PACIFIC SALMON COMMISSION
JOINT CHINOOK
TECHNICAL COMMITTEE REPORT

PRELIMINARY RETROSPECTIVE ANALYSIS OF THE U.S. & CANADIAN PROPOSALS FOR ABUNDANCE-BASED REGIMES FOR CHINOOK FISHERIES
REPORT TCCHINOOK(99)-1

January 28, 1999

Table of Contents

List of Tables

List of Figures

Acknowledgements

The analysis for this report was completed primarily due to the extensive efforts of Gary Morishima (model coding), Dell Simmons (model validation and model runs), John Carlile (summary tables), and Jim Scott (report compilation). The CTC extends its thanks to each of them for the large contribution that they made toward completing this assignment.

1.0 Introduction

In February of 1998, the United States (U.S.) and Canada exchanged proposals for abundance-based management regimes for chinook salmon. While many aspects of the proposals are similar, conceptual and technical differences exist. To identify and determine the significance of those differences, the Commissioners asked a bilateral workgroup to provide responses to a list of expository questions (see TCChinook (98)-01) and to conduct a retrospective analysis of the proposals. The retrospective analysis simulates the effects the proposed regimes would have had upon the fishing mortality, exploitation rates, and escapement of chinook salmon if the regimes had been in place from 1985 through 1996.

Briefly, both the U.S. and Canadian proposals include: 1) an abundance-based management approach for chinook salmon that includes limits for mixed-stock ocean fisheries (aggregate abundance-based management (AABM)) and constraints for the remaining fisheries (individual stock-based management (ISBM)); 2) provisions for adjusting allowable harvests in response to stock status; 3) a list of technical assignments; 4) approaches to reduce incidental mortalities; and 5) provisions for terminal exclusions, hatchery add-ons, and overage/underage policies.

The Chinook Technical Committee (CTC) has developed a version of the Pacific Salmon Commission (PSC) chinook model that provides the capability to simulate many features of the U.S. and Canadian proposals for AABM and ISBM regimes. Most importantly, the model now allows the specification of a set of rules that establish fishery specific impact limits that vary by year in response to the abundance of chinook salmon. The rules used by the CTC in this analysis are based upon our interpretation of the proposals (as assisted by the Commissioners during bilateral deliberations in December, 1998). However, not all features of the proposed regimes are currently simulated, nor are all factors affecting chinook salmon fishing mortality and escapement considered. Important limitations of the analysis include the following:

Survival Rates. The retrospective analysis does not address the question "What will be the effects of the proposed regimes on fishery catches and escapement in future years". Catch and escapement in the future will depend to a large extent on the effects of the freshwater and marine environment on chinook salmon survival rates. Survival rates for most stocks are currently substantially less than the rates for broods that were harvested in the late 1980s.

Stock Status. Provisions for adjusting fishery impacts in response to stock status are not simulated. This decision was driven by several factors: 1) the provision is not fully developed in the Canadian proposal; and 2) interpretation of the U.S. proposal is difficult, and implementation occurs "only for those stocks for which the escapement goal review has been completed and the escapement goal agreed to." The escapement goal review has not yet been completed by the CTC.

Fishery Impacts. Simulated fishery impacts are identical to the target catch or mortality in each year. In practice, uncertainty in predictions and management error will result in impacts that differ from the target values.

Time Stratification. The PSC chinook model does not currently have the capability to assess changes in stock composition, abundance, or exploitation rates at a time step finer than one year. Therefore, analysis of the Canadian proposal for the West Coast Vancouver Island (WCVI) and North of Leadbetter Point (NLP) troll fishery was predicated on the understanding that the total allowable mortalities would be computed based on the aggregate abundance of chinook available on an annual basis to the WCVI and NLP troll fisheries (see June 12, 1998 letter from the CTC to the chairs of the PSC).

Fishery Stratification. Fisheries in the PSC chinook model generally correspond to those identified in the U.S. and Canadian proposals. One exception is the NLP troll fishery referenced in the Canadian proposal. The closest approximation in the PSC chinook model, and the fishery used as a surrogate in the CTC analysis, is the U.S. south ocean troll fishery. This model fishery includes all troll fisheries off the coasts of the states of Washington, Oregon, and California that impact stocks from Puget Sound, the Washington Coast, the Columbia River, and far north migrating stocks from the Oregon coast (see June 12, 1998 letter from the CTC to the chairs of the PSC).

2.0 Simulation of Proposed Regimes

The CTC simulated the proposed regimes using a retrospective analysis for the years 1985 through 1996. The retrospective analysis examines the effects the proposed regimes would have had upon the fishing mortality, exploitation rates, and escapement of chinook salmon if the regimes had been in place from 1985 through 1996. A retrospective, rather than forward analysis, was used because of uncertainty in future survival rates, and the limited capabilities of the current version of the PSC chinook model to simulate multiple scenarios for survival rates.

The CTC retrospective analysis includes two variants of each Party's proposal, with the variants differing in the management regime applied to the ISBM fisheries. Previous discussions within the CTC indicated that substantial uncertainty existed in the interpretation of both the U.S. and Canadian proposals for the ISBM fisheries (see TCChinook (98)-01). This uncertainty led to a recommendation by the CTC that each proposal be modeled with ISBM fisheries at both actual fishery levels and at a 25% reduction from the 1979 through 1982 base period. This recommendation was accepted by the commissioners at the December, 1998 Executive Session of the PSC.

The results from the simulation of the proposals are compared with a benchmark, the 1998 preseason calibration of the PSC chinook model. The benchmark run and four retrospective model runs are summarized below and discussed in greater detail in Section 2.1:

> **Benchmark** provides the base against which to compare the results from the proposed regimes. The Benchmark run includes the estimates of stock productivity, escapements, fishery catches, chinook non-retention mortality, and sublegal chinook mortality used by the CTC in the 1998 preseason calibration of the PSC chinook model (calibration 9812).
>
> **US-Act** simulates the U.S. proposal for AABM fisheries in combination with the actual post-season estimates of exploitation rates in the U.S. proposed ISBM fisheries.
>
> **US-25** simulates the U.S. proposal for AABM fisheries in combination with exploitation rates in the U.S. proposed ISBM fisheries reduced by 25% from the 1979 through 1982 base period[1].
>
> **Can-Act** simulates the Canadian proposal for AABM fisheries combined with actual post-season estimates of exploitation rates in the Canadian proposed ISBM fisheries.
>
> **Can-25** simulates the Canadian proposal for AABM fisheries combined with exploitation rates in the Canadian proposed ISBM fisheries proposed reduced by 25% from the 1979 through 1982 base period[1].

[1] See exceptions for the WCVI net and Washington Coastal net fisheries identified in sections 2.1.1 and 2.1.2.

2.1 Computation of Allowable Impacts and Allocation Among Fisheries

2.1.1 U.S. Proposal

The U.S. proposal identifies four regions in which to apply AABM, and each region can include up to five fisheries:

1) Southeast Alaska (SEAK) – SEAK troll, SEAK sport, and SEAK net

2) North/Central British Columbia (NCBC) – North British Columbia (NBC) troll, NBC net, Central British Columbia (CBC) troll, CBC net, and NCBC sport

3) WCVI – WCVI troll and WCVI outside sport

4) Strait of Georgia (GS) – GS troll and GS sport

The U.S. proposal provides explicit procedures for relating an abundance index (AI) and a harvest rate index (HRI) to compute the total allowable catch for AABM fisheries within a region, but does not specify the allocation of that catch among gear types (Table 1). With the exception of the SEAK fisheries, the CTC chose to allocate the total allowable catch based on the average proportion of the catch taken by each gear type in the years 1985 through 1996. For the SEAK fishery, 20,000 fish were allocated to the net fishery, and the sport fishery catch was set to 25% of the troll fishery catch (Table 1).

The ISBM fisheries were simulated using either post-season estimates of exploitation rates (US-Act), or with a 25% reduction in exploitation rates from the 1979 through 1982 base period (US-25). Two exceptions existed to the latter case. For the WCVI net fishery, and for the Washington Coastal net fishery, post-season estimates of exploitation rates were used for both US-Act and US-25. The WCVI net fishery is managed primarily to meet escapement objectives for the Robertson Creek Hatchery stock (one component of the WCVI hatchery stock), and much of the Washington Coastal net fishery is managed with stepped harvest rates and an escapement floor. The CTC concluded that regimes in these fisheries were unlikely to be modified in a manner that would consistently reduce exploitation rates by 25% from the 1979 through 1982 base period.

2.1.2 Canadian Proposal

The Canadian proposal for AABM fisheries differs from the U.S. proposal in at least three fundamental ways:

1) the allowable fishery impacts are derived from a measure of abundance that is computed for fishery aggregates that span both nations rather than a fishery (or fishery aggregates) within a nation (Table 2);

2) the allowable fishery impacts are expressed in terms of total adult equivalent (AEQ) mortality rather than catch;

3) the HRI is a 50% reduction from the 1979 through 1982 base period rather than a stepped schedule in which the HRI is dependent on the AI.

