.0	0.1	6.4	0.0	0.0	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2015	1692	2,3,4,5	12.1	0.9	2.7	0.0	0.6	0.0	0.0	0.0	0.0	7.3	0.0	0.0	5.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2016	1858	2,3,4,5	15.5	4.7	1.2	0.9	1.5	0.0	0.0	0.0	0.0	6.5	0.0	0.0	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2017	1798	2,3,4,5	9.2	0.3	1.2	1.2	2.9	0.0	0.0	0.0	0.2	6.3	0.0	0.0	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2018	846	2,3,4,5	6.1	1.8	1.8	0.4	2.5	0.0	0.0	0.0	0.7	9.3	0.0	0.0	18.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2019	1432	2,3,4,5	3.3	6.1	0.3	0.0	0.2	0.0	0.0	0.0	0.0	5.4	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
79–84	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
85–95	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
96–98	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
99–08	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
09–18	1363		9.8	3.2	1.8	0.5	1.7	0.0	0.0	0.0	0.2	6.6	0.0	0.0	7.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19–28	1432		3.3	6.1	0.3	0.0	0.2	0.0	0.0	0.0	0.0	5.4	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Appendix C34—Percent distribution of Puntledge River Summer AEQ total fishing mortalities and escapement.

Appendix C35— Percent distribution of Queets Fall Fingerling AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement							
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC	Puget Sd	SEAK			Canada		Southern US			Stray	Esc.	
			T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	S	N	S	T	N	S	N	S	T	N	S			
2009	1700	2,3,4,5	27.7	1.6	3.6	9.9	3.4	0.1	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.2	0.0	0.3	35.1			
2010	2695	2,3,4,5	21.2	0.0	4.2	4.6	4.6	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.2	
2011	2750	2,3,4,5	23.2	0.1	3.5	5.9	4.9	0.1	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.3	
2012	2761	2,3,4,5	37.9	0.2	2.8	8.7	7.3	0.9	0.7	0.0	0.0	0.0	0.0	0.0	0.2	0.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0
2013	1795	2,3,4,5	19.3	0.9	5.7	8.5	16.3	0.4	1.0	0.0	0.0	0.5	0.0	0.0	0.0	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.7
2014	2256	2,3,4,5	24.4	1.1	3.4	7.4	6.2	0.8	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.8
2015	2226	2,3,4,5	19.0	0.0	5.4	7.6	8.1	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.8
2016	1526	2,3,4,5	28.6	0.1	2.7	18.0	1.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.3	
2017	1289	2,3,4,5	13.4	0.0	3.3	8.9	2.2	1.3	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	44.5
2018	1402	3,4,5	20.5	0.0	4.6	19.7	3.5	0.9	0.0	0.0	0.0	0.0	0.0	0.9	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.3	
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
79–84	203		25.0	0.8	0.0	20.1	0.9	9.1	0.0	0.0	0.4	0.4	0.0	0.5	0.0	1.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.1	
85–95	813		20.5	1.2	0.8	13.0	1.3	6.7	0.0	0.6	0.2	0.0	0.0	0.2	0.2	0.1	0.3	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.2	
96–98	826		27.9	0.2	1.4	9.2	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	44.1	
99–08	1761		17.3	0.1	3.5	6.7	3.6	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	53.5	
09–18	2040		23.5	0.4	3.9	9.9	5.8	0.5	0.6	0.0	0.0	0.1	0.0	0.0	0.1	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.4	
19–28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

Appendix C36— Percent distribution of Quillayute AEQ total fishing mortalities and escapement based on Queets River CWT recoveries adjusted to terminal impact specific information available for Quillayute.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery								Terminal Fishery						Escapement													
			SEAK			NBC		WCVI	NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.				
			T	N	S	T	N	S	T	N	S	T	N	S	T	S	T	S	N	S	T	N	S	T	N	S	T	N	S							
2009	1700	2,3,4,5	27.7	1.6	3.6	9.9	3.4	0.1	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.4	0.0	0.3	27.9						
2010	2695	2,3,4,5	21.2	0.0	4.2	4.6	4.6	0.0	0.4	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.7			
2011	2750	2,3,4,5	23.2	0.1	3.5	5.9	4.9	0.1	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.1			
2012	2761	2,3,4,5	37.9	0.2	2.8	8.7	7.3	0.9	0.7	0.0	0.0	0.0	0.0	0.0	0.2	0.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	20.9		
2013	1795	2,3,4,5	19.3	0.9	5.7	8.5	16.3	0.4	1.0	0.0	0.0	0.5	0.0	0.0	0.0	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.2		
2014	2256	2,3,4,5	24.4	1.1	3.4	7.4	6.2	0.8	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.0		
2015	2226	2,3,4,5	19.0	0.0	5.4	7.6	8.1	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.6		
2016	1526	2,3,4,5	28.6	0.1	2.7	18.0	1.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.4		
2017	1289	2,3,4,5	13.4	0.0	3.3	8.9	2.2	1.3	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.2		
2018	1402	3,4,5	20.5	0.0	4.6	19.7	3.5	0.9	0.0	0.0	0.0	0.0	0.0	0.9	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.1		
2019	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
79-84	180		21.9	0.6	0.0	19.4	0.7	10.0	0.0	0.5	0.8	0.3	0.0	0.6	0.0	0.8	0.0	0.5	0.0	0.0	0.2	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.2	0.0	0.0	32.9	
85-95	813		20.5	1.2	0.8	13.0	1.3	6.7	0.0	0.6	0.2	0.0	0.0	0.2	0.2	0.1	0.2	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.0		
96-98	826		27.9	0.2	1.4	9.2	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.9		
99-08	1761		17.3	0.1	3.5	6.7	3.6	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.9	0.0	1.2	47.1
09-18	2040		23.5	0.4	3.9	9.9	5.8	0.5	0.6	0.0	0.0	0.1	0.0	0.0	0.1	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.0	
19-28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

Appendix C37—Percent distribution of Grays Harbor AEQ total fishing mortalities and escapement based on Queets River CWT recoveries adjusted to terminal impact specific information available for Grays Harbor.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery								Terminal Fishery						Escapement										
			SEAK			NBC		WCVI	NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.	
			T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	N	S	T	N	S	T	N	S	T	N	S					
2009	1700	2,3,4,5	27.7	1.6	3.6	9.9	3.4	0.1	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.5	0.0	0.3	35.8				
2010	2695	2,3,4,5	21.2	0.0	4.2	4.6	4.6	0.0	0.4	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	46.8			
2011	2750	2,3,4,5	23.2	0.1	3.5	5.9	4.9	0.1	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.5			
2012	2761	2,3,4,5	37.9	0.2	2.8	8.7	7.3	0.9	0.7	0.0	0.0	0.0	0.0	0.2	0.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	16.2	0.0	0.4	23.6
2013	1795	2,3,4,5	19.3	0.9	5.7	8.5	16.3	0.4	1.0	0.0	0.0	0.5	0.0	0.0	0.0	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.8
2014	2256	2,3,4,5	24.4	1.1	3.4	7.4	6.2	0.8	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.7
2015	2226	2,3,4,5	19.0	0.0	5.4	7.6	8.1	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.2
2016	1526	2,3,4,5	28.6	0.1	2.7	18.0	1.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.6
2017	1289	2,3,4,5	13.4	0.0	3.3	8.9	2.2	1.3	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	51.9
2018	1402	3,4,5	20.5	0.0	4.6	19.7	3.5	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.4
2019	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
79-84	180		21.9	0.6	0.0	19.4	0.7	10.0	0.0	0.5	0.8	0.3	0.0	0.6	0.0	0.8	0.0	0.5	0.0	0.0	0.2	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.5	
85-95	813		20.5	1.2	0.8	13.0	1.3	6.7	0.0	0.6	0.2	0.0	0.0	0.2	0.2	0.1	0.2	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.4	
96-98	826		27.9	0.2	1.4	9.2	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	39.7	
99-08	1761		17.3	0.1	3.5	6.7	3.6	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.6	
09-18	2040		23.5	0.4	3.9	9.9	5.8	0.5	0.6	0.0	0.0	0.1	0.0	0.0	0.1	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.4	
19-28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			

Appendix C38—Percent distribution of Hoh AEQ total fishing mortalities and escapement based on Queets River CWT recoveries adjusted to terminal impact specific information available for Hoh.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery								Terminal Fishery						Escapement											
			SEAK			NBC		WCVI	NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.		
			T	N	S	T	N	S	T	N	S	T	N	S	T	S	T	S	N	S	T	N	S	T	N	S	T	N	S					
2009	1700	2,3,4,5	27.7	1.6	3.6	9.9	3.4	0.1	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.7	0.0	0.3	39.6				
2010	2695	2,3,4,5	21.2	0.0	4.2	4.6	4.6	0.0	0.4	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	52.2	
2011	2750	2,3,4,5	23.2	0.1	3.5	5.9	4.9	0.1	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	
2012	2761	2,3,4,5	37.9	0.2	2.8	8.7	7.3	0.9	0.7	0.0	0.0	0.0	0.0	0.0	0.2	0.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	25.5
2013	1795	2,3,4,5	19.3	0.9	5.7	8.5	16.3	0.4	1.0	0.0	0.0	0.5	0.0	0.0	0.0	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.8
2014	2256	2,3,4,5	24.4	1.1	3.4	7.4	6.2	0.8	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40.1
2015	2226	2,3,4,5	19.0	0.0	5.4	7.6	8.1	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.3
2016	1526	2,3,4,5	28.6	0.1	2.7	18.0	1.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	45.6
2017	1289	2,3,4,5	13.4	0.0	3.3	8.9	2.2	1.3	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	48.9
2018	1402	3,4,5	20.5	0.0	4.6	19.7	3.5	0.9	0.0	0.0	0.0	0.0	0.0	0.9	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	45.4
2019	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
79-84	180		21.9	0.6	0.0	19.4	0.7	10.0	0.0	0.5	0.8	0.3	0.0	0.6	0.0	0.8	0.0	0.5	0.0	0.0	0.2	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.8	
85-95	813		20.5	1.2	0.8	13.0	1.3	6.7	0.0	0.6	0.2	0.0	0.0	0.2	0.2	0.1	0.2	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.7	
96-98	826		27.9	0.2	1.4	9.2	0.0	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	43.3	
99-08	1761		17.3	0.1	3.5	6.7	3.6	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	46.2	
09-18	2040		23.5	0.4	3.9	9.9	5.8	0.5	0.6	0.0	0.0	0.1	0.0	0.0	0.1	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	39.4	
19-28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

Appendix C39— Percent distribution of Quinsam River Fall AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement									
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.	
			T	N	S	T	N	S	T	N	S	T	N	S	T	S	T	S	N	S	T	N	S	N	S	T	N	S	T	N	S			
2009	458	2,3,4,5	11.8	4.4	2.2	0.9	5.2	0.0	1.5	0.0	0.0	4.4	0.0	1.5	10.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	57.6
2010	479	2,3,4,5	8.1	7.5	1.0	0.0	1.3	0.0	0.0	0.0	0.0	4.6	0.0	0.0	24.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	51.6	
2011	755	2,3,4,5	10.9	8.1	0.7	0.0	2.1	0.0	0.0	0.0	0.0	12.7	0.0	0.0	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	60.7	
2012	853	2,3,4,5	16.5	6.2	2.2	0.7	0.6	0.0	0.0	0.0	0.0	8.9	0.0	0.0	6.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	57.9	
2013	729	2,3,4,5	10.8	7.4	1.0	0.4	1.8	0.0	0.0	0.0	0.0	5.2	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	68.3	
2014	500	2,3,4,5	11.8	5.8	1.4	0.0	0.4	0.0	0.0	0.2	0.0	4.0	0.0	0.0	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	69.4	
2015	890	2,3,4,5	9.6	5.5	1.3	0.0	0.9	0.0	0.6	0.0	0.0	9.8	0.0	0.0	17.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	54.2	
2016	2505	2,3,4,5	11.7	5.3	2.5	0.2	2.2	0.0	0.0	0.0	0.0	10.8	0.0	0.0	10.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	56.7	
2017	2726	2,3,4,5	10.9	1.5	2.6	1.2	2.6	0.1	0.3	0.0	0.0	11.1	0.0	0.0	12.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	56.9	
2018	2543	2,3,4,5	9.4	2.6	1.3	2.0	5.7	0.0	0.0	0.0	0.8	13.2	0.0	0.0	13.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	51.3	
2019	3145	2,3,4,5	7.9	10.0	1.5	0.5	2.8	0.1	0.3	0.0	0.0	20.0	0.0	0.0	7.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	49.3	
79–84	1505		15.7	4.0	2.8	9.8	0.0	0.4	0.0	10.5	15.3	2.8	1.2	6.6	7.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.5	
85–95	1184		14.1	10.4	2.1	7.1	0.3	0.5	0.0	5.0	11.3	3.0	0.4	4.7	7.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.6	
96–98	453		11.0	3.0	1.9	1.7	0.9	0.1	0.6	0.9	7.3	3.1	0.0	0.7	12.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	56.5		
99–08	839		14.7	4.8	2.6	0.8	1.0	0.0	0.0	0.0	0.6	7.7	0.0	0.2	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	61.4		
09–18	1244		11.2	5.4	1.6	0.5	2.3	0.0	0.2	0.0	0.1	8.5	0.0	0.2	11.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	58.5		
19–28	3145		7.9	10.0	1.5	0.5	2.8	0.1	0.3	0.0	0.0	20.0	0.0	0.0	7.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	49.3	

Appendix C40— Percent distribution of East Vancouver Island North AEQ total fishing mortalities and escapement based on Quinsam River CWT recoveries adjusted for basin-specific terminal impacts.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement								
			SEAK			NBC		WCVI	NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.	
			T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S				
2009	458	2,3,4,5	11.8	4.4	2.2	0.9	5.2	0.0	1.5	0.0	0.0	4.4	0.0	1.5	8.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	59.6
2010	479	2,3,4,5	8.1	7.5	1.0	0.0	1.3	0.0	0.0	0.0	0.0	4.6	0.0	0.0	18.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	58.0	
2011	755	2,3,4,5	10.9	8.1	0.7	0.0	2.1	0.0	0.0	0.0	0.0	12.7	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	63.6	
2012	853	2,3,4,5	16.5	6.2	2.2	0.7	0.6	0.0	0.0	0.0	0.0	8.9	0.0	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	61.4	
2013	729	2,3,4,5	10.8	7.4	1.0	0.4	1.8	0.0	0.0	0.0	0.0	5.2	0.0	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	70.1	
2014	500	2,3,4,5	11.8	5.8	1.4	0.0	0.4	0.0	0.0	0.2	0.0	4.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	70.6	
2015	890	2,3,4,5	9.6	5.5	1.3	0.0	0.9	0.0	0.6	0.0	0.0	9.8	0.0	0.0	16.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	55.3	
2016	2505	2,3,4,5	11.7	5.3	2.5	0.2	2.2	0.0	0.0	0.0	0.0	10.8	0.0	0.0	6.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	61.2	
2017	2726	2,3,4,5	10.9	1.5	2.6	1.2	2.6	0.1	0.3	0.0	0.0	11.1	0.0	0.0	9.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	60.3	
2018	2543	2,3,4,5	9.4	2.6	1.3	2.0	5.7	0.0	0.0	0.0	0.8	13.2	0.0	0.0	11.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	53.4	
2019	3145	2,3,4,5	7.9	10.0	1.5	0.5	2.8	0.1	0.3	0.0	0.0	20.0	0.0	0.0	6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.3	
79-84	1505		15.7	4.0	2.8	9.8	0.0	0.4	0.0	10.5	15.3	2.8	1.2	6.6	6.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.3	
85-95	1184		14.1	10.4	2.1	7.1	0.3	0.5	0.0	5.0	11.3	3.0	0.4	4.7	5.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.4	
96-98	453		11.0	3.0	1.9	1.7	0.9	0.1	0.6	0.9	7.3	3.1	0.0	0.7	9.1	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	59.4		
99-08	839		14.7	4.8	2.6	0.8	1.0	0.0	0.0	0.0	0.6	7.7	0.0	0.2	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	64.9		
09-18	1244		11.2	5.4	1.6	0.5	2.3	0.0	0.2	0.0	0.1	8.5	0.0	0.2	8.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	61.4		
19-28	3145		7.9	10.0	1.5	0.5	2.8	0.1	0.3	0.0	0.0	20.0	0.0	0.0	6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.3	

Appendix C41— Percent distribution of Robertson Creek Fall AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement								
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC	Puget Sd	SEAK			Canada		Southern US			Stray	Esc.		
			T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	S	N	S	T	N	S	N	S	T	N	S				
2009	1418	2,3,4,5	13.3	7.2	2.9	2.2	6.3	0.0	1.1	0.0	0.0	5.2	0.0	0.0	5.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.4	12.4	0.0	0.0	0.0	0.0	37.0			
2010	1342	2,3,4,5	7.8	0.3	4.0	3.2	4.8	0.7	2.0	0.0	0.0	2.5	0.0	0.0	4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4	3.1	0.0	0.1	0.0	0.0	62.2			
2011	2361	2,3,4,5	14.0	2.0	1.5	3.5	3.6	0.2	3.9	0.0	0.0	3.5	0.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.1	0.0	0.0	16.9	16.1	0.0	0.0	0.0	0.0	29.9	
2012	1994	2,3,4,5	13.4	3.6	1.2	2.9	2.6	0.2	2.0	0.0	0.0	3.2	0.0	0.0	5.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.5	15.4	0.0	0.1	0.0	0.0	35.8	
2013	1425	2,3,4,5	10.8	3.9	1.5	1.0	4.4	0.0	1.1	0.0	0.0	1.6	0.0	0.0	9.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	64.4	
2014	2344	2,3,4,5	14.7	2.1	3.3	2.0	2.9	0.8	4.7	0.0	0.0	1.4	0.0	0.0	5.3	0.0	0.1	0.0	0.0	0.0	0.0	0.8	0.1	0.0	0.0	0.1	4.8	0.0	0.0	0.0	0.0	0.0	56.9
2015	3503	2,3,4,5	4.1	3.3	3.1	0.4	3.7	0.3	2.8	0.0	0.1	2.2	0.0	0.0	8.8	0.3	0.5	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	10.4	9.3	0.0	0.0	0.0	0.0	50.2	
2016	5290	2,3,4,5	14.2	5.2	4.8	2.0	3.7	0.8	0.8	0.0	0.1	3.5	0.0	0.0	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.7	6.5	0.0	0.0	0.0	0.0	45.5	
2017	7394	2,3,4,5	8.2	0.7	4.3	1.7	7.3	0.6	4.2	0.0	0.0	1.6	0.0	1.1	7.5	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.4	10.2	0.0	0.1	0.0	0.0	36.0	
2018	8999	2,3,4,5	5.7	0.6	1.2	4.3	6.5	1.3	4.4	0.0	0.0	2.8	0.0	0.0	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	29.2	9.8	0.0	0.0	0.0	0.0	26.6	
2019	13303	2,3,4,5	4.8	5.8	1.9	2.6	5.0	0.8	2.4	0.0	0.0	3.3	0.0	0.0	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.2	9.0	0.0	0.0	0.0	0.0	22.8	
79–84	4281		30.3	3.0	0.8	12.3	0.0	6.7	0.1	7.9	4.4	0.1	0.2	1.2	0.9	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	10.4	6.3	0.0	0.1	0.0	0.0	15.1		
85–95	5661		15.5	6.0	1.9	8.6	0.7	6.1	0.7	1.8	1.5	0.1	0.0	0.7	2.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	6.3	14.0	0.0	0.1	0.0	0.0	33.6		
96–98	2077		13.6	1.8	4.7	4.3	1.7	0.3	0.5	0.8	0.2	1.1	0.0	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	11.9	0.0	0.0	0.0	0.0	52.2		
99–08	2228		11.9	2.1	3.3	2.6	3.3	0.1	0.9	0.0	0.0	2.0	0.0	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.4	10.5	0.0	0.0	0.0	0.0	46.2		
09–18	3607		10.6	2.9	2.8	2.3	4.6	0.5	2.7	0.0	0.0	2.7	0.0	0.1	6.5	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	10.3	9.0	0.0	0.0	0.0	0.0	44.5		
19–28	13303		4.8	5.8	1.9	2.6	5.0	0.8	2.4	0.0	0.0	3.3	0.0	0.0	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.2	9.0	0.0	0.0	0.0	0.0	22.8		

Appendix C42—Percent distribution of Northwest Vancouver Island AEQ total fishing mortalities and escapement based on Robertson Creek Fall CWT recoveries terminally adjusted for basin-specific terminal impacts.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery								Terminal Fishery						Escapement								
			SEAK			NBC		WCVI	NBC & CBC			Southern BC			N Falcon	S Falcon		WAC	Puget Sd		SEAK			Canada		Southern US			Stray	Esc.	
			T	N	S	T	N	S	T	N	S	T	N	S	T	S	T	N	S	T	N	S	T	N	S	T	N	S			
2009	1418	2,3,4,5	13.3	7.2	2.9	2.2	6.3	0.0	1.1	0.0	0.0	5.2	0.0	0.0	5.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	55.9	
2010	1342	2,3,4,5	7.8	0.3	4.0	3.2	4.8	0.7	2.0	0.0	0.0	2.5	0.0	0.0	4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	69.7	
2011	2361	2,3,4,5	14.0	2.0	1.5	3.5	3.6	0.2	3.9	0.0	0.0	3.5	0.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	63.0	
2012	1994	2,3,4,5	13.4	3.6	1.2	2.9	2.6	0.2	2.0	0.0	0.0	3.2	0.0	0.0	5.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	65.7	
2013	1425	2,3,4,5	10.8	3.9	1.5	1.0	4.4	0.0	1.1	0.0	0.0	1.6	0.0	0.0	9.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.7
2014	2344	2,3,4,5	14.7	2.1	3.3	2.0	2.9	0.8	4.7	0.0	0.0	1.4	0.0	0.0	5.3	0.0	0.1	0.0	0.0	0.0	0.8	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	61.9
2015	3503	2,3,4,5	4.1	3.3	3.1	0.4	3.7	0.3	2.8	0.0	0.1	2.2	0.0	0.0	8.8	0.3	0.5	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	69.9
2016	5290	2,3,4,5	14.2	5.2	4.8	2.0	3.7	0.8	0.8	0.0	0.1	3.5	0.0	0.0	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	57.7	
2017	7394	2,3,4,5	8.2	0.7	4.3	1.7	7.3	0.6	4.2	0.0	0.0	1.6	0.0	1.1	7.5	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	1.3	61.6
2018	8999	2,3,4,5	5.7	0.6	1.2	4.3	6.5	1.3	4.4	0.0	0.0	2.8	0.0	0.0	7.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.4	65.6	
2019	13303	2,3,4,5	4.8	5.8	1.9	2.6	5.0	0.8	2.4	0.0	0.0	3.3	0.0	0.0	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	67.0	
79-84	4281		30.3	3.0	0.8	12.3	0.0	6.7	0.1	7.9	4.4	0.1	0.2	1.2	0.9	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	31.7	
85-95	5661		15.5	6.0	1.9	8.6	0.7	6.1	0.7	1.8	1.5	0.1	0.0	0.7	2.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	53.8	
96-98	2077		13.6	1.8	4.7	4.3	1.7	0.3	0.5	0.8	0.2	1.1	0.0	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	67.5	
99-08	2228		11.9	2.1	3.3	2.6	3.3	0.1	0.9	0.0	0.0	2.0	0.0	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	70.0	
09-18	3607		10.6	2.9	2.8	2.3	4.6	0.5	2.7	0.0	0.0	2.7	0.0	0.1	6.5	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	63.8	
19-28	13303		4.8	5.8	1.9	2.6	5.0	0.8	2.4	0.0	0.0	3.3	0.0	0.0	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	67.0	

Appendix C43— Percent distribution of Southwest Vancouver Island AEQ total fishing mortalities and escapement based on Robertson Creek Fall CWT recoveries terminally adjusted for basin-specific terminal impacts.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery								Terminal Fishery						Escapement										
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.
			T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S				
2009	1418	2,3,4,5	12.0	6.7	2.2	2.0	4.9	0.0	1.1	0.0	0.0	4.4	0.0	0.0	5.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	61.4
2010	1342	2,3,4,5	5.8	0.2	3.1	2.5	3.9	0.7	1.7	0.0	0.0	2.3	0.0	0.0	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	75.3
2011	2361	2,3,4,5	12.4	1.2	1.4	3.0	3.0	0.2	3.6	0.0	0.0	3.4	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	67.1
2012	1994	2,3,4,5	11.9	2.4	1.1	2.5	2.0	0.2	1.7	0.0	0.0	2.8	0.0	0.0	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	71.1
2013	1425	2,3,4,5	8.3	1.5	1.3	0.8	3.7	0.0	1.0	0.0	0.0	1.8	0.0	0.0	9.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	72.6
2014	2344	2,3,4,5	13.1	2.0	2.2	1.8	2.0	0.8	4.0	0.0	0.0	1.1	0.0	0.0	4.0	0.0	0.1	0.0	0.0	0.0	0.0	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	68.2
2015	3503	2,3,4,5	3.3	1.7	2.2	0.3	2.8	0.3	2.5	0.0	0.1	2.0	0.0	0.0	8.2	0.2	0.5	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	75.4
2016	5290	2,3,4,5	12.5	4.1	4.1	1.8	3.1	0.8	0.8	0.0	0.1	3.3	0.0	0.0	6.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	62.5
2017	7394	2,3,4,5	6.7	0.4	3.0	1.5	5.6	0.6	3.7	0.0	0.0	1.3	0.0	1.1	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	68.2
2018	8999	2,3,4,5	4.2	0.3	0.9	3.6	5.1	1.3	4.1	0.0	0.0	2.6	0.0	0.0	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	71.0
2019	13303	2,3,4,5	4.0	2.0	1.7	2.1	4.4	0.8	2.2	0.0	0.0	3.2	0.0	0.0	5.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	73.4
79-84	4281		26.4	3.4	0.7	12.1	0.0	6.5	0.1	7.7	4.5	0.1	0.2	1.3	1.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.5
85-95	5661		13.1	2.1	1.7	8.0	0.6	5.9	0.7	1.6	1.6	0.1	0.0	0.8	1.9	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	61.1	
96-98	2077		11.0	0.9	3.6	3.2	1.4	0.0	0.5	0.7	0.2	1.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	74.2	
99-08	2228		10.3	1.4	2.9	2.4	2.7	0.1	0.8	0.0	0.0	1.9	0.0	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	74.2	
09-18	3607		9.0	2.1	2.2	2.0	3.6	0.5	2.4	0.0	0.0	2.5	0.0	0.1	5.8	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	69.3	
19-28	13303		4.0	2.0	1.7	2.1	4.4	0.8	2.2	0.0	0.0	3.2	0.0	0.0	5.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	73.4

Appendix C44— Percent distribution of Samish Fall Fingerling AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement								
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.
			T	N	S	T	N	S	T	S	T	N	S	T	N	S	T	S	N	S	T	N	S	T	N	S	T	N	S				
2009	1621	2,3,4,5	0.0	0.1	0.0	0.0	0.0	3.3	4.3	0.0	0.0	0.0	0.0	0.0	5.5	3.5	0.4	0.0	0.0	0.0	0.1	13.0	0.0	0.0	0.0	0.0	0.0	31.0	0.0	0.0	38.9		
2010	1797	2,3,4,5	0.0	0.0	0.1	0.0	0.0	7.1	6.8	0.0	0.0	0.0	0.0	0.0	6.0	10.4	0.7	0.3	0.0	0.0	0.2	9.5	0.0	0.0	0.0	0.0	0.0	29.8	0.0	1.0	28.3		
2011	1326	2,3,4,5	0.1	0.0	0.0	0.0	0.0	5.1	5.2	0.0	0.0	0.0	0.0	0.0	9.7	3.2	0.3	0.0	0.0	0.0	0.2	8.5	0.0	0.0	0.0	0.0	0.0	35.5	0.0	0.5	31.5		
2012	1841	2,3,4,5	0.0	0.2	0.1	0.5	0.0	2.2	4.5	0.0	0.0	0.2	0.0	0.4	6.8	6.6	1.0	0.3	0.0	0.0	0.0	6.8	0.0	0.0	0.0	0.0	0.0	51.8	0.0	0.2	18.4		
2013	1785	2,3,4,5	0.0	0.0	0.0	0.0	0.0	1.2	3.7	0.0	0.0	0.0	0.0	0.0	8.6	3.5	0.2	0.0	0.0	0.0	1.7	10.9	0.0	0.0	0.0	0.0	0.0	43.0	0.0	0.2	26.9		
2014	1574	2,3,4,5	0.6	0.1	0.0	0.4	0.3	5.8	4.8	0.0	0.0	0.0	0.0	0.0	11.3	5.9	0.9	0.3	0.0	0.0	0.0	11.1	0.0	0.0	0.0	0.0	0.0	24.9	0.0	0.3	33.4		
2015	888	2,3,4,5	0.6	0.0	0.0	0.3	0.0	2.5	2.9	0.0	0.0	0.8	0.0	0.0	13.2	10.4	1.4	0.0	0.0	0.0	0.1	5.9	0.0	0.0	0.0	0.0	0.0	31.2	0.0	0.1	30.7		
2016	778	2,3,4,5	0.8	0.1	0.0	0.0	0.6	1.2	3.3	0.0	0.0	0.9	0.0	0.0	19.8	1.5	0.8	0.0	0.0	0.0	0.0	9.9	0.0	0.0	0.0	0.0	0.0	33.0	0.0	0.0	28.0		
2017	1398	2,3,4,5	0.5	0.4	0.0	0.0	0.0	4.2	3.1	0.0	0.0	0.4	0.0	0.0	24.4	3.8	1.1	0.0	0.0	0.0	0.0	6.4	0.0	0.0	0.0	0.0	0.0	36.6	0.0	0.1	19.0		
2018	1018	2,3,4,5	0.0	0.2	0.0	1.4	0.0	2.8	2.8	0.0	0.0	0.4	0.0	0.0	21.1	5.4	1.8	0.2	0.0	0.0	0.1	6.4	0.0	0.0	0.0	0.0	0.0	23.8	0.0	0.2	33.5		
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
79–84	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
85–95	1330		0.1	0.0	0.0	0.2	0.0	12.9	3.0	0.1	0.4	0.0	2.0	1.9	14.3	6.4	0.7	0.2	0.0	0.0	2.2	12.9	0.0	0.0	0.0	0.1	0.0	21.4	0.1	0.1	21.0		
96–98	1130		1.4	0.1	0.0	0.1	0.0	1.8	1.3	0.2	0.4	0.0	0.0	0.2	12.2	1.1	4.9	0.0	0.0	0.1	0.8	10.6	0.0	0.0	0.0	0.1	0.0	33.6	0.0	0.1	31.1		
99–08	1123		0.8	0.0	0.0	0.3	0.0	8.2	6.0	0.0	0.1	0.3	0.0	0.0	10.3	4.7	2.4	0.1	0.0	0.0	0.3	7.2	0.0	0.0	0.0	0.0	0.0	34.4	0.0	0.2	24.6		
09–18	1403		0.3	0.1	0.0	0.3	0.1	3.5	4.1	0.0	0.0	0.3	0.0	0.0	12.6	5.4	0.8	0.1	0.0	0.0	0.2	8.8	0.0	0.0	0.0	0.0	0.0	34.1	0.0	0.3	28.9		
19–28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					

Appendix C45— Percent distribution of Lower Shuswap River Summer AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement								
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC	Puget Sd	SEAK			Canada		Southern US			Stray	Esc.		
			T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	N	S	T	N	S	T	N	S					
2009	1691	2,3,4,5	9.2	0.0	1.3	6.4	3.4	0.8	2.3	0.0	0.0	0.6	0.0	0.0	8.9	0.1	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	10.0	6.2	0.0	0.0	0.0	0.2	50.4		
2010	2026	2,3,4,5	9.8	0.0	1.5	10.5	3.1	0.0	0.5	0.0	0.0	0.3	0.0	0.0	9.4	0.2	0.1	0.1	0.0	0.0	1.2	0.0	0.0	0.0	9.4	1.9	0.0	0.3	0.0	1.2	50.4		
2011	1856	2,3,4,5	8.1	0.1	1.8	7.6	4.5	1.3	0.7	0.0	0.0	0.0	0.0	0.0	1.2	8.4	0.5	0.0	0.0	0.0	0.3	0.5	0.0	0.0	0.0	9.3	2.9	0.0	0.0	0.0	0.1	52.9	
2012	1945	2,3,4,5	6.8	0.0	2.6	7.5	4.4	1.1	1.2	0.0	0.0	0.8	0.0	0.4	10.1	0.2	0.4	0.2	0.0	0.0	0.1	2.3	0.0	0.0	0.0	4.5	4.9	0.0	0.0	0.0	0.0	52.7	
2013	8225	2,3,4,5	7.4	0.1	0.5	7.5	3.5	0.2	1.0	0.0	0.0	0.3	0.0	0.0	1.6	10.3	0.6	0.0	0.0	0.0	0.3	0.7	0.0	0.0	0.0	2.5	2.0	0.0	0.0	0.0	0.9	60.5	
2014	4669	2,3,4,5	10.9	0.2	1.0	7.1	2.7	3.3	1.6	0.0	0.0	0.1	0.0	0.0	3.0	5.4	1.9	0.4	0.1	0.0	0.0	0.5	0.9	0.0	0.0	0.0	8.0	1.8	0.0	0.0	0.0	0.9	50.1
2015	5012	2,3,4,5	6.7	0.2	0.3	3.7	1.5	0.6	1.2	0.0	0.0	0.7	0.0	0.5	8.0	2.4	0.5	0.0	0.0	0.0	0.8	1.1	0.0	0.0	0.0	2.9	3.1	0.0	0.1	0.0	1.4	64.5	
2016	2152	2,3,4,5	9.9	0.6	1.6	9.0	2.7	1.8	1.0	0.0	0.0	0.5	0.0	0.4	5.8	0.3	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	2.6	2.0	0.0	0.3	0.0	0.0	61.2	
2017	3053	2,3,4,5	12.3	0.0	1.7	7.5	3.6	1.5	2.1	0.0	0.0	0.0	0.0	0.0	0.2	11.0	0.2	0.3	0.0	0.0	0.0	0.8	0.0	0.0	0.0	2.5	1.7	0.0	0.1	0.0	0.5	53.9	
2018	5118	2,3,4,5	4.5	0.0	0.7	3.3	2.7	0.9	1.9	0.0	0.0	0.1	0.0	0.0	1.4	9.6	0.2	0.2	0.0	0.0	0.0	1.0	0.0	0.0	0.0	4.9	2.8	0.0	0.0	0.0	0.2	65.1	
2019	6926	2,3,4,5	1.7	1.1	0.4	0.2	1.4	0.4	0.3	0.0	0.0	1.0	0.0	0.0	0.4	4.3	0.1	0.0	0.0	0.0	0.4	0.4	0.0	0.0	0.0	3.4	2.9	0.0	0.0	0.0	0.9	80.7	
79–84	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
85–95	998		15.1	0.7	0.8	14.8	0.9	4.8	0.4	2.9	0.9	0.3	0.1	5.7	2.1	0.1	0.0	0.0	0.0	1.3	0.4	0.5	0.0	0.0	5.8	1.5	0.0	0.2	0.0	0.3	40.3		
96–98	702		17.0	0.4	3.1	5.4	5.6	0.3	0.3	0.1	0.1	1.1	0.0	1.5	5.8	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	9.8	0.7	0.0	0.1	0.0	0.4	47.5			
99–08	1173		12.4	0.2	3.7	6.8	5.1	0.3	0.7	0.2	0.0	1.1	0.0	0.1	6.8	0.1	0.0	0.0	0.0	0.3	0.0	0.0	0.0	6.1	2.4	0.0	0.0	0.0	0.2	53.5			
09–18	3575		8.6	0.1	1.3	7.0	3.2	1.1	1.4	0.0	0.0	0.3	0.0	0.9	8.7	0.7	0.2	0.0	0.0	0.4	0.8	0.0	0.0	0.0	5.7	2.9	0.0	0.1	0.0	0.5	56.2		
19–28	6926		1.7	1.1	0.4	0.2	1.4	0.4	0.3	0.0	0.0	1.0	0.0	0.0	0.4	4.3	0.1	0.0	0.0	0.0	0.4	0.4	0.0	0.0	0.0	3.4	2.9	0.0	0.0	0.0	0.9	80.7	