The Canadian proposal does not specify the means to allocate the total allowable impacts between fisheries. Based upon recommendations of Canadian members of the CTC, 50% of the allowable impacts within the SEAK/NBC regional aggregate were allocated to SEAK, and 75% of the allowable impacts within the WCVI/NLP regional aggregate were allocated to the WCVI troll fishery. Additional information regarding the allocation of allowable impacts between gear types is provided in Table 2.

Fisheries designated as ISBM in the Canadian proposal were simulated in the same manner as previously described for the U.S. proposal.

2.2 Modifications to PSC Chinook Model

Simulation of the proposed regimes required extensive modification of the PSC chinook model. While a detailed description of those modifications is beyond the scope of this report, we have provided a summary of the sequence of computations in the base model and in the enhanced version used in the simulation of the U.S. and Canadian proposals (Table 3).

Extensive revisions were required for the model computations for chinook nonretention (CNR) mortality. When retrospective assessments of abundance-based regimes are performed, user-supplied data on season length, effort, and encounters are no longer directly applicable since allowable catch levels change from historically observed levels. The AABM version of the PSC chinook model has incorporated new algorithms that adjust user-supplied data for differences in landed catch between the level allowed under AABM levels and observed actual catches. Revisions to the three general algorithms used by the CTC are described below.

RT Method. No change in the algorithm is required.

Reported Encounter Method. This method uses user-supplied estimates of legal-sized CNR encounters (LCNREnc), sublegal-sized CNR encounters (SubCNREnc), and landed catch (LC).

Step 1. Compute total potential legal encounters

PotLegEnc = Potential Encounters (Real Fish) = Observed Catch+Reported Legal CNR/Legal Selectivity Factor)

Step 2. Convert model catch (preterminal and terminal combined) under AABM regime to real fish (AdjMC) and estimate the number of legal sized encounters (LCNRABM)

LCNRABM = (PotLegEnc-AdjMC)*Legal Selectivity Factor

Step 3. Adjust LCNREnc to model fish and estimate legal CNR mortality

Legal CNRMortality = LCNREnc*(Release + Drop Off Mortality Rate for legal-sized fish)

Step 4. Estimate sublegal CNR encounters

Sublegal Encounters=LCNRABM*(SubCNREnc/LCNREnc)

Step 5. Estimate sublegal CNR mortality

Sublegal CNRMortality = Sublegal Encounters*(Release + Drop Off Mortality Rate for sublegal-sized fish)

Effort and Season Length Method. This method utilizes data on the number of days (or effort) of chinook retention and the number of days (or effort) of fishing under non-retention regulations.

Step 1. Compute new retention period in proportion to observed retention data

New Retention = Observed Retention*(Estimated Fishery Catch/Observed Catch)

Step 2. Compute new nonretention data

New Non-Retention = MAX {0, Observed Non-Retention + (Observed Retention-New Retention)}

For all CNR methods: 1) legal CNR mortality is distributed by stock and age in proportion to legal catch; and 2) sublegal CNR mortality is distributed among stock and age in proportion to fraction non-vulnerable, in the same manner as used to distribute other sublegal shaker mortality.

Table 1. Summary of parameters and computations used by the CTC to simulate the U.S. proposal for AABM fisheries.

Region	Gear Type Used for Abundance Index	Catch HRI Schedule		Computation of Allowable Catch	Allocation of Catch
SEAK	SEAK Troll	AI<0.60 0.60<AI<1.18 1.18<AI<1.90 1.90<AI	HRI=0.55 HRI=0.60 HRI=0.65 HRI=0.70	Troll Catch = $e^{(12.38+\ln(HRI*AI))}$ Total Catch = 20,000 + (Troll Catch)/0.80	Net = 20,000 Troll = 0.80*(Total Catch – 20,000) Sport = 0.20*(Total Catch – 20,000)
NCBC	NBC Troll + CBC Troll	AI<0.60 0.60<AI<1.18 1.18<AI<1.90 1.90<AI	HRI=0.35 HRI=0.40 HRI=0.45 HRI=0.50	Troll Catch = $e^{(12.39+\ln(HRI*AI))}$ Total Catch = (Troll Catch)/0.70	NBC Net = 0.15 * Total Catch CBC Net = 0.08 * Total Catch NBC Troll = 0.59 * Total Catch CBC Troll = 0.11 * Total Catch Sport = 0.07 * Total Catch
WCVI	WCVI Troll	AI<0.60 0.60<AI<1.18 1.18<AI<1.90 1.90<AI	HRI=0.30 HRI=0.35 HRI=0.40 HRI=0.45	Total Catch = $e^{(13.16+\ln(HRI*AI))}$	Troll = 0.82 * Total Catch Sport = 0.18 * Total Catch
GS	GS Sport + GS Troll	AI<0.60 0.60<AI<1.18 1.18<AI<1.90 1.90<AI	HRI=0.40 HRI=0.45 HRI=0.50 HRI=0.55	Total Catch = $e^{(12.90+\ln(HRI*AI))}$	Troll = 0.18 * Total Catch Sport = 0.82 * Total Catch

Table 2. Summary of parameters and computations used by the CTC to simulate the Canadian proposal for AABM fisheries.

Region	Gear Type(s) Used for Abundance Index	Total Mortality HRI Schedule	Computation of Total Allowable AEQ Mortality (TAAM)	Allocation of Total Allowable AEQ Mortality (TAAM)
SEAK + NBC	SEAK Troll, Net, Sport and NBC Troll, Net, and Sport	HRI = 0.50	Total AEQ mortality reduced by 50% from expectation with 1979 through 1982 base period exploitation rates, base period minimum size limits, and current abundance	SEAK Net, Troll, Sport [1] NBC Net = 0.091 * TAAM NBC Troll = 0.353 * TAAM NCBC Sport = 0.056 *TAAM
WCVI + NLP	WCVI Troll + NLP Troll	HRI = 0.50	Total AEQ mortality reduced by 50% from expectation with 1979 through 1982 base period exploitation rates, base period minimum size limits, and current abundance	WCVI Troll = 0.75 * TAAM NLP Troll = 0.25 * TAAM

1/ Allocation of total mortality for the SEAK net, troll, and sport fisheries is based upon the catch sharing formula shown in Table 1, adjusted annually to reflect differences in the ratio of total adult equivalent mortality to catch for each gear type.

Table 3. Comparison of the sequence of computations in the previous version of the model and the version used to simulate the proposed U.S. and Canadian regimes.

Original Model		U.S. Proposal for AABM Fisheries		Canadian Proposal for AABM Fisheries	
1	Update Cohort	1	Update Cohort	1	Update Cohort
		2	Compute Abundance Index for principal mixed stock fisheries in region	2	Compute Base Period Total Mortalities (TM) For All Fisheries (AEQ or Nominal Catch +Legal CNR)
2	Establish Catch Targets For Ceilinged Fisheries and set initial RT=1	3	Identify HRI level and establish catch targets for ceilinged fisheries according to specified formulas. Establish catch targets for associated fisheries in region and set initial RT=1	3	Establish TM Targets By region. Convert to model fish and allocate TM to gear types within region. Set initial RTs = HRI for relevant regional aggregate
		4	Convert Catch Targets to Model Fish	4	Set Initial RT factors Based on TM Targets
3	Compute Pre-Terminal Catches	5	Compute Pre-Terminal Catches	5	Compute Pre-Terminal Catches
4	Compute Pre-Terminal Shakers	6	Compute Pre-Terminal Shakers	6	Compute Pre-Terminal Shakers
5	Compute Pre-Terminal CNR & distribute all pre-terminal incidental mortalities among stocks and ages	7	Compute Pre-Terminal CNR & distribute all pre-terminal incidental mortalities among stocks and ages	7	Compute Pre-Terminal CNR & distribute all pre-terminal incidental mortalities among stocks and ages
6	Compute Terminal Run Sizes By Stock	8	Compute Terminal Run Sizes By Stock	8	Compute Terminal Run Sizes By Stock
7	Compute Terminal Catches	9	Compute Terminal Catches	9	Compute Terminal Catches
8	Compute Terminal Shakers	10	Compute Terminal Shakers	10	Compute Pre-Terminal & Terminal Shakers
9	Compute Terminal CNR & distribute terminal incidental mortalities all among stocks and ages	11	Compute Total CNR for Pre-Terminal and Terminal Fisheries & distribute total incidental mortalities among stocks and ages	11	Compute Total CNR for Pre-Terminal and Terminal Fisheries & distribute total incidental mortalities among stocks and ages
				12	Compute TM By Fishery in accordance with Options (AEQ or Nominal)
10	Compare catches with ceiling targets	12	Compare catches with targets and test for convergence	13	Compare TM with Targets & Test For Convergence
11	Set new RT factor, reflecting forcing if specified If convergence Not Reached, Set NEW RT = (Catch/Ceiling)*Old RT Repeat From Step 3 …… IF Convergence Reached, compute escapement & production, proceed to next year, GO TO Step 1	13	IF Convergence Not Reached, Set NEW RT=(Catch/Ceiling)*Old RT (force all catches to ceiling levels) Repeat From Step 5 …… IF Convergence Reached, compute escapement & production, proceed to next year, GO TO Step 1	14	IF Convergence Not Reached, Set NEW RT=(TM/Target)*Old RT Repeat From Step 5 …… IF Convergence Reached, compute escapement & production, proceed to next year, GO TO Step 1

3.0 Comparison of Regimes

The CTC has provided seven statistics to contrast the proposals and the benchmark model run: 1) abundance indices by fishery; 2) harvest rate indices by fishery; 3) non-ceiling fishery indices; 4) total catch by naturally-spawning stock and fishery; 5) total adult equivalent mortality by stock and fishery; 6) brood exploitation rates by stock; and 7) escapements by naturally spawning stock. For each statistic, we begin by describing what the statistic measures, suggestions for interpreting the statistic, and a brief summary of the results from the retrospective analysis.

Abundance Indices by Fishery. The model abundance estimates are based on biological information (e.g., productivity, escapement goals, age at maturity, catch distribution patterns, survival rates, enhancement levels) and estimates of fishing mortalities. An AI is computed by dividing the abundance in any year by the average abundance during the base period (1979 through 1982). We have provided AIs for the primary fisheries suggested for AABM in either the U.S. or Canadian proposals in Appendix A. Changes in AIs relative to the benchmark are summarized in Figure 1.

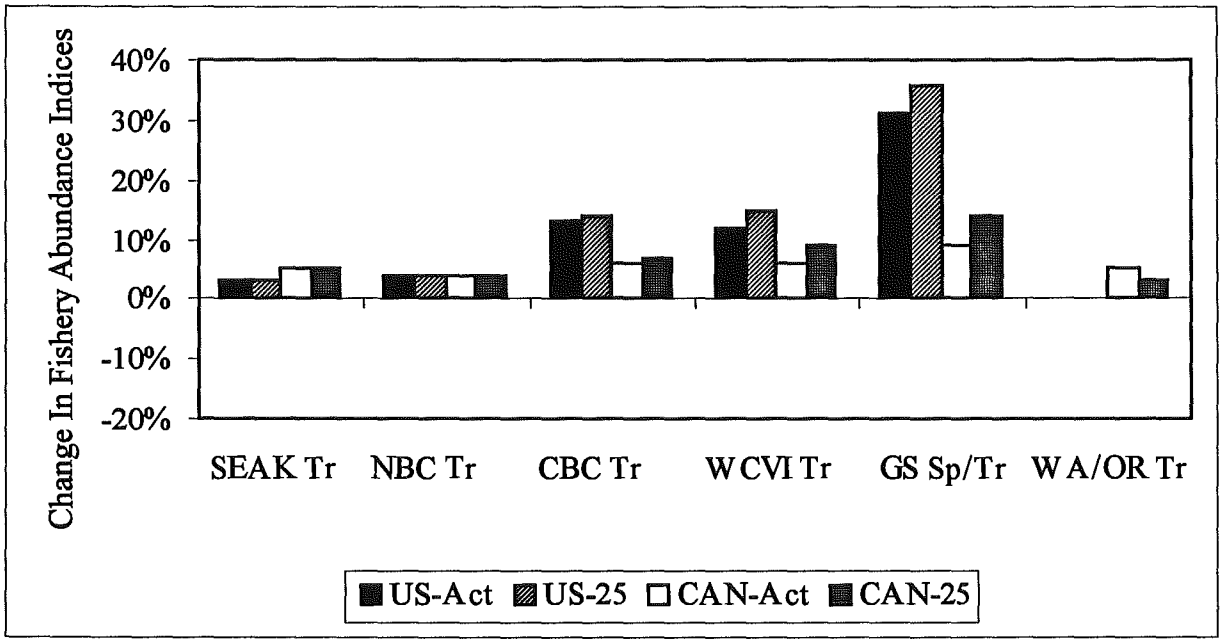

Figure 1. Average percent change in abundance indices by fishery relative to the benchmark.

Harvest Rate Indices by Fishery. The HRI is the ratio of stock and age-specific exploitation rates for total AEQ mortality in a fishery in a year relative to the 1979 through 1982 base period. An index less than 1.0 represents a decrease from base period harvest rates while an index greater than 1.0 represents an increase. We have provided HRIs for sport and troll fisheries suggested for AABM in either the U.S. or Canadian proposals and expressed them relative to the benchmark value (Appendix B). Changes in HRI relative to the benchmark are summarized in Figure 2.

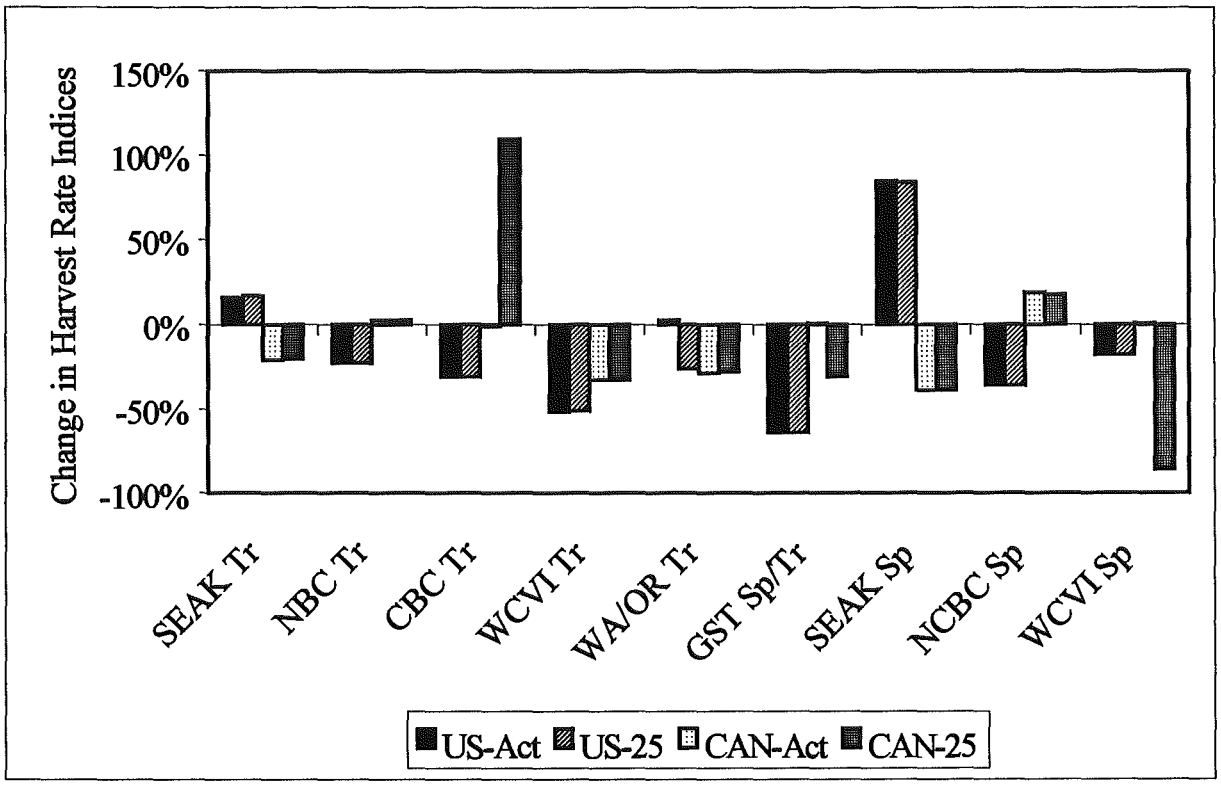

Figure 2. Average percent change in harvest rate indices by fishery relative to the benchmark.

Non-Ceiling Fishery Indices. The non-ceiling index compares on a stock-by-stock and calendar year basis the expected AEQ mortalities (assuming base period exploitation rates and current abundance) with the observed AEQ mortalities over all the ISBM fisheries of a Party. Index values greater than 1.0 indicate that exploitation rates have increased relative to the 1979 through 1982 base period. A non-ceiling index is provided for each naturally spawning chinook stock included in the PSC chinook model, and the index is reported separately for U.S. and Canadian ISBM fisheries (Appendix C). Note that since the ISBM fisheries are not consistently defined in the U.S. and Canadian proposals, direct comparison of the index values is appropriate only within proposals(e.g., US-Act vs. US-25).