Appendix C46— Percent distribution of Skagit Spring Fingerling AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement										
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.		
			T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	N	S	T	N	S	N	S	T	N	S	N	S						
2009	906	2,3,4,5	0.6	0.0	0.0	0.0	0.0	3.0	4.3	0.0	0.0	0.0	0.0	0.0	7.2	1.2	0.0	0.0	0.0	0.0	0.0	7.9	0.0	0.0	0.0	0.0	0.0	0.0	17.3	0.0	0.4	58.1			
2010	1462	2,3,4,5	0.1	0.0	0.0	0.0	0.0	2.3	2.9	0.0	0.0	0.0	0.0	0.0	7.8	0.3	0.0	0.0	0.0	0.0	0.2	2.8	0.0	0.0	0.0	0.0	0.0	0.0	19.6	0.0	0.2	63.7			
2011	1301	2,3,4,5	0.4	0.1	0.0	0.0	0.0	1.4	3.6	0.0	0.0	0.5	0.0	0.0	5.5	0.0	0.2	0.0	0.0	0.0	0.1	5.1	0.0	0.0	0.0	0.0	0.0	0.0	18.7	0.0	0.5	63.9			
2012	1575	2,3,4,5	0.0	0.0	0.0	0.0	0.0	3.2	2.9	0.0	0.0	0.8	0.0	0.0	11.2	0.3	0.0	0.0	0.0	0.0	0.0	8.8	0.0	0.0	0.0	0.0	0.0	0.0	18.4	0.0	0.3	54.3			
2013	1211	2,3,4,5	0.7	0.6	0.0	0.0	0.0	2.8	3.6	0.0	0.0	0.5	0.0	0.0	7.8	0.4	0.2	0.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	25.8	0.0	0.2	52.5			
2014	1045	2,3,4,5	2.1	0.2	0.0	1.1	0.0	3.2	4.8	0.0	0.0	0.5	0.0	0.0	8.1	0.0	0.0	0.0	0.0	0.0	0.0	8.2	0.0	0.0	0.0	0.0	0.0	0.0	25.9	0.0	0.1	45.8			
2015	975	2,3,4,5	0.7	0.0	0.0	0.0	0.0	1.5	1.1	0.0	0.0	0.3	0.0	0.0	5.4	0.4	0.0	0.0	0.0	0.0	0.1	8.4	0.0	0.0	0.0	0.0	0.0	0.0	11.8	0.0	0.5	69.6			
2016	1670	2,3,4,5	0.8	0.8	0.0	0.2	0.0	2.6	1.8	0.0	0.0	1.0	0.0	0.0	9.9	0.6	0.1	0.0	0.0	0.0	0.0	8.0	0.0	0.0	0.0	0.0	0.0	0.0	12.8	0.0	0.3	61.2			
2017	1848	2,3,4,5	1.0	0.0	0.0	0.0	0.0	3.1	5.0	0.0	0.0	0.5	0.0	0.0	9.9	0.1	0.3	0.0	0.0	0.0	0.0	4.8	0.0	0.0	0.0	0.0	0.0	0.0	18.7	0.0	0.1	56.6			
2018	1205	2,3,4,5	0.7	0.1	0.0	0.2	0.0	3.1	2.9	0.0	0.0	1.1	0.0	0.0	12.8	0.9	0.0	0.0	0.0	0.0	0.3	4.7	0.0	0.0	0.0	0.0	0.0	0.0	23.7	0.0	0.4	49.0			
2019	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
79–84	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
85–95	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
96–98	790		2.0	0.0	0.0	0.1	0.0	1.1	3.5	0.2	1.2	0.6	0.0	0.7	15.8	0.0	0.0	0.0	0.0	0.0	0.7	8.4	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.3	64.8			
99–08	1498		1.3	0.1	0.2	0.3	0.0	8.6	4.2	0.0	0.1	0.4	0.0	0.0	9.1	0.7	0.0	0.0	0.0	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0	2.3	0.0	0.3	67.8			
09–18	1320		0.7	0.2	0.0	0.2	0.0	2.6	3.3	0.0	0.0	0.5	0.0	0.0	8.6	0.4	0.1	0.0	0.0	0.0	0.1	6.4	0.0	0.0	0.0	0.0	0.0	0.0	19.3	0.0	0.3	57.5			
19–28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix C47— Percent distribution of Skagit Spring Yearling AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement								
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.
			T	N	S	T	N	S	T	N	S	T	N	S	T	S	T	S	N	S	T	N	S	T	N	S	T	N	S				
2009	391	2,3,4,5	1.0	0.0	0.0	0.0	0.0	1.5	12.0	0.0	0.0	0.0	0.0	0.0	5.6	1.5	0.0	0.0	0.0	0.0	0.3	9.7	0.0	0.0	0.0	0.0	0.0	0.0	14.1	0.0	0.3	54.0	
2010	413	2,3,4,5	0.2	0.0	0.0	0.0	1.2	0.0	1.7	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	11.1	0.0	0.0	0.0	0.0	0.0	0.0	17.9	0.0	0.5	65.1	
2011	594	2,3,4,5	0.0	0.0	0.0	0.0	0.0	2.2	1.7	0.0	0.0	0.5	0.0	0.0	10.3	0.2	0.0	0.0	0.0	0.0	0.0	14.1	0.0	0.0	0.0	0.0	0.0	0.0	11.1	0.0	0.2	59.8	
2012	850	2,3,4,5	0.7	0.0	0.0	0.0	0.0	1.1	3.4	0.0	0.0	0.0	0.0	0.0	1.3	7.5	0.8	0.0	0.0	0.0	0.0	15.9	0.0	0.0	0.0	0.0	0.0	0.0	14.8	0.0	0.0	54.5	
2013	430	3,4,5	0.0	0.0	0.9	0.0	0.0	2.1	2.1	0.0	0.0	0.0	0.0	0.0	10.7	0.9	0.5	0.0	0.0	0.0	0.0	8.4	0.0	0.0	0.0	0.0	0.0	0.0	16.7	0.0	0.9	56.7	
2014	444	4,5	0.9	0.0	0.0	0.0	0.0	2.9	1.8	0.0	0.0	0.0	0.0	0.0	7.9	0.7	0.0	0.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	35.1	0.0	0.0	45.7	
2015	79	5	Failed Criteria						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2016	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
2017	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
2018	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
79-84	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
85-95	447		0.3	0.0	0.0	0.8	0.0	4.7	1.6	0.9	3.3	0.1	1.7	7.4	23.6	2.0	0.0	0.0	0.0	0.1	11.0	20.0	0.0	0.0	0.0	0.3	0.0	0.0	3.4	0.0	0.0	18.9	
96-98	924		0.4	0.1	0.0	0.0	0.0	2.1	6.0	0.0	0.4	1.1	0.0	1.7	18.9	0.0	0.0	0.0	0.0	0.0	1.4	26.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.1	40.9	
99-08	990		0.4	0.0	0.0	0.1	0.0	6.9	4.4	0.0	0.0	0.0	0.0	0.0	12.2	0.5	0.2	0.0	0.0	0.0	0.3	13.2	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.1	59.6	
09-18	536		0.4	0.0	0.2	0.0	0.2	1.4	4.2	0.0	0.0	0.1	0.0	0.3	7.3	0.7	0.1	0.0	0.0	0.0	0.1	11.9	0.0	0.0	0.0	0.0	0.0	0.0	14.9	0.0	0.4	58.0	
19-28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				

Appendix C48— Percent distribution of Skykomish Fall Fingerling AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement												
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.				
			T	N	S	T	N	S	T	N	S	T	N	S	T	S	T	S	N	S	T	N	S	N	S	T	N	S	T	N	S						
2009	350	2,3,4,5	0.0	0.0	0.0	0.0	0.0	2.3	4.9	0.0	0.0	0.0	0.0	0.0	4.0	1.1	0.0	0.0	0.0	0.0	16.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	71.4
2010	421	2,3,4,5	0.0	0.2	0.0	0.0	0.0	2.6	1.4	0.0	0.0	0.0	0.0	0.0	4.0	0.7	0.0	0.0	0.0	0.0	1.7	8.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0	75.8		
2011	485	2,3,4,5	0.2	0.4	0.0	0.0	0.0	1.9	3.7	0.0	0.0	0.0	0.0	0.0	6.4	1.6	0.6	0.0	0.0	0.4	0.4	20.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.8	0.2	57.1		
2012	1037	2,3,4,5	0.3	0.0	0.0	0.0	0.2	3.9	2.5	0.0	0.0	0.1	0.0	0.0	16.1	2.9	0.0	0.0	0.0	0.2	0.4	10.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	2.2	59.3		
2013	632	2,3,4,5	0.3	0.0	0.3	0.0	0.0	6.8	6.5	0.0	0.0	0.0	0.0	0.0	11.2	1.7	0.6	0.0	0.0	0.0	0.6	9.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	61.4		
2014	486	2,3,4,5	1.2	0.0	0.0	0.0	0.0	1.4	2.1	0.0	0.0	0.2	0.0	0.0	13.6	0.0	0.0	0.0	0.0	0.0	0.0	14.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	66.7		
2015	616	2,3,4,5	0.8	1.0	0.0	0.0	0.0	1.5	3.7	0.0	0.0	0.8	0.0	0.0	5.2	3.6	0.6	0.0	0.0	0.3	1.6	18.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	62.5		
2016	1542	2,3,4,5	0.6	1.8	0.0	0.3	0.0	2.6	2.1	0.0	0.0	0.9	0.0	0.0	14.5	1.4	0.3	0.2	0.0	0.0	0.1	10.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	64.2		
2017	1351	2,3,4,5	1.3	0.0	0.0	0.3	0.0	5.0	1.4	0.0	0.0	1.6	0.0	0.0	8.5	0.6	0.5	0.0	0.0	0.0	0.3	8.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	72.3		
2018	746	2,3,4,5	0.3	0.1	0.0	0.0	0.0	1.2	0.9	0.0	0.0	0.0	0.0	0.0	15.8	1.1	0.0	0.0	0.0	0.0	0.4	11.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	68.6		
2019	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
79-84	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
85-95	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
96-98	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
99-08	744		0.6	0.0	0.0	0.2	0.0	14.5	4.1	0.0	0.2	0.3	0.0	0.0	7.1	2.4	0.1	0.0	0.0	0.0	0.6	7.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	61.5		
09-18	767		0.5	0.4	0.0	0.1	0.0	2.9	2.9	0.0	0.0	0.4	0.0	0.0	9.9	1.5	0.3	0.0	0.0	0.1	0.5	12.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.4	0.3	65.9		
19-28	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			

Appendix C49— Percent distribution of Similkameen Summer Yearling AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery								Terminal Fishery						Escapement											
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.	
			T	N	S	T	S	T	N	S	T	N	S	T	N	S	T	S	N	S	T	N	S	T	N	S	T	N	S					
2009	8286	3,4,5,6	7.7	0.1	0.8	2.9	2.6	3.0	1.7	0.0	0.0	0.2	0.0	0.0	0.5	0.9	0.3	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	15.0	4.2	0.0	59.9		
2010	7305	3,4,5,6	9.9	0.3	1.6	3.3	1.5	4.8	0.7	0.0	0.0	1.2	0.0	0.0	0.2	2.9	1.1	0.9	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.7	3.8	0.0	51.0	
2011	11700	3,4,5,6	7.5	0.1	0.9	2.8	1.3	2.1	1.3	0.0	0.0	0.4	0.0	0.0	0.2	0.6	1.2	1.2	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.3	6.8	0.0	55.1
2012	9802	3,4,5,6	12.9	0.5	0.7	3.0	1.2	4.7	2.4	0.0	0.0	0.6	0.0	0.0	0.9	4.5	3.2	3.4	1.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.8	4.3	0.0	49.6
2013	7928	3,4,5,6	6.8	0.3	0.6	3.7	2.4	2.7	1.2	0.0	0.0	0.1	0.0	0.0	0.5	3.2	1.2	2.5	0.4	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.3	4.4	0.0	57.2
2014	10664	3,4,5,6	10.6	0.4	0.7	0.9	0.8	4.1	0.5	0.0	0.0	0.4	0.1	0.0	0.1	3.8	1.5	2.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.6	2.4	0.0	59.6
2015	18669	3,4,5,6	8.5	0.1	0.8	1.3	0.6	1.1	0.6	0.0	0.0	0.1	0.0	0.0	0.1	3.3	2.4	1.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.6	3.6	0.2	60.4
2016	16415	3,4,5,6	14.1	0.4	1.2	3.0	1.9	4.0	1.0	0.0	0.0	0.4	0.0	0.0	0.3	1.4	0.6	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.5	3.0	0.0	53.9
2017	7285	3,4,5,6	6.1	0.2	1.4	2.6	3.2	3.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	2.1	1.4	0.8	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	4.4	0.0	58.9
2018	5207	3,4,5,6	7.3	0.0	0.9	2.6	1.0	2.6	0.7	0.0	0.0	0.4	0.0	0.0	0.3	4.8	0.6	0.5	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.7	2.5	0.1	59.8
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
79-84	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
85-95	3034		9.9	2.1	2.0	3.1	1.6	3.4	0.3	0.3	0.6	0.0	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.1	0.1	75.3	
96-98	2465		8.7	0.2	0.5	1.2	0.2	0.6	0.1	0.0	0.1	0.3	0.0	0.1	0.1	0.1	0.1	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.4	0.2	0.0	86.4	
99-08	5016		10.4	0.5	1.5	4.0	2.6	3.8	0.5	0.0	0.2	0.3	0.0	0.0	0.3	1.5	0.6	1.1	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.4	2.6	0.1	63.4
09-18	10326		9.1	0.2	0.9	2.6	1.7	3.3	1.0	0.0	0.0	0.4	0.0	0.0	0.3	2.7	1.3	1.5	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.9	4.0	0.0	56.6
19-28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Appendix C50— Percent distribution of Tsou-Yess Fall Fingerling AEQ total fishing mortalities and escapement.

Appendix C51— Percent distribution of Spring Creek Tule AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement									
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.	
			T	N	S	T	N	S	T	N	S	T	N	S	T	S	T	S	N	S	T	N	S	N	S	T	N	S	T	N	S			
2009	2573	2,3,4,5	0.0	0.0	0.0	0.0	0.0	1.3	2.6	0.0	0.0	0.3	0.0	0.0	0.2	1.7	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.1	2.3	0.2	45.9		
2010	4141	2,3,4,5	0.0	0.0	0.0	0.0	0.0	4.9	3.2	0.0	0.0	0.0	0.0	0.0	0.7	12.0	5.2	4.2	0.3	0.1	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.4	1.4	0.1	32.6
2011	2245	2,3,4,5	0.0	0.0	0.0	0.0	0.0	5.9	6.1	0.0	0.0	0.0	0.0	0.0	0.4	5.9	6.5	2.2	0.2	0.7	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.4	1.3	0.3	28.4
2012	2517	2,3,4,5	0.0	0.0	0.0	0.0	0.0	3.5	3.3	0.0	0.0	0.0	0.0	0.0	0.2	9.5	8.9	4.8	0.6	0.4	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.7	2.5	0.2	26.7
2013	2855	2,3,4,5	0.0	0.0	0.0	0.0	0.0	3.1	3.3	0.0	0.0	0.0	0.0	0.0	1.4	5.5	4.0	1.5	1.0	0.2	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	39.9	5.7	0.0	32.2
2014	5072	2,3,4,5	0.0	0.0	0.0	0.4	0.0	2.9	1.8	0.0	0.0	0.0	0.1	0.0	0.5	11.1	7.1	5.8	0.2	0.4	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.2	3.5	0.2	23.2
2015	6877	2,3,4,5	0.0	0.0	0.0	0.0	0.0	2.2	2.6	0.0	0.0	0.0	0.0	0.0	0.2	14.6	5.5	5.9	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.9	3.0	0.4	22.1
2016	2315	2,3,4,5	0.0	0.0	0.0	0.0	0.0	5.4	2.9	0.0	0.0	0.0	0.0	0.0	1.0	5.7	5.9	1.0	0.4	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	45.8	6.5	0.4	24.3
2017	2670	2,3,4,5	0.0	0.0	0.0	0.0	0.0	4.9	5.2	0.0	0.0	0.0	0.0	0.0	0.8	16.7	8.0	4.9	0.1	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.4	6.7	0.3	23.3
2018	1836	2,3,4,5	0.0	0.0	0.0	0.0	0.0	2.5	3.5	0.0	0.0	0.0	0.0	0.0	1.1	12.0	5.4	3.2	1.0	0.0	0.1	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.2	8.2	0.0	34.0
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
79–84	4268		0.0	0.0	0.0	0.0	0.0	26.2	0.2	0.8	0.1	0.0	0.1	1.1	1.2	16.0	5.7	1.8	0.4	0.5	0.5	5.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.4	0.5	0.2	17.7
85–95	1510		0.0	0.0	0.0	0.1	0.0	17.8	2.2	0.4	0.0	0.0	0.1	0.6	0.8	11.7	3.1	3.5	0.5	0.0	1.7	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	2.5	1.4	25.1
96–98	754		0.0	0.0	0.0	0.0	0.0	5.1	2.2	0.0	0.0	0.0	0.0	0.0	0.3	0.8	1.0	4.4	0.5	0.0	0.0	2.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	30.8	6.4	0.8	45.4	
99–08	3256		0.0	0.0	0.0	0.0	0.0	9.6	3.4	0.0	0.0	0.0	0.0	0.5	6.6	2.9	4.2	0.5	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.5	2.7	0.2	40.6	
09–18	3310		0.0	0.0	0.0	0.0	0.0	3.7	3.5	0.0	0.0	0.0	0.0	0.9	9.5	6.1	3.3	0.4	0.2	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.2	4.1	0.2	29.3	
19–28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Appendix C52— Percent distribution of South Puget Sound Fall Fingerling AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement							
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray
T	N	S	T	N	S	T	S	T	N	S	T	N	S	T	N	S	T	S	N	S	T	N	S	T	N	S	N	S	T	N	S	
2009	2906	2,3,4,5	0.1	0.0	0.0	0.2	0.0	5.2	8.2	0.0	0.0	0.0	0.0	0.0	4.8	2.9	0.3	0.0	0.0	0.0	2.4	13.2	0.0	0.0	0.0	0.0	0.0	0.0	11.3	0.2	0.3	50.9
2010	2920	2,3,4,5	0.1	0.0	0.0	0.1	0.1	5.5	5.5	0.0	0.0	0.4	0.0	0.0	2.3	2.9	1.4	0.1	0.0	0.1	0.9	11.3	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0	68.1
2011	2821	2,3,4,5	0.3	0.1	0.0	0.0	0.0	3.5	5.5	0.0	0.0	0.0	0.0	0.0	3.8	3.1	0.4	0.1	0.0	0.0	1.5	15.3	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	60.3
2012	2774	2,3,4,5	0.0	0.0	0.0	0.1	0.0	4.4	4.4	0.0	0.0	0.0	0.0	0.0	5.5	5.4	0.7	0.7	0.0	0.0	1.3	19.9	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.1	56.1
2013	2906	2,3,4,5	0.1	0.4	0.0	0.1	0.0	3.0	2.6	0.0	0.0	0.0	0.0	0.0	3.9	3.4	0.7	0.0	0.0	0.0	1.5	12.7	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0	70.5
2014	2045	2,3,4,5	1.2	0.6	0.0	0.2	0.0	6.1	3.8	0.0	0.0	0.0	0.0	0.0	6.9	4.1	2.1	0.5	0.0	0.0	0.4	14.8	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.1	58.0
2015	1980	2,3,4,5	0.5	0.0	0.0	0.0	0.0	2.7	3.0	0.0	0.0	0.2	0.0	0.0	12.7	10.1	0.9	0.3	0.0	0.2	1.9	18.9	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.4	47.8
2016	3016	2,3,4,5	0.0	0.1	0.0	0.3	0.0	1.8	3.0	0.0	0.0	0.2	0.0	0.0	8.7	2.5	0.4	0.1	0.0	0.0	1.4	17.8	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.4	62.8
2017	4532	2,3,4,5	0.2	0.0	0.1	0.1	0.0	3.6	4.1	0.0	0.0	0.2	0.0	0.0	4.1	3.9	1.4	0.4	0.0	0.0	0.7	8.7	0.0	0.0	0.0	0.0	0.0	0.0	4.4	0.0	0.2	67.8
2018	3962	2,3,4,5	0.5	0.2	0.1	0.2	0.2	2.1	4.3	0.0	0.0	0.2	0.0	0.0	10.2	5.9	1.0	0.0	0.0	0.0	1.0	19.0	0.0	0.0	0.0	0.0	0.0	0.0	9.3	0.0	0.1	45.8
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
79–84	3947		0.2	0.1	0.0	0.5	0.0	20.8	0.1	1.4	0.3	0.0	1.2	1.6	7.4	1.9	0.1	0.1	0.0	0.1	13.8	29.3	0.0	0.0	0.0	0.0	0.0	0.0	8.3	0.1	0.2	12.5
85–95	2501		0.2	0.1	0.0	0.1	0.0	15.4	1.6	0.3	0.4	0.0	0.2	2.3	6.0	6.4	0.3	0.2	0.0	0.1	10.5	19.3	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.1	0.6	29.8
96–98	3262		0.7	0.0	0.0	0.4	0.0	2.7	1.6	0.0	0.3	0.0	0.0	0.2	2.7	1.6	0.0	0.2	0.0	0.0	3.1	15.3	0.0	0.0	0.0	0.1	0.0	0.0	2.2	0.2	0.2	68.5
99–08	2909		0.3	0.0	0.0	0.4	0.0	10.7	3.7	0.0	0.0	0.0	0.0	0.0	3.6	4.5	0.5	0.5	0.0	0.0	4.4	12.5	0.0	0.0	0.0	0.0	0.0	0.0	7.7	0.0	0.2	50.7
09–18	2986		0.3	0.1	0.0	0.1	0.0	3.8	4.5	0.0	0.0	0.1	0.0	0.0	6.3	4.4	0.9	0.2	0.0	0.0	1.3	15.2	0.0	0.0	0.0	0.0	0.0	0.0	3.7	0.0	0.2	58.8
19–28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

Appendix C53— Percent distribution of South Puget Sound Fall Yearling AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery								Terminal Fishery						Escapement										
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.
			T	N	S	T	N	S	T	N	S	T	N	S	T	S	T	S	N	S	T	N	S	N	S	T	N	S	N	S	T	N	S
2009	208	2,3,4,5	0.0	0.0	0.0	0.0	0.0	0.0	12.5	0.0	0.0	0.0	0.0	0.0	4.3	0.5	0.0	0.0	0.0	2.9	59.6	0.0	0.0	0.0	0.0	0.0	0.0	1.0	3.4	0.0	15.9		
2010	171	2,3,4,5	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	2.3	0.6	1.8	0.0	0.0	0.0	5.3	33.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	52.0	
2011	241	3,4,5	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.4	0.8	0.0	2.1	23.2	63.1	0.0	0.0	0.0	0.0	0.0	0.0	5.4	0.0	0.0	1.2	
2012	217	2,4,5	0.0	0.0	0.0	0.0	0.0	0.0	1.4	5.5	0.0	0.0	0.0	0.0	0.0	2.3	3.7	3.7	1.4	0.0	0.0	31.8	46.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.1
2013	37	2,3,5	0.0	0.0	0.0	0.0	0.0	0.0	8.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.6	48.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.6	
2014	9	2,3,4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	
2015	10	2,3,4,5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	60.0		
2016	6	3,4,5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.7
2017	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2018	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
79–84	385		0.0	0.0	0.0	0.0	0.0	5.1	0.0	1.2	0.0	0.0	0.0	0.0	1.6	0.3	0.0	0.0	0.0	13.9	67.3	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.3	0.0	7.9		
85–95	890		0.0	0.0	0.0	0.0	0.0	3.2	0.4	0.0	0.0	0.0	0.0	0.5	1.0	1.8	0.1	0.1	0.0	0.0	15.1	64.3	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.6	0.1	12.4	
96–98	694		0.2	0.0	0.0	0.0	0.0	0.8	0.7	0.0	0.0	0.0	0.0	0.0	1.2	0.6	1.0	0.3	0.0	0.0	2.9	80.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0	11.8	
99–08	346		0.0	0.0	0.0	0.0	0.0	2.8	1.1	0.0	0.0	0.0	0.0	0.0	1.1	0.5	0.0	0.2	0.0	9.0	56.9	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.4	26.4		
09–18	209		0.0	0.0	0.0	0.0	0.0	0.8	4.9	0.0	0.0	0.0	0.0	2.2	1.7	1.5	0.6	0.0	0.5	15.8	50.5	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.8	0.7	18.3		
19–28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

Appendix C54— Percent distribution of Squaxin Pens Fall Yearling AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery								Terminal Fishery						Escapement									
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray
			T	N	S	T	S	T	S	T	N	S	T	N	S	T	S	N	S	T	N	S	T	N	S	T	N	S	T	N	S	
2009	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2010	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2011	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2012	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2013	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2014	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2015	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2016	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2017	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2018	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
79–84	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
85–95	820		0.0	0.0	0.0	0.0	0.0	9.2	1.7	0.0	0.2	0.0	0.2	1.7	3.3	7.9	0.3	0.0	0.0	0.0	19.1	47.2	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	1.2	7.2
96–98	336		0.0	0.0	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.1	0.0	1.4	0.0	0.0	4.8	89.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.3	0.9
99–08	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
09–18	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
19–28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

Appendix C55— Percent distribution of Salmon River AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement						
			SEAK			NBC		WCVI	NBC & CBC			Southern BC			N Falcon		S Falcon		WAC	Puget Sd		SEAK			Canada		Southern US			Stray	Esc.
			T	N	S	T	S	T	T	N	S	T	N	S	T	S	T	S	N	S	T	N	S	T	N	S	T	N	S		
2009	2584	2,3,4,5	18.5	1.0	1.9	13.4	3.7	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.3	24.5	0.0	34.9			
2010	4015	2,3,4,5	13.0	0.0	1.4	7.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.7	0.1	33.7		
2011	5395	2,3,4,5	11.0	0.0	0.7	5.8	2.4	2.1	1.5	0.0	0.0	0.0	0.0	0.0	1.5	0.6	0.3	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	29.2	0.0	43.9		
2012	4145	2,3,4,5	17.2	0.3	0.6	9.6	2.6	1.9	2.1	0.0	0.0	0.0	0.0	0.0	4.2	0.5	0.1	2.8	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	22.0	0.1	35.7		
2013	8404	2,3,4,5	5.8	0.2	0.7	8.2	3.9	0.5	0.8	0.0	0.0	0.0	0.0	0.0	2.1	0.7	0.4	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.9	0.0	53.2		
2014	11703	2,3,4,5	9.5	0.1	0.8	5.6	2.0	1.6	0.1	0.1	0.0	0.1	0.0	0.0	0.0	1.4	0.3	0.5	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	20.9	0.0	56.2	
2015	14040	2,3,4,5	7.7	0.1	0.6	3.8	2.2	0.7	0.4	0.0	0.0	0.1	0.0	0.0	0.0	1.9	0.8	0.5	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.3	0.2	57.1	
2016	9628	2,3,4,5	15.7	0.0	1.1	14.6	1.9	1.3	0.8	0.0	0.0	0.0	0.0	0.0	0.4	0.2	0.2	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.3	0.0	51.8		
2017	3881	2,3,4,5	11.0	0.0	0.6	15.8	3.3	0.9	0.0	0.0	0.0	0.0	0.0	0.7	1.3	0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.0	0.1	53.7		
2018	1147	2,3,4,5	26.3	0.0	1.5	27.3	8.1	2.2	1.1	0.0	0.0	0.0	0.0	0.0	0.3	0.7	0.5	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.0	0.1	21.7		
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
79–84	758		19.6	0.3	0.4	16.5	0.0	5.6	0.0	1.3	0.9	0.0	0.0	0.2	0.1	0.0	0.3	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.1	18.7	0.0	35.2		
85–95	2070		15.7	0.8	0.2	14.0	0.7	6.4	0.0	0.8	0.2	0.0	0.0	0.4	0.0	0.2	0.1	1.1	0.5	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	20.8	0.0	37.9	
96–98	3366		19.4	0.2	0.6	5.0	0.8	0.3	0.0	0.1	0.0	0.0	0.0	1.0	0.0	0.1	0.0	1.7	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.6	0.0	40.3		
99–08	3374		18.6	0.3	1.4	7.0	4.0	0.8	0.5	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.8	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.5	0.1	40.0	
09–18	6494		13.6	0.2	1.0	11.1	3.2	1.2	0.7	0.0	0.0	0.0	0.0	0.0	0.2	1.4	0.4	0.3	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	21.5	0.1	44.2		
19–28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			

Appendix C56—Percent distribution of Nehalem AEQ total fishing mortalities and escapement based on Salmon River Hatchery CWT recoveries with terminal adjustments for basin-specific terminal fishery performance.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery								Terminal Fishery						Escapement										
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.
			T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S				
2009	2584	2,3,4,5	18.5	1.0	1.9	13.4	3.7	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.8	0.0	58.5			
2010	4015	2,3,4,5	13.0	0.0	1.4	7.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.8	0.1	68.6	
2011	5395	2,3,4,5	11.0	0.0	0.7	5.8	2.4	2.1	1.5	0.0	0.0	0.0	0.0	0.0	1.5	0.6	0.3	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	11.6	0.0	61.5		
2012	4145	2,3,4,5	17.2	0.3	0.6	9.6	2.6	1.9	2.1	0.0	0.0	0.0	0.0	0.0	0.1	4.2	0.5	0.1	2.8	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.9	0.1	49.8
2013	8404	2,3,4,5	5.8	0.2	0.7	8.2	3.9	0.5	0.8	0.0	0.0	0.0	0.0	0.0	0.3	2.1	0.7	0.4	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.4	0.0	60.8
2014	11703	2,3,4,5	9.5	0.1	0.8	5.6	2.0	1.6	0.1	0.1	0.0	0.1	0.0	0.0	0.0	1.4	0.3	0.5	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	18.3	0.0	58.8
2015	14040	2,3,4,5	7.7	0.1	0.6	3.8	2.2	0.7	0.4	0.0	0.0	0.1	0.0	0.0	0.0	1.9	0.8	0.5	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.0	0.2	57.4
2016	9628	2,3,4,5	15.7	0.0	1.1	14.6	1.9	1.3	0.8	0.0	0.0	0.0	0.0	0.0	0.4	0.2	0.2	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.2	0.0	54.8	
2017	3881	2,3,4,5	11.0	0.0	0.6	15.8	3.3	0.9	0.0	0.0	0.0	0.0	0.0	0.7	1.3	0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.4	0.1	56.3	
2018	1147	2,3,4,5	26.3	0.0	1.5	27.3	8.1	2.2	1.1	0.0	0.0	0.0	0.0	0.0	0.3	0.7	0.5	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	0.1	27.9	
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
79-84	758		19.6	0.3	0.4	16.5	0.0	5.6	0.0	1.3	0.9	0.0	0.0	0.2	0.1	0.0	0.3	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	4.3	0.0	49.6		
85-95	2070		15.7	0.8	0.2	14.0	0.7	6.4	0.0	0.8	0.2	0.0	0.0	0.4	0.0	0.2	0.1	1.1	0.5	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.2	0.0	46.5	
96-98	3366		19.4	0.2	0.6	5.0	0.8	0.3	0.0	0.1	0.0	0.0	0.0	1.0	0.0	0.1	0.0	1.7	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.8	0.0	56.1	
99-08	3374		18.6	0.3	1.4	7.0	4.0	0.8	0.5	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.8	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.5	0.1	54.1	
09-18	6494		13.6	0.2	1.0	11.1	3.2	1.2	0.7	0.0	0.0	0.0	0.0	0.0	0.2	1.4	0.4	0.3	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	10.2	0.1	55.4		
19-28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

Appendix C57— Percent distribution of Siletz AEQ total fishing mortalities and escapement based on Salmon River Hatchery CWT recoveries with terminal adjustments for basin-specific terminal fishery performance..

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery								Terminal Fishery						Escapement										
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.
			T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S				
2009	2584	2,3,4,5	18.5	1.0	1.9	13.4	3.7	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	10.2	0.0	49.2			
2010	4015	2,3,4,5	13.0	0.0	1.4	7.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.5	0.1	69.9		
2011	5395	2,3,4,5	11.0	0.0	0.7	5.8	2.4	2.1	1.5	0.0	0.0	0.0	0.0	0.0	1.5	0.6	0.3	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	26.7	0.0	46.5		
2012	4145	2,3,4,5	17.2	0.3	0.6	9.6	2.6	1.9	2.1	0.0	0.0	0.0	0.0	0.0	0.1	4.2	0.5	0.1	2.8	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.6	0.1	47.1
2013	8404	2,3,4,5	5.8	0.2	0.7	8.2	3.9	0.5	0.8	0.0	0.0	0.0	0.0	0.0	0.3	2.1	0.7	0.4	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0	0.0	60.1
2014	11703	2,3,4,5	9.5	0.1	0.8	5.6	2.0	1.6	0.1	0.1	0.0	0.1	0.0	0.0	0.0	1.4	0.3	0.5	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	15.3	0.0	61.8	
2015	14040	2,3,4,5	7.7	0.1	0.6	3.8	2.2	0.7	0.4	0.0	0.0	0.1	0.0	0.0	0.0	1.9	0.8	0.5	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.9	0.2	46.5
2016	9628	2,3,4,5	15.7	0.0	1.1	14.6	1.9	1.3	0.8	0.0	0.0	0.0	0.0	0.0	0.4	0.2	0.2	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.2	0.0	49.9	
2017	3881	2,3,4,5	11.0	0.0	0.6	15.8	3.3	0.9	0.0	0.0	0.0	0.0	0.0	0.7	1.3	0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.6	0.1	46.1	
2018	1147	2,3,4,5	26.3	0.0	1.5	27.3	8.1	2.2	1.1	0.0	0.0	0.0	0.0	0.0	0.3	0.7	0.5	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.2	0.1	17.5	
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
79-84	758		19.6	0.3	0.4	16.5	0.0	5.6	0.0	1.3	0.9	0.0	0.0	0.2	0.1	0.0	0.3	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	6.3	0.0	47.6		
85-95	2070		15.7	0.8	0.2	14.0	0.7	6.4	0.0	0.8	0.2	0.0	0.0	0.4	0.0	0.2	0.1	1.1	0.5	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	6.4	0.0	52.3		
96-98	3366		19.4	0.2	0.6	5.0	0.8	0.3	0.0	0.1	0.0	0.0	0.0	1.0	0.0	0.1	0.0	1.7	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.6	0.0	61.4		
99-08	3374		18.6	0.3	1.4	7.0	4.0	0.8	0.5	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.8	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.7	0.1	51.9		
09-18	6494		13.6	0.2	1.0	11.1	3.2	1.2	0.7	0.0	0.0	0.0	0.0	0.0	0.2	1.4	0.4	0.3	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	16.2	0.1	49.5		
19-28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			

Appendix C58—Percent distribution of Siuslaw AEQ total fishing mortalities and escapement based on Salmon River Hatchery CWT recoveries with terminal adjustments for basin-specific terminal fishery performance.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery								Terminal Fishery						Escapement										
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.
			T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S				
2009	2584	2,3,4,5	18.5	1.0	1.9	13.4	3.7	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	13.1	0.0	46.2			
2010	4015	2,3,4,5	13.0	0.0	1.4	7.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.9	0.1	58.5	
2011	5395	2,3,4,5	11.0	0.0	0.7	5.8	2.4	2.1	1.5	0.0	0.0	0.0	0.0	0.0	1.5	0.6	0.3	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	23.9	0.0	49.2		
2012	4145	2,3,4,5	17.2	0.3	0.6	9.6	2.6	1.9	2.1	0.0	0.0	0.0	0.0	0.0	0.1	4.2	0.5	0.1	2.8	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.6	0.1	46.0
2013	8404	2,3,4,5	5.8	0.2	0.7	8.2	3.9	0.5	0.8	0.0	0.0	0.0	0.0	0.0	0.3	2.1	0.7	0.4	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.2	0.0	47.9
2014	11703	2,3,4,5	9.5	0.1	0.8	5.6	2.0	1.6	0.1	0.1	0.0	0.1	0.0	0.0	0.0	1.4	0.3	0.5	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	20.7	0.0	56.5
2015	14040	2,3,4,5	7.7	0.1	0.6	3.8	2.2	0.7	0.4	0.0	0.0	0.1	0.0	0.0	0.0	1.9	0.8	0.5	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.4	0.2	50.9
2016	9628	2,3,4,5	15.7	0.0	1.1	14.6	1.9	1.3	0.8	0.0	0.0	0.0	0.0	0.0	0.4	0.2	0.2	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.4	0.0	38.6
2017	3881	2,3,4,5	11.0	0.0	0.6	15.8	3.3	0.9	0.0	0.0	0.0	0.0	0.0	0.7	1.3	0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.2	0.1	41.6	
2018	1147	2,3,4,5	26.3	0.0	1.5	27.3	8.1	2.2	1.1	0.0	0.0	0.0	0.0	0.0	0.3	0.7	0.5	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.7	0.1	12.0	
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
79-84	758		19.6	0.3	0.4	16.5	0.0	5.6	0.0	1.3	0.9	0.0	0.0	0.2	0.1	0.0	0.3	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	11.0	0.0	43.0		
85-95	2070		15.7	0.8	0.2	14.0	0.7	6.4	0.0	0.8	0.2	0.0	0.0	0.4	0.0	0.2	0.1	1.1	0.5	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.5	0.0	47.2	
96-98	3366		19.4	0.2	0.6	5.0	0.8	0.3	0.0	0.1	0.0	0.0	0.0	1.0	0.0	0.1	0.0	1.7	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.7	0.0	49.2	
99-08	3374		18.6	0.3	1.4	7.0	4.0	0.8	0.5	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.8	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.0	0.1	48.6	
09-18	6494		13.6	0.2	1.0	11.1	3.2	1.2	0.7	0.0	0.0	0.0	0.0	0.0	0.2	1.4	0.4	0.3	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	20.9	0.1	44.7			
19-28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			

Appendix C59— Percent distribution of Southern Southeast Alaska Spring AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery								Terminal Fishery						Escapement										
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.
			T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	N	S	T	N	S	N	S	T	N	S	T	N	S			
2009	7802	3,4,5,6	16.7	4.0	2.6	0.5	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	63.8			
2010	5926	3,4,5,6	18.1	3.8	7.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	57.2			
2011	6111	3,4,5,6	13.1	8.3	3.6	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	57.6			
2012	3792	3,4,5,6	27.3	9.3	4.3	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	34.8			
2013	5874	3,4,5,6	15.7	13.4	2.4	0.2	0.7	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	45.0			
2014	4838	3,4,5,6	24.7	7.6	2.6	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	53.6			
2015	5453	3,4,5,6	26.8	11.8	2.8	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	38.8			
2016	3567	3,4,5,6	26.5	8.2	3.5	0.4	0.6	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	37.3			
2017	4137	3,4,5,6	21.0	8.9	3.8	0.0	0.8	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	54.1			
2018	2547	3,4,5,6	8.3	8.4	2.4	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	65.9			
2019	2292	3,4,5,6	4.8	20.2	0.4	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	64.1			
79-84	4738		34.2	2.6	8.7	1.3	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	46.9			
85-95	12220		26.8	13.2	8.2	0.8	0.1	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	39.5			
96-98	4901		26.9	7.1	10.6	0.0	0.5	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	28.7			
99-08	8060		22.2	3.9	9.0	0.4	0.4	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	45.6			
09-18	5005		19.8	8.4	3.5	0.3	0.4	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	50.8			
19-28	2292		4.8	20.2	0.4	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	64.1			

Appendix C60— Percent distribution of Skagit Summer Fingerling AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement							
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray
			T	N	S	T	N	S	T	N	S	T	N	S	T	S	N	S	T	N	S	T	N	S	T	N	S	T	N	S		
2009	833	2,3,4,5	7.7	1.0	0.8	1.7	0.0	3.6	6.0	0.0	0.0	1.2	0.0	0.0	7.0	0.2	0.0	0.0	0.0	0.1	3.1	0.0	0.0	0.0	0.0	0.0	0.0	33.7	0.0	1.2	32.7	
2010	568	2,3,4,5	8.5	0.5	0.2	1.6	0.0	4.6	4.2	0.0	0.5	4.8	0.0	0.0	2.8	0.5	0.0	0.0	0.0	0.4	3.5	0.0	0.0	0.0	0.0	0.0	0.0	7.0	0.9	3.7	56.3	
2011	570	2,3,4,5	4.9	0.0	0.5	0.0	0.0	6.7	5.4	0.0	0.0	0.7	0.0	0.0	6.0	1.2	0.0	0.0	0.0	0.5	6.8	0.0	0.0	0.0	0.0	0.0	0.0	18.2	0.0	2.1	46.8	
2012	533	2,3,4,5	8.6	1.7	0.0	1.9	0.4	2.6	2.3	0.0	0.0	0.0	0.0	0.0	2.8	0.0	0.4	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	2.8	0.0	3.2	72.4	
2013	329	2,3,4,5	4.6	1.8	0.0	2.1	0.0	0.9	9.7	0.0	0.0	1.5	0.0	0.0	6.7	0.9	0.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	14.6	0.0	6.1	47.1	
2014	366	2,3,4,5	16.1	2.2	0.0	0.0	0.0	7.1	1.6	0.0	0.0	1.9	0.0	0.0	16.7	0.8	0.0	0.0	0.0	0.0	4.9	0.0	0.0	0.0	0.0	0.0	0.0	6.3	0.0	4.1	38.3	
2015	653	2,3,4,5	14.2	0.5	0.8	0.9	0.9	1.2	6.9	0.0	0.0	2.0	0.0	0.0	10.9	1.8	0.0	0.0	0.0	0.8	4.1	0.0	0.0	0.0	0.0	0.0	0.0	2.3	0.0	0.0	52.7	
2016	934	2,3,4,5	7.9	1.4	0.0	0.4	1.8	3.1	6.3	0.0	0.0	2.4	0.0	0.0	20.0	0.9	1.1	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	0.0	4.1	42.2	
2017	919	2,3,4,5	5.5	2.0	0.7	0.4	2.6	6.7	24.0	0.0	0.0	2.1	0.0	0.0	15.5	0.4	0.7	0.0	0.0	0.0	4.7	0.0	0.0	0.0	0.0	0.0	0.0	3.4	0.0	0.1	29.7	
2018	1319	2,3,4,5	4.5	1.1	0.3	1.4	0.8	2.4	12.0	0.0	0.0	0.5	0.0	0.0	11.8	1.2	0.0	0.0	0.0	0.3	10.4	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.8	50.5	
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
79-84	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
85-95	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
96-98	182		3.8	0.0	0.0	0.0	0.0	1.6	3.8	0.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	83.0
99-08	1016		8.1	0.6	0.2	1.4	0.7	6.6	5.5	0.0	0.1	0.2	0.0	0.3	5.9	0.3	0.0	0.0	0.0	0.4	2.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	2.0	63.0	
09-18	702		8.3	1.2	0.3	1.0	0.7	3.9	7.9	0.0	0.1	1.7	0.0	0.0	10.0	0.8	0.2	0.0	0.0	0.0	4.8	0.0	0.0	0.0	0.0	0.0	0.0	9.4	0.1	2.5	46.9	
19-28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

Appendix C61— Percent distribution of Stikine River AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement									
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC	Puget Sd		SEAK			Canada		Southern US			Stray	Esc.		
			T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	S	N	S	T	N	S	N	S	T	N	S	T	N	S		
2009	226	3,4,5,6	11.9	3.5	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	57.1
2010	248	3,4,5,6	13.3	2.8	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	62.5
2011	387	3,4,5,6	4.7	5.7	2.6	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	65.6
2012	621	3,4,5,6	8.9	3.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	68.8
2013	485	3,4,5,6	4.1	3.5	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	75.9
2014	559	3,4,5,6	3.9	3.6	0.2	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	77.8
2015	762	3,4,5,6	3.9	1.6	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	74.7
2016	604	3,4,5,6	3.5	0.2	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	78.8
2017	299	3,4,5,6	6.7	0.7	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	81.3
2018	176	4,5,6	1.1	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	96.0
2019	220	5,6	6.8	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.8
79–84	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
85–95	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
96–98	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
99–08	360		7.5	0.8	5.3	1.9	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	46.5
09–18	437		6.2	2.5	1.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	73.8
19–28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Appendix C62— Percent distribution of Stillaguamish Fall Fingerling AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement								
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.
			T	N	S	T	N	S	T	S	T	N	S	T	N	S	T	S	N	S	T	N	S	N	S	T	N	S					
2009	977	2,3,4,5	1.2	0.1	0.3	0.3	0.6	2.4	4.2	0.0	0.0	0.0	0.0	0.0	7.7	0.2	0.0	0.0	0.0	0.0	1.1	12.6	0.0	0.0	0.0	0.0	0.0	0.0	3.8	0.0	5.1	60.4	
2010	885	2,3,4,5	1.0	0.0	0.0	0.0	0.0	8.0	7.7	0.0	0.0	0.5	0.0	0.0	8.9	2.4	0.5	0.0	0.0	0.0	2.8	8.7	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	1.2	56.3	
2011	1411	2,3,4,5	1.3	0.2	0.0	0.0	0.0	4.6	7.0	0.0	0.0	2.8	0.0	0.0	7.3	0.6	0.2	0.0	0.0	0.0	1.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.1	2.6	65.8	
2012	1004	2,3,4,5	1.7	0.3	0.0	0.3	0.0	4.2	2.1	0.0	0.0	0.5	0.0	0.0	7.9	0.3	0.0	0.0	0.0	0.0	0.2	5.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	8.7	67.6	
2013	475	2,3,4,5	1.3	1.9	0.6	0.0	0.0	6.5	7.8	0.0	0.0	1.1	0.0	0.0	11.6	4.4	0.0	0.0	0.0	0.0	0.8	17.5	0.0	0.0	0.0	0.0	0.0	0.0	3.4	0.0	1.7	41.5	
2014	943	2,3,4,5	3.7	0.7	0.0	0.6	0.4	8.1	8.4	0.0	0.0	2.0	0.0	0.0	19.4	1.5	0.5	0.0	0.4	0.0	1.1	21.3	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	1.7	28.6	
2015	458	2,3,4,5	3.3	0.2	0.0	0.0	0.0	5.9	3.7	0.0	0.0	2.0	0.0	0.0	14.4	0.9	0.0	0.0	0.0	0.0	3.5	11.4	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	9.0	45.6	
2016	559	2,3,4,5	0.9	0.5	0.0	0.0	0.0	6.3	3.9	0.0	0.0	3.9	0.0	0.0	14.3	0.9	0.0	0.0	0.0	0.0	3.8	11.4	0.0	0.0	0.0	0.0	0.0	0.0	4.3	0.0	1.4	48.3	
2017	985	2,3,4,5	1.1	0.5	0.3	0.0	0.7	7.8	4.9	0.0	0.0	0.6	0.0	0.0	9.7	1.4	0.1	0.0	0.0	0.0	2.3	11.6	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	9.6	48.3	
2018	1492	2,3,4,5	1.6	0.1	0.0	0.3	0.0	3.3	5.4	0.0	0.0	0.2	0.0	0.0	13.3	0.7	0.0	0.0	0.0	0.0	3.2	10.6	0.0	0.0	0.0	0.0	0.0	0.0	3.2	0.0	3.1	55.0	
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
79–84	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
85–95	735		1.0	0.0	0.0	0.4	0.0	11.0	4.8	1.4	3.0	0.2	0.2	1.9	7.6	3.8	0.1	0.0	0.0	0.0	3.3	18.3	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.6	41.2	
96–98	1082		6.0	0.2	0.1	0.6	0.0	2.6	3.8	0.0	2.8	0.4	0.0	0.4	4.9	0.0	0.0	0.0	0.0	0.0	0.7	13.8	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	4.9	58.6	
99–08	815		2.1	0.3	0.0	0.0	0.0	7.8	3.2	0.0	0.2	0.0	0.0	0.0	6.4	0.6	0.0	0.0	0.0	0.0	1.0	7.5	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	5.9	64.1	
09–18	919		1.7	0.5	0.1	0.2	0.2	5.7	5.5	0.0	0.0	1.4	0.0	0.0	11.5	1.3	0.1	0.0	0.0	0.0	2.0	11.5	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0	4.4	51.8	
19–28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			

Appendix C63—Percent distribution of Columbia River Summers AEQ total fishing mortalities and escapement.

Appendix C64— Percent distribution of Taku River AEQ total fishing mortalities and escapement.

Appendix C65— Percent distribution of Taku And Stikine Rivers AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement									
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC	Puget Sd	SEAK			Canada		Southern US			Stray	Esc.			
			T	N	S	T	N	S	T	N	S	T	N	S	T	S	T	S	N	S	T	N	S	T	N	S	T	N	S					
2009	573	3,4,5,6	9.9	1.4	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	59.0
2010	474	3,4,5,6	9.1	1.7	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	2.1	0.0	14.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	70.3	
2011	725	3,4,5,6	5.9	3.4	2.6	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	6.3	0.0	10.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	71.0	
2012	899	3,4,5,6	9.5	2.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	2.2	0.1	14.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	71.0
2013	836	3,4,5,6	3.8	2.6	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.7	0.2	8.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	81.1
2014	921	3,4,5,6	3.5	2.1	0.1	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	2.5	0.0	9.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	81.4	
2015	1183	3,4,5,6	5.0	1.6	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.0	13.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	76.7	
2016	864	3,4,5,6	2.8	0.1	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.0	13.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	80.9	
2017	488	3,4,5,6	5.9	1.4	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	84.6	
2018	287	3,4,5,6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	97.2	
2019	577	4,5,6	2.6	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	94.6			
79–84	315		5.9	0.2	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.4	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	89.2	
85–95	347		2.9	0.0	8.4	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	86.5	
96–98	485		0.9	0.0	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90.7		
99–08	1283		3.8	0.2	5.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	7.6	1.0	8.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	72.8		
09–18	725		5.6	1.7	1.3	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	3.0	0.1	10.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	77.3		
19–28	577		2.6	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	94.6			

Appendix C66— Percent distribution of Unuk River AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery								Terminal Fishery						Escapement										
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.
			T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	
2009	401	3,4,5,6	14.5	1.5	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	77.6	
2010	427	3,4,5,6	18.0	0.9	6.3	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2	69.6	
2011	283	3,4,5,6	20.1	4.2	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	72.1
2012	206	3,4,5,6	35.0	7.3	6.8	0.0	1.0	0.0	0.0	0.0	0.0	0.0	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	41.3	
2013	190	3,4,5,6	17.9	13.7	2.1	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	60.0
2014	201	3,4,5,6	27.4	6.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	59.7	
2015	215	3,4,5,6	25.6	7.4	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	61.4	
2016	150	3,4,5,6	21.3	14.7	4.7	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	55.3	
2017	132	3,4,5,6	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	85.6	
2018	283	3,4,5,6	11.0	9.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	68.2	
2019	318	4,5,6	4.7	4.1	0.9	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	80.8	
79–84	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
85–95	293		15.1	1.3	4.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	77.5	
96–98	318		10.9	4.5	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	80.7	
99–08	856		11.4	3.9	7.4	0.4	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	72.8	
09–18	249		19.9	6.5	3.0	0.1	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	65.1	
19–28	318		4.7	4.1	0.9	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	80.8	

Appendix C67—Percent distribution of Columbia River Upriver Bright AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement								
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC	Puget Sd	SEAK			Canada		Southern US			Stray	Esc.		
			T	N	S	T	N	T	S	T	N	S	T	N	S	T	N	S	T	S	N	S	T	N	S	N	S	T	N	S			
2009	1339	2,3,4,5	22.0	1.7	1.8	9.3	1.3	0.6	0.9	0.0	0.0	0.0	0.0	0.0	1.0	0.7	1.1	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	19.5	5.3	0.0	33.8			
2010	1736	2,3,4,5	5.1	0.4	2.5	1.7	1.3	0.9	1.4	0.0	0.0	0.0	0.0	0.0	0.0	2.4	2.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.6	4.1	0.0	59.2	
2011	3024	2,3,4,5	10.9	0.2	0.9	3.0	2.4	1.7	2.5	0.0	0.0	0.9	0.0	0.0	0.3	1.4	0.9	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.0	4.8	0.0	45.8	
2012	5093	2,3,4,5	7.1	0.6	0.5	2.7	0.7	0.9	1.5	0.0	0.0	0.4	0.0	0.0	0.3	2.0	0.9	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.1	5.8	0.0	64.2
2013	14479	2,3,4,5	5.2	0.0	0.4	2.4	1.9	0.8	1.5	0.0	0.0	0.2	0.0	0.0	0.6	1.8	0.9	0.8	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.4	5.9	0.0	52.8
2014	16366	2,3,4,5	14.7	0.3	1.1	5.2	1.0	2.4	0.3	0.0	0.0	0.3	0.0	0.0	0.2	1.3	0.5	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.8	3.2	0.0	50.2	
2015	13706	2,3,4,5	8.9	0.8	0.9	2.3	1.5	0.5	0.6	0.0	0.0	0.1	0.0	0.0	0.2	1.1	0.9	0.3	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.5	4.8	0.0	63.5
2016	10376	2,3,4,5	12.1	1.4	1.5	7.9	1.1	1.8	0.5	0.0	0.0	0.4	0.0	0.0	0.3	0.8	0.5	0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.5	4.2	0.1	53.1
2017	6480	2,3,4,5	7.2	0.3	1.5	7.5	1.8	1.7	0.7	0.0	0.0	0.0	0.0	0.0	0.1	1.0	0.2	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.3	6.2	0.0	58.2
2018	2542	2,3,4,5	5.8	0.0	0.4	6.3	2.9	0.5	0.3	0.0	0.0	0.4	0.0	0.0	0.7	0.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.2	4.0	0.0	66.6
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
79–84	2507		19.1	0.5	0.4	8.1	0.0	7.3	0.0	2.0	2.2	0.1	0.2	0.4	0.3	0.7	0.6	0.1	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.8	0.3	0.4	47.2
85–95	1557		11.7	1.2	0.7	8.3	0.2	10.2	0.1	0.5	0.9	0.0	0.0	0.3	0.2	0.6	0.4	0.4	0.1	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	24.8	2.6	0.1	36.4	
96–98	857		9.5	1.4	2.0	3.0	0.1	0.5	0.0	0.2	0.1	0.2	0.0	0.0	0.1	0.0	0.0	0.6	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	18.5	3.9	0.0	59.7	
99–08	1631		13.9	0.7	1.9	4.3	1.5	1.5	1.2	0.0	0.0	0.2	0.0	0.1	0.4	0.8	0.7	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.6	3.4	0.1	54.2
09–18	7514		9.9	0.6	1.2	4.8	1.6	1.2	1.0	0.0	0.0	0.3	0.0	0.0	0.4	1.3	0.9	0.3	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.9	4.8	0.0	54.7
19–28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Appendix C68— Percent distribution of University of Washington Accelerated AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery								Terminal Fishery						Escapement									
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray
			T	N	S	T	N	S	T	N	S	T	N	S	T	S	T	S	N	S	T	N	S	T	N	S	T	N	S			
2009	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2010	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2011	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2012	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2013	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2014	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2015	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2016	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2017	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2018	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
79–84	4093		0.0	0.0	0.0	0.1	0.0	12.9	0.1	0.4	0.0	0.0	0.6	1.9	3.7	1.8	0.2	0.0	0.0	0.2	10.3	44.8	0.0	0.0	0.0	0.0	0.1	0.0	1.9	0.0	0.0	20.9
85–95	932		0.2	0.0	0.0	0.0	0.0	15.9	0.9	0.1	0.3	0.0	0.5	4.0	4.7	2.7	0.1	0.1	0.0	0.0	14.2	23.9	0.0	0.0	0.0	0.0	0.0	0.0	12.4	0.0	0.1	20.0
96–98	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
99–08	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
09–18	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
19–28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

Appendix C69— Percent distribution of White River Spring Yearling AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement								
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.
			T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	N	S	T	N	S	N	S	T	N	S	N	S				
2009	207	2,3,4,5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	1.0	83.6			
2010	212	2,3,4,5	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	7.5	0.0	0.0	88.2			
2011	216	2,3,4,5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	94.0				
2012	202	2,3,4,5	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.9	0.0	0.0	0.0	0.0	0.0	0.0	15.8	0.0	0.0	73.3			
2013	94	2,3,4,5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	86.2			
2014	116	2,3,4,5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	6.0	0.0	0.0	0.0	0.0	0.0	0.0	6.9	0.0	0.0	86.2		
2015	224	2,3,4,5	0.0	0.0	0.0	0.0	0.0	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	3.1	0.0	0.0	0.0	0.0	0.0	0.0	11.2	0.0	0.4	81.7		
2016	125	2,3,4,5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.8	0.0	0.0	0.0	0.0	0.0	0.0	27.2	0.0	0.0	68.0			
2017	168	2,3,4,5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	4.2	0.0	0.0	95.2			
2018	56	3,4,5	0.0	0.0	0.0	0.0	0.0	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	39.3	0.0	1.8	55.4			
2019	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
79–84	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
85–95	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
96–98	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
99–08	672		0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	1.0	0.2	0.0	0.0	0.0	0.2	15.4	0.0	0.0	0.0	0.0	0.0	0.0	3.6	0.0	0.1	77.7			
09–18	184		0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.3	4.7	0.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0	0.2	83.8			
19–28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				

Appendix C70— Percent distribution of Willamette Spring AEQ total fishing mortalities and escapement.

Catch Year	Est # of CWT	Ages	AABM Fishery						ISBM Fishery										Terminal Fishery						Escapement								
			SEAK			NBC		WCVI		NBC & CBC			Southern BC			N Falcon		S Falcon		WAC		Puget Sd		SEAK			Canada		Southern US			Stray	Esc.
			T	N	S	T	N	S	T	N	S	T	N	S	T	N	S	N	S	T	N	S	N	S	T	N	S	T	N	S			
2009	3845	3,4,5,6	3.5	0.1	0.0	0.2	0.1	0.8	1.9	0.0	0.0	0.2	0.0	0.0	0.8	0.3	0.2	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	8.1	20.2	0.0	63.4		
2010	11269	3,4,5,6	2.9	0.0	0.1	0.5	0.2	0.5	0.1	0.0	0.0	0.1	0.0	0.0	0.0	1.9	0.2	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	32.5	0.1	56.9	
2011	7649	3,4,5,6	4.1	0.0	0.2	0.8	0.2	1.1	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.9	0.2	0.2	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.2	41.7	0.3	44.8	
2012	5869	3,4,5,6	6.5	0.0	0.3	0.3	0.2	3.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.8	0.4	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.9	37.3	0.8	43.4	
2013	6289	3,4,5,6	2.4	0.0	0.6	0.4	0.3	0.7	0.3	0.0	0.0	0.0	0.0	0.0	0.3	1.0	0.3	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	29.8	0.0	58.8	
2014	14285	3,4,5,6	4.6	0.2	0.2	0.7	0.1	3.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	1.6	0.5	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	21.8	0.0	63.6	
2015	16822	3,4,5,6	5.1	0.1	0.1	0.6	0.1	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.1	4.0	0.5	1.3	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.9	25.6	0.5	56.3	
2016	5819	3,4,5,6	13.8	0.1	0.3	0.8	0.4	4.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	2.1	0.1	0.7	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3	22.6	0.0	50.5	
2017	6455	3,4,5,6	2.5	0.0	0.1	0.5	0.5	3.3	0.1	0.0	0.0	0.0	0.0	0.0	0.2	4.3	0.5	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	23.0	0.0	62.1	
2018	5430	3,4,5,6	1.3	0.1	0.0	0.7	0.3	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	24.5	0.0	67.2	
2019	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
79–84	4860		7.2	0.3	0.2	6.1	0.0	2.3	0.0	0.2	0.2	0.0	0.1	0.0	0.1	0.9	0.5	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2	18.3	0.0	59.2	
85–95	2817		7.4	0.8	0.3	3.2	0.0	1.7	0.3	0.3	0.3	0.0	0.0	0.0	0.1	1.0	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	7.7	30.6	0.1	45.8		
96–98	2475		3.9	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	22.1	0.2	72.4	
99–08	8310		4.6	0.1	0.2	0.4	0.2	2.3	0.1	0.0	0.0	0.0	0.0	0.1	0.5	0.1	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.8	19.9	0.1	64.5		
09–18	8373		4.7	0.1	0.2	0.6	0.2	1.8	0.3	0.0	0.0	0.1	0.0	0.0	0.2	2.0	0.3	0.3	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3	27.9	0.2	56.7	
19–28	NA		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

APPENDIX D: FISHERY EXPLOITATION RATE INDICES BY STOCK, AGE AND FISHERY, BASED ON CODED-WIRE TAG (CWT) DATA

Fishery Indices

When the PST was originally signed in 1985, catch ceilings and increases in stock abundance were expected to reduce harvest rates in fisheries. Fishery indices (FI) provide a means to assess performance against this expectation. Relative to the base period, an index less than 1.0 represents a decrease from base period harvest rates whereas an index greater than 1.0 represents an increase. Fishery indices are used to measure relative changes in fishery harvest rates because it is not possible to directly estimate the fishery harvest rates.

Indices are presented for the AABM troll fisheries only, although ACLs also apply to sport and net fisheries in SEAK and sport fisheries in NBC and WCVI. CWT recoveries from the troll fisheries are used because the majority of the catch and the most reliable CWT sampling occurs in these fisheries. In addition, there are data limitations in the base period for the sport fisheries (e.g., few observed recoveries in NBC due to small fishery size). Because the allocation of the catch among gear types has changed in some fisheries (e.g., the proportion of the catch harvested by the sport fishery has increased in all AABM fisheries), the indices may not represent the harvest impact of all gear types.

Ratio of Means

Fishery indices are computed in adult equivalents (AEQs) for both reported catch and total mortality (reported catch plus IM). The total mortality AEQ exploitation rate is estimated as (see Appendix I1 for a description of notation):

$$ER_{s,a,f,CY} = \frac{\text{TotMorts}_{s,a,f,CY} * AEQ_{s,BY=CY-a,a,f}}{\text{Cohort}_{s,BY=CY-a,a} * (1 - NM_a)} \quad \text{Equation D.1}$$

whereas the reported catch AEQ exploitation rate is estimated as

$$ER_{s,a,f,CY} = \frac{\text{Re}p\text{Morts}_{s,a,f,CY} * AEQ_{s,BY=CY-a,a,f}}{\text{Cohort}_{s,BY=CY-a,a} * (1 - NM_a)} \quad \text{Equation D.2}$$

and a ratio of means (ROM) estimator is used to calculate the FI

$$FI_{f,CY} = \frac{\sum_{s \in \{S\}} \sum_{a \in \{A\}} ER_{s,a,f,CY}}{\left(\frac{\sum_{BPYR=79}^{82} \sum_{s \in \{S\}} \sum_{a \in \{A\}} ER_{s,a,f,BPYR}}{4} \right)} \quad \text{Equation D.3}$$

The ROM estimator of the fishery index limits inclusion of stocks to those with adequate tagging during the base period, but fishing patterns for some fisheries have changed substantially since the base period and some stocks included in the index are no longer tagged (e.g., University of Washington Accelerated). One example of a recent change in the fishing pattern is the SEAK troll fishery, where the catch during the winter season has increased, the spring fishery has been largely curtailed, and the summer season has become markedly shorter. Because stock distributions are dynamic throughout the year, stock-specific impacts of the SEAK fishery have likely changed over time.

Stratified Proportional Fishery Index

To account for changes in stock composition and to include stocks without base period data, the CTC created alternative fishery indices (CTC 1996⁵). The CTC determined that a useful FI should have the following characteristics:

1. The index should measure changes in fishery harvest rates if the distribution of stocks is unchanged from the base period.
2. The index should have an expected value of 1.0 for random variation around the base period fishery harvest rate, cohort size, and stock distributions.
3. The index should weight changes in stock distribution by abundance.

After exploring several alternatives, the CTC concluded that the best estimate for a fishery index consisted of the product of a fishery harvest rate index and an index of stock abundance weighted by average distribution (i.e., the proportion of a cohort vulnerable to the fishery). To that effect, a report by the CTC (2009⁶) stated that for all AABM fisheries, the stratified proportional fishery index (SPFI) was the most accurate and precise index for estimating the harvest rate occurring in a fishery. However, the SPFI was never fully implemented for the NBC and WCVI Troll fisheries for reasons described in CTC 2021a

For computation of the SPFI, the CWT harvest rate ($h_{t,CY}$) must initially be set to an arbitrary value between 0 and 1. Then, the distribution parameter ($d_{t,s,a}$) is calculated (Equation D.4), and the result is substituted into Equation D.5 to recursively recalculate $h_{t,CY}$ and subsequently $d_{t,s,a}$. The largest stock-age distribution parameter in a stratum is then set to 1 to create a unique solution. See Appendix I2 for a description of notation.

$$d_{t,s,a} = \sum_{CY} r_{t,CY,s,a} / \sum_{CY} (h_{t,CY} * n_{CY,s,a})$$

Equation D.4

⁵ CTC. 1996. 1994 annual report. Pacific Salmon Commission Joint Chinook Technical Committee Report TCCHINOOK (96)-1. Vancouver, BC.

⁶ CTC. 2009. Special report of Chinook Technical Committee HRI Workgroup on the Evaluation of Harvest rate indices for use in Monitoring Harvest Rate Changes in Chinook AABM Fisheries Pacific Salmon Commission Joint Chinook Technical Committee Report TCCHINOOK (09)-02. Vancouver, BC.

$$h_{t,CY} = \sum_s \sum_a r_{t,CY,s,a} / \sum_s \sum_a (d_{t,s,a} * n_{CY,s,a})$$

Equation D.5

The resulting unique solution is inserted into the following equations to compute the yearly harvest rates for each stratum (Equation D.8) and the overall fishery (Equation D.9).

$$H_{t,CY} = \left[\left(\frac{\sum_s \sum_a c_{t,CY,s,a}}{\sum_s \sum_a r_{t,CY,s,a}} \right) * (C_{t,CY} - A_{t,CY}) \right] / [(C_{t,CY} - A_{t,CY}) / h_{t,CY}]$$

Equation D.6

$$H_{.CY} = \sum_t \left[\left(\frac{\sum_s \sum_a c_{t,CY,s,a}}{\sum_s \sum_a r_{t,CY,s,a}} \right) * (C_{t,CY} - A_{t,CY}) \right] / \sum_t [(C_{t,CY} - A_{t,CY}) / h_{t,CY}]$$

Equation D.7

$$S_{t,CY} = H_{t,CY} / \sum_{CY=1979}^{1982} H_{t,CY}$$

Equation D.8

$$S_{.CY} = H_{.CY} / \sum_{CY=1979}^{1982} H_{.CY}$$

Equation D.9

LIST OF APPENDIX D TABLES

Appendix D1– Alaska troll Stratified Proportion Fishery Index (SPFI) values as landed catch, based on CWT data.....	174
Appendix D2– Alaska troll Stratified Proportion Fishery Index (SPFI) values as total mortality, based on CWT data.....	175
Appendix D3– List of stock acronyms used in landed catch and total mortality exploitation rate tables.....	176
Appendix D4– Landed catch exploitation rate indices by stock and age in the Northern British Columbia troll fishery, based on coded-wire tag (CWT) data.....	177
Appendix D5– Total mortality exploitation rate indices by stock and age in the Northern British Columbia troll fishery, based on coded-wire tag (CWT) data.....	178
Appendix D6– Landed Catch exploitation rate indices by stock and age in the West Coast Vancouver Island (WCVI) troll fishery, based on coded-wire tag (CWT) data.....	179
Appendix D7– Total mortality exploitation rate indices by stock and age in the West Coast Vancouver Island (WCVI) troll fishery, based on coded-wire tag (CWT) data.....	180

Appendix D1—Alaska troll Stratified Proportion Fishery Index (SPFI) values as landed catch, based on CWT data.

YEAR	SPFI	WIN/SPR	JUNE OUT	JUNE IN	JULY OUT	JULY IN	FALL	ER Stock Identifiers	Age 4	Age 5
1979	0.82	1.26	1.07	0.63	0.73	0.38	0.73	Atnarko		
1980	1.27	0.63	0.95	1.43	1.58	1.81	1.58	Elk	Age 4	Age 5
1981	1.11	1.15	1.12	0.93	1.04	0.90	1.04	Kitsumkalum	Age 5	
1982	0.80	0.96	0.87	1.01	0.64	0.91	0.64	Northern SEAK	Age 5	Age 6
1983	0.99	1.09	0.61	0.71	1.25	1.05	1.25	Queets	Age 4	Age 5
1984	0.63	0.41	0.94	1.02	0.51	0.26	0.51	Quinsam	Age 4	Age 5
1985	0.68	0.46	0.57	0.81	0.82	0.73	0.82	Robertson Creek	Age 3	Age 4
1986	0.44	0.47	0.15	0.40	1.34	0.61	1.34	Lower Shuswap	Age 3	Age 4
1987	0.44	0.66	0.17	0.51	0.61	1.24	0.61	Salmon River Hatchery	Age 3	Age 4
1988	0.35	1.36	0.00	0.13	0.65	1.22	0.65	Southern SEAK	Age 4	Age 5
1989	0.48	0.86	0.18	0.41	0.51	0.50	0.51	Skagit Summer Fall	Age 4	Age 4
1990	0.68	0.63	0.11	0.83	1.16	1.10	1.16	Columbia River Summers	Age 4	Age 5
1991	0.61	1.38	0.21	0.90	0.82	0.57	0.82	Columbia Upriver Brights	Age 4	Age 5
1992	0.40	1.15	0.06	0.48	0.41	0.22	0.41	Willamette Spring Hatchery	Age 4	Age 5
1993	0.45	0.81	0.02	0.27	0.87	0.27	0.87			
1994	0.39	0.72	0.03	0.11	0.65	0.16	0.65			
1995	0.38	0.45	0.04	0.28	0.78	0.84	0.78			
1996	0.35	0.52	0.07	0.49	0.57	0.41	0.57			
1997	0.76	0.60	0.13	0.52	1.46	0.09	1.46			
1998	0.45	0.79	0.05	0.18	0.99	0.45	0.99			
1999	0.56	0.90	0.10	0.24	0.97	0.10	0.97			
2000	0.70	1.11	0.09	0.10	1.47	0.06	1.47			
2001	0.42	0.65	0.07	0.14	0.84	0.11	0.84			
2002	0.54	0.83	0.06	0.13	1.42	0.17	1.42			
2003	0.50	1.26	0.07	0.14	0.93	0.31	0.93			
2004	0.39	0.83	0.07	0.15	0.94	0.30	0.94			
2005	0.46	0.79	0.11	0.20	1.15	0.48	1.15			
2006	0.63	1.34	0.11	0.61	1.25	0.13	1.25			
2007	0.64	1.16	0.13	0.79	1.25	0.23	1.25			
2008	0.36	0.80	0.07	0.68	0.77	0.09	0.77			
2009	0.54	0.83	0.14	0.32	1.03	0.16	1.03			
2010	0.39	1.18	0.05	0.27	0.82	0.08	0.82			
2011	0.36	1.08	0.05	0.27	0.90	0.21	0.90			
2012	0.68	1.56	0.09	0.21	1.38	0.11	1.38			
2013	0.38	0.74	0.11	0.54	0.57	0.13	0.57			
2014	0.55	1.33	0.09	0.48	1.00	0.13	1.00			
2015	0.49	1.25	0.10	1.21	0.70	0.46	0.70			
2016	0.60	2.02	0.11	0.60	1.14	0.15	1.14			
2017	0.36	1.26	0.10	0.31	0.46	0.34	0.46			
2018	0.30	0.51	0.04	0.01	0.80	0.31	0.80			

Appendix D2—Alaska troll Stratified Proportion Fishery Index (SPFI) values as total mortality, based on CWT data.