Total Catch by Stock and Fishery. The catch in a fishery results from the abundance of chinook salmon, the HRI applied, and the minimum size limits and/or other fishing regulations affecting incidental mortality. Catches are presented in Appendix D by fishery and stock, a sum for all stocks included in the model (Model Catch), and for all stocks contributing to the fishery (Total Catch). "Model Catch" may deviate from "Total Catch" if not all stocks contributing to the fishery are represented in the model, or if model biases result in predicted catches that deviate from the true values. Percent changes from benchmark values under the simulated regimes are presented for these periods (1985-1990; 1991-1996; 1985-1996); the 1985-1996 average change is presented in Figures 3-1 and 3-2.

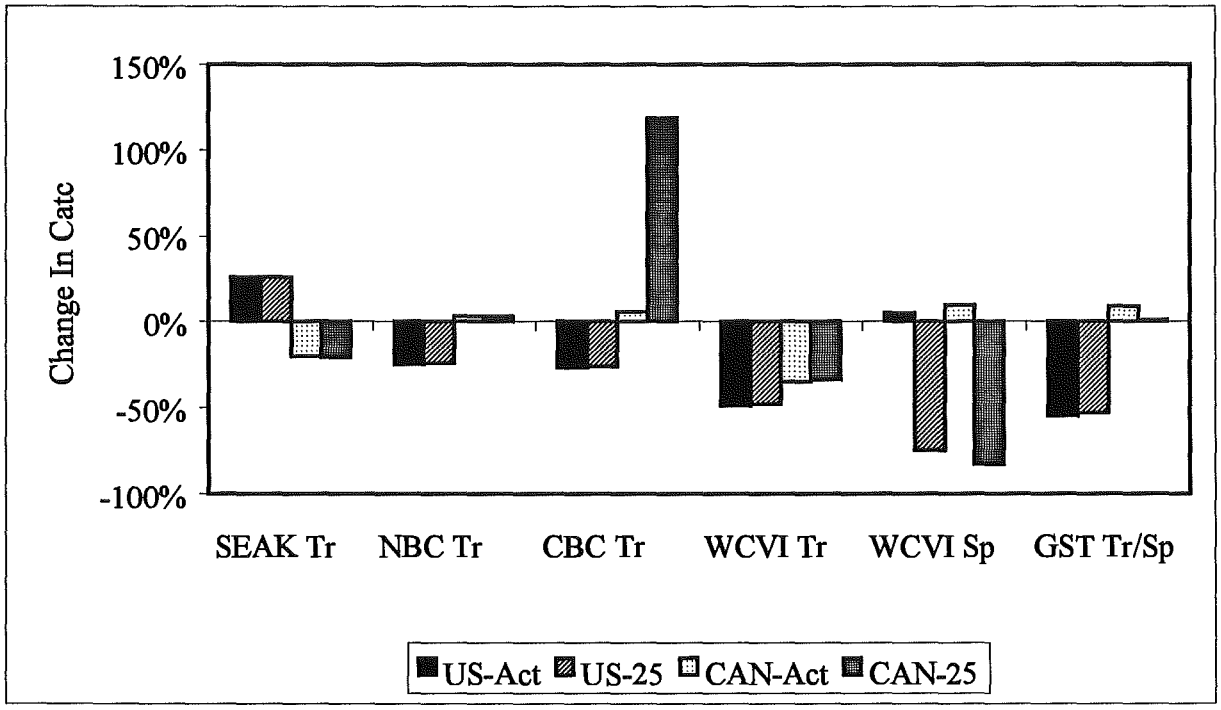

Figure 3-1. Average percent change in catches relative to the benchmark over the 1985-1996 period of retrospective analysis, part 1.

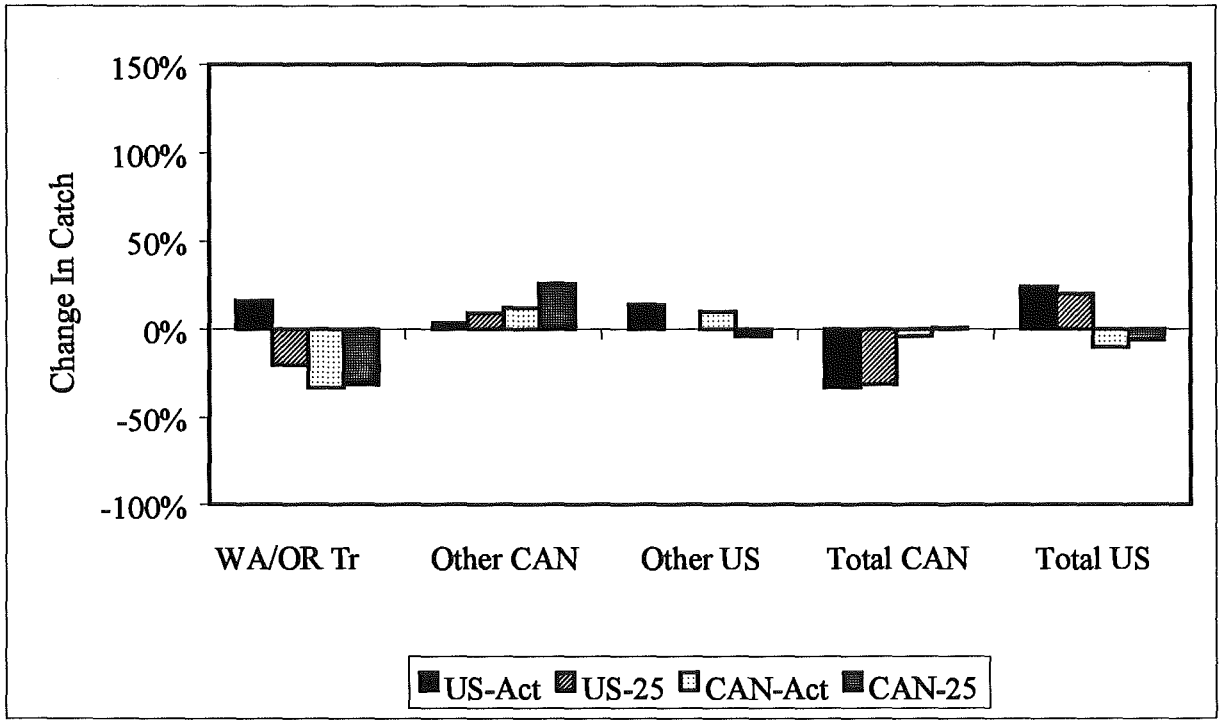

Figure 3-2. Average percent change in catches relative to the benchmark over the 1985-1996 period of retrospective analysis, part 2.

Total AEQ Mortalities by Stock and Fishery. The AEQ mortalities in a fishery result from the abundance of chinook salmon, the harvest rate index applied, minimum size limits (and/or other fishing regulations affecting incidental mortality), and CNR. Percent changes from benchmark values under the simulated regimes are presented for three periods (1985-1990; 1991-1996; 1985-1996) in Appendix E. The 1985-1996 average changes in total AEQ mortality are summarized in Figure 4.

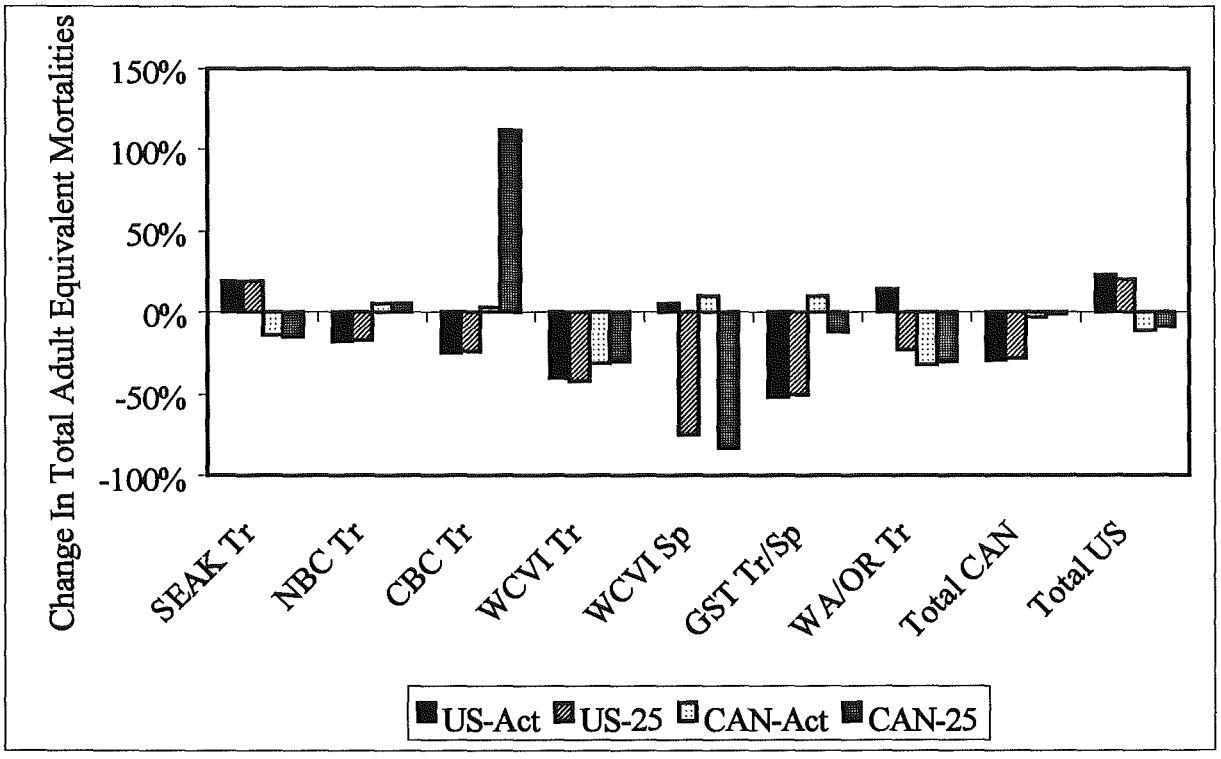

Figure 4. Average percent change in total adult equivalent mortalities relative to the benchmark.