YEAR	SPFI	WIN/SPR	JUNE OUT	JUNE IN	JULY OUT	JULY IN	FALL	ER Stock Identifiers				
1979	0.82	1.30	1.11	0.61	0.71	0.37	0.71	Atnarko	Age 4	Age 5		
1980	1.19	0.61	0.90	1.48	1.42	1.73	1.42	Elk	Age 4	Age 5		
1981	1.12	1.13	1.12	0.89	1.08	0.85	1.08	Kitsumkalum	Age 5			
1982	0.87	0.95	0.86	1.02	0.78	1.04	0.78	Northern SEAK	Age 5	Age 6		
1983	1.08	1.05	0.59	0.71	1.57	0.98	1.57	Queets	Age 4	Age 5		
1984	0.66	0.41	0.94	1.03	0.60	0.40	0.60	Quinsam	Age 4	Age 5		
1985	0.77	0.44	0.57	0.80	1.05	0.70	1.05	Robertson Creek	Age 3	Age 4	Age 5	
1986	0.48	0.45	0.15	0.40	1.53	0.64	1.53	Lower Shuswap	Age 3	Age 4		
1987	0.51	0.63	0.16	0.50	0.75	1.64	0.75	Salmon River Hatchery	Age 3	Age 4	Age 5	
1988	0.36	1.33	0.00	0.14	0.65	1.32	0.65	Southern SEAK	Age 4	Age 5	Age 5	Age 6
1989	0.53	0.81	0.18	0.39	0.56	0.58	0.56	Skagit Summer Fall	Age 4	Age 4		
1990	0.79	0.65	0.11	0.89	1.40	1.13	1.40	Columbia River Summers	Age 4	Age 5		
1991	0.64	1.31	0.20	0.87	0.85	0.70	0.85	Columbia Upriver Brights	Age 4	Age 5		
1992	0.46	1.10	0.06	0.48	0.56	0.23	0.56	Willamette Spring Hatchery	Age 4	Age 5		
1993	0.50	0.78	0.02	0.26	1.01	0.28	1.01					
1994	0.46	0.69	0.03	0.11	0.82	0.18	0.82					
1995	0.43	0.43	0.04	0.28	0.91	0.84	0.91					
1996	0.44	0.50	0.07	0.49	0.72	0.44	0.72					
1997	0.76	0.56	0.13	0.50	1.45	0.10	1.45					
1998	0.42	0.75	0.04	0.17	0.92	0.41	0.92					
1999	0.61	0.85	0.09	0.24	1.07	0.14	1.07					
2000	0.73	1.08	0.09	0.10	1.54	0.09	1.54					
2001	0.42	0.62	0.07	0.14	0.84	0.14	0.84					
2002	0.52	0.76	0.06	0.12	1.33	0.17	1.33					
2003	0.48	1.17	0.07	0.13	0.87	0.29	0.87					
2004	0.38	0.80	0.07	0.15	0.91	0.30	0.91					
2005	0.46	0.76	0.11	0.20	1.11	0.45	1.11					
2006	0.61	1.28	0.11	0.60	1.19	0.13	1.19					
2007	0.64	1.14	0.13	0.82	1.23	0.22	1.23					
2008	0.38	0.77	0.07	0.67	0.80	0.11	0.80					
2009	0.55	0.80	0.13	0.32	1.03	0.18	1.03					
2010	0.40	1.16	0.05	0.28	0.84	0.09	0.84					
2011	0.36	1.04	0.04	0.26	0.86	0.20	0.86					
2012	0.66	1.52	0.09	0.21	1.30	0.13	1.30					
2013	0.41	0.70	0.11	0.53	0.59	0.23	0.59					
2014	0.53	1.27	0.08	0.48	0.94	0.13	0.94					
2015	0.48	1.20	0.09	1.20	0.67	0.49	0.67					
2016	0.58	1.88	0.10	0.60	1.06	0.14	1.06					
2017	0.37	1.19	0.09	0.31	0.48	0.40	0.48					
2018	0.31	0.48	0.04	0.01	0.81	0.29	0.81					

Appendix D3—List of stock acronyms used in landed catch and total mortality exploitation rate tables.

Acronym	Stock Name
CWF	Cowlitz Fall Tule
GAD	George Adams Fall Fingerling
LRH	Lower River Hatchery
LRW	Lewis River Wild
QUE	Queets Fall Fingerling
QUI	Quinsam Fall
RBT	Robertson Creek Hatchery
SAM	Samish Fall Fingerling
SHU	Lower Shuswap
SPR	Spring Creek National Fish Hatchery
SPS	South Puget Sound Fall Fingerling
SRH	Salmon River Hatchery
SSA	Southern Southeast Alaska
SUM	Columbia River Summers
URB	Columbia Upriver Brights
WSH	Willamette Spring

Appendix D4—Landed catch exploitation rate indices by stock and age in the Northern British Columbia troll fishery, based on coded-wire tag (CWT) data.

Year	QUE Age 5	QUI Age 3	QUI Age 4	RBT Age 3	RBT Age 4	RBT Age 5	SHU Age 4	SRH Age 3	SRH Age 4	SRH Age 5	SSA	URB Age 4	URB Age 5	WSH Age 4	Fishery Index
1979	0.55	0.87	1.15	0.83	0.48		1.17					1.10		0.65	0.83
1980	0.79	0.98	1.05	0.85	0.77			0.93				1.02	1.14	1.18	0.94
1981	1.78	1.44	0.85	1.04	1.75			1.28		1.00		1.27	1.50	1.53	1.28
1982	0.88	0.71	0.95	1.28		1.00	0.55	1.07			1.00	0.61	0.36	0.64	0.86
1983	1.23	1.50	0.99	0.73	0.75	0.76	0.56	1.21	0.23	2.84	1.23		1.27	0.80	
1984	0.25	0.50	0.39	1.37	1.67			1.45	1.55	1.37	1.99		0.51	1.29	
1985	0.25	0.59	0.93	1.87	1.72		0.41		1.50	0.88	1.59	1.49	0.22	1.28	
1986	0.95	0.84		0.93			0.12	1.23		0.88	1.14	1.74		1.00	
1987	0.35	0.62	0.45			0.20	0.85	1.03	0.63	1.61	1.80			0.93	
1988	0.18	0.69	0.30	0.62		0.66		0.66	0.56	2.21	0.99	2.07	0.80	0.73	
1989	0.44	0.44	0.37	0.88	1.05	0.58	0.13	0.58	1.07	1.01	0.94	3.69	0.37	0.93	
1990	0.35	0.95	0.28	0.71	0.55	1.46	0.18	0.52	1.28	2.05	1.14	2.08	0.31	0.95	
1991	0.42	0.66	0.35	0.71	1.10	1.50	0.14	0.84	1.06	0.77			0.28	0.88	
1992		1.89	0.27	0.57	0.63	1.36	0.13	0.54	0.51	0.12			0.10	0.71	
1993			0.14	0.62	0.83	1.24	0.13	1.27	1.23	0.35	1.07		0.21	0.91	
1994			0.30	0.72	0.86	1.43	0.21	1.12	1.01	0.06	0.86	1.81	0.12	0.95	
1995				0.42	0.20	0.96	0.12	0.00	0.38	0.00		0.50	0.16	0.40	
1996			0.00			0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	
1997	0.39	0.26	0.21	0.32		0.73	0.18	0.22	0.17		0.50		0.13	0.32	
1998	0.00	0.00		0.51		0.47	0.07	0.97	0.61	0.00		1.09	0.00	0.50	
1999	0.16	0.18		0.36	0.56	0.09	0.10	0.42	0.24	0.00	1.09		0.00	0.32	
2000	0.00	0.06				0.00	0.05	0.57	0.21	0.00	0.00	0.00	0.02	0.13	
2001	0.00	0.01	0.00			0.00	0.05	0.36	0.48	0.00	0.00		0.03	0.18	
2002		0.13	0.00	0.44		1.26	0.19	0.63	0.67	0.49	0.18		0.36	0.56	
2003	0.00	0.00	0.04	0.05	0.00	0.78	0.05	0.66	0.24	0.00	0.70	0.95	0.09	0.31	
2004	0.00	0.06	0.09	0.20	0.44	0.80	0.09	0.54	0.45	1.02	0.67	1.19	0.31	0.45	
2005	0.07	0.04	0.03	0.33	0.11	0.95	0.11	0.95	0.52	0.18	1.33	0.91	0.14	0.50	
2006	0.08	0.07	0.09	0.26	0.27	1.18		1.00	0.72	0.40	1.20	1.23	0.07	0.64	
2007		0.43		0.46	0.43		0.00	1.17	0.64	0.09	1.07		0.00	0.57	
2008			0.08	0.64	0.19	0.53	0.07	0.71		0.10			0.06	0.38	
2009		0.11	0.19	0.21		0.66	0.01	1.36	0.93	0.93	1.77		0.05	0.68	
2010	0.00		0.13	0.09		0.81	0.21	1.10	0.42	0.22			0.19	0.44	
2011	0.00	0.00	0.00	0.32		0.69	0.06	0.91	0.54	0.00	0.56		0.17	0.42	
2012		0.09	0.08	0.21	0.36	0.96	0.04	1.40	0.70	0.26	1.46	2.48	0.10	0.73	
2013		0.12	0.01	0.19	0.14	0.67	0.02	0.92	0.74	0.32	0.83		0.14	0.45	
2014	0.00	0.00		0.24		0.62	0.08	0.72	0.28	0.44	0.95	1.53	0.24	0.46	
2015	0.00	0.00	0.03		0.00	0.36	0.04	0.62	0.43	0.18	0.39	0.92	0.24	0.31	
2016	0.00	0.04	0.09	0.17		0.99	0.06	2.06	0.91	0.58	1.58	1.91	0.41	0.83	
2017	0.10	0.11	0.10	0.21	0.15	0.70	0.00	1.96	1.09		1.25	1.74	0.18	0.71	
2018	0.08	0.28	0.21	0.50	0.37	0.40		4.04	1.58		1.33	2.46	0.24	1.12	

Appendix D5—Total mortality exploitation rate indices by stock and age in the Northern British Columbia troll fishery, based on coded-wire tag (CWT) data.

Year	QUE Age 5	QUI Age 3	QUI Age 4	RBT Age 3	RBT Age 4	RBT Age 5	SHU Age 4	SRH Age 3	SRH Age 4	SRH Age 5	SSA Age 4	URB Age 4	URB Age 5	WSH Age 4	Fishery Index					
1979		0.56	0.85	1.16	0.83	0.48		1.17				1.10		0.63	0.83					
1980		0.79	0.98	1.02	0.85	0.77			0.94			1.03	1.14	1.14	0.94					
1981		1.75	1.45	0.85	1.04	1.76		1.27		1.00		1.27	1.51	1.52	1.28					
1982		0.89	0.72	0.96	1.28		1.00	0.56	1.06		1.00	0.60	0.35	0.70	0.86					
1983		1.21	1.50	0.98	0.73	0.76	0.74	0.62	1.21	0.23	2.87	1.23		1.25	0.80					
1984		0.27	0.51	0.49	1.37	1.68			1.45	1.54	1.39	1.98		0.50	1.28					
1985		0.26	0.60	1.07	1.86	1.74		0.49		1.50	0.92	1.58	1.46	0.21	1.28					
1986		0.92	0.85		0.93			0.17	1.23		0.89	1.15	1.71		0.99					
1987		0.48	0.66	0.49				0.32	0.86	1.05	0.71	1.66	1.82		0.96					
1988		0.29	0.72	0.35	0.64		0.68		0.69	0.57	2.45	1.04	2.09	0.91	0.76					
1989		0.50	0.47	0.44	0.89	1.06	0.59	0.28	0.62	1.08	1.07	1.01	3.69	0.39	0.95					
1990		0.52	1.00	0.38	0.74	0.56	1.52	0.34	0.56	1.33	2.52	1.21	2.13	0.34	1.00					
1991		0.57	0.68	0.47	0.73	1.12	1.54	0.33	0.88	1.07	0.89			0.31	0.92					
1992			1.95	0.41	0.60	0.66	1.38	0.20	0.57	0.53	0.23			0.12	0.74					
1993				0.32	0.65	0.86	1.28	0.30	1.31	1.25	0.32	1.12		0.23	0.94					
1994					0.52	0.75	0.88	1.47	0.40	1.15	1.02	0.15	0.89	1.86	0.14	0.98				
1995						0.44	0.22	1.01	0.22	0.03	0.41	0.09		0.53	0.21	0.43				
1996						0.07		0.02	0.04	0.02	0.03	0.14	0.06		0.06	0.03				
1997		0.37	0.25	0.26	0.32			0.74	0.21	0.23	0.17		0.50		0.14	0.33				
1998		0.00	0.00		0.51			0.47	0.20	0.97	0.61	0.00		1.07	0.00	0.50				
1999		0.18	0.18		0.36	0.56	0.08	0.13	0.41	0.24	0.00	1.10		0.00	0.32					
2000		0.00	0.06				0.00	0.07	0.57	0.20	0.00	0.00	0.00		0.02	0.13				
2001		0.00	0.01	0.00			0.00	0.07	0.36	0.49	0.05	0.00			0.03	0.19				
2002				0.13	0.03	0.45		1.29	0.24	0.64	0.68	0.60	0.18		0.40	0.57				
2003				0.00	0.00	0.04	0.05	0.00	0.80	0.11	0.67	0.25	0.09	0.72	0.96	0.10	0.32			
2004				0.00	0.06	0.13	0.21	0.46	0.83	0.17	0.57	0.47	1.09	0.68	1.24	0.33	0.47			
2005				0.06	0.04	0.06	0.34	0.11	0.98	0.25	0.99	0.53	0.25	1.38	0.96	0.15	0.52			
2006				0.07	0.06	0.13	0.26	0.26	1.20		1.01	0.72	0.51	1.22	1.23	0.09	0.64			
2007					0.43	0.47	0.43		0.04	1.19	0.64	0.11	1.04		0.00	0.56				
2008						0.13	0.66	0.19	0.52	0.13	0.72		0.10		0.07	0.39				
2009					0.11	0.20	0.21		0.67	0.12	1.37	0.94	0.98	1.78		0.04	0.68			
2010					0.00	0.16	0.09		0.82	0.26	1.11	0.42	0.24			0.20	0.44			
2011					0.00	0.00	0.07	0.35		0.75	0.10	0.98	0.58	0.05	0.61		0.20	0.45		
2012						0.09	0.13	0.21	0.38	0.96	0.09	1.41	0.71	0.34	1.43	2.47	0.11	0.72		
2013						0.12	0.03	0.18	0.13	0.74	0.09	1.00	0.81	0.36	0.90		0.14	0.49		
2014						0.00	0.00	0.25		0.63	0.13	0.73	0.28	0.48	0.96	1.52	0.23	0.46		
2015						0.00	0.00	0.03		0.00	0.37	0.10	0.63	0.44	0.17	0.40	0.93	0.26	0.31	
2016						0.00	0.04	0.11	0.17		1.00	0.31	2.09	0.92	0.59	1.62	1.91	0.40	0.84	
2017						0.11	0.11	0.11	0.21	0.16	0.72	0.33	2.02	1.12		1.29	1.76	0.18	0.74	
2018						0.10	0.28	0.24	0.51	0.36	0.40		4.06	1.59		1.35	2.45	0.28	1.12	

Appendix D6—Landed Catch exploitation rate indices by stock and age in the West Coast Vancouver Island (WCVI) troll fishery, based on coded-wire tag (CWT) data.

Year	CWF Age 4	GAD Age 3	GAD Age 4	LRH Age 3	LRH Age 4	LRW Age 4	RBT Age 3	RBT Age 4	RBT Age 5	SAM Age 3	SAM Age 4	SAM Age 5	SPR Age 3	SPR Age 4	SPS Age 3	SPS Age 4	SRH Age 3	SRH Age 4	SRH Age 5	SUM Age 4	URB Age 3	URB Age 4	WSH Age 4	Fishery Index		
1979				1.16			1.17	1.26			1.00	1.00	0.97	0.84			1.13	1.57			1.12	1.63	1.03	1.06		
1980				0.55	0.90		1.41	1.43					1.17	1.39						0.67	1.10	0.99	1.11	1.02		
1981	0.79	0.73	1.00	1.14	0.79	0.85	0.67	0.58	1.00				0.94	0.63	0.72					1.00	1.33		0.99	0.63	0.87	
1982	1.21	1.27	1.00	1.15	1.31	1.16	0.75	0.73		1.00			0.93	1.14	1.29	0.87					0.78	0.39	1.23	1.05		
1983	1.36		1.41	1.64	1.68	0.96	0.42	0.84	1.83			0.96		1.44	0.93	1.64	0.89	1.51				0.28	0.43	0.28	1.20	
1984	1.29	2.08		2.11	2.89		1.31	1.11	1.04				1.08	1.32	1.38	1.60	0.96					0.62	1.22	0.72	1.47	
1985	0.89		0.84	1.20	1.13		0.49	0.00						0.53	0.96	0.81	0.65					0.60	0.95	0.44	0.83	
1986	1.27			1.24	1.22	0.47		1.11						1.19	1.00	0.89	1.07					1.05	1.29		1.08	
1987	0.85			0.92		1.45	0.27							0.45		0.75	0.51	0.26				0.72	0.73		0.69	
1988	0.84	0.44		1.11	1.37	1.05	0.44	0.57		0.60				0.98		0.30	0.68				1.25	0.06	1.76	0.88	0.92	
1989	0.52	0.26	0.49	0.28	0.56	0.56	0.22	0.34	0.00	0.21	0.60			0.58	0.39	0.34	0.38	0.34			0.77	0.81	0.82	0.55	0.48	
1990	0.71	1.11	0.94	1.13	0.42	1.21	0.67	0.51	1.49	0.41	0.87			0.86	0.71	0.73	0.80	0.72	0.43		1.67		1.49	0.85	0.87	
1991			0.93	0.80		0.74	0.59	0.53	1.36	0.25	0.56	1.10		0.55	0.53	0.42	0.51	0.94	0.36	2.32	0.52		0.08	0.70		
1992	1.14		0.45	0.65		0.32	1.54	2.41	5.08	1.05	0.26			0.43	0.74	0.74	0.72	1.34	2.63	3.90	0.96			0.17	0.88	
1993				1.08	0.68		0.22	0.60	0.66	1.28	0.09	0.70		0.53	0.99	1.04	0.51	1.21	1.23			0.45	1.83	0.45	0.85	
1994	0.12					0.43		0.45	0.28	0.16	0.39			0.36	0.35	0.27	0.25	0.04					0.88	0.26	0.57	
1995		0.22																					0.12	0.32		
1996	0.00	0.00	0.00	0.00			0.00				0.00	0.00		0.00							0.00	0.00	0.00	0.00		
1997	0.38		0.21	0.74			0.00	0.04			0.02	0.24		0.47	0.40	0.04	0.29	0.00	0.03	0.00	0.07		0.07	0.00	0.29	
1998								0.00			0.08			0.04	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.01			0.03	
1999		0.05		0.09					0.00		0.07			0.02		0.02	0.05	0.00	0.00	0.00	0.03			0.00	0.04	
2000			1.22	0.09	1.73						1.10			0.05	0.76	0.03	0.71	0.00	0.00	0.28	0.24	0.08	0.47	0.12	0.69	
2001		0.79	1.24	0.30	0.90	0.72	0.00			0.42	0.38			0.15	0.60	0.49	0.55	0.00	0.05		0.54	0.09	0.16	0.30	0.55	
2002	0.56	0.17	0.63	0.29	0.39		0.02	0.00		0.26	0.40			0.28	0.68	0.41	0.49	0.00	0.00	0.15	0.58	0.06	0.24	0.56	0.42	
2003	0.53	0.12	0.73	0.27	0.76	0.12	0.00	0.00		0.59				0.29	0.58	0.35	0.55	0.00	0.00	0.00	0.69	0.12	0.09	1.00	0.47	
2004		0.08	1.19	0.38	1.04	0.12	0.03	0.02	0.00	0.18	0.57			0.35	0.81	0.36	0.83	0.19	0.26	0.62	0.34	0.11	0.45	3.64	0.62	
2005	0.30	0.76	0.98	0.73	1.70	0.12	0.00	0.00		0.12	0.79			0.88	1.19	0.68	0.80	0.16	0.23	0.81	0.59	0.09	0.41		0.78	
2006		0.28	0.92			0.46	0.00	0.00	0.00	0.39	0.77			0.57	1.40	0.52	0.73		0.28	0.35	0.46		0.63		0.70	
2007		1.02	0.80	0.69				0.02		1.28	0.57			0.62	0.93	1.00	0.70	0.00	0.12	0.55			0.12	0.69		
2008		0.47	0.38	0.41			0.00		0.00	0.72	0.34			0.21		0.50	0.32	0.24		0.00	0.27	0.22		0.22	0.32	
2009	0.00	0.64	0.52	0.19	0.22			0.00		0.66	0.16			0.16	0.06	0.57	0.19	0.04	0.04	0.10	0.42		0.11	0.15	0.22	
2010	0.11	0.98	0.45	0.34			0.04	0.26		0.98	0.13			0.24	0.36	0.48	0.12	0.00	0.00	0.34	0.10		0.31	0.28		
2011	0.07	0.43	0.22	0.41	0.75		0.00	0.00		0.00	0.42			0.25	0.59	0.05	0.21	0.12	0.56	0.43	0.22	0.00	0.33	0.60	0.33	
2012	0.20	0.31	0.25	0.16	0.00		0.00	0.00	0.17	0.34	0.05			0.11	0.45	0.36	0.18	0.04	0.42	0.69	0.28	0.08	0.31	1.40	0.21	
2013	0.06	0.20	0.24	0.18	0.14		0.00			0.14	0.09			0.15	0.14	0.03	0.20	0.04	0.07	0.00	0.19		0.04	0.25	0.37	0.15
2014	0.13	0.18	0.28	0.26		0.20		0.18		0.69	0.26			0.12	0.30	0.47	0.26	0.14	0.25	0.53	0.48	0.05	0.42	1.61	0.28	
2015		0.08	0.09	0.21	0.33		0.01	0.18		0.15				0.09	0.22	0.23	0.12	0.09	0.14	0.36	0.07	0.03	0.09	0.22	0.16	
2016	0.18	0.21	0.38	0.22	1.13		0.01	0.18		0.15	0.81		0.07		0.13	0.61	0.10	0.28	0.02	0.25	0.54	0.45	0.12	0.38	1.58	0.37
2017	0.25	0.46	0.18	0.49			0.12	0.13		0.15				0.32		0.42	0.22	0.00	0.18	0.29	0.44	0.23	0.23	0.23	1.50	0.32
2018	0.00	0.34	0.09	0.27			0.14	0.27		0.43	0.05			0.13		0.22	0.14		0.42	0.74	0.23	0.02	0.24	0.61	0.17	

Appendix D7– Total mortality exploitation rate indices by stock and age in the West Coast Vancouver Island (WCVI) troll fishery, based on coded-wire tag (CWT) data.

Year	CWF Age 4	GAD Age 3	GAD Age 4	LRH Age 3	LRH Age 4	LRW Age 4	RBT Age 3	RBT Age 4	RBT Age 5	SAM Age 3	SAM Age 4	SAM Age 5	SPR Age 3	SPR Age 4	SPS Age 3	SPS Age 4	SRH Age 3	SRH Age 4	SRH Age 5	SUM Age 4	URB Age 3	URB Age 4	WSH Age 4	Fishery Index
1979				1.15			1.20	1.25		1.00	1.00	0.95	0.84		1.13	1.54				1.11	1.64	1.00	1.05	
1980				0.56	0.88		1.38	1.42				1.16	1.39				1.11	0.67	1.10	1.00	1.09	1.01		
1981	0.79	0.72	1.00	1.13	0.78	0.85	0.66	0.60	1.00			0.92	0.63	0.73		0.46	1.00	1.33		0.98	0.64	0.86		
1982	1.21	1.28		1.17	1.34	1.15	0.75	0.72		1.00		0.96		0.97	1.14	1.27	0.87	0.89		0.79	0.38	1.27	1.06	
1983	1.37		1.40	1.63	1.70	0.96	0.45	0.84	1.87			1.08	1.39	0.92	1.58	0.89	1.40			0.27	0.41	0.30	1.20	
1984	1.31	1.89		2.07	2.94		1.31	1.11	1.08			0.96		1.25	1.33	1.57	0.96			0.64	1.20	0.72	1.46	
1985	0.91		0.84	1.23	1.17		0.48	0.00					0.56	0.93	0.82	0.66				0.61	0.96	0.47	0.84	
1986	1.29			1.16	1.20	0.47		1.11					1.19	0.99	0.92	1.06	0.19			1.06	1.30		1.07	
1987	0.89			1.23		1.49	0.29						0.46	0.94	0.53	0.37	0.26			0.87	0.79		0.77	
1988	0.92	0.53		1.36	1.53	1.11	0.49	0.59		0.75			1.00	0.41	0.72		0.68	1.30	0.41	1.89	0.96	1.01		
1989	0.55	0.40	0.50	0.33	0.62	0.58	0.24	0.34	0.00	0.38	0.61		0.63	0.40	0.42	0.39	0.41	0.77	0.83		0.88	0.57	0.51	
1990	0.76	1.17	0.95	1.18	0.48	1.24	0.71	0.53	1.55	0.51	0.88		0.89	0.73	0.98	0.84	0.81	0.46	1.69		1.55	0.91	0.91	
1991				0.98	0.76		0.77	0.66	0.55	1.41	0.45	0.58	1.10	0.58	0.55	0.56	0.53	1.05	0.39	2.39	0.53		0.09	
1992	1.16		0.47	0.77		0.34	1.89	2.51	5.25	1.02	0.27		0.51	0.76	0.80	0.73	1.52	2.67	3.99	0.96		0.25	0.92	
1993				1.23	0.77		1.44	2.36	2.52	1.23	0.44		0.61	1.02	1.17	0.53	1.53	1.29		0.69	1.89	0.47	0.93	
1994	0.11					0.24	0.73	0.70	1.33	0.27	0.71		0.87	0.66	0.26	0.46	0.41	2.20			0.92	0.27	0.60	
1995		0.32				0.48		0.49	0.31	0.27	0.42		0.44	0.40	0.35	0.28	0.10	0.31			0.15	0.37		
1996	0.03	0.07	0.03	0.06			0.04			0.07	0.02		0.04		0.07	0.02	0.07	0.02	0.03	0.07	0.06	0.03	0.04	
1997	0.38		0.21	0.89			0.01	0.04		0.09	0.25		0.56	0.44	0.15	0.31	0.01	0.03	0.00	0.07	0.07	0.00	0.33	
1998							0.01	0.00			0.08		0.04	0.00	0.00	0.03	0.00	0.00	0.00	0.01		0.03		
1999		0.04		0.08					0.00			0.07		0.01		0.02	0.05	0.00	0.00	0.00	0.00	0.04		
2000				1.22	0.08	1.75					1.07		0.05	0.74	0.03	0.71	0.00	0.00	0.28	0.24	0.08	0.46	0.11	
2001		0.66	1.28	0.28	0.89	0.70	0.00			0.37	0.37		0.14	0.58	0.44	0.55	0.00	0.05		0.53	0.08	0.15	0.27	
2002	0.55	0.14	0.62	0.27	0.38		0.01	0.00		0.22	0.39		0.26	0.67	0.37	0.48	0.00	0.00	0.15	0.58	0.06	0.25	0.51	
2003	0.54	0.10	0.72	0.25	0.76	0.12	0.00	0.00			0.57		0.26	0.57	0.32	0.55	0.00	0.00	0.00	0.68	0.11	0.09	0.91	
2004	0.07	1.19	0.35	1.04	0.12	0.03	0.02	0.00		0.16	0.56		0.32	0.79	0.31	0.82	0.17	0.26	0.62	0.33	0.10	0.44	3.32	
2005	0.29	0.64	0.97	0.66	1.70	0.12	0.00	0.00		0.10	0.78		0.83	1.17	0.60	0.79	0.14	0.23	0.82	0.58	0.08	0.41	0.76	
2006		0.24	0.91			0.44	0.00	0.00		0.35	0.75		0.53	1.40	0.47	0.72		0.28	0.35	0.45		0.61	0.68	
2007		0.86	0.80	0.62				0.02		1.12	0.57		0.56	0.90	0.88	0.69	0.00	0.12	0.54		0.12	0.65		
2008		0.39	0.37	0.39			0.00			0.62	0.33		0.20	0.44	0.31	0.21	0.00	0.00	0.27	0.20		0.20	0.31	
2009	0.00	0.55	0.51	0.19	0.22			0.00		0.57	0.15		0.15	0.05	0.50	0.18	0.04	0.04	0.10	0.41	0.10	0.14	0.21	
2010	0.11	0.83	0.44	0.31			0.03	0.26		0.85	0.13		0.22	0.34	0.43	0.12	0.00	0.00	0.33	0.09		0.29	0.27	
2011	0.07	0.37	0.22	0.38	0.74		0.00	0.00		0.00	0.41		0.23	0.57	0.04	0.20	0.11	0.56	0.43	0.22	0.00	0.33	0.56	
2012	0.20	0.26	0.24	0.14	0.00		0.00	0.00	0.17	0.30	0.05		0.10	0.43	0.32	0.17	0.04	0.43	0.69	0.27	0.07	0.30	1.28	
2013	0.06	0.17	0.24	0.16	0.13		0.00			0.13	0.09		0.14	0.13	0.03	0.20	0.04	0.07	0.00	0.18	0.03	0.25	0.33	
2014	0.13	0.14	0.27	0.24		0.20		0.17		0.60	0.25		0.11	0.29	0.42	0.25	0.13	0.25	0.54	0.48	0.05	0.42	1.46	
2015	0.06	0.09	0.20	0.32		0.01				0.14			0.09	0.22	0.21	0.12	0.08	0.14	0.36	0.07	0.03	0.09	0.20	
2016	0.18	0.17	0.37	0.20	1.11		0.01	0.18		0.07			0.12	0.59	0.09	0.28	0.02	0.25	0.54	0.45	0.11	0.38	1.44	
2017	0.25	0.39	0.17	0.45			0.10	0.13	0.15	0.69	0.36	0.05		0.29		0.37	0.22	0.00	0.18	0.29	0.44	0.21	0.23	1.36
2018	0.00	0.28	0.09	0.26			0.13	0.26		0.36	0.05		0.13		0.19	0.14		0.41	0.74	0.23	0.01	0.24	0.56	

APPENDIX E: ISSUES WITH AND CHANGES TO THE EXPLOITATION RATE ANALYSIS

Appendix E1— Changes to programs

Coshak

The AWG noted in HRJ file output sporadic instances where nominal catch or total mortality was non-zero, but the AEQ adjusted estimate of either of these quantities was zero. It was investigated and it was determined it was a logical flaw in the CalcCohort subroutine. This flaw was corrected and documented in the code.

Appendix E2— CWT codes with zero recoveries

Due to inconsistencies in the past, the AWG decided there needed to be a consistent approach to including or excluding CWT codes with zero recoveries. These tag codes will only affect the release to age-2 survival estimates reported in the Calibration & Exploitation Rate Analysis report. Inclusion or exclusion of these tag codes won't affect other derived metrics such as exploitation and maturity rates. The AWG decided that tag codes with zero recoveries should always be included in the ERA unless there is a compelling reason for exclusion. These compelling reasons might include cases of a scientific treatment study, disease, atypical release timing and atypical size and weight at release. However, excluding a tag code simply because there is an expectation that something must have been unusual about the release (without identifying it) because there were zero recoveries is not a compelling reason to exclude that tag code.

Appendix E3— California CWT Recoveries

California CWT fishery recoveries currently get mapped to the South of Falcon sport and troll fisheries. Some AWG members expressed a concern that these fishery recoveries may distort the CYER metric for ISBM fishery compliance. Ideally, separate ERA and Chinook Model fisheries would be created for these recoveries. However, this would require recalibration of the base period for all stocks caught in California fisheries and this was not considered a feasible option. A sensitivity analysis was conducted by removing California recoveries in CAS for Columbia River Summers (SUM) and Elk River Hatchery (ELK), which are two Attachment I indicator stocks with associated CYER limits. This procedure will result in underestimates of the true CWT cohort size, but more accurate estimates of CYER for the aggregate Southern US ISBM fishery. Note, since the CYER is based on the mortality distribution table it is insensitive to the estimated cohort size. In general, this sensitivity analysis concluded that the number of California fishery recoveries was so small (relative to all Southern US fishery recoveries), that inclusion of these recoveries does not affect the CYER metric at a magnitude that fishery managers are likely capable of achieving (i.e. Southern US CYER limits increased by a range of 0.00 to 0.02 in the years examined, 2009 – 2018).

Appendix E4— *Maturation rate average for incomplete broods*

As part of the Phase II model calibration work, the AWG investigated (May 2019) the optimal combination of EV and maturation rate forecasting techniques to use for incomplete broods in the Chinook Model. Consistent with these recommendations for the Chinook Model, the AWG also changed the default Coshak setting for averaging maturity rates for incomplete broods from 9 to 6 years. The six-year average was the best naïve model from the model selection exercise.

Appendix E5— *Changes to Application of IDL*

Salmon returning to the Columbia River have to swim through several dams en route to their natal hatchery or spawning ground. Upstream passage through dams and the effects that dams have on river flow and temperature can result in reduced survival (< 100%) of returning adult salmon. In order for the cohort analysis procedure to accurately reconstruct the terminal run size (and subsequent pre-terminal cohort sizes), an inter-dam loss estimate (IDL, calculated as a survival rate in the absence of terminal harvest) is produced and CWT recoveries in the escapement category get expanded by this estimate. In general terms, the terminal run size can be calculated as escapement/IDL + terminal harvest.

During the 2020 ERA it became apparent that, throughout the time series of recoveries, there were multiple sport and net recoveries upstream of the IDL calculation zone. For instance, the URB IDL is calculated from Bonneville to McNary Dam and there were multiple fishery recoveries in multiple years above McNary Dam. Coshak will only apply the IDL estimate to escapement recoveries. As is done for escapement recoveries, the sport and net recoveries upstream of the IDL calculation area need to be expanded for IDL. This was achieved by remapping sport and net recoveries upstream of MCD to escapement with specific fishery lookups in CAS.

The procedure described above results in more accurate estimates of pre-terminal cohort sizes and subsequent derived quantities such as exploitation and maturity rates. Conversely, the procedure results in an unrepresentative mortality distribution table and biased CYER metric (escapement will be biased high and terminal sport and net will be biased low).

Appendix E6— *Stock Specific Changes*

Lyon's Ferry Subyearling (LYF) and Yearling (LYY)

Typically, very few fish voluntarily swim into the Lyon's Ferry Hatchery tributary/channel. Most of the adults collected for brood stock are trapped in the adult ladder at Lower Granite Dam (a few miles upstream) and trucked back to the hatchery. The adult trap at Lower Granite Dam is not operated continuously throughout the day. Consequently, there is some size selectivity of trapped adults that are subsequently trucked to the hatchery. Additionally, adult fish also fall back over the dam spillway and re-ascend up the ladder. Expansion of CWT recoveries from the Lower Granite Dam

adult trap should (but currently do not) account for these complex attributes. Hence, these expanded recoveries are not represented on RMIS. An auxiliary file is created so that the estimated number of CWT recoveries of an individual tag code and age correspond with the Lower Granite run size (of an individual tag code and age), as reported by the Snake River Fall run reconstruction group.

The methodology described above was first implemented in the 2019 ERA. During the 2020 ERA it became apparent that RMIS includes CWT recoveries upstream of Lower Granite Dam. These recovery estimates are also included in the auxiliary file, which is used to estimate the run size at Lower Granite Dam. An additional auxiliary file was created to negate the CWT recoveries occurring upstream of Lower Granite Dam.

Appendix E7— Fishery Specific Changes

The fine scale fishery lookups were reviewed and updated.

APPENDIX F: BROOD YEAR EXPLOITATION RATE PLOTS

The brood year exploitation rate (BYER) metric provides a measure of the cumulative impact of fisheries upon all age classes of a stock and brood. The BYER is computed for each stock as the ratio of adult equivalent (AEQ) total fishing mortality to AEQ total fishing mortality plus escapement.

$$BYER_{BY,F} = \frac{\sum_{a=Minage}^{Maxage} \left(\sum_{f \in F} TotMorts_{BY,a,f} * AEQ_{BY,a,f} \right)}{\sum_{a=Minage}^{Maxage} \left(\sum_{f=1}^{Numfisheries} TotMorts_{BY,a,f} * AEQ_{BY,a,f} + Esc_{BY,a} \right)}$$
Equation F.1

All terms are defined in Table F1. The AEQ factor represents the proportion of fish of a given age that would, in the absence of fishing, leave the ocean to return to the terminal area.

The AEQ factor is calculated as

$$AEQ_{BY,a-1,f} = MatRte_{a-1,BY} + (1 - MatRte_{a-1,BY}) * Surv_a * AEQ_{BY,a,f}$$

$$AEQ_{BY,Maxage,f} \equiv 1.0$$
Equation F.2

The AEQ factor is equal to 1 for the oldest age of maturation and for all ages in terminal fisheries. The BYER can be partitioned into AEQ reported catch and AEQ IM. BYERs are not computed for incomplete BYs.

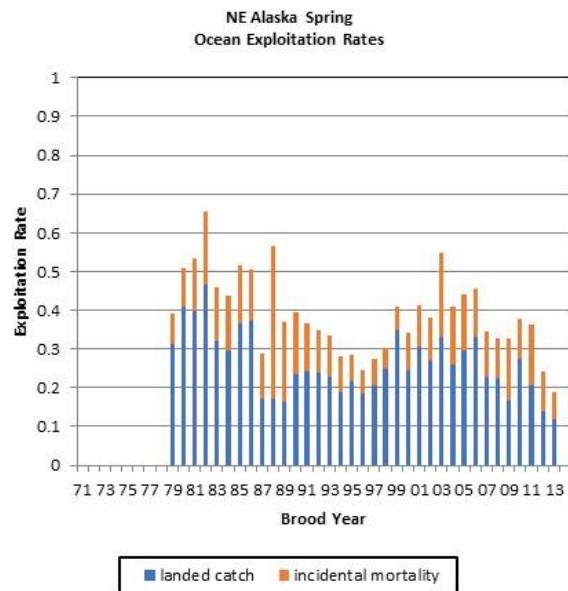
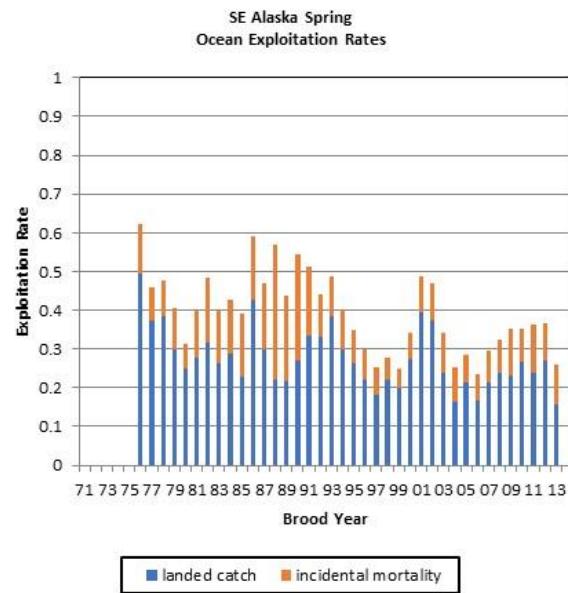
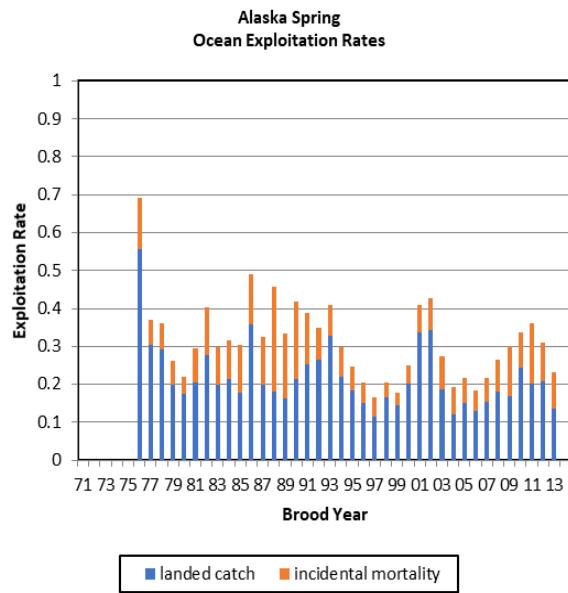
If a hatchery indicator stock is subject to directed terminal fisheries, its BYER will differ from the corresponding wild stock. In these circumstances, this issue is addressed by reporting the BYER in the ocean fisheries (i.e., excludes the terminal fishery impacts). The BYER statistic reported for each exploitation rate indicator stock is given in Table 2.2.

LIST OF APPENDIX F TABLES

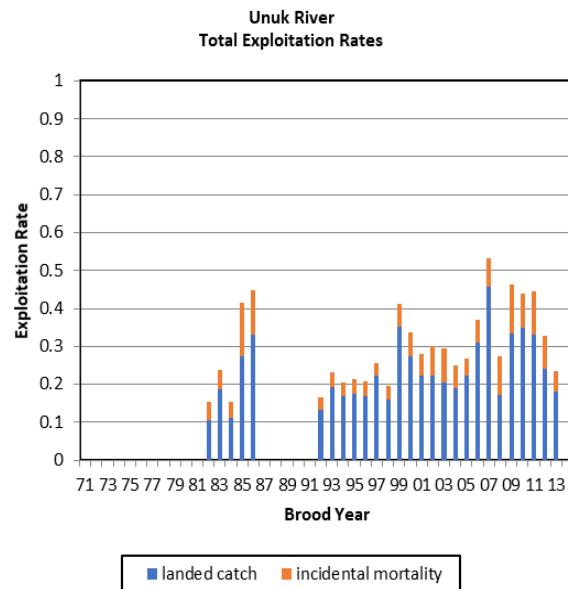
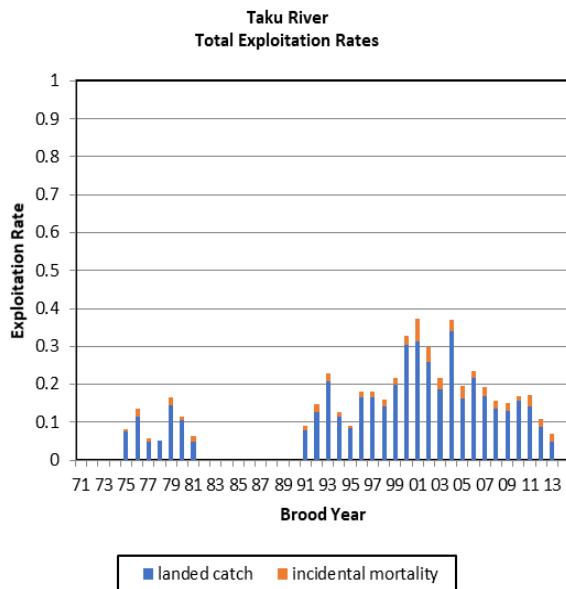
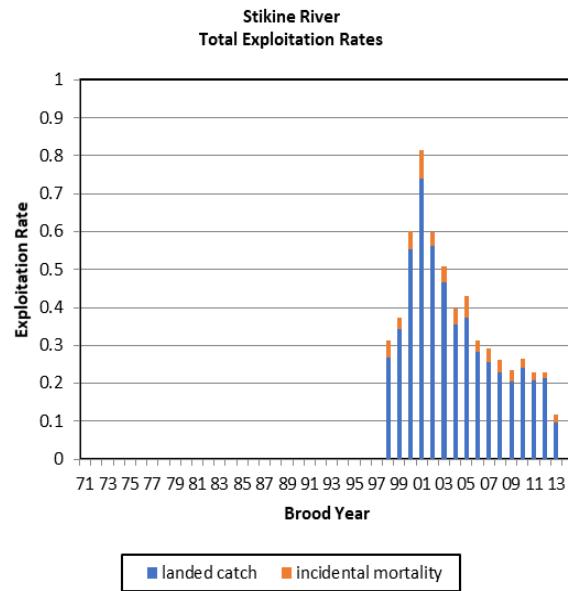
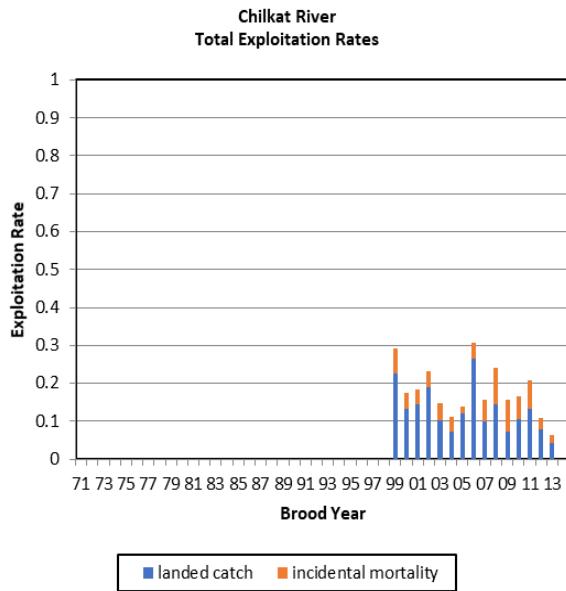
<i>Appendix F1— Brood year exploitation rates for Southeast Alaska (SEAK) hatchery indicator stocks. Catch and incidental mortality are shown. Only completed brood years are included.</i>	<i>188</i>
<i>Appendix F2— Brood year exploitation rate for Southeast Alaska (SEAK) and transboundary wild indicator stocks. Catch and incidental mortality are shown. Only completed brood years are included.</i>	<i>189</i>
<i>Appendix F3— Total brood year exploitation rate for North and Central B.C. stocks. Catch and incidental mortality are shown. Only completed brood years are included.</i>	<i>191</i>
<i>Appendix F4— Brood year ocean exploitation rates for Robertson Creek Fall. Catch and incidental mortality are shown. Only completed brood years are included.</i>	<i>192</i>
<i>Appendix F5— Total brood year exploitation rate for the Strait of Georgia CWT indicator stocks. Catch and IM are shown. Only completed brood years are included.</i>	<i>193</i>
<i>Appendix F6— Total brood year exploitation rate for Fraser Late stocks. Catch and incidental mortality are shown. Only completed brood years are included.</i>	<i>195</i>

<i>Appendix F7— Total brood year exploitation rate for Fraser Early stocks. Catch and incidental mortality are shown. Only completed brood years are included.</i>	196
<i>Appendix F8— Brood year exploitation rate in terms of landed catch and incidental mortality for Washington coast indicator stocks.....</i>	197
<i>Appendix F9— Brood year exploitation rate in terms of landed catch and incidental mortality for Northern Puget Sound CWT indicator stocks.</i>	198
<i>Appendix F10— Brood year exploitation rate in terms of landed catch and incidental mortality for Central Puget Sound CWT indicator stocks Stillaguamish Fall and Skykomish Summer Fingerling.....</i>	200
<i>Appendix F11— Brood year exploitation rate in terms of landed catch and incidental mortality for Southern Puget Sound CWT indicator stocks.....</i>	201
<i>Appendix F12— Brood year exploitation rate in terms of landed catch and incidental mortality for Juan de Fuca and Hood Canal CWT indicator stocks Elwha and George Adams (Skokomish River) Fall Fingerling.....</i>	202
<i>Appendix F13— Brood year exploitation rate for summer and fall Columbia River CWT indicator stocks, including Willamette Spring Chinook. Catch and incidental mortality are shown. Only completed brood years are included.</i>	203
<i>Appendix F14— Brood year exploitation rate (ocean only) for Oregon Coast CWT indicator stocks. Catch and incidental mortality are shown. Only completed brood years are included.....</i>	206

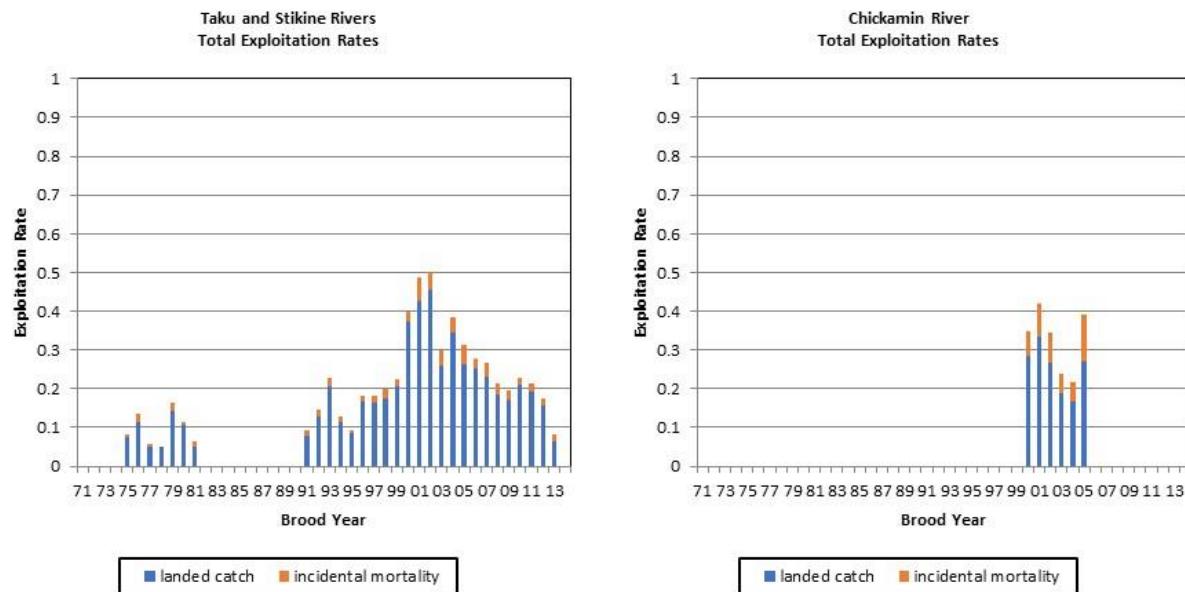
Appendix F1— Brood year exploitation rates for Southeast Alaska (SEAK) hatchery indicator stocks. Catch and incidental mortality are shown. Only completed brood years are included.



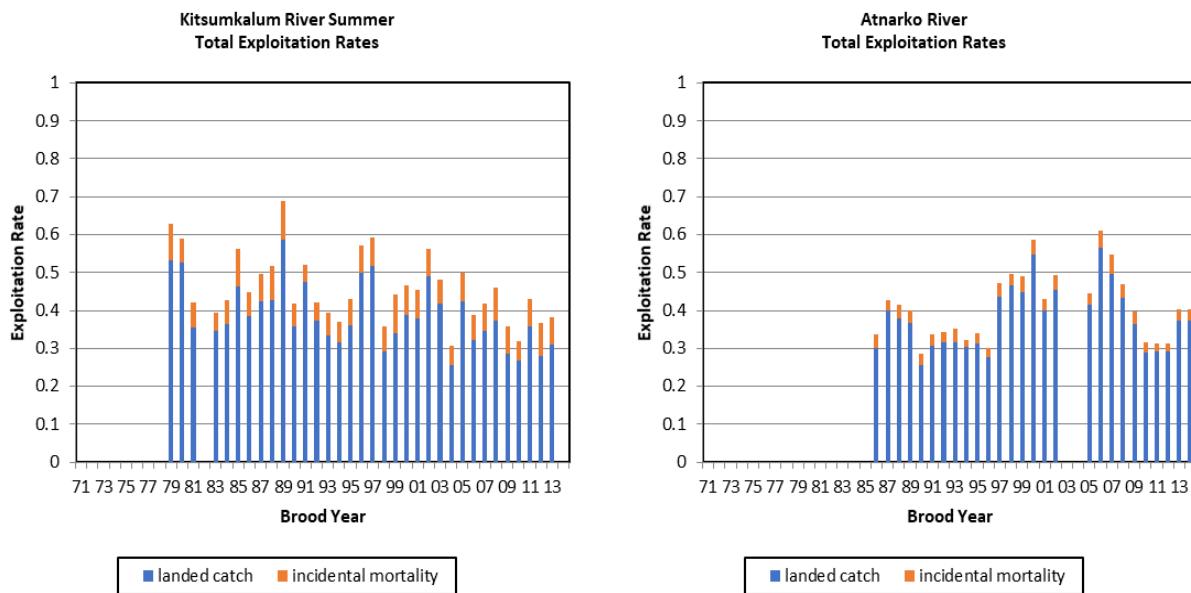
Appendix F2— Brood year exploitation rate for Southeast Alaska (SEAK) and transboundary wild indicator stocks. Catch and incidental mortality are shown. Only completed brood years are included.



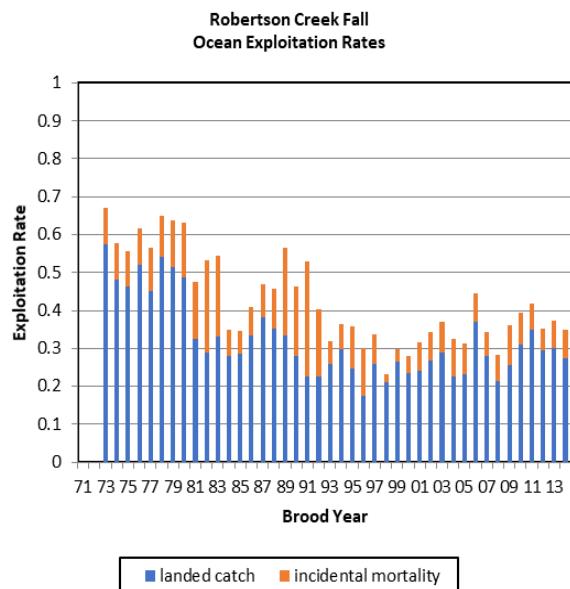
Appendix F2 continued.



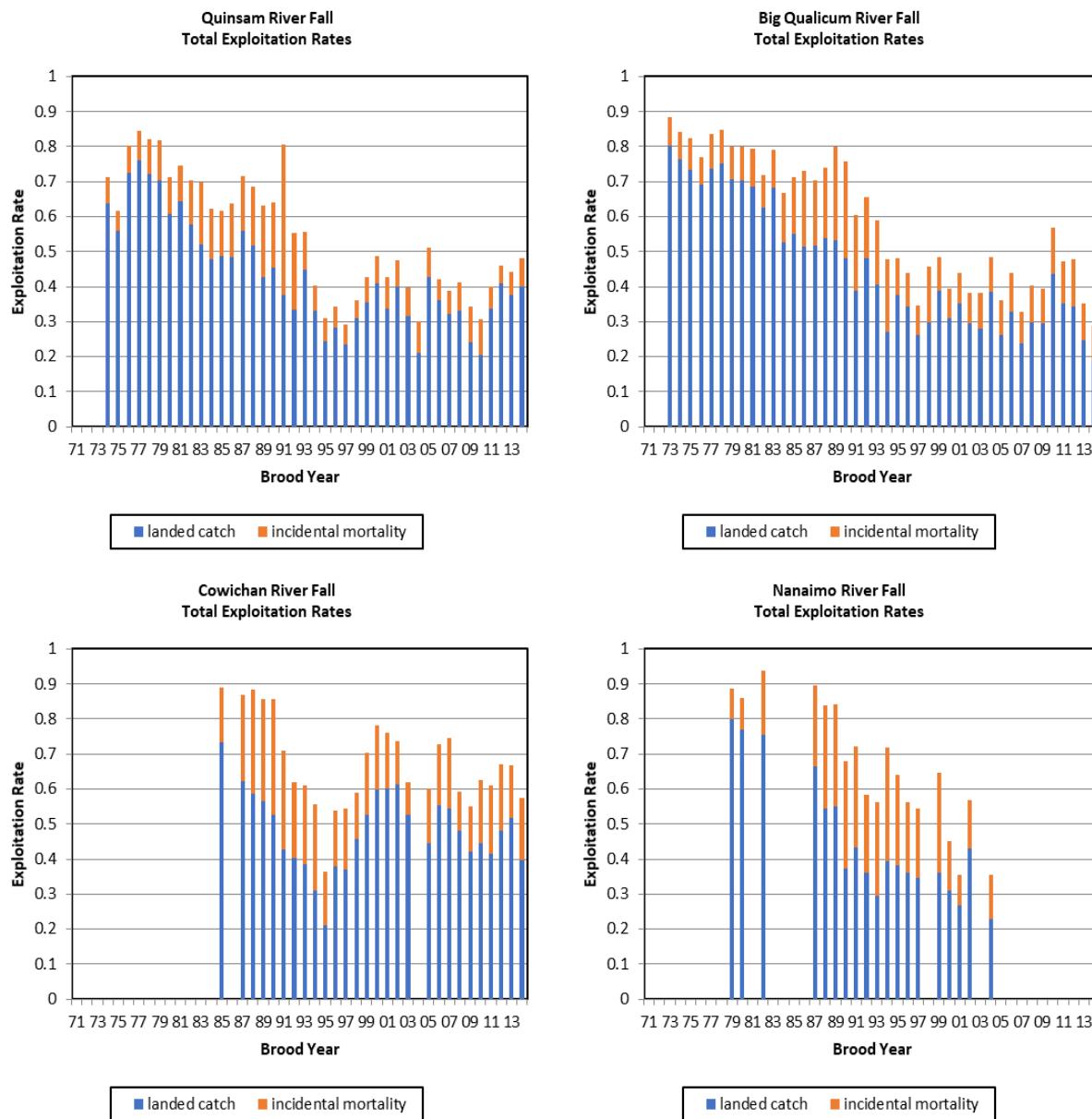
Appendix F3— Total brood year exploitation rate for North and Central B.C. stocks. Catch and incidental mortality are shown. Only completed brood years are included.



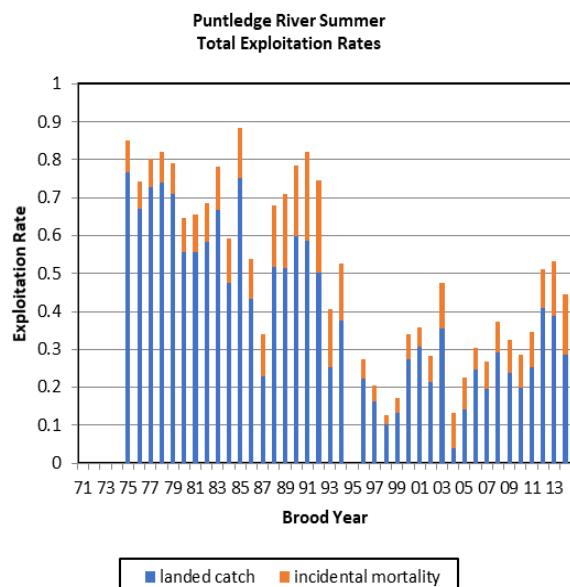
Appendix F4— Brood year ocean exploitation rates for Robertson Creek Fall. Catch and incidental mortality are shown. Only completed brood years are included.



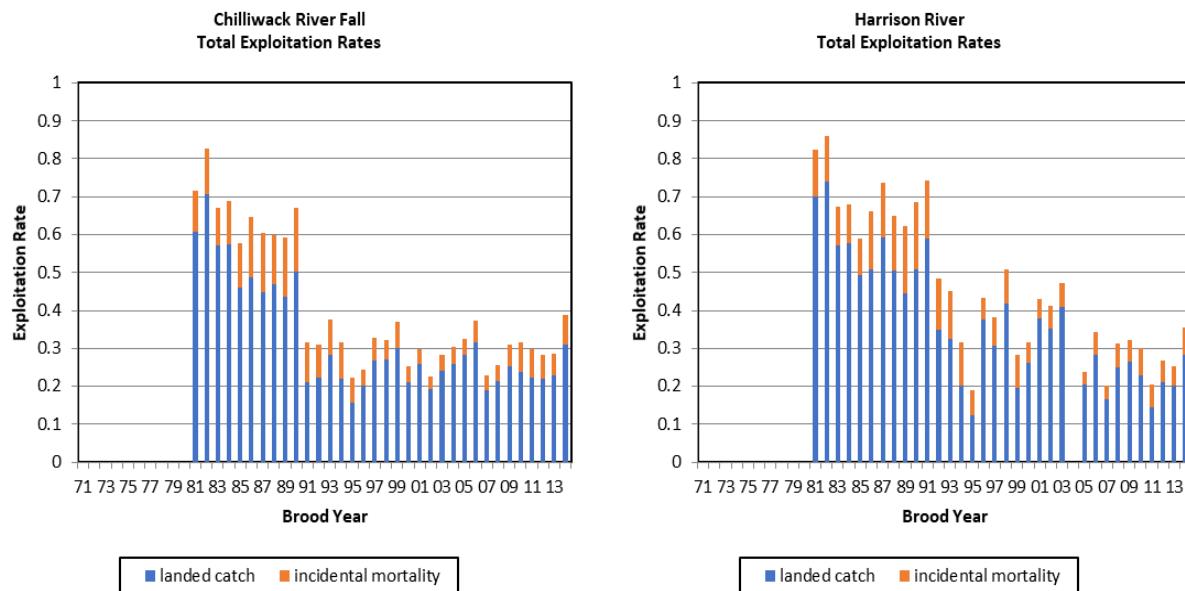
Appendix F5— Total brood year exploitation rate for the Strait of Georgia CWT indicator stocks. Catch and IM are shown. Only completed brood years are included.



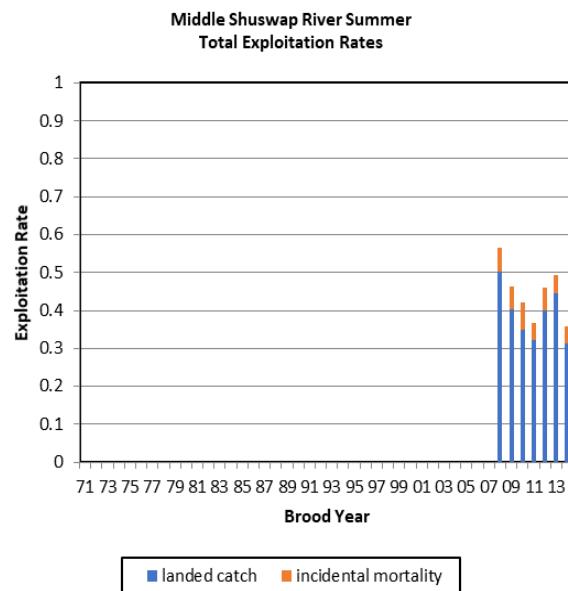
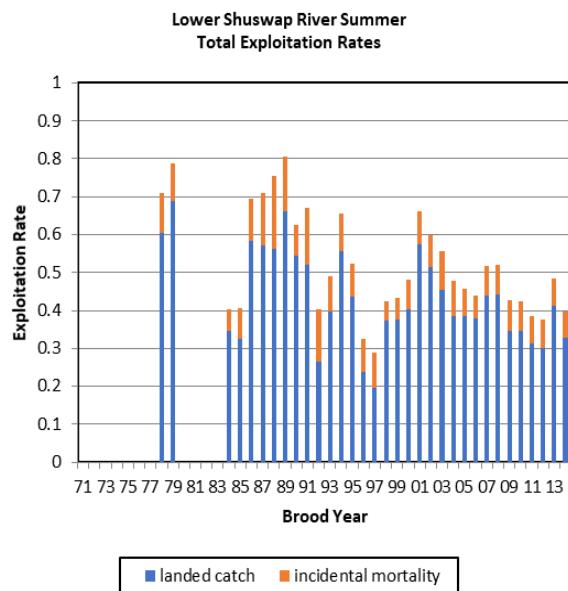
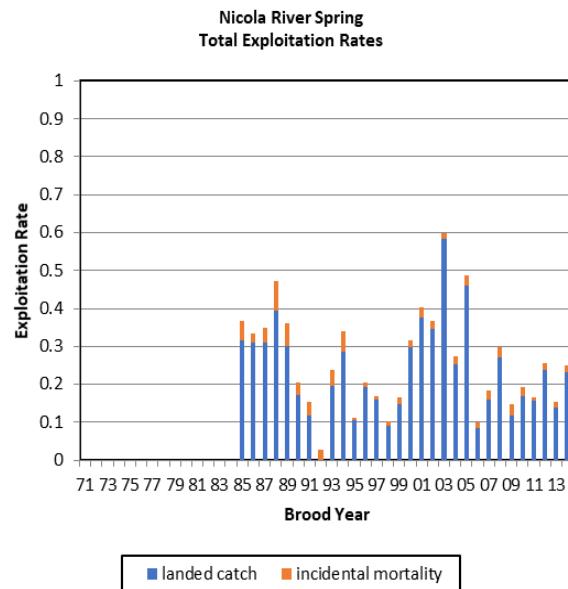
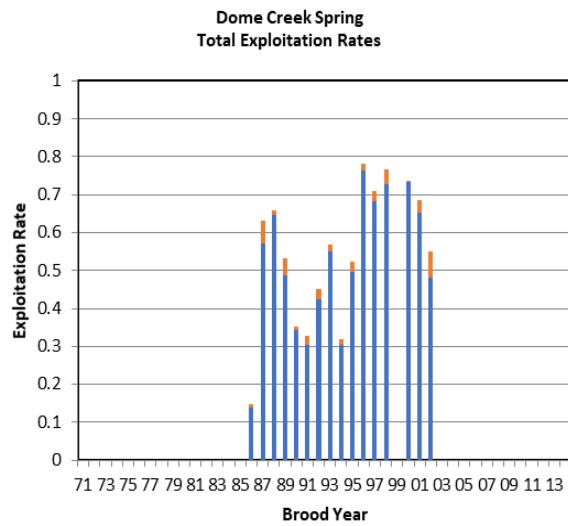
Appendix F5 continued.



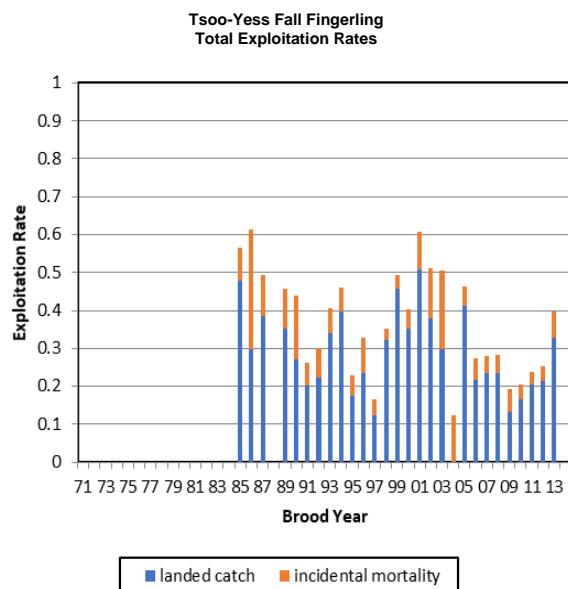
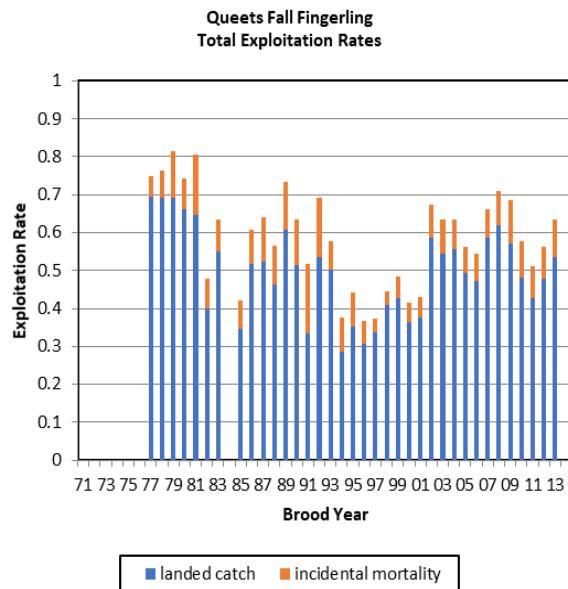
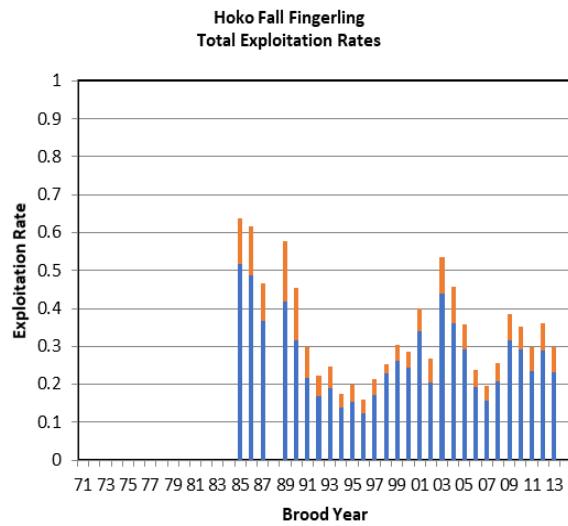
Appendix F6— Total brood year exploitation rate for Fraser Late stocks. Catch and incidental mortality are shown. Only completed brood years are included.



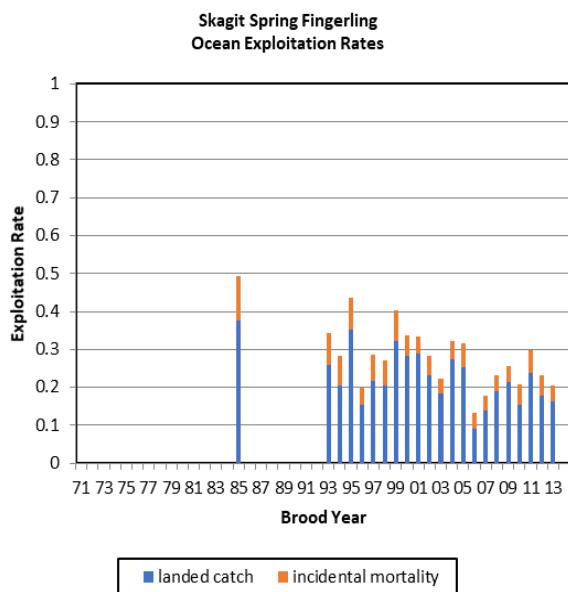
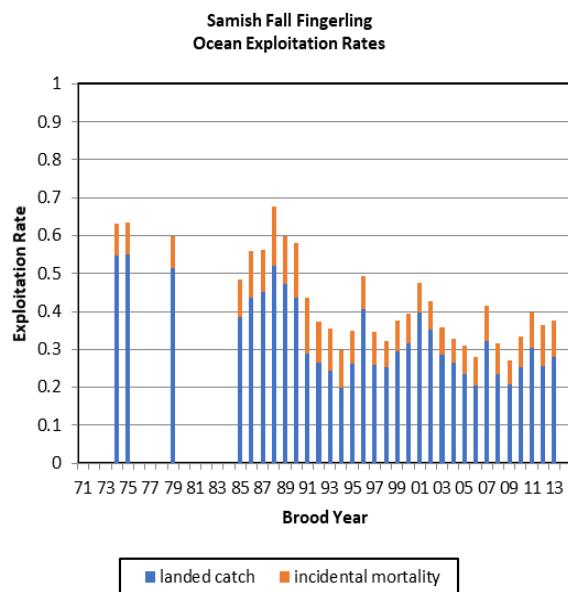
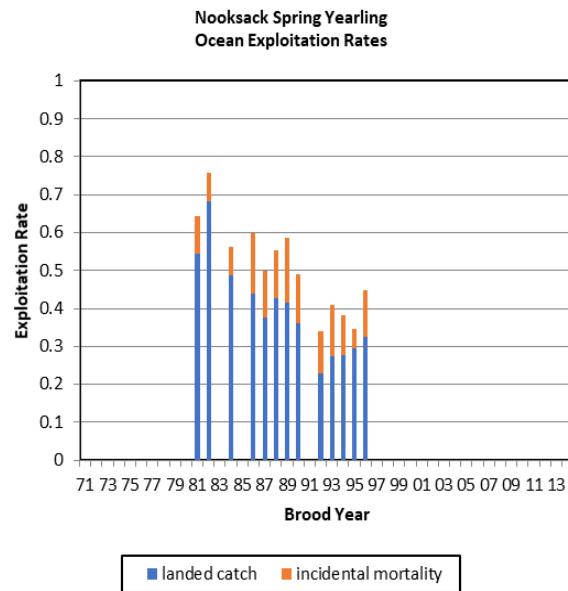
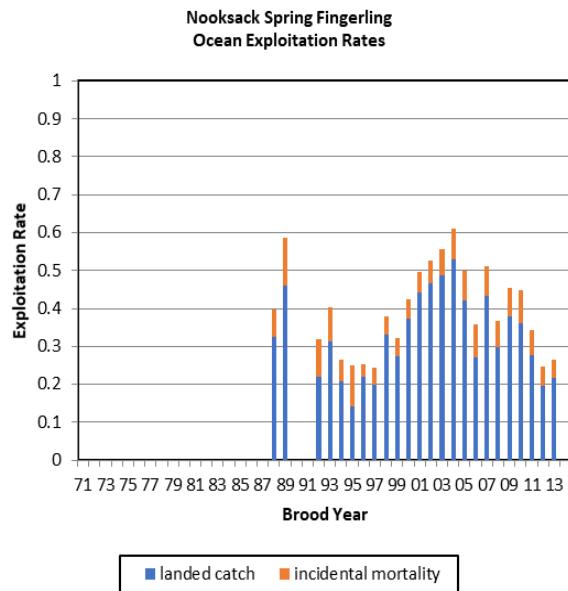
Appendix F7— Total brood year exploitation rate for Fraser Early stocks. Catch and incidental mortality are shown. Only completed brood years are included.