Brood Exploitation Rates by Stock. Brood year exploitation rates provide the best measure of the cumulative impact of fisheries upon all age classes of a stock. The rates are computed as the ratio of AEQ mortality to AEQ mortality plus escapement. Brood year exploitation rates by model stock are presented for three time periods (1985-1990; 1991-1996; 1985-1996) in Appendix F. Changes in brood year exploitation rates for the 1985-1996 period are summarized in Figures 5-1 through 5-3.

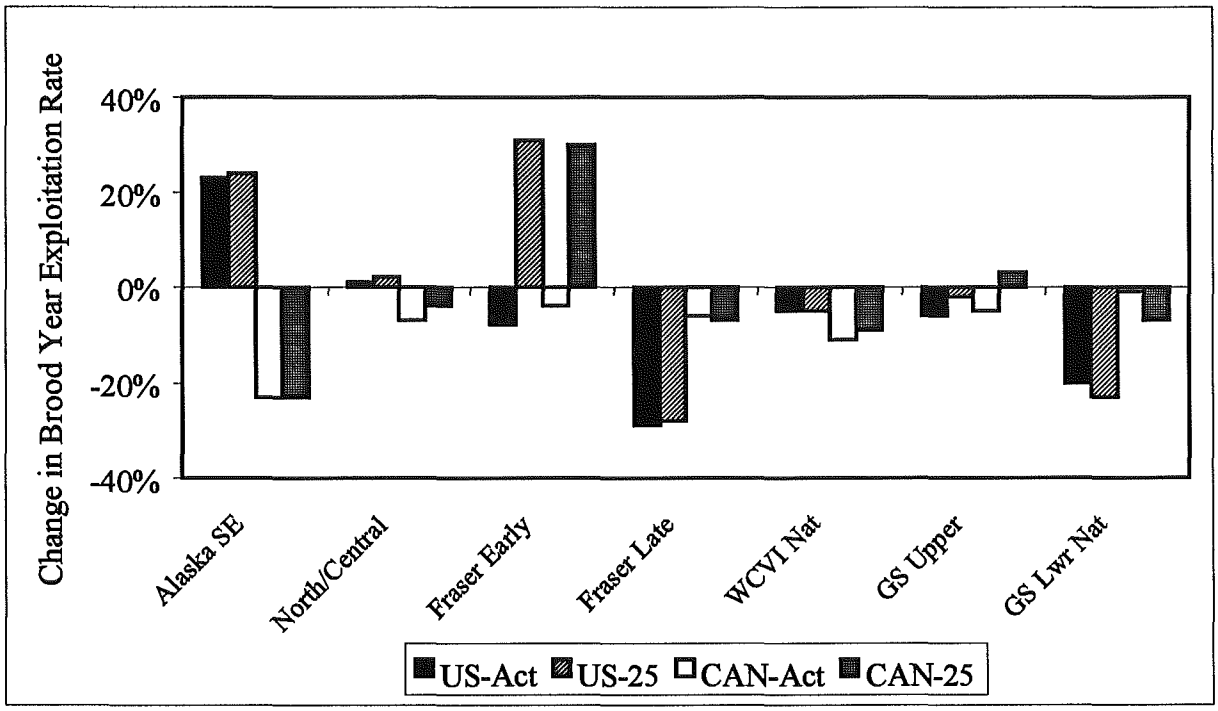

Figure 5-1. Percent change in average brood year exploitation rates relative to the benchmark for Alaska and Canada stocks.

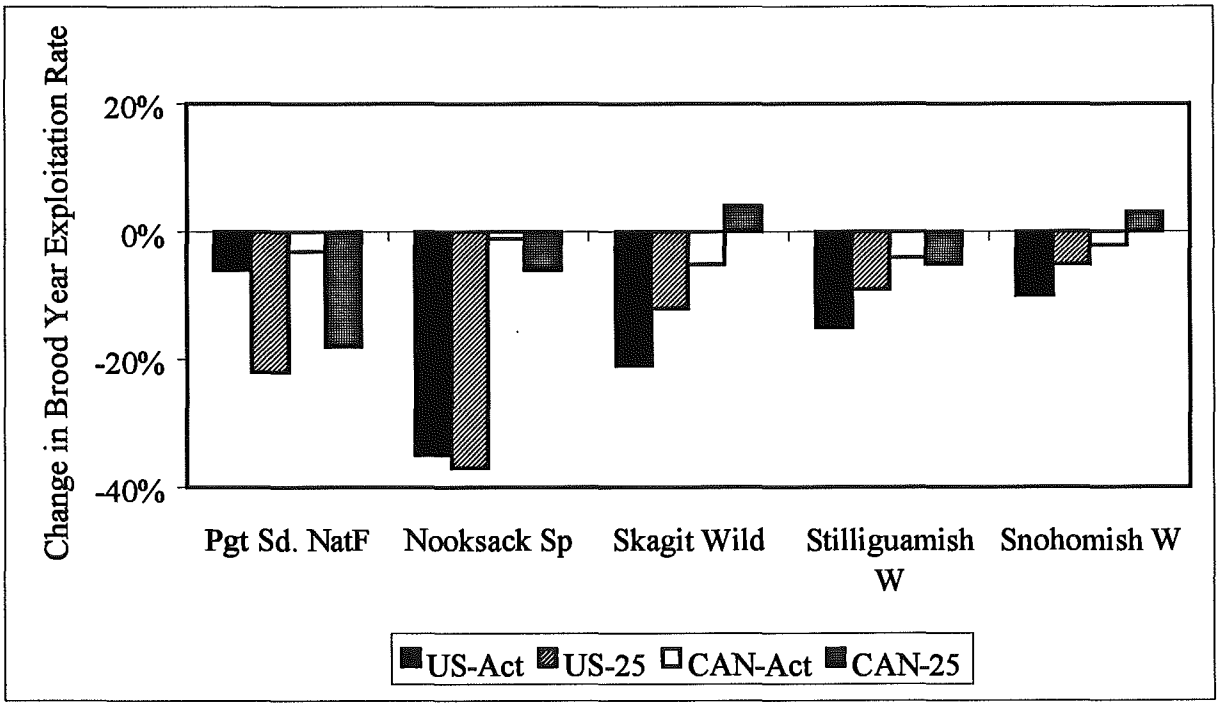

Figure 5-2. Percent change in average brood year exploitation rates relative to the benchmark for Puget Sound stocks.