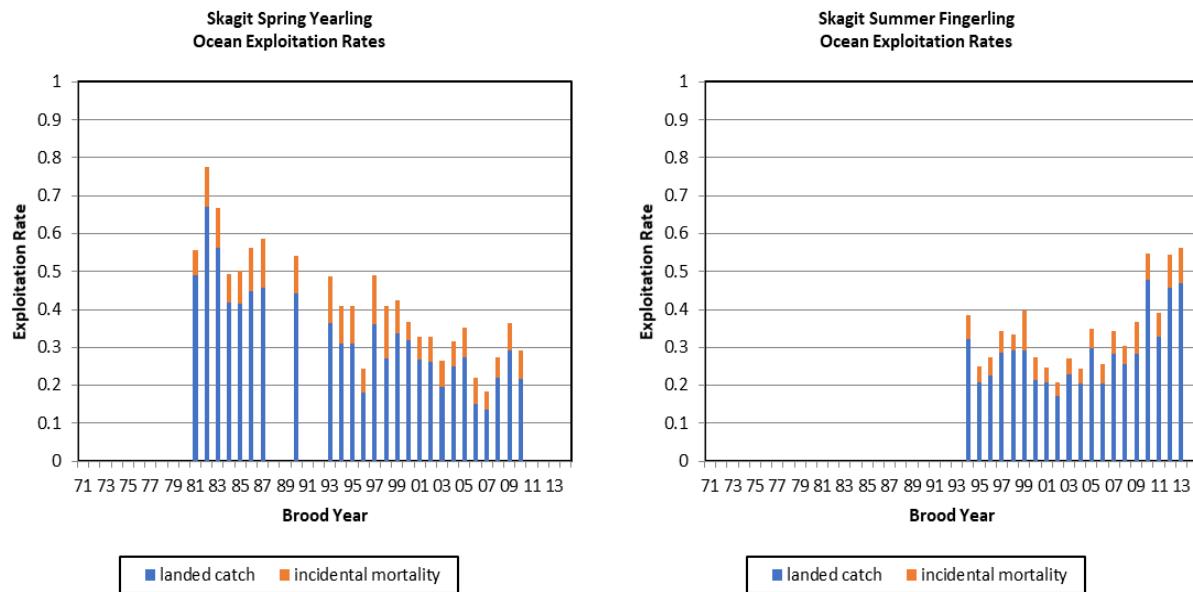
Appendix F8— Brood year exploitation rate in terms of landed catch and incidental mortality for Washington coast indicator stocks.



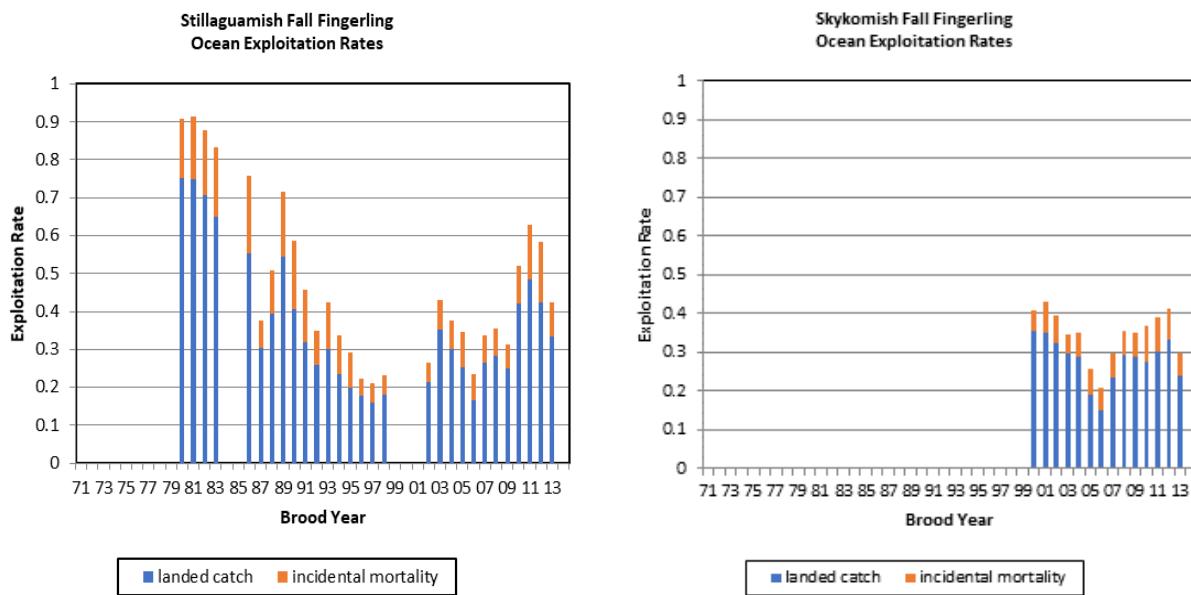
Appendix F9— Brood year exploitation rate in terms of landed catch and incidental mortality for Northern Puget Sound CWT indicator stocks.



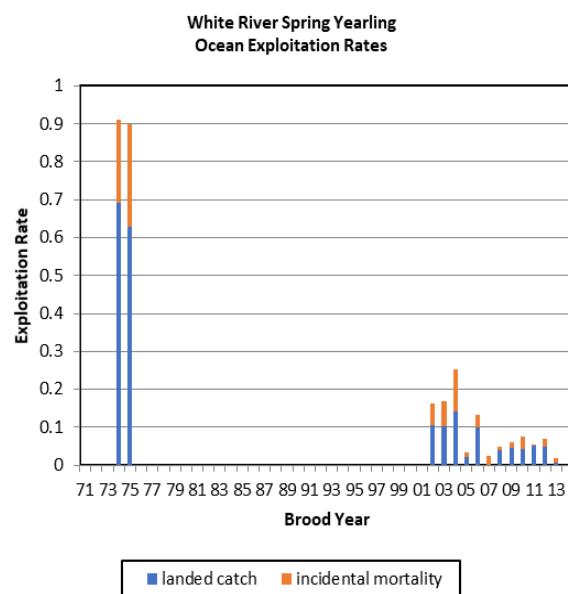
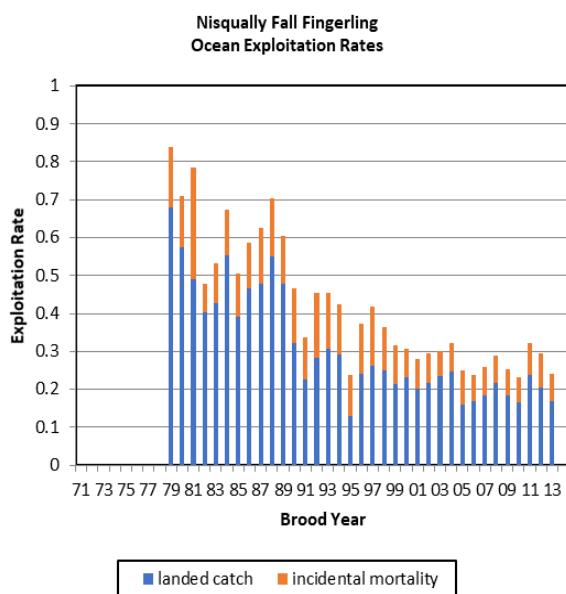
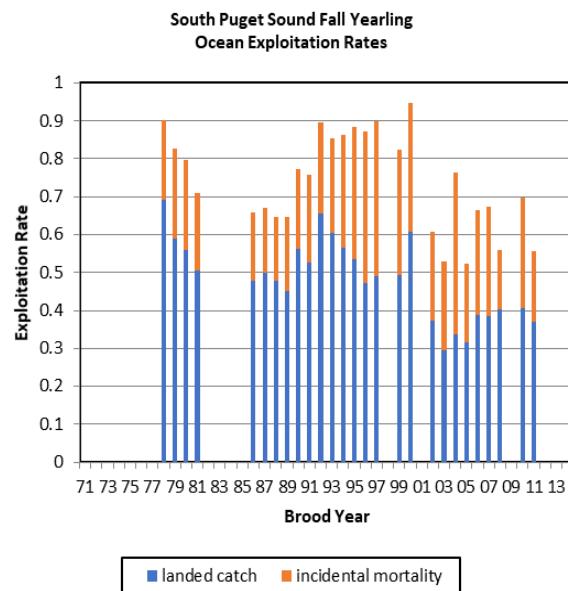
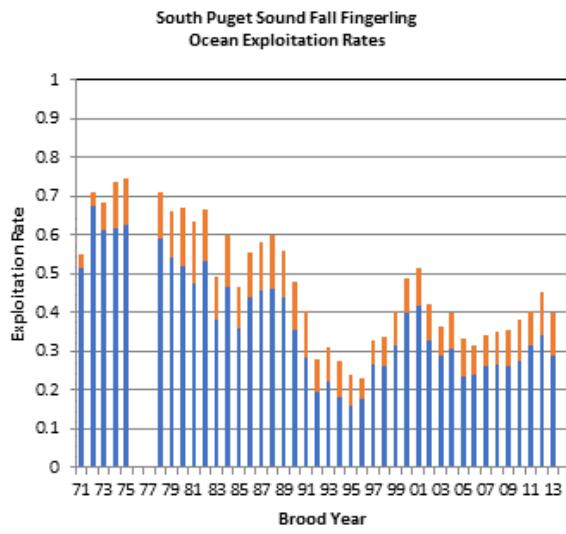
Appendix F9 continued.



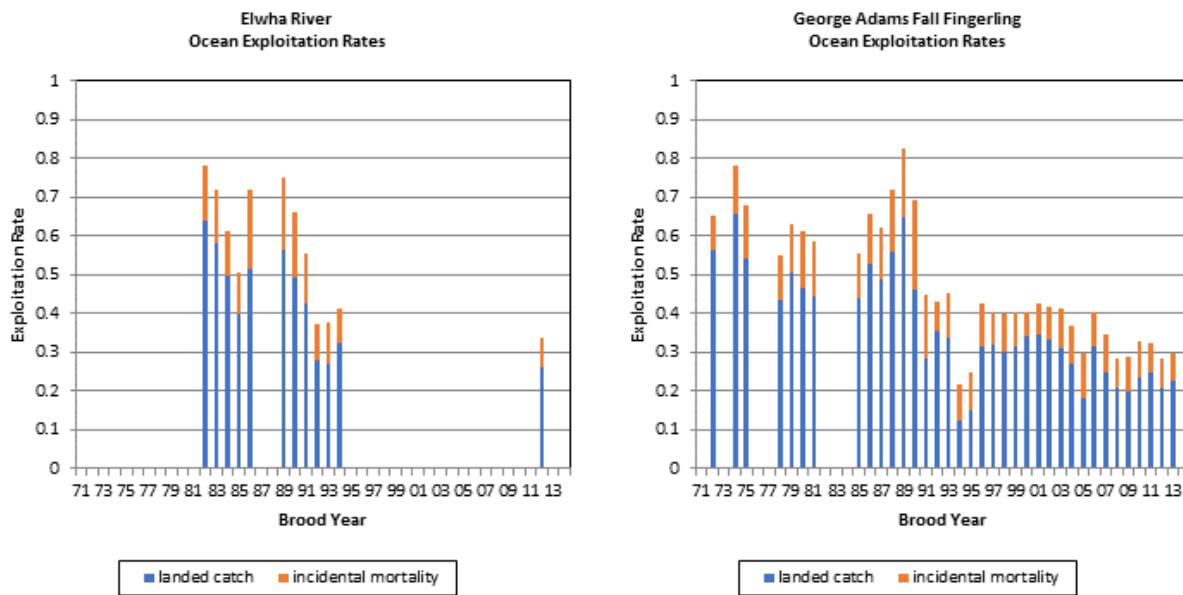
Appendix F10— Brood year exploitation rate in terms of landed catch and incidental mortality for Central Puget Sound CWT indicator stocks Stillaguamish Fall and Skykomish Summer Fingerling.



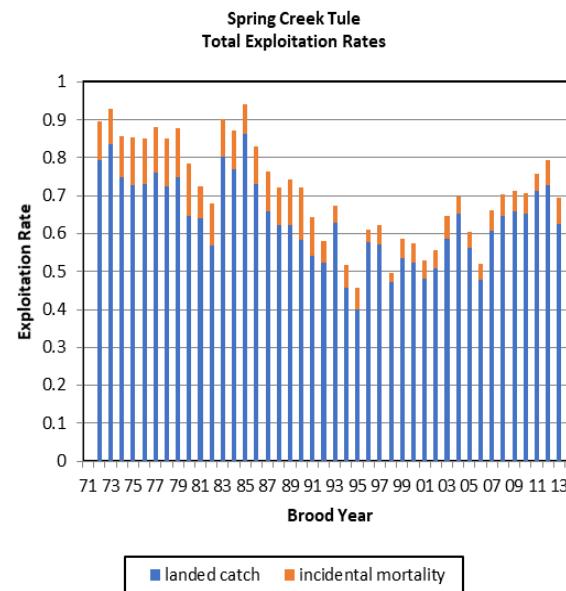
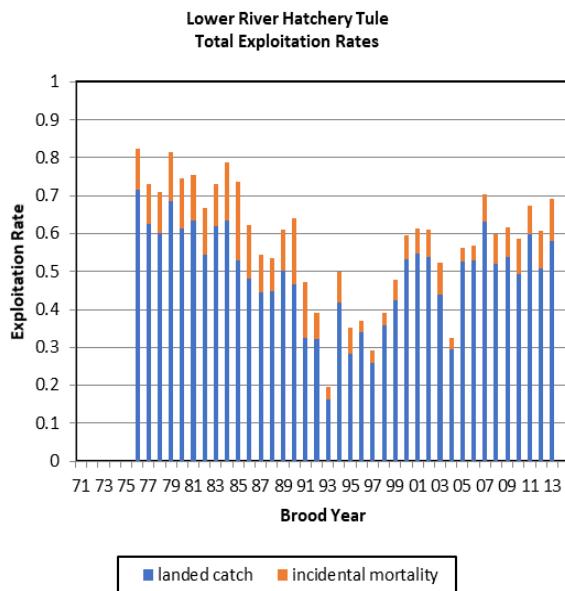
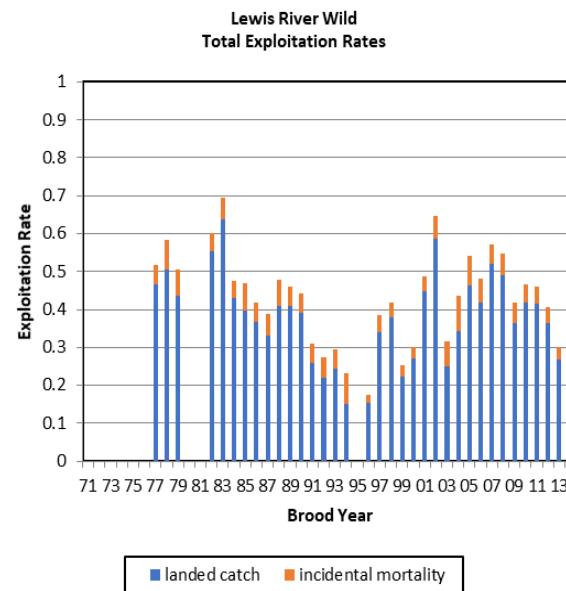
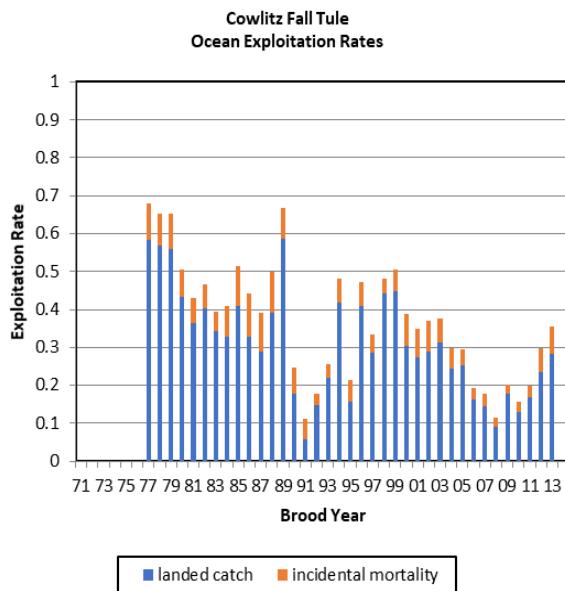
Appendix F11— Brood year exploitation rate in terms of landed catch and incidental mortality for Southern Puget Sound CWT indicator stocks.



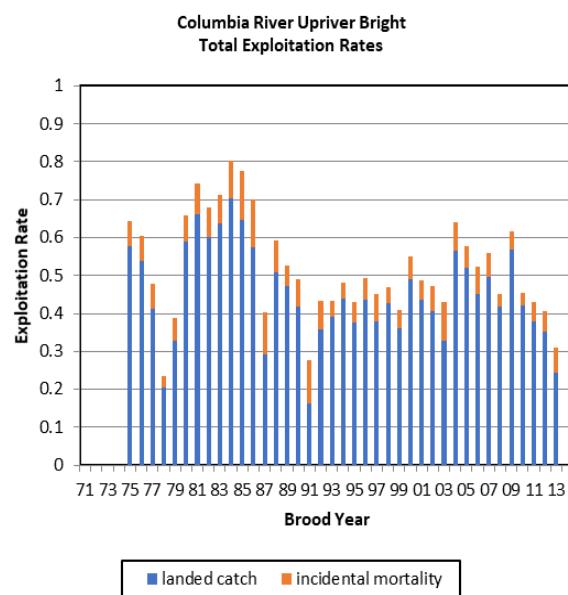
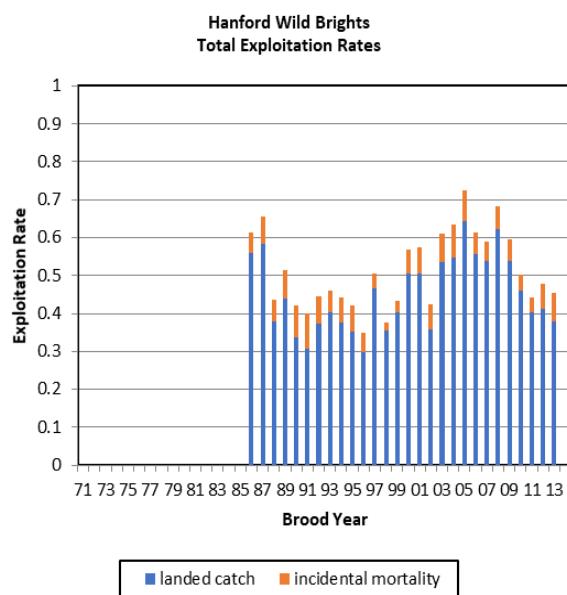
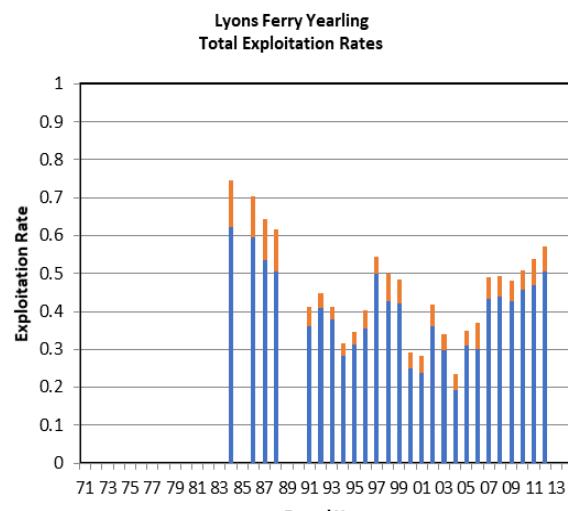
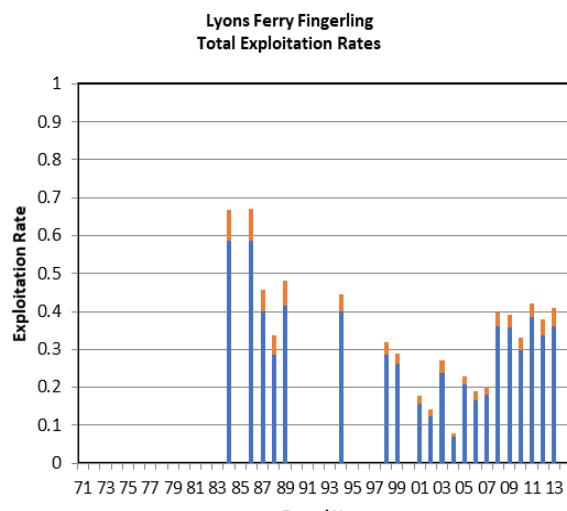
Appendix F12— Brood year exploitation rate in terms of landed catch and incidental mortality for Juan de Fuca and Hood Canal CWT indicator stocks Elwha and George Adams (Skokomish River) Fall Fingerling.



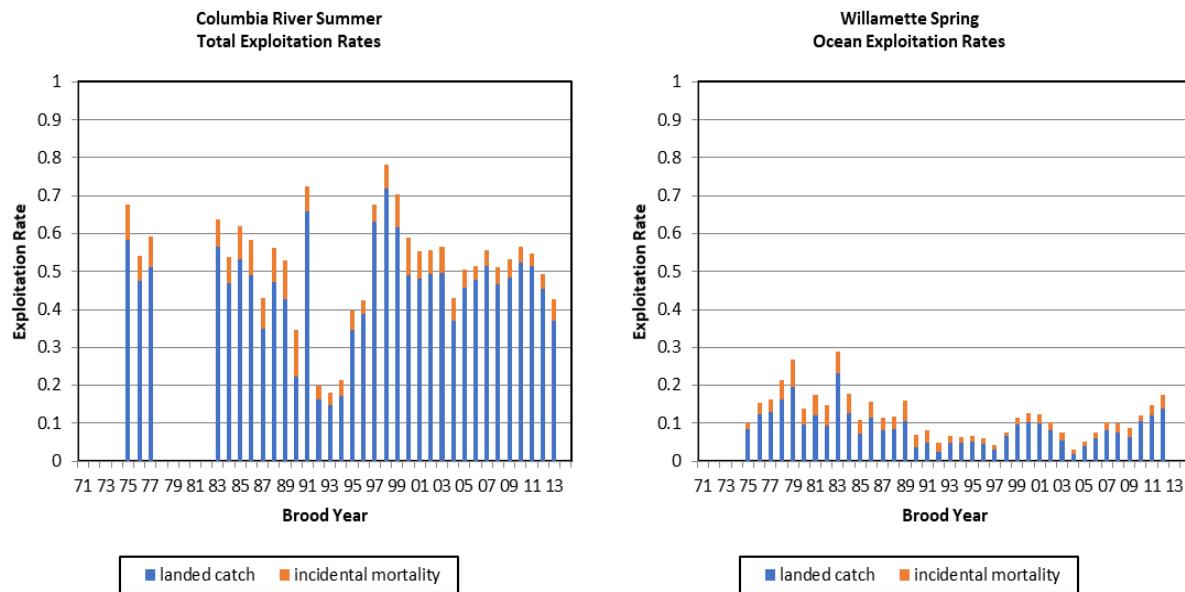
Appendix F13— Brood year exploitation rate for summer and fall Columbia River CWT indicator stocks, including Willamette Spring Chinook. Catch and incidental mortality are shown. Only completed brood years are included.



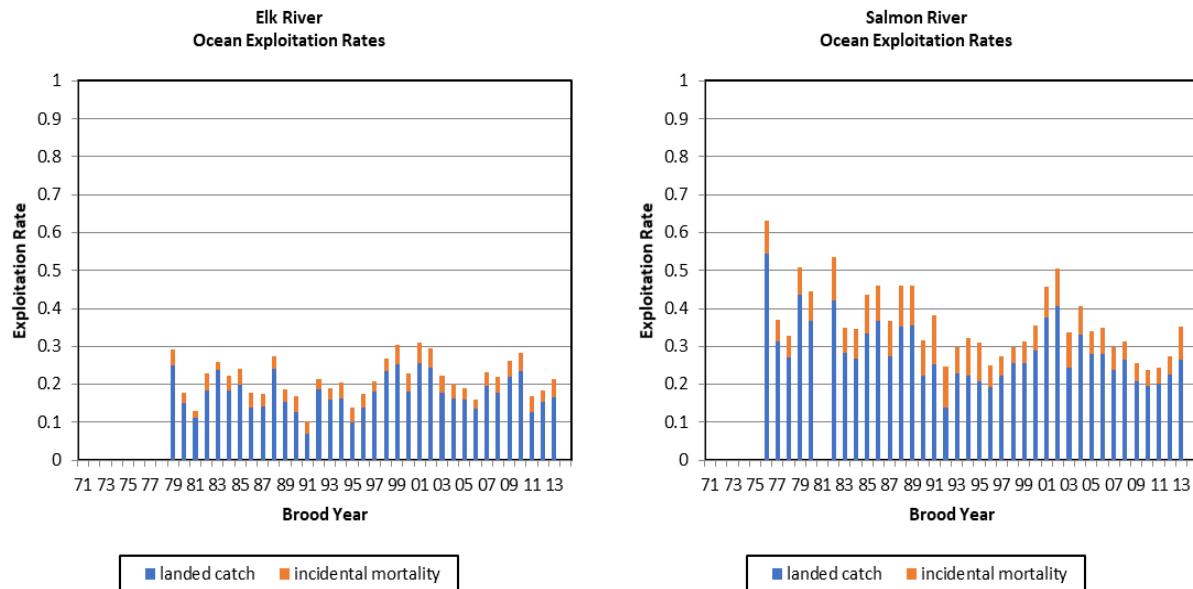
Appendix F13 continued.



Appendix F13 continued.



Appendix F14— Brood year exploitation rate (ocean only) for Oregon Coast CWT indicator stocks. Catch and incidental mortality are shown. Only completed brood years are included.



APPENDIX G: SURVIVAL RATE PLOTS

The BY smolt-to-age 2 or 3 survival of CWT-tagged juveniles after release is calculated for most exploitation rate indicator stocks (Table 2.2). This survival rate is frequently referred to as the early marine survival of the tag group and is calculated using the youngest age's cohort size before fishing and maturation or escapement mortality processes begin; for subyearling stocks, this is age 2 and for yearling stocks this is age 3. The CWT-based estimate is our most direct measure of early marine survival and is not final until all ages from that brood have returned to spawn. Preliminary estimates are generated, not reported in average survival estimates, but are displayed in the plots by using available CWT data and average maturation rates.

The BY survival rate for a fingerling stock is the estimated age-2 cohort (determined from the cohort analysis) divided by the number of CWT fish released, whereas for yearling stocks, rate is calculated using the estimated age-3 cohort:

$$CohSurv_{BY,a=2or3} = \frac{Cohort_{BY,a=2or3}}{TotCWTRelease_{BY}} \quad \text{Equation G.1}$$

where Cohort_{BY,a} is calculated recursively from the oldest age to the youngest age using:

$$Cohort_{BY,a} = \frac{\sum_{f=1}^{Numfisheris} TotMorts_{BY,a,f} + Esc_{BY,a} + Cohort_{BY,a+1}}{1 - NM_a} \quad \text{Equation G.2}$$

If there are no CWT recoveries for the oldest ocean age of a stock, the next youngest cohort size is estimated using:

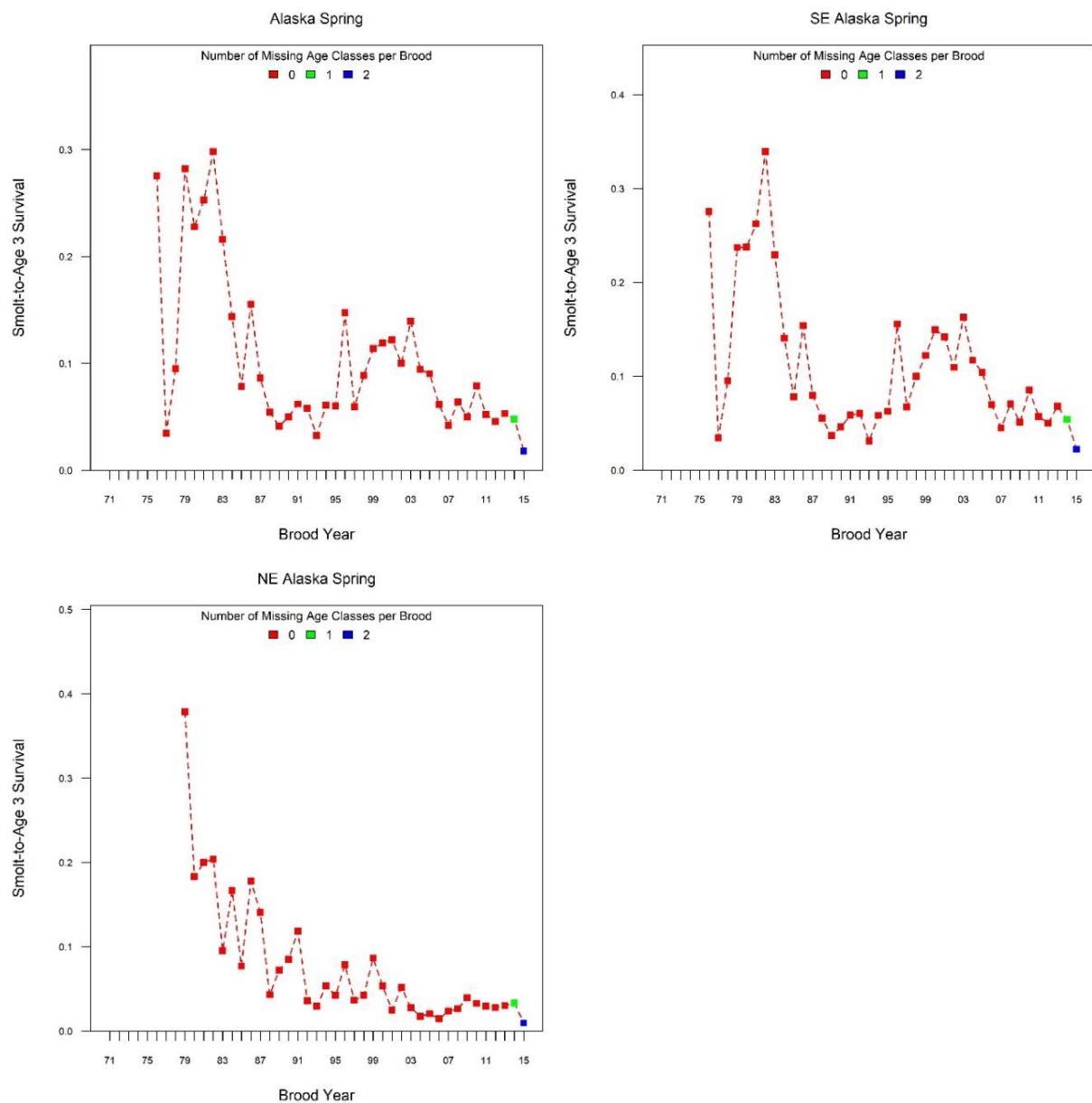
$$Cohort_{BY,max\,age-1} = \frac{\sum_{f \in Pretermint} TotMorts_{BY,max\,age-1,f} + Esc_{BY,max\,age-1} + \sum_{f \in Terminal} TotMorts_{BY,max\,age-1,f}}{1 - NM_{max\,age-1}} \quad \text{Equation G.3}$$

LIST OF APPENDIX G TABLES

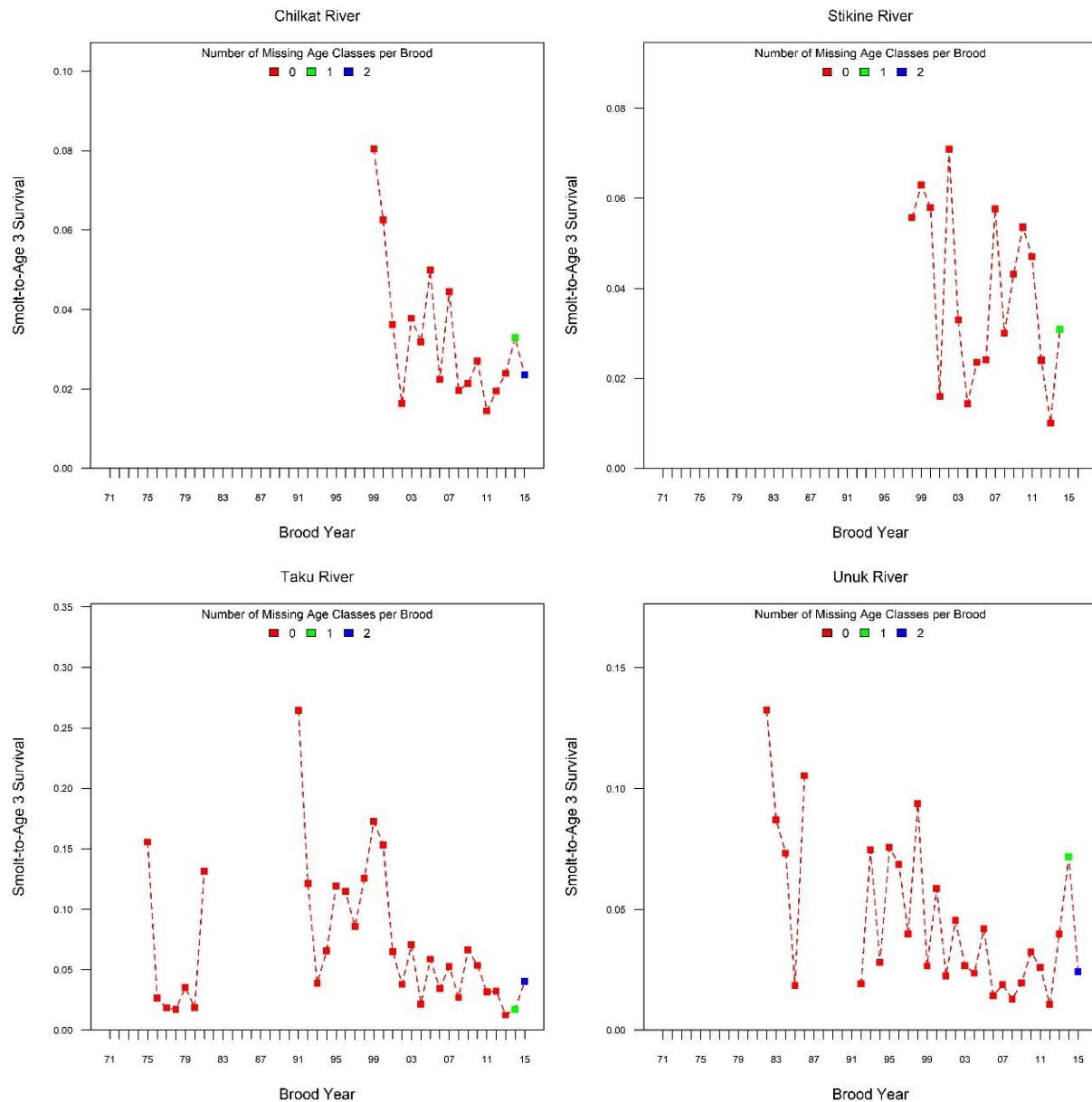
Appendix G1—Smolt-to-youngest age survival rates for the Southeast Alaska (SEAK) hatchery indicator stocks.....	210
Appendix G2—Smolt-to-youngest age survival rates for Southeast (SEAK) and transboundary wild indicator stocks.....	211
Appendix G3—Smolt-to-age 3 survival rates for Northern and Central B.C. stocks.....	213
Appendix G4—Smolt-to-age 2 survival rates for Robertson Creek Fall.....	214
Appendix G5—Smolt-to-age 2 survival rates for Strait of Georgia stocks.....	215
Appendix G6—Smolt-to-youngest age survival rates for Fraser Late stocks.....	217
Appendix G7—Smolt-to-youngest age survival rates for Fraser Early stocks.....	218
Appendix G8—Smolt-to-youngest age survival rates for Washington Coast CWT indicator stocks of Hoko, Queets, and Tsoo-Yess Fall Fingerling.....	219

<i>Appendix G9— Smolt-to-youngest age survival rates for Northern Puget Sound CWT indicator stocks.....</i>	220
<i>Appendix G10— Smolt-to-youngest age survival rates for Central Puget Sound CWT indicator stocks Stillaguamish Fall Fingerling and Skykomish Fall Fingerling.</i>	222
<i>Appendix G11— Smolt-to-youngest age survival rates for Southern Puget Sound CWT indicator stocks.....</i>	223
<i>Appendix G12— Smolt-to-youngest age survival rates for Juan de Fuca and Hood Canal CWT indicator stocks Elwha River and George Adams (Skokomish River) Fall Fingerling.</i>	224
<i>Appendix G13— Smolt-to-youngest age survival rates for summer and fall Columbia River, including Willamette Spring, Chinook CWT indicator stocks.....</i>	225
<i>Appendix G14— Smolt-to-youngest age survival rates for North Oregon Coast CWT indicator stocks.....</i>	228

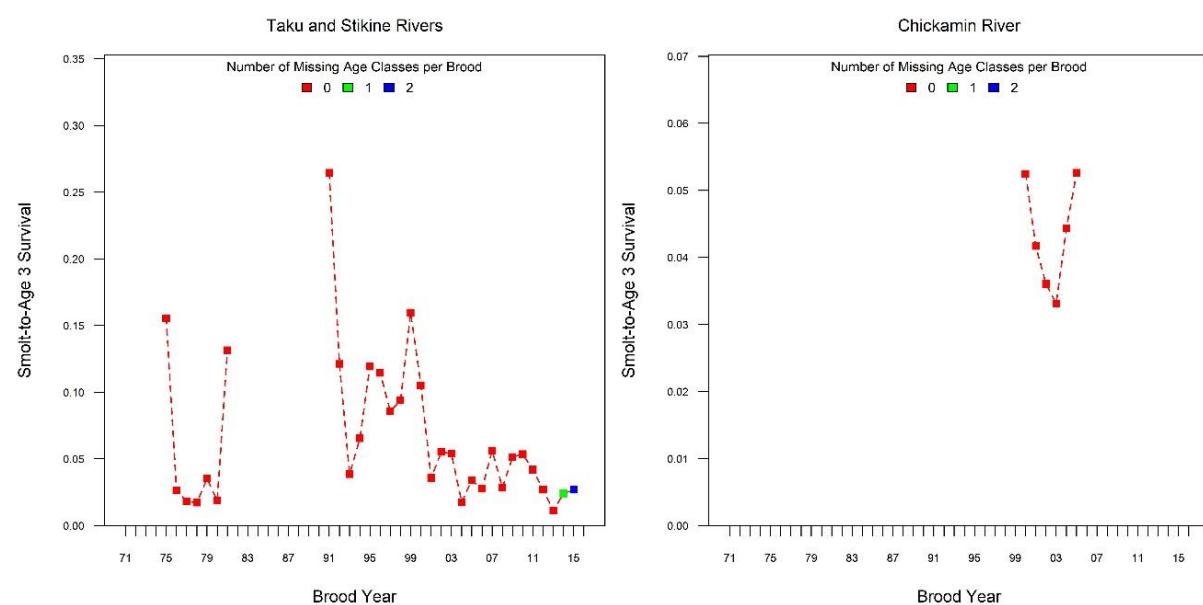
Appendix G1—Smolt-to-youngest age survival rates for the Southeast Alaska (SEAK) hatchery indicator stocks.



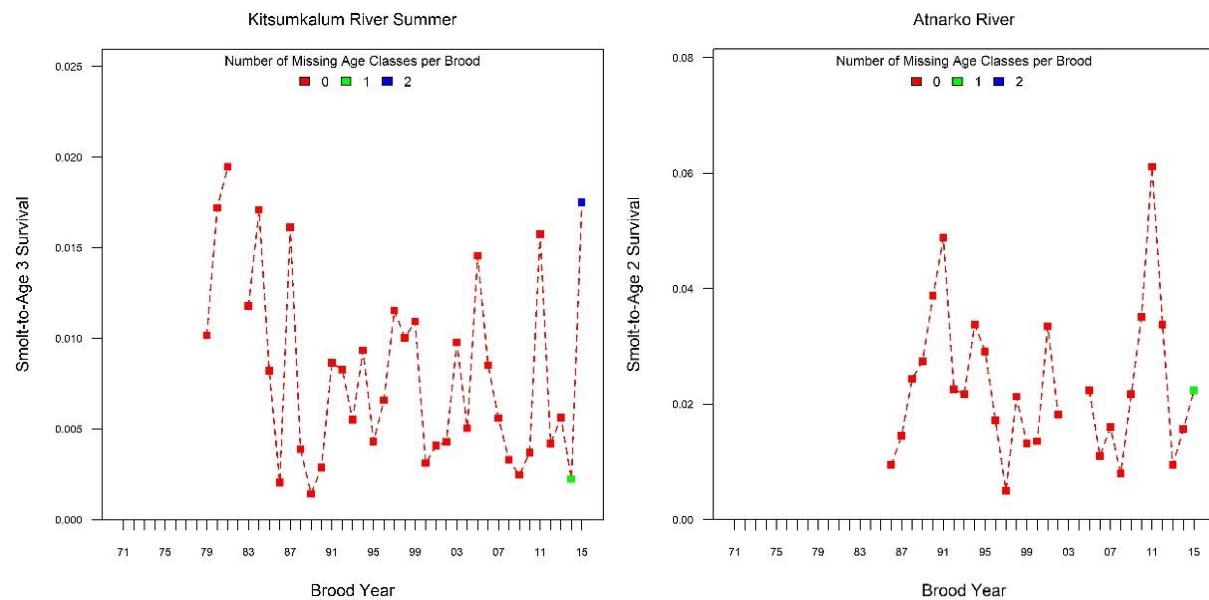
Appendix G2—Smolt-to-youngest age survival rates for Southeast (SEAK) and transboundary wild indicator stocks.



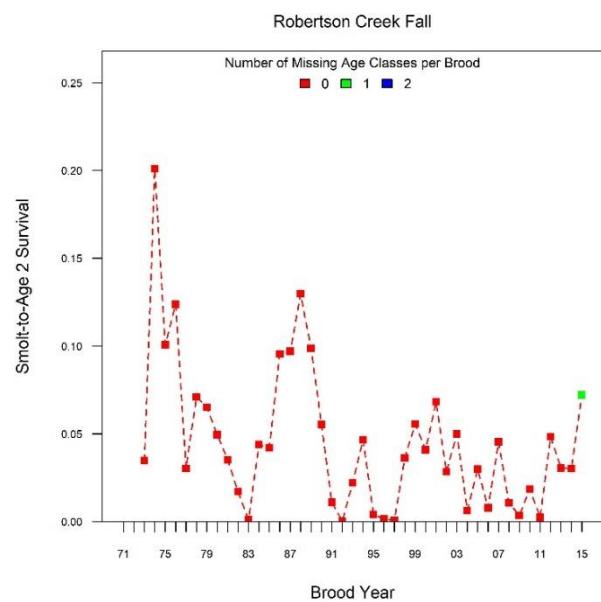
Appendix G2 continued.



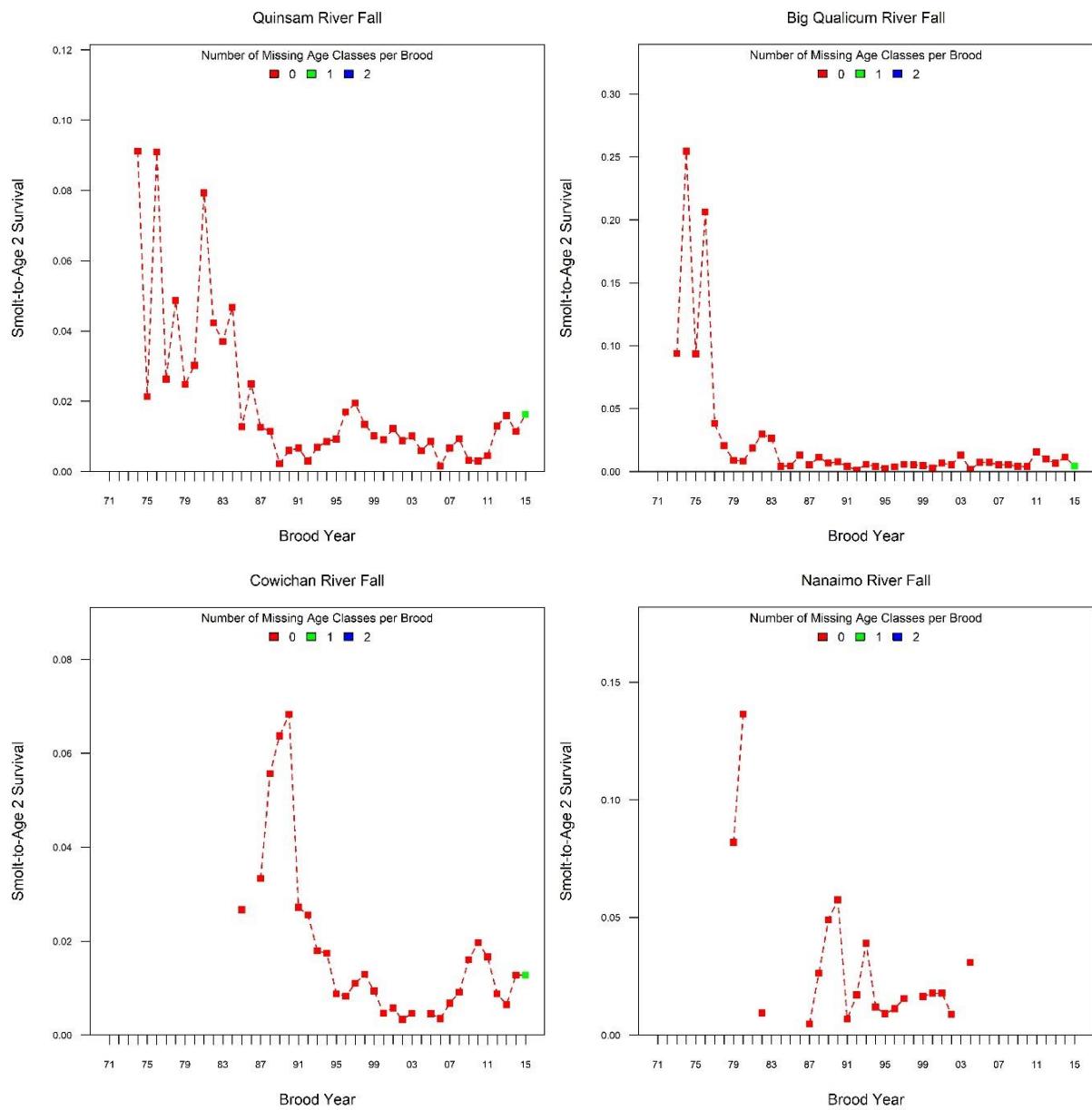
Appendix G3—Smolt-to-age 3 survival rates for Northern and Central B.C. stocks.



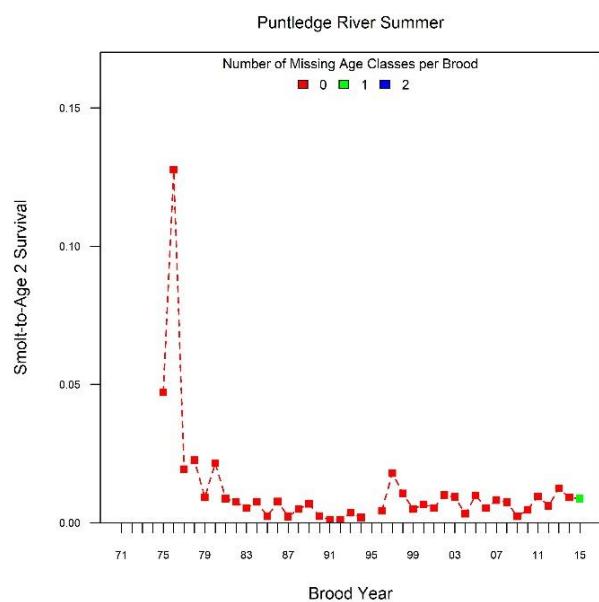
Appendix G4— Smolt-to-age 2 survival rates for Robertson Creek Fall.



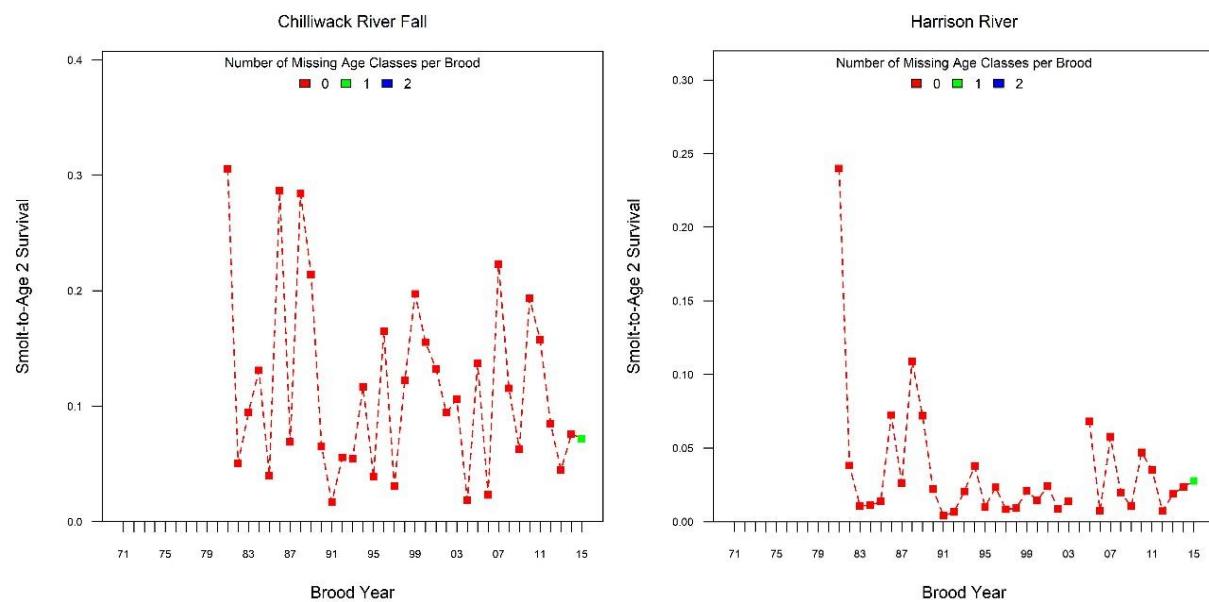
Appendix G5—Smolt-to-age 2 survival rates for Strait of Georgia stocks.



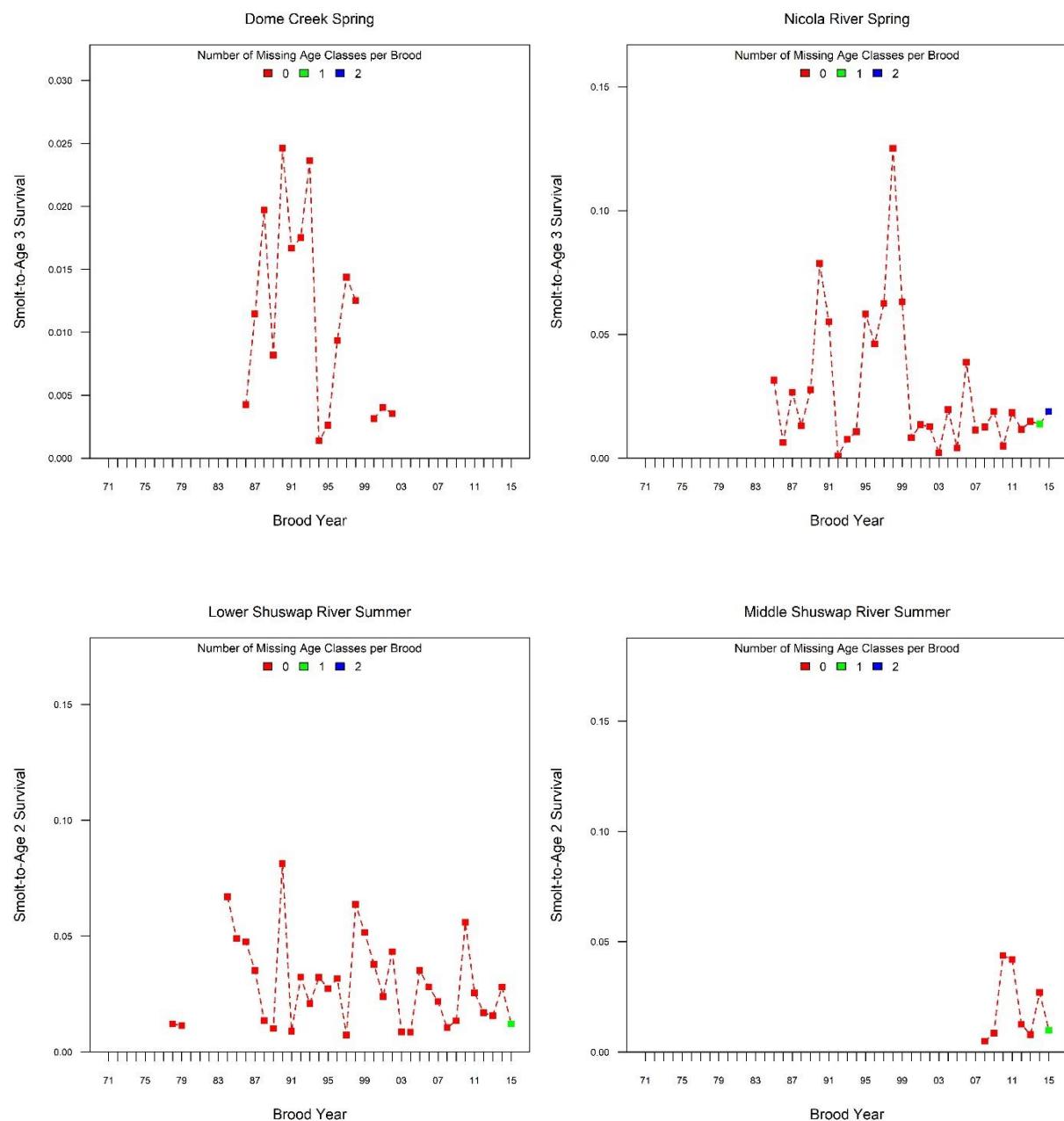
Appendix G5 continued.



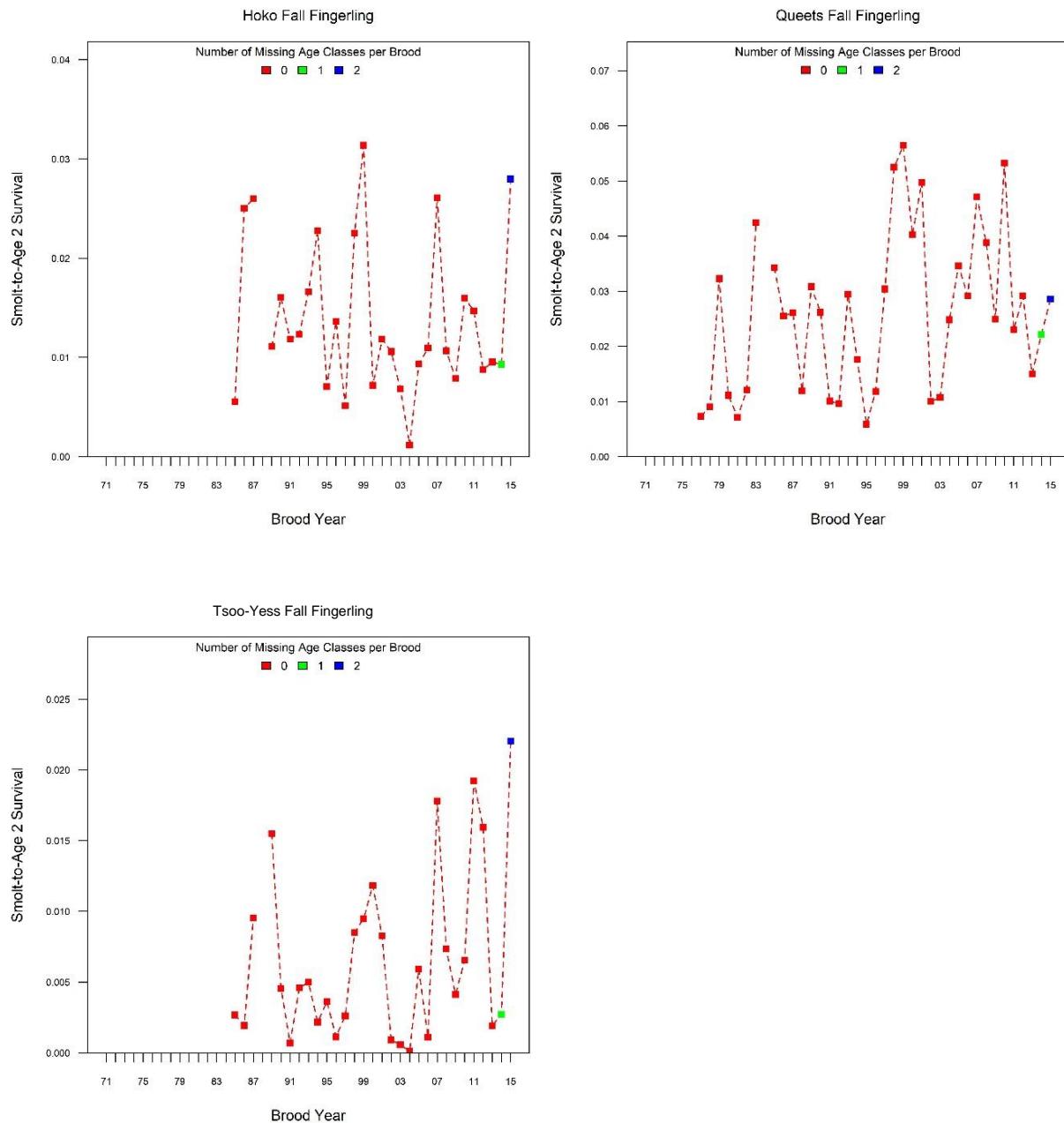
Appendix G6— Smolt-to-youngest age survival rates for Fraser Late stocks.



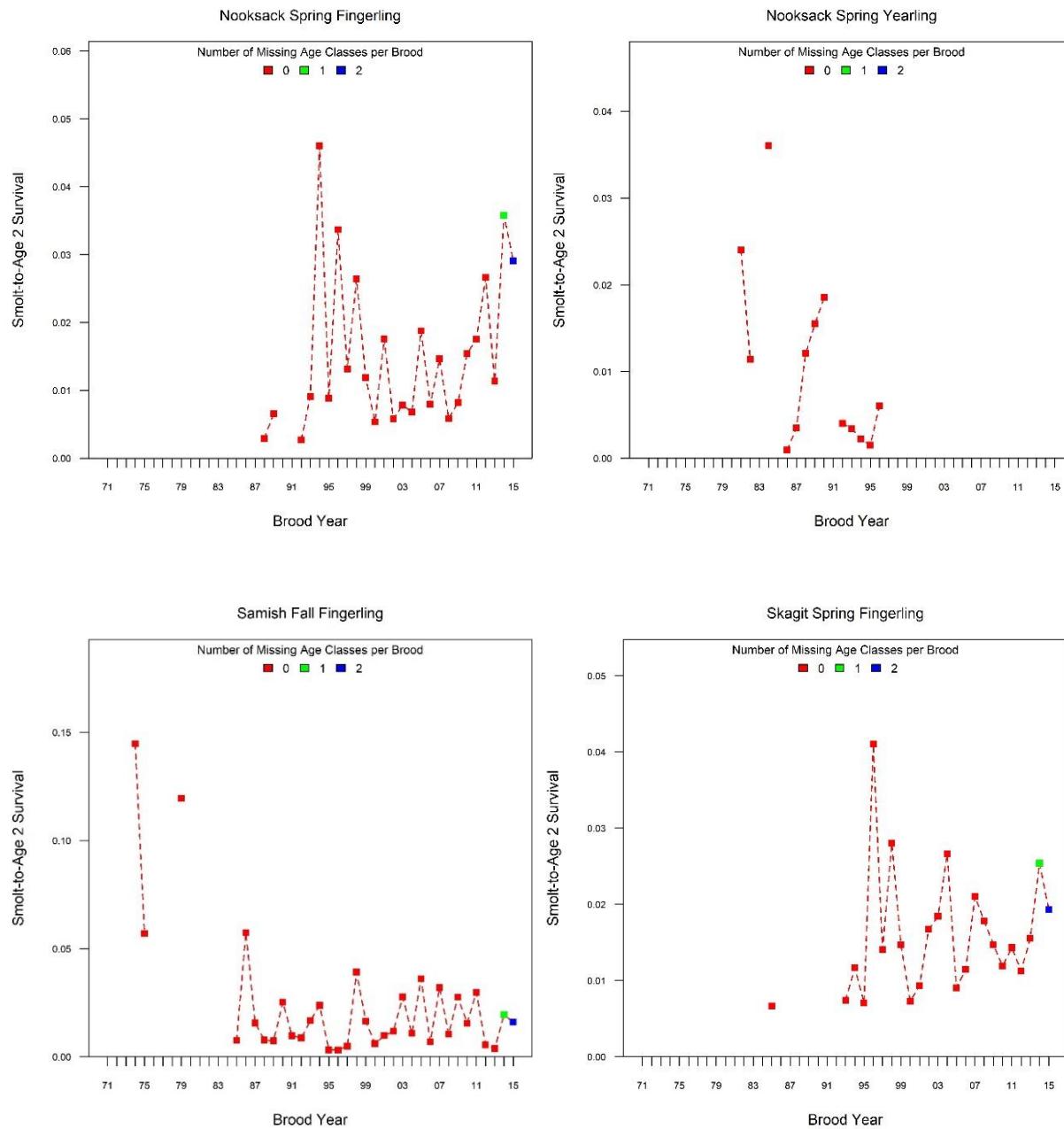
Appendix G7—Smolt-to-youngest age survival rates for Fraser Early stocks.



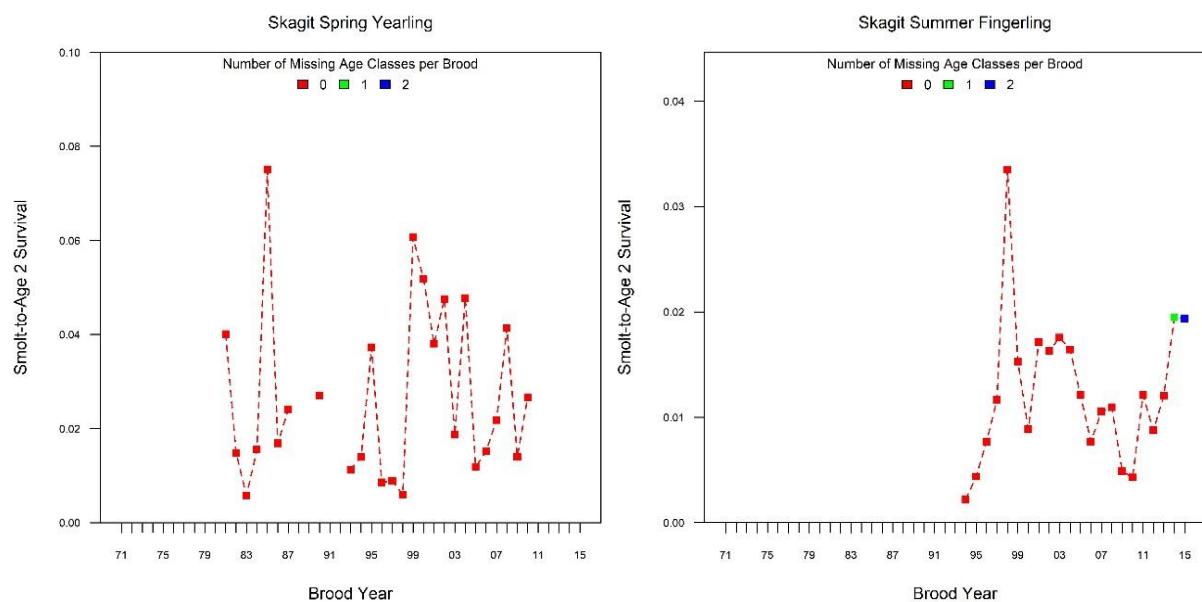
Appendix G8—Smolt-to-youngest age survival rates for Washington Coast CWT indicator stocks of Hoko, Queets, and Tsoo-Yess Fall Fingerling.



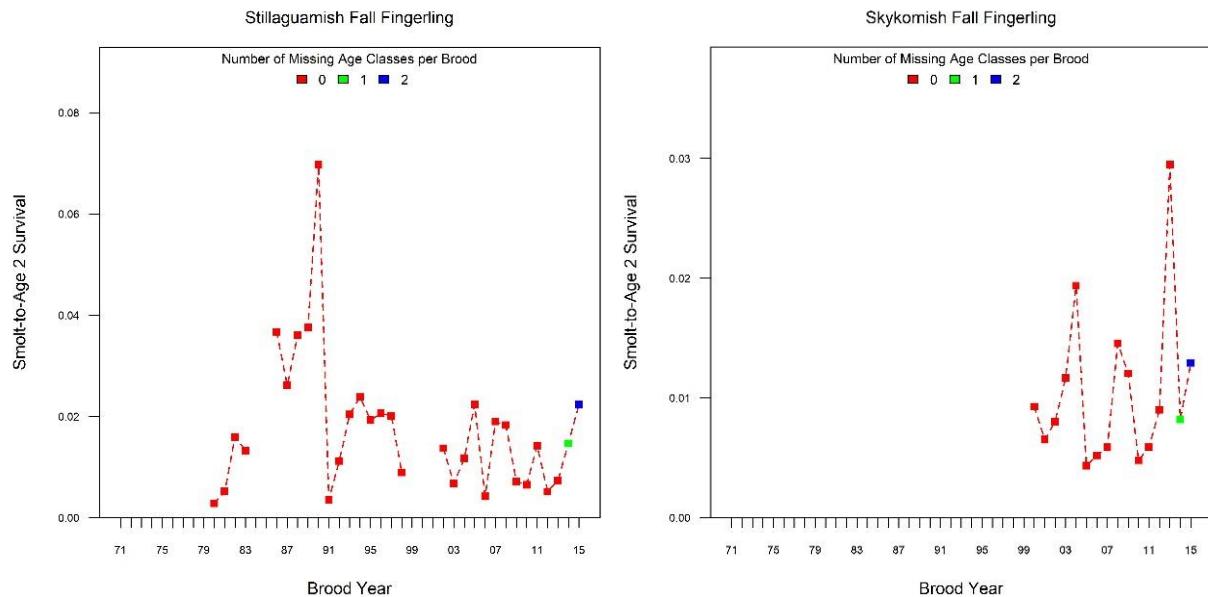
Appendix G9—Smolt-to-youngest age survival rates for Northern Puget Sound CWT indicator stocks.



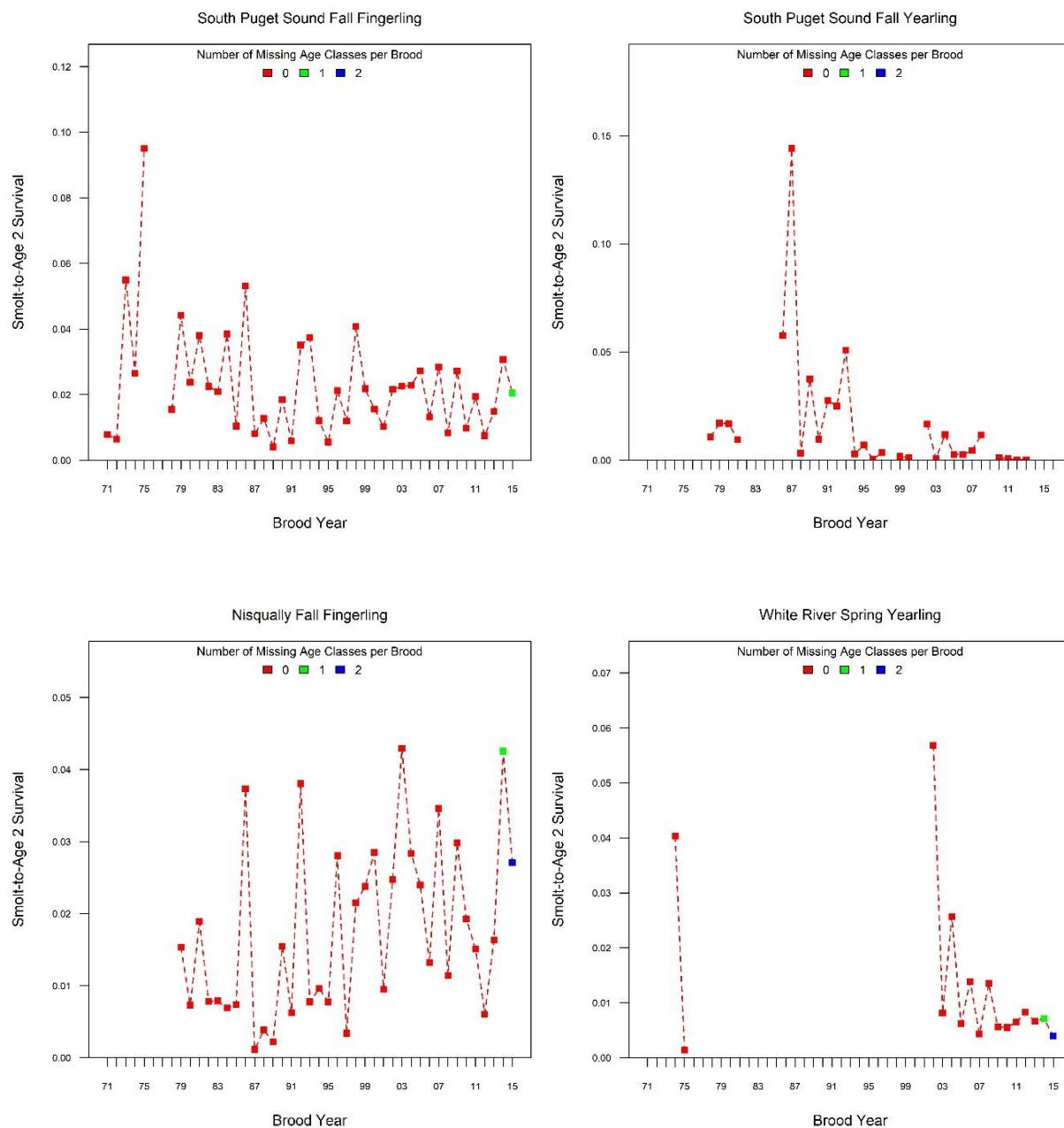
Appendix G9 continued.