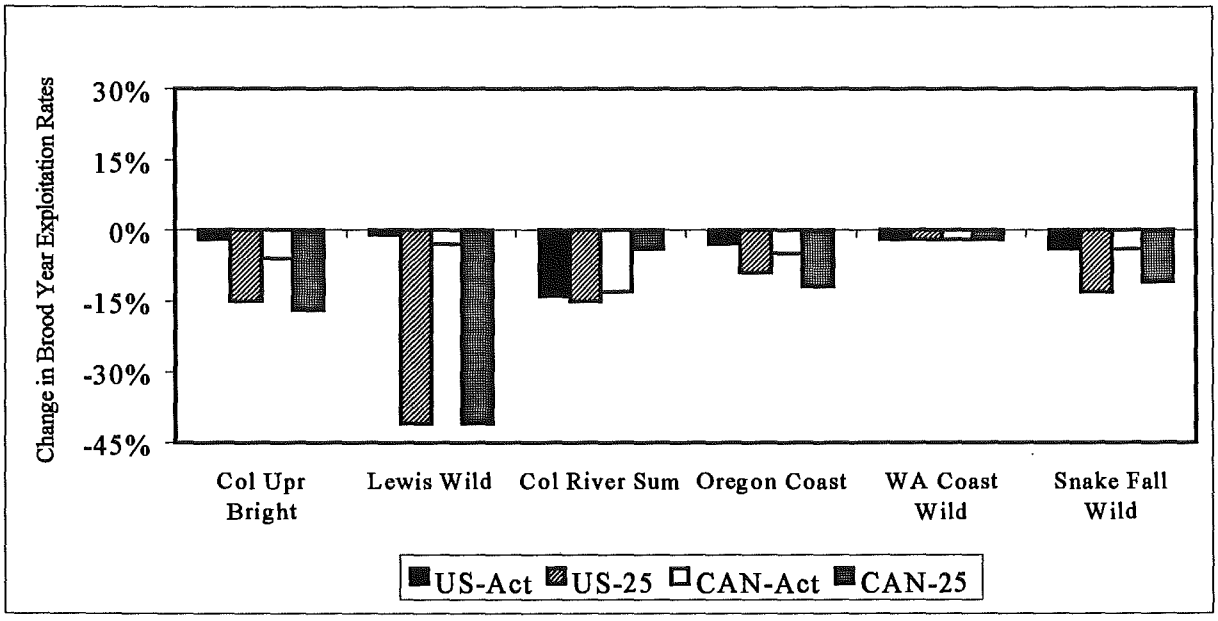

Figure 5-3. Percent change in average brood year exploitation rates relative to the benchmark for other Washington and Oregon stocks.

Escapement by Stock. The escapement of a stock reflects the cumulative effect of all previous survival rates and fishery exploitation. The escapements reported in the benchmark column of tables in Appendix G are model predictions; deviations from observed escapements may occur due to random errors or biases in the model calibration.

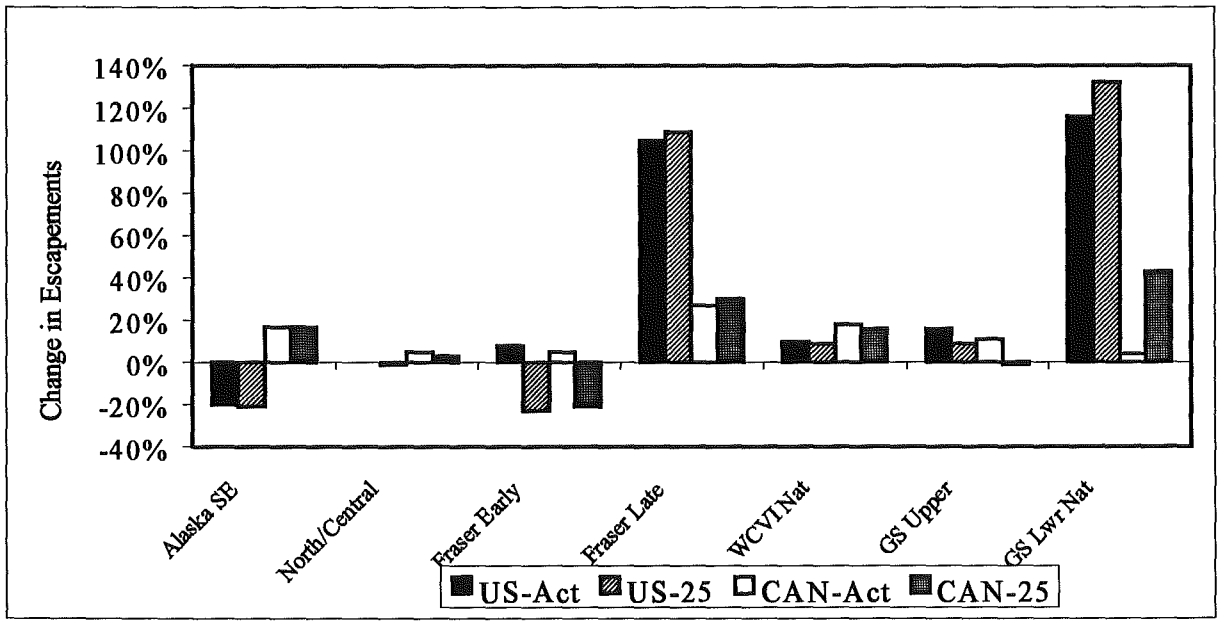

Figure 6-1. Percent change in 1985-1996 average model-estimated escapements relative to the benchmark for Alaska and Canada stocks.

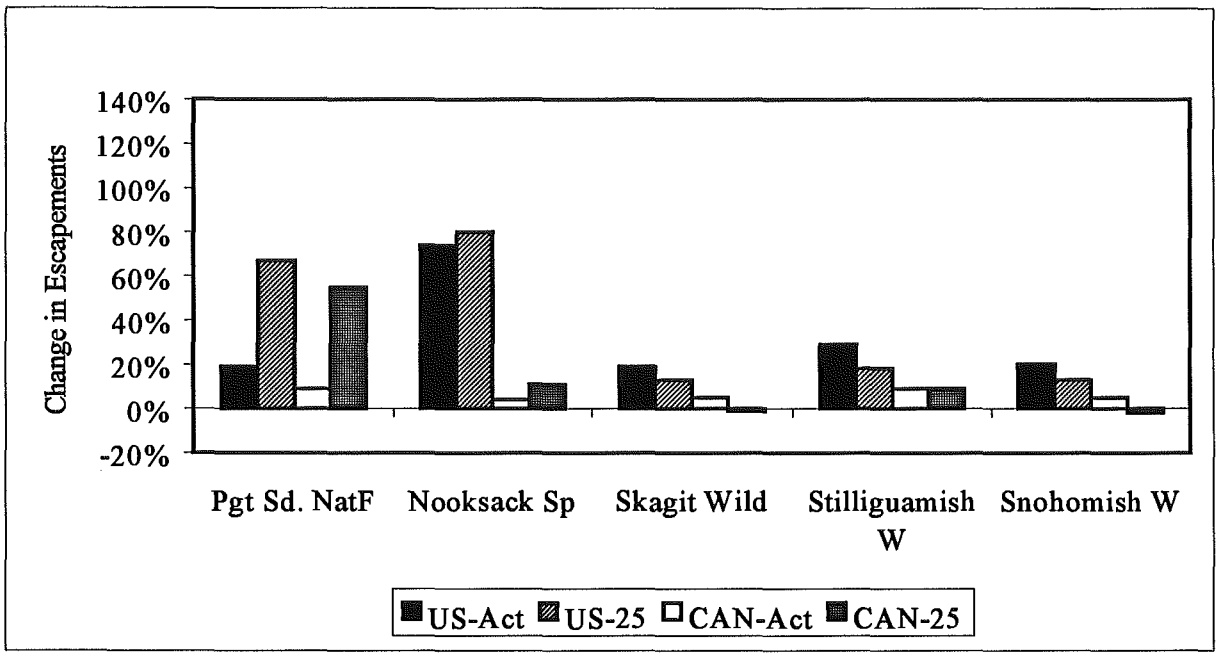

Figure 6-2. Percent change in 1985-1996 average model-estimated escapements relative to the benchmark for Puget Sound stocks.

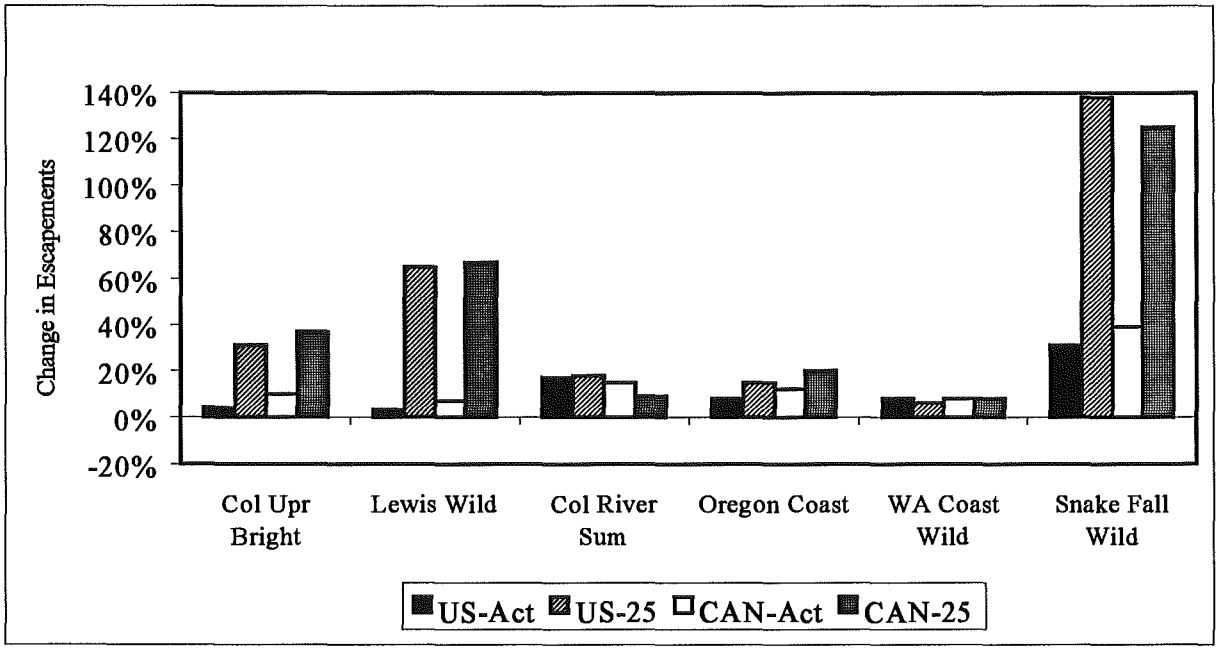

Figure 6-3. Percent change in 1985-1996 average model-estimated escapements relative to the benchmark for other Washington and Oregon stocks.