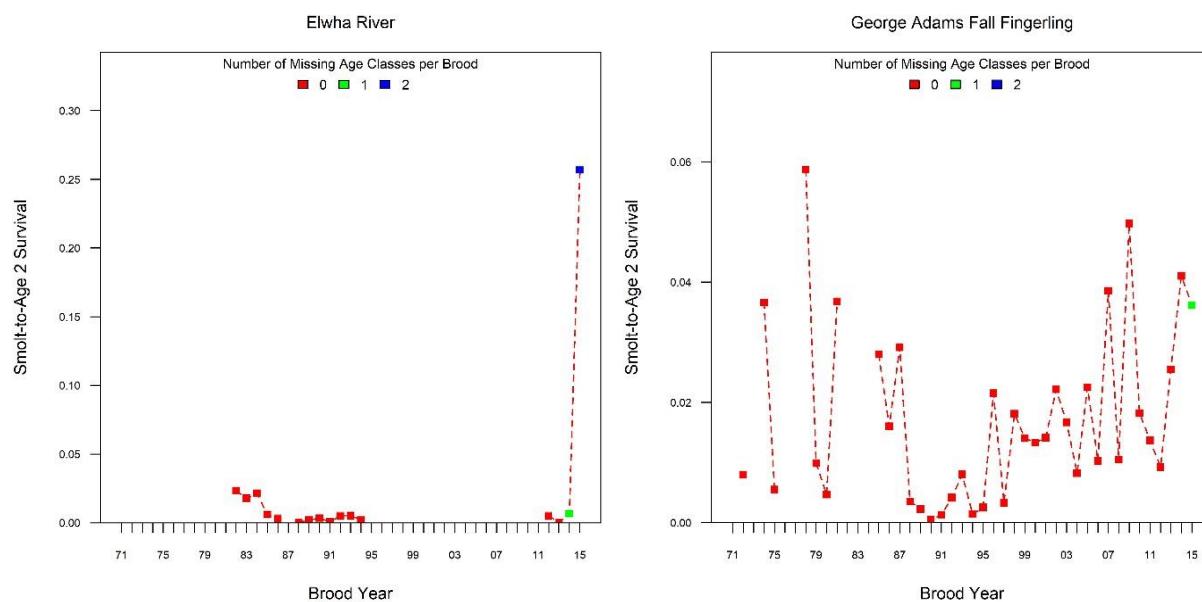
Appendix G10—Smolt-to-youngest age survival rates for Central Puget Sound CWT indicator stocks Stillaguamish Fall Fingerling and Skykomish Fall Fingerling.



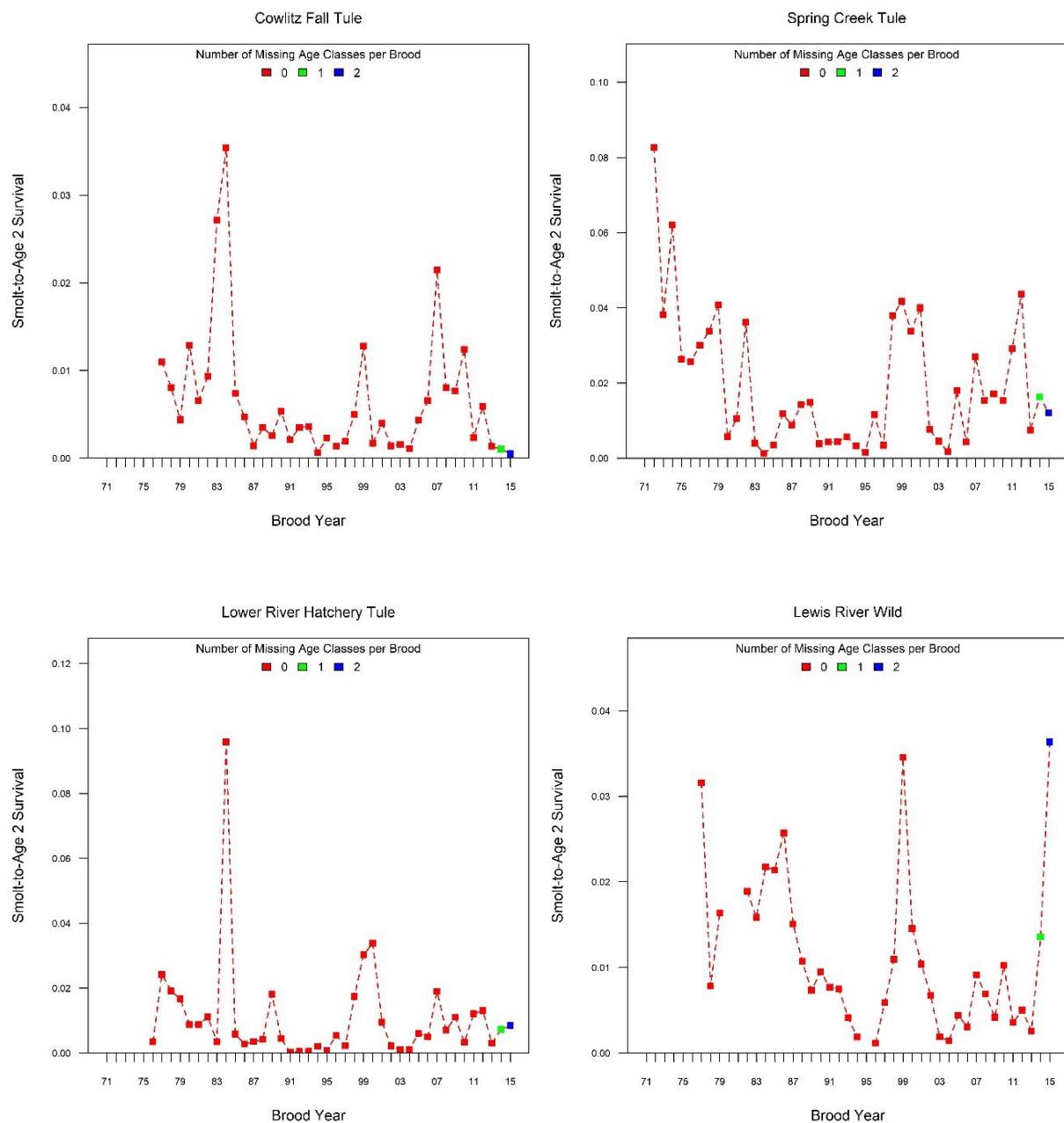
Appendix G11—Smolt-to-youngest age survival rates for Southern Puget Sound CWT indicator stocks.



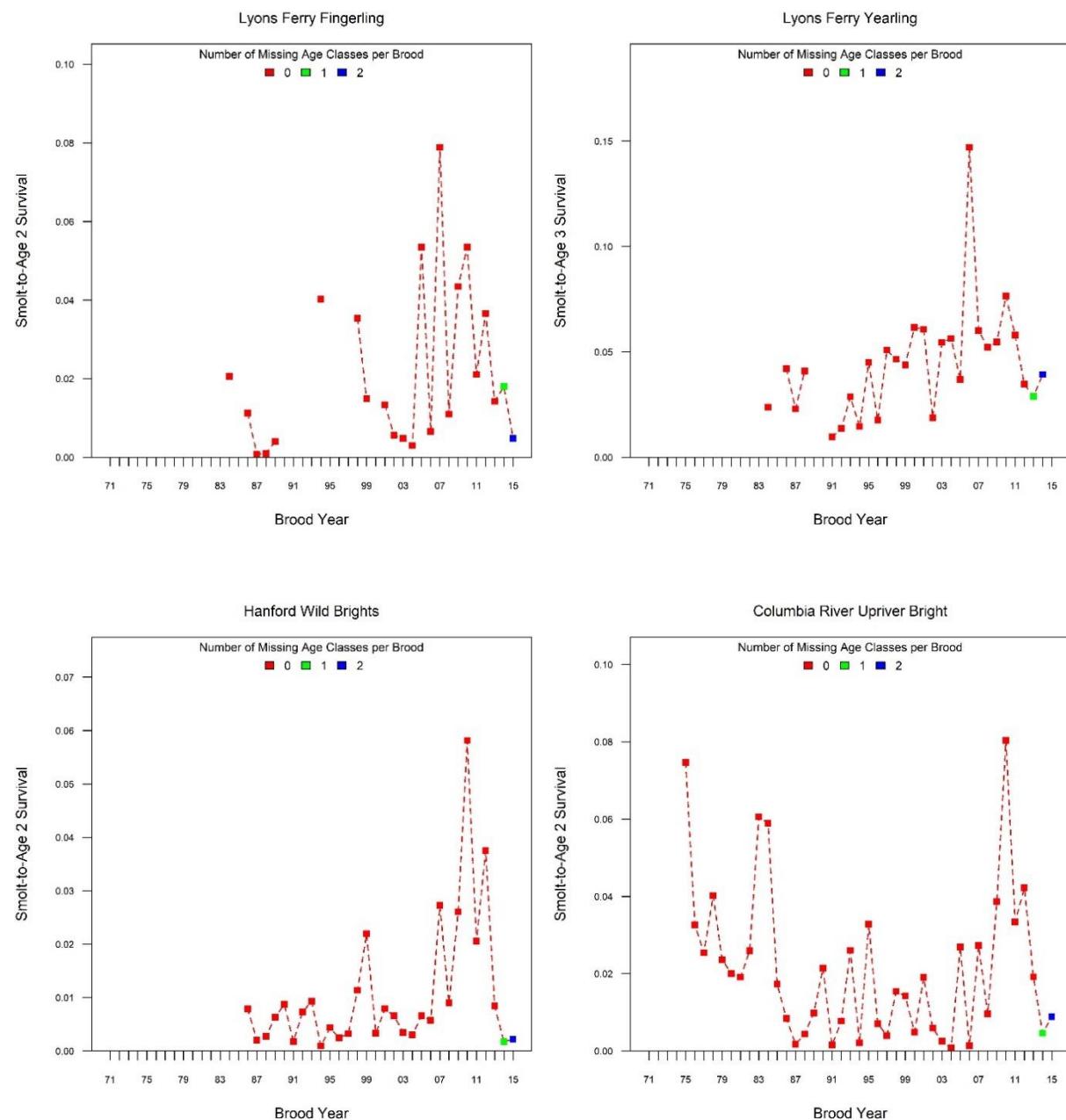
Appendix G12—Smolt-to-youngest age survival rates for Juan de Fuca and Hood Canal CWT indicator stocks Elwha River and George Adams (Skokomish River) Fall Fingerling.



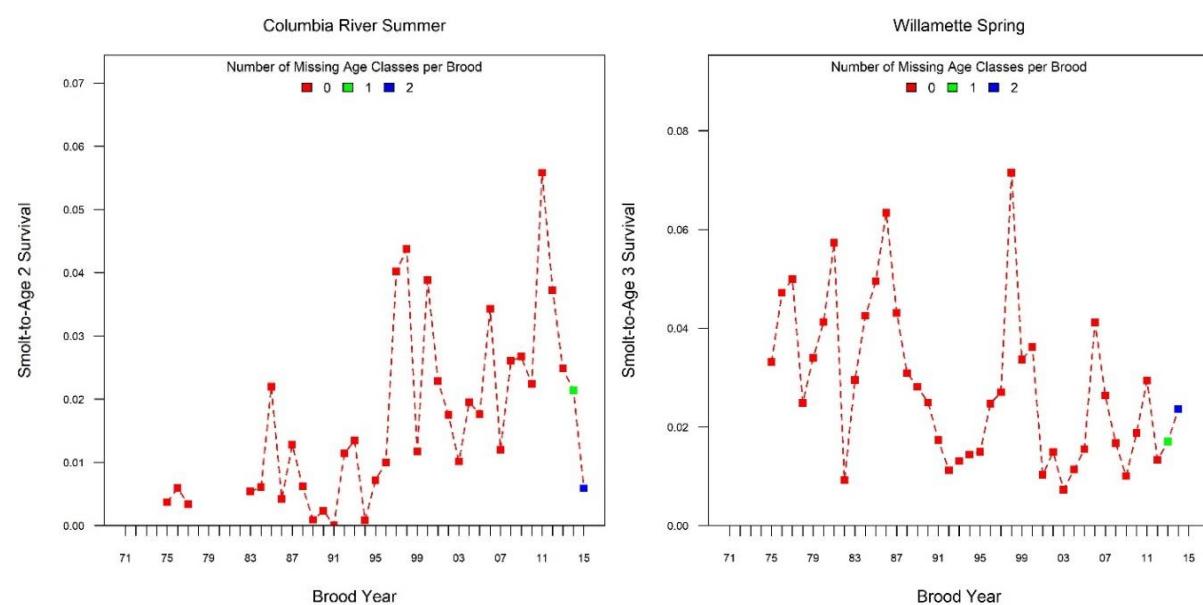
Appendix G13—Smolt-to-youngest age survival rates for summer and fall Columbia River, including Willamette Spring, Chinook CWT indicator stocks.



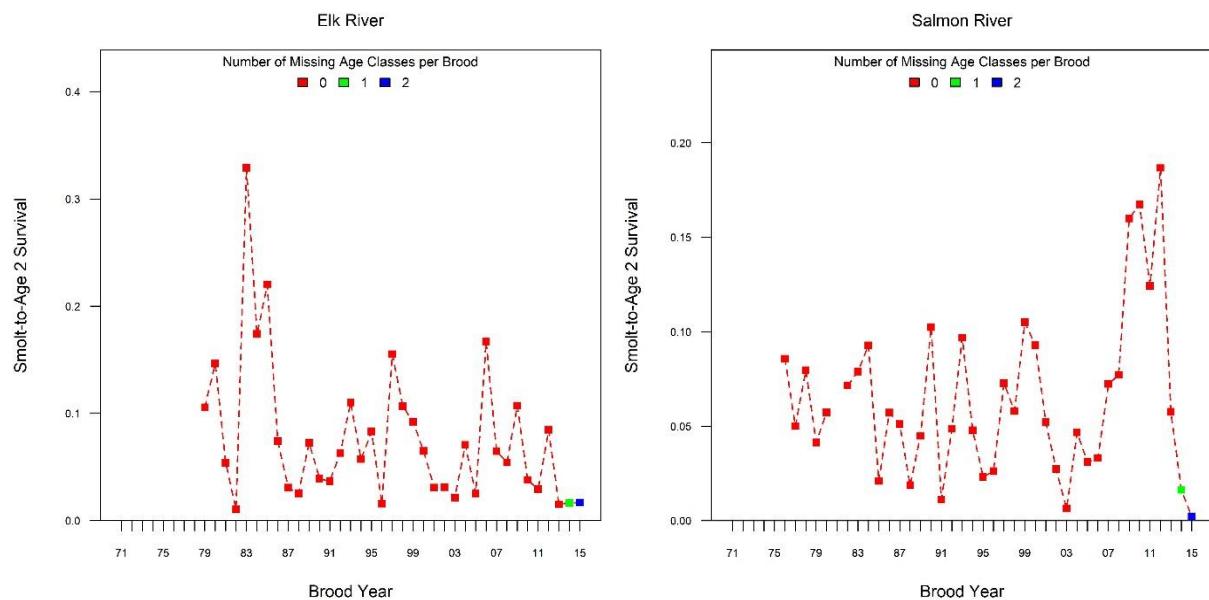
Appendix G13 continued.



Appendix G13 continued.



Appendix G14—Smolt-to-youngest age survival rates for North Oregon Coast CWT indicator stocks.



APPENDIX H: TERMINAL AREA ADJUSTMENT DATA

LIST OF APPENDIX H TABLES

<i>Appendix H1— Robertson Creek Fall (RBT) harvest rate and terminally adjusted harvest rates for the Northwest Vancouver Island (NWVI) and Southwest Vancouver Island (SWVI) escapement indicator stocks, 1979–2019.</i>	231
<i>Appendix H2— Quinsam Hatchery (QUI) harvest rate and terminally adjusted harvest rates for the East Vancouver Island North (EVIN) escapement indicator stock, 1979–2019.</i>	232
<i>Appendix H3— Queets River Fall (QUE) harvest rate and terminally adjusted harvest rates for the Grays Harbor, Hoh River, and Quillayute River escapement indicator stocks, 1979–2018.</i>	233
<i>Appendix H4— Salmon River Hatchery (SRH) harvest rate and terminally adjusted harvest rates for Nehalem, Siletz, and Siuslaw escapement indicator stocks, 1979–2018.</i>	234
<i>Appendix H5— Elk River Hatchery (ELK) harvest rate and terminally adjusted harvest rates for South Umpqua and Coquille escapement indicator stocks, 1979–2018.</i>	235

Fishery Acronym	ERA Fishery
TWCVI TERM N	West Coast Vancouver Island Terminal Net
TWCVI TERM S	West Coast Vancouver Island Terminal Sport
TWCVI FS	West Coast Vancouver Island Terminal Freshwater Sport
TJNST TERM S	Johnstone Strait Terminal Sport
TGS FS	Strait of Georgia Terminal Freshwater Sport
WA CST N	Washington Coast Net
TWAC FN	Washington Coast Terminal Freshwater Net
TNF TERM S	North of Falcon Terminal Sport
TSF TERM FS	South of Falcon Terminal Freshwater Sport
TOR TERM FS	Oregon Terminal Freshwater Sport

Appendix H1— Robertson Creek Fall (RBT) harvest rate and terminally adjusted harvest rates for the Northwest Vancouver Island (NWVI) and Southwest Vancouver Island (SWVI) escapement indicator stocks, 1979–2019.

Year	Robertson Creek Fall			Northwest Vancouver Island			Southwest Vancouver Island		
	Fishery			Fishery			Fishery		
	TWCVI TERM N	TWCVI TERM S	TWCVI FS	TWCVI TERM N	TWCVI TERM S	TWCVI FS	TWCVI TERM N	TWCVI TERM S	TWCVI FS
1979	0%	5%	0%	0%	0%	0%	0%	0%	0%
1980	10%	3%	0%	0%	0%	0%	0%	0%	0%
1981	10%	4%	0%	0%	0%	0%	0%	0%	0%
1982	13%	6%	0%	0%	0%	0%	0%	0%	0%
1983	15%	5%	0%	0%	0%	0%	0%	0%	0%
1984	15%	14%	0%	0%	0%	0%	0%	0%	0%
1985	1%	15%	0%	0%	0%	0%	0%	0%	0%
1986	0%	28%	0%	0%	0%	0%	0%	0%	0%
1987	0%	20%	0%	0%	0%	0%	0%	0%	0%
1988	6%	12%	1%	0%	0%	0%	0%	0%	0%
1989	16%	16%	0%	0%	0%	0%	0%	0%	0%
1990	7%	8%	0%	0%	0%	0%	0%	0%	0%
1991	13%	13%	0%	0%	0%	0%	0%	0%	0%
1992	0%	5%	0%	0%	0%	0%	0%	0%	0%
1993	7%	12%	0%	0%	0%	0%	0%	0%	0%
1994	11%	15%	0%	0%	0%	0%	0%	0%	0%
1995	6%	8%	0%	0%	0%	0%	0%	0%	0%
1996	0%	2%	0%	0%	0%	0%	0%	0%	0%
1997	6%	17%	0%	0%	0%	0%	0%	0%	0%
1998	4%	16%	0%	0%	0%	0%	0%	0%	0%
1999	6%	18%	0%	0%	0%	0%	0%	0%	0%
2000	0%	0%	0%	0%	0%	0%	0%	0%	0%
2001	0%	1%	0%	0%	0%	0%	0%	0%	0%
2002	7%	15%	0%	0%	0%	0%	0%	0%	0%
2003	8%	16%	0%	0%	0%	0%	0%	0%	0%
2004	12%	13%	0%	0%	0%	0%	0%	0%	0%
2005	31%	6%	0%	0%	0%	0%	0%	0%	0%
2006	25%	10%	0%	0%	0%	0%	0%	0%	0%
2007	25%	12%	0%	0%	0%	0%	0%	0%	0%
2008	20%	13%	0%	0%	0%	0%	0%	0%	0%
2009	6%	11%	1%	0%	0%	0%	0%	0%	0%
2010	4%	2%	1%	0%	0%	0%	0%	0%	0%
2011	17%	16%	0%	0%	0%	0%	0%	0%	0%
2012	14%	15%	0%	0%	0%	0%	0%	0%	0%
2013	0%	2%	0%	0%	0%	0%	0%	0%	0%
2014	0%	5%	0%	0%	0%	0%	0%	0%	0%
2015	10%	9%	0%	0%	0%	0%	0%	0%	0%
2016	6%	6%	0%	0%	0%	0%	0%	0%	0%
2017	15%	10%	0%	0%	0%	0%	0%	0%	0%
2018	29%	10%	0%	0%	0%	0%	0%	0%	0%
2019	35%	9%	0%	0%	0%	0%	0%	0%	0%

Appendix H2— Quinsam Hatchery (QUI) harvest rate and terminally adjusted harvest rates for the East Vancouver Island North (EVIN) escapement indicator stock, 1979–2019.

Year	Quinsam Hatchery		East Vancouver Island North	
	Fishery		Fishery	
	TJNST TERM S	TGS FS	TJNST TERM S	TGS FS
1979	1%	0%	0%	0%
1980	1%	0%	0%	0%
1981	0%	0%	0%	0%
1982	0%	0%	0%	0%
1983	1%	0%	0%	0%
1984	2%	0%	0%	0%
1985	0%	0%	0%	0%
1986	1%	0%	0%	0%
1987	3%	0%	0%	0%
1988	2%	0%	0%	0%
1989	0%	0%	0%	0%
1990	6%	0%	0%	0%
1991	3%	0%	0%	0%
1992	0%	0%	0%	0%
1993	2%	0%	0%	0%
1994	1%	0%	0%	0%
1995	2%	0%	0%	0%
1996	2%	0%	0%	0%
1997	3%	0%	0%	0%
1998	4%	0%	0%	0%
1999	11%	0%	0%	0%
2000	2%	0%	0%	0%
2001	0%	0%	0%	0%
2002	4%	0%	0%	0%
2003	4%	0%	0%	0%
2004	3%	0%	0%	0%
2005	7%	0%	0%	0%
2006	1%	0%	0%	0%
2007	3%	0%	0%	0%
2008	0%	0%	0%	0%
2009	2%	0%	0%	0%
2010	6%	0%	0%	0%
2011	3%	0%	0%	0%
2012	4%	0%	0%	0%
2013	2%	0%	0%	0%
2014	1%	0%	0%	0%
2015	1%	0%	0%	0%
2016	4%	0%	0%	0%
2017	3%	0%	0%	0%
2018	2%	0%	0%	0%
2019	1%	0%	0%	0%

Appendix H3— Queets River Fall (QUE) harvest rate and terminally adjusted harvest rates for the Grays Harbor, Hoh River, and Quillayute River escapement indicator stocks, 1979–2018.

Year	Queets River Fall			Grays Harbor			Hoh			Quillayute		
	Fishery			Fishery			Fishery			Fishery		
	TWAC FN	WA CST N	TNF TERM S	TWAC FN	WA CST N	TNF TERM S	TWAC FN	WA CST N	TNF TERM S	TWAC FN	WA CST N	TNF TERM S
1979	-	-	-	44%	0%	0%	23%	0%	0%	41%	0%	0%
1980	0%	0%	0%	44%	0%	0%	21%	0%	0%	12%	0%	0%
1981	27%	0%	0%	50%	0%	0%	23%	0%	0%	16%	0%	0%
1982	26%	0%	0%	37%	0%	0%	22%	0%	0%	26%	0%	0%
1983	16%	0%	0%	59%	0%	0%	24%	0%	0%	45%	0%	0%
1984	26%	0%	0%	38%	0%	0%	27%	0%	0%	13%	0%	0%
1985	13%	0%	0%	8%	0%	0%	37%	0%	0%	27%	0%	0%
1986	7%	0%	0%	36%	0%	0%	17%	0%	0%	25%	0%	0%
1987	20%	0%	0%	39%	0%	0%	35%	0%	0%	39%	0%	0%
1988	13%	0%	0%	27%	0%	0%	40%	0%	0%	31%	0%	0%
1989	26%	0%	0%	52%	0%	0%	41%	0%	0%	42%	0%	0%
1990	13%	0%	0%	55%	0%	0%	33%	0%	0%	19%	0%	0%
1991	15%	0%	0%	54%	0%	0%	46%	0%	0%	18%	0%	0%
1992	15%	0%	0%	42%	0%	0%	22%	0%	0%	18%	0%	0%
1993	14%	0%	0%	55%	0%	0%	23%	0%	0%	8%	0%	0%
1994	20%	0%	0%	47%	0%	0%	8%	0%	0%	13%	0%	0%
1995	26%	0%	0%	54%	0%	0%	24%	0%	0%	18%	0%	0%
1996	17%	0%	0%	35%	0%	0%	26%	0%	0%	21%	0%	0%
1997	20%	0%	0%	38%	0%	0%	42%	0%	0%	11%	0%	0%
1998	10%	0%	4%	34%	0%	0%	21%	0%	0%	15%	0%	0%
1999	8%	0%	0%	15%	0%	0%	35%	0%	0%	30%	0%	0%
2000	2%	0%	0%	37%	0%	0%	34%	0%	0%	22%	0%	0%
2001	15%	0%	0%	50%	0%	0%	38%	0%	0%	32%	0%	0%
2002	17%	0%	0%	24%	0%	0%	23%	0%	0%	36%	0%	0%
2003	12%	0%	0%	10%	0%	0%	30%	0%	0%	22%	0%	0%
2004	9%	0%	0%	23%	0%	0%	27%	0%	0%	38%	0%	0%
2005	16%	0%	0%	12%	0%	0%	21%	0%	0%	23%	0%	0%
2006	13%	0%	0%	22%	0%	0%	34%	0%	0%	26%	0%	0%
2007	13%	0%	0%	26%	0%	0%	36%	0%	0%	26%	0%	0%
2008	19%	0%	0%	14%	0%	0%	23%	0%	0%	31%	0%	0%
2009	17%	0%	0%	31%	0%	0%	24%	0%	0%	47%	0%	0%
2010	14%	0%	0%	27%	0%	0%	19%	0%	0%	34%	0%	0%
2011	20%	0%	0%	33%	0%	0%	40%	0%	0%	41%	0%	0%
2012	20%	0%	0%	41%	0%	0%	36%	0%	0%	47%	0%	0%
2013	19%	0%	0%	33%	0%	0%	62%	0%	0%	43%	0%	0%
2014	13%	0%	0%	32%	0%	0%	27%	0%	0%	62%	0%	0%
2015	7%	0%	0%	42%	0%	0%	26%	0%	0%	48%	0%	0%
2016	10%	0%	0%	29%	0%	0%	6%	0%	0%	27%	0%	0%
2017	24%	0%	0%	25%	0%	0%	29%	0%	0%	55%	0%	0%
2018	14%	0%	0%	22%	0%	0%	8%	0%	0%	41%	0%	0%

Appendix H4— Salmon River Hatchery (SRH) harvest rate and terminally adjusted harvest rates for Nehalem, Siletz, and Siuslaw escapement indicator stocks, 1979–2018.

	Salmon River Hatchery	Nehalem	Siletz	Siuslaw
Year	Fishery	Fishery	Fishery	Fishery
	TSF TERM FS	TSF TERM FS	TSF TERM FS	TSF TERM FS
1979	11%	5%	9%	18%
1980	15%	11%	10%	10%
1981	16%	4%	15%	14%
1982	24%	10%	10%	15%
1983	21%	9%	14%	35%
1984	18%	6%	10%	25%
1985	12%	4%	6%	13%
1986	33%	10%	7%	15%
1987	23%	14%	14%	22%
1988	13%	13%	8%	14%
1989	22%	11%	13%	18%
1990	21%	21%	8%	14%
1991	22%	25%	9%	17%
1992	14%	22%	9%	12%
1993	22%	40%	22%	52%
1994	17%	27%	6%	16%
1995	29%	35%	16%	24%
1996	46%	24%	11%	22%
1997	18%	18%	19%	32%
1998	25%	18%	9%	35%
1999	31%	15%	15%	16%
2000	19%	14%	15%	40%
2001	25%	19%	11%	29%
2002	31%	12%	10%	19%
2003	31%	11%	13%	17%
2004	23%	25%	45%	18%
2005	29%	18%	22%	23%
2006	25%	21%	17%	20%
2007	18%	18%	27%	44%
2008	13%	14%	25%	20%
2009	24%	1%	17%	22%
2010	42%	9%	7%	22%
2011	29%	16%	36%	33%
2012	22%	14%	18%	20%
2013	22%	19%	20%	36%
2014	21%	24%	20%	27%
2015	22%	28%	41%	36%
2016	11%	13%	21%	39%
2017	12%	14%	30%	37%
2018	9%	9%	43%	61%

Appendix H5—Elk River Hatchery (ELK) harvest rate and terminally adjusted harvest rates for South Umpqua and Coquille escapement indicator stocks, 1979–2018.

Year	Elk River		South Umpqua		Coquille	
	Fishery		Fishery		Fishery	
	TSF TERM FS	TOR TERM T	TSF TERM FS	TOR TERM T	TSF TERM FS	TOR TERM T
1979	-	-	20%	0%	16%	0%
1980	-	-	22%	0%	12%	0%
1981	-	-	19%	0%	13%	0%
1982	46%	4%	21%	0%	8%	0%
1983	29%	6%	9%	0%	36%	0%
1984	20%	6%	9%	0%	11%	0%
1985	32%	4%	7%	0%	14%	0%
1986	15%	9%	16%	0%	11%	0%
1987	25%	6%	12%	0%	16%	0%
1988	36%	0%	10%	0%	13%	0%
1989	32%	12%	6%	0%	15%	0%
1990	38%	5%	11%	0%	13%	0%
1991	28%	0%	13%	0%	20%	0%
1992	35%	4%	10%	0%	13%	0%
1993	21%	12%	28%	0%	27%	0%
1994	34%	10%	11%	0%	24%	0%
1995	32%	8%	11%	0%	13%	0%
1996	12%	16%	13%	0%	18%	0%
1997	18%	12%	6%	0%	14%	0%
1998	10%	8%	43%	0%	19%	0%
1999	20%	16%	29%	0%	14%	0%
2000	19%	20%	27%	0%	20%	0%
2001	14%	8%	24%	0%	18%	0%
2002	10%	11%	14%	0%	17%	0%
2003	18%	17%	20%	0%	17%	0%
2004	7%	18%	20%	0%	19%	0%
2005	11%	16%	55%	0%	26%	0%
2006	12%	18%	38%	0%	23%	0%
2007	17%	17%	22%	0%	29%	0%
2008	20%	2%	20%	0%	15%	0%
2009	17%	1%	25%	0%	7%	0%
2010	12%	6%	31%	0%	10%	0%
2011	18%	16%	38%	0%	24%	0%
2012	16%	13%	35%	0%	29%	0%
2013	14%	17%	33%	0%	40%	0%
2014	13%	12%	30%	0%	25%	0%
2015	16%	20%	20%	0%	31%	0%
2016	14%	4%	35%	0%	20%	0%
2017	15%	9%	25%	0%	22%	0%
2018	13%	15%	27%	0%	40%	0%

APPENDIX I: PARAMETERS USED IN THE 2020 EXPLOITATION RATE ANALYSIS

The following two tables summarize the notations used throughout this report.

LIST OF APPENDIX I TABLES

<i>Appendix I1— Parameter definitions for all equations except those used for the Stratified Proportional Fishery Index (SPFI).....</i>	<i>236</i>
<i>Appendix I2— Parameter descriptions for equations used for the stratified proportional fishery index (SPFI).</i>	<i>237</i>

Appendix I1— Parameter definitions for all equations except those used for the Stratified Proportional Fishery Index (SPFI).

Parameter	Description
a	age class
A	set of all ages that meet selection criteria
$AEQ_{BY,a,f}$	adult equivalent factor in brood year BY , age a , and fishery f (for terminal fisheries, $AEQ = 1.0$ for all ages)
$CohSurv_{BY,a=2or3}$	cohort survival of CWT fish to age 2 or 3 for brood year BY
$AvgMatRte_a$	average maturation rate for age a
$BPYR$	base period year
$BYER_{BY,f}$	brood year exploitation rate in adult equivalents for brood year BY and fishery f
$BPISBMR_{f,a}$	average base period ISBM exploitation rate for fishery f and age a
BY	brood year
$Cohort_{BY,a}$	cohort by brood year BY and age a (<i>where stock is implied from context</i>)
$Cohort_{s,BY,a}$	cohort by stock s , brood year BY and age a (<i>where stocks are defined explicitly in a summation</i>)
CY	calendar year
$CYDist_{CY,F}$	proportion of total stock mortality (or escapement) in a calendar year CY attributable to a fishery or a set of fisheries F
CY_{end}	end calendar year for average
CY_{start}	start calendar year for average
$d_{t,s,a}$	distribution parameter for time step t , stock s , and age a
$Esc_{Y,a}$	escapement past all fisheries for either brood year BY or calendar year CY and age a
$ER_{s,a,f,CY}$	exploitation rate at age a divided by cohort size at age a for stock s in fishery f in year CY
$EV_{n,BY}$	the stock productivity scalar for iteration n and brood year BY
f	a single fishery
$f \in \{F\}$	a fishery f within the set of fisheries of interest

Parameter	Description
F	ocean, terminal or other sets of fisheries or spawning escapements
$FI_{f,CY}$	fishery exploitation rate index for fishery f in year CY
$FP_{a,s,CY,f}$	ratio of $ER_{s,a,f,CY}$ to $BPIISBMER$
$ISBMIdxCY$	ISBM index for calendar year CY
$MatRte_{a-1,BY}$	maturity rate at next younger age by brood year
$Maxage$	maximum age of stock (generally age 6 for stream type stocks, age 5 for ocean type stocks)
$Minage$	minimum age of stock (generally age 3 for stream type stocks, age 2 for ocean type stocks)
$Morts_{CY,a,f}$	landed or total fishing mortality in year CY and age a in fishery f
NM_a	annual natural mortality prior to fishing on age a cohort
$Numfisheries$	total number of fisheries
RT_{CY}	ratio of the catch quota in the current year to the catch that would be predicted given current abundance, current size limits, and base period exploitation rates
s	a particular stock
S	set of all stocks that meet selection criteria
SC_{BY}	ratio of the estimated and model predicted terminal run for brood year BY
$Surv_a$	survival rate ($1-NM_a$) by age
$TotMorts_{BY,a,f}$	total fishing related mortality for brood year BY or calendar year CY or during the base period BPER and age a in fishery f
$RepMorts_{BY,a,f}$	Reported fishing-related mortality for brood year BY or calendar year CY or during the base period BPER and age a in fishery f
$TotCWTRelease_{BY}$	number of CWT fish released in the indicator group in brood year BY

Appendix I2— Parameter descriptions for equations used for the stratified proportional fishery index (SPFI).

Parameter	Description
$A_{t,CY}$	Alaska hatchery origin catch by strata t , year CY
$c_{t,CY,s,a}$	adult equivalent CWT catch by strata t , year CY , stock s and age a
$C_{t,CY}$	catch by strata t , year CY
$d_{t,s,a}$	distribution parameter by strata t , stock s and age a
$h_{t,CY}$	CWT harvest rate by strata t , year CY
H_{CY}	harvest rate by year CY
$H_{t,CY}$	harvest rate by strata t , year CY
$n_{CY,s,a}$	CWT cohort size by year CY , stock s and age a
$r_{t,CY,s,a}$	CWT recoveries by strata t , year CY , stock s and age a
S_{CY}	SPFI by year CY
$S_{t,CY}$	SPFI by strata t , year CY