4.0 Discussion

The CTC has provided a preliminary analysis of the U.S. and Canadian proposals for abundance-based regimes for chinook fisheries. The analysis should provide a useful basis for initiating discussions, but is limited by: 1) the scope and implementation of the retrospective analysis as identified in Section 1; 2) the extent of the review by the CTC; 3) and the lack of agreed biologically-based escapement goals and exploitation rates against which to compare the proposals. The CTC is currently working to complete an assessment of the escapement goals and sustainable exploitation rates for naturally spawning chinook salmon stocks, and will update this report when that task has been completed. Adoption of new goals may alter the magnitude, but not necessarily the pattern, of deviations from the benchmarks. The CTC also will continue to review and improve the methods and data used in the analysis.

Appendix A. Abundance Indices by Fishery

List of Tables

Table A-1. Retrospective comparison of fishery abundance indices by year.

Fishery Abundance Indices from 1985-1996													
Fishery	Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Alaska Troll	Benchmark	1.27	1.48	1.78	2.04	1.85	1.84	1.82	1.64	1.71	1.54	0.99	0.90
	US-ACT	1.27	1.55	1.85	2.06	1.85	1.85	1.85	1.67	1.82	1.65	1.05	0.92
	US-25	1.27	1.55	1.85	2.06	1.87	1.88	1.86	1.67	1.81	1.65	1.04	0.91
	CAN-ACT	1.27	1.55	1.86	2.08	1.90	1.91	1.92	1.73	1.87	1.71	1.09	0.96
	CAN-25	1.27	1.54	1.86	2.10	1.91	1.92	1.90	1.70	1.85	1.68	1.06	0.94
North Troll	Benchmark	1.27	1.47	1.79	1.80	1.68	1.64	1.52	1.37	1.42	1.22	0.88	0.94
	US-ACT	1.27	1.54	1.86	1.84	1.70	1.67	1.57	1.42	1.50	1.31	0.95	0.99
	US-25	1.27	1.54	1.87	1.84	1.72	1.70	1.58	1.41	1.50	1.31	0.94	0.98
	CAN-ACT	1.27	1.53	1.85	1.84	1.72	1.69	1.60	1.43	1.52	1.32	0.95	0.99
	CAN-25	1.27	1.53	1.86	1.85	1.73	1.70	1.59	1.42	1.51	1.31	0.94	0.98
Central Troll	Benchmark	0.98	0.88	0.84	1.02	1.12	1.04	1.05	1.07	1.00	0.64	0.44	0.53
	US-ACT	0.98	0.98	0.91	1.08	1.22	1.16	1.25	1.28	1.17	0.79	0.52	0.61
	US-25	0.98	0.99	0.92	1.08	1.26	1.21	1.29	1.31	1.19	0.80	0.51	0.60
	CAN-ACT	0.98	0.92	0.87	1.05	1.19	1.11	1.14	1.15	1.12	0.73	0.47	0.56
	CAN-25	0.98	0.91	0.88	1.06	1.19	1.12	1.15	1.17	1.13	0.75	0.48	0.57
WCVI Troll	Benchmark	0.88	0.95	1.29	0.99	0.85	0.77	0.69	0.69	0.62	0.45	0.36	0.43
	US-ACT	0.88	1.03	1.35	1.04	0.94	0.88	0.84	0.87	0.73	0.57	0.44	0.50
	US-25	0.88	1.04	1.36	1.05	1.00	0.95	0.89	0.90	0.76	0.59	0.44	0.49
	CAN-ACT	0.88	0.98	1.32	1.02	0.93	0.83	0.77	0.76	0.69	0.52	0.39	0.46
	CAN-25	0.88	0.98	1.33	1.04	0.95	0.87	0.79	0.78	0.72	0.56	0.41	0.47
WCVI Sport	Benchmark	0.89	0.95	1.38	0.94	0.82	0.67	0.61	0.59	0.53	0.39	0.36	0.43
	US-ACT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	US-25	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	CAN-ACT	0.89	0.98	1.41	0.97	0.88	0.72	0.69	0.65	0.59	0.44	0.39	0.46
	CAN-25	0.89	0.96	1.41	0.98	0.89	0.72	0.68	0.63	0.58	0.44	0.39	0.44
GS Troll & Sport	Benchmark	0.92	0.85	0.51	0.46	0.61	0.69	0.53	0.65	0.51	0.40	0.30	0.33
	US-ACT	0.92	1.02	0.59	0.54	0.75	0.93	0.80	1.09	0.74	0.63	0.42	0.45
	US-25	0.92	1.04	0.61	0.55	0.78	0.99	0.84	1.14	0.76	0.66	0.42	0.45
	CAN-ACT	0.92	0.89	0.52	0.47	0.65	0.76	0.60	0.76	0.59	0.48	0.33	0.36
	CAN-25	0.92	0.88	0.54	0.50	0.66	0.80	0.63	0.82	0.63	0.55	0.36	0.40
WA/OR Troll	Benchmark	0.64	0.68	1.41	0.71	0.58	0.44	0.54	0.47	0.36	0.22	0.25	0.30
	US-ACT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	US-25	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	CAN-ACT	0.64	0.69	1.43	0.72	0.62	0.47	0.61	0.50	0.40	0.24	0.26	0.32
	CAN-25	0.64	0.68	1.42	0.72	0.61	0.46	0.60	0.48	0.39	0.24	0.26	0.31

Table A-2. Retrospective comparison of fishery abundance indices (average).

	Average Fishery Abundance Indices for 1985-1996														
	1985 -1990					1991 - 1996					1985 - 1996				
Fishery	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25
Alaska Troll	1.71	2%	2%	3%	3%	1.43	4%	4%	8%	6%	1.57	3%	3%	5%	5%
North Troll	1.61	2%	3%	3%	3%	1.22	5%	5%	6%	5%	1.42	4%	4%	4%	4%
Centr Troll	0.98	8%	9%	4%	5%	0.79	19%	20%	10%	11%	0.88	13%	14%	6%	7%
WCVI Troll	0.96	7%	9%	4%	6%	0.54	22%	26%	11%	15%	0.75	12%	15%	6%	9%
WCVI Sport	0.94	NA	NA	3%	3%	0.49	NA	NA	11%	8%	0.71	NA	NA	6%	5%
Geo St Tr & Sp	0.67	18%	21%	4%	7%	0.45	52%	57%	15%	25%	0.56	31%	36%	9%	14%
WA/OR Troll	0.74	NA	NA	2%	2%	0.36	NA	NA	10%	6%	0.55	NA	NA	5%	3%

Appendix B. Harvest Rate Indices by Fishery

List of Tables

Table B. Retrospective comparison of fishery harvest rate indices.

	Average Fishery Indices for 1985-1996														
	1985 -1990					1991 - 1996					1985 - 1996				
Fishery	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25
Alaska Troll	0.57	11%	11%	-24%	-24%	0.51	23%	23%	-17%	-16%	0.54	16%	17%	-21%	-20%
North Troll	0.74	-29%	-29%	-7%	-7%	0.67	-16%	-16%	14%	14%	0.71	-23%	-23%	3%	3%
Centr Troll	0.41	-43%	-44%	0%	70%	0.24	-10%	-10%	-1%	178%	0.32	-31%	-31%	-1%	110%
WCVI Troll	0.77	-53%	-53%	-37%	-37%	0.62	-50%	-50%	-29%	-29%	0.70	-52%	-51%	-33%	-33%
WA/OR Troll	1.16	4%	-36%	-42%	-42%	0.83	2%	-11%	-10%	-10%	0.99	3%	-26%	-29%	-28%
Geo St Tr & Sp	0.82	-64%	-64%	1%	-19%	1.02	-65%	-64%	2%	-41%	0.92	-64%	-64%	1%	-31%
Alaska Sport	1.07	162%	162%	-16%	-16%	1.95	43%	42%	-51%	-52%	1.51	85%	84%	-39%	-39%
Nor/Cen Sport	1.10	-7%	-7%	68%	67%	1.88	-53%	-53%	-9%	-10%	1.49	-36%	-36%	19%	18%
WCVI Sport	3.87	12%	12%	2%	-81%	6.57	-36%	-36%	0%	-89%	5.22	-18%	-18%	1%	-86%

Appendix C. Non-Ceiling Fishery Indices

List of Tables

Table C-1. Retrospective comparison of non-ceiling indices.

CAN Non-Ceiling	Average Non-Ceiling Indices 1985-1996											
	1985 -1990				1991 - 1996				1985 - 1996			
Stock	US-ACT	US-25	CAN-ACT	CAN-25	US-ACT	US-25	CAN-ACT	CAN-25	US-ACT	US-25	CAN-ACT	CAN-25
Alaska South SE	NA	NA	0.43	0.72	NA	NA	0.24	0.70	NA	NA	0.34	0.71
North/Central	1.03	0.78	0.60	0.71	0.95	0.77	0.44	0.71	0.99	0.77	0.52	0.71
Fraser Early	0.49	0.75	0.52	0.75	0.31	0.75	0.41	0.74	0.40	0.75	0.46	0.74
Fraser Late	0.79	0.74	0.68	0.67	0.51	0.75	0.72	0.64	0.65	0.75	0.70	0.65
WCVI Natural	0.86	0.74	0.65	0.69	0.78	0.72	0.58	0.68	0.82	0.73	0.62	0.68
Georgia St. Upper	0.75	0.75	0.62	0.72	0.38	0.75	0.48	0.71	0.57	0.75	0.55	0.71
Georgia St. Lwr Nat	0.94	0.74	0.66	0.59	0.85	0.75	0.61	0.54	0.89	0.75	0.64	0.56
Pgt Sd NatF	1.09	0.82	0.86	0.66	0.66	0.76	0.83	0.54	0.87	0.79	0.84	0.60
Nooksack Spring	0.97	0.85	0.48	0.47	0.70	0.76	0.43	0.37	0.84	0.80	0.46	0.42
Skagit Wild	0.92	0.79	0.59	0.60	0.56	0.75	0.46	0.49	0.74	0.77	0.52	0.54
Stillaguamish Wild	0.87	0.83	0.73	0.64	0.64	0.75	0.72	0.53	0.75	0.79	0.72	0.59
Snohomish Wild	0.94	0.80	0.60	0.59	0.56	0.75	0.45	0.48	0.75	0.77	0.52	0.54
Col Upriver Brights	1.22	0.79	0.74	0.80	0.55	0.76	0.52	0.71	0.88	0.77	0.63	0.75
Lewis River Wild	1.34	0.74	0.70	0.70	0.60	0.74	0.52	0.69	0.97	0.74	0.61	0.70
Col River Summer	0.83	0.83	0.53	0.69	0.61	0.75	0.40	0.64	0.72	0.79	0.46	0.66
Oregon Coast	0.73	0.73	0.70	0.68	0.34	0.72	0.72	0.65	0.54	0.72	0.71	0.66
WA Coastal Wild	0.87	0.85	0.70	0.72	0.64	0.76	0.57	0.61	0.75	0.81	0.64	0.67
Snake Fall	1.30	0.75	0.92	0.67	0.58	0.75	0.86	0.61	0.94	0.75	0.89	0.64

Table C-2. Retrospective comparison of non-ceiling indices.

US Non-Ceiling	Average Non-Ceiling Indices 1985-1996											
	1985 -1990				1991 - 1996				1985 - 1996			
Stock	US-ACT	US-25	CAN-ACT	CAN-25	US-ACT	US-25	CAN-ACT	CAN-25	US-ACT	US-25	CAN-ACT	CAN-25
Alaska South SE	1.23	0.75	1.03	0.77	0.85	0.75	1.03	0.77	1.04	0.75	1.03	0.77
North/Central	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fraser Early	0.85	0.76	0.86	0.76	0.61	0.77	0.62	0.77	0.73	0.76	0.74	0.77
Fraser Late	0.89	0.72	0.71	0.74	0.77	0.78	0.64	0.80	0.83	0.75	0.68	0.77
WCVI Natural	0.94	0.75	0.94	0.76	0.74	0.74	0.73	0.75	0.84	0.74	0.84	0.75
Georgia St. Upper	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Georgia St. Lwr Nat	0.86	0.74	0.85	0.74	0.67	0.78	0.67	0.78	0.76	0.76	0.76	0.76
Pgt Sd NatF	0.98	0.73	0.97	0.73	0.83	0.72	0.83	0.72	0.91	0.72	0.90	0.72
Nooksack Spring	0.90	0.75	0.90	0.75	0.69	0.75	0.69	0.75	0.79	0.75	0.79	0.75
Skagit Wild	0.64	0.72	0.64	0.72	0.43	0.72	0.44	0.71	0.53	0.72	0.54	0.72
Stillaguamish Wild	0.65	0.74	0.65	0.74	0.57	0.74	0.57	0.74	0.61	0.74	0.61	0.74
Snohomish Wild	0.78	0.78	0.78	0.78	0.64	0.78	0.64	0.78	0.71	0.78	0.71	0.78
Col Upriver Brights	1.86	0.90	1.90	0.91	1.03	0.90	1.04	0.91	1.45	0.90	1.47	0.91
Lewis River Wild	1.46	0.71	1.50	0.71	1.91	0.71	2.02	0.71	1.69	0.71	1.76	0.71
Col River Summer	0.79	0.72	0.69	0.71	0.48	0.72	0.41	0.71	0.64	0.72	0.55	0.71
Oregon Coast	0.97	0.75	0.96	0.75	0.94	0.75	0.94	0.75	0.96	0.75	0.95	0.75
WA Coastal Wild	1.01	0.99	1.00	0.99	0.99	0.99	0.99	0.99	1.00	0.99	1.00	0.99
Snake Fall	1.45	0.83	1.60	0.87	0.81	0.83	0.77	0.87	1.13	0.83	1.19	0.87

Appendix D. Total Catch by Stock and Fishery

List of Tables

Table D-1. Retrospective comparison of catches for model chinook stocks.

Alaska Troll	Average Chinook Catch 1985-1996														
	1985 -1990					1991 - 1996					1985 - 1996				
Stock	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25
Alaska South SE	10,259	8%	8%	-26%	-25%	5,952	14%	13%	-12%	-12%	8,105	10%	10%	-21%	-20%
North/Central	25,177	13%	13%	-29%	-29%	22,701	32%	31%	-16%	-16%	23,939	22%	22%	-22%	-23%
Fraser Early	9,769	16%	14%	-28%	-28%	7,564	34%	17%	-18%	-27%	8,667	24%	15%	-24%	-28%
Fraser Late	445	36%	41%	-26%	-26%	180	147%	157%	5%	11%	313	68%	74%	-18%	-16%
WCVI Natural	11,385	19%	18%	-25%	-26%	16,519	39%	38%	-12%	-14%	13,952	31%	30%	-17%	-19%
Georgia St. Upper	6,653	22%	22%	-26%	-27%	3,003	36%	34%	-15%	-20%	4,828	26%	25%	-23%	-25%
Georgia St. Lwr Nat	207	77%	96%	-28%	-17%	351	118%	139%	-17%	6%	279	103%	123%	-21%	-2%
Pgt Sd NatF	130	29%	31%	-24%	-21%	75	37%	37%	-18%	-16%	102	32%	33%	-22%	-19%
Nooksack Spring	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
Skagit Wild	248	22%	23%	-28%	-28%	97	48%	47%	-16%	-18%	172	29%	29%	-25%	-25%
Stillaguamish Wild	36	41%	39%	-23%	-23%	50	64%	56%	-13%	-14%	43	55%	49%	-18%	-18%
Snohomish Wild	58	38%	40%	-23%	-22%	51	50%	52%	-15%	-16%	55	44%	46%	-19%	-20%
Col Upriver Brights	41,107	20%	20%	-23%	-23%	14,398	32%	33%	-17%	-17%	27,752	23%	24%	-22%	-22%
Lewis River Wild	2,214	27%	28%	-21%	-21%	1,063	35%	36%	-16%	-16%	1,639	30%	30%	-19%	-20%
Col River Summer	3,137	22%	22%	-25%	-26%	1,863	49%	50%	-10%	-14%	2,500	32%	33%	-20%	-22%
Oregon Coast	26,446	19%	19%	-25%	-25%	13,104	35%	37%	-15%	-14%	19,775	24%	25%	-22%	-21%
WA Coastal Wild	7,002	23%	24%	-24%	-24%	4,802	36%	37%	-16%	-16%	5,902	28%	29%	-21%	-20%
Snake Fall	91	31%	44%	-18%	-12%	66	70%	217%	14%	87%	78	47%	117%	-5%	30%
CAN Hatchery	20,906	16%	17%	-26%	-27%	32,917	39%	38%	-11%	-13%	26,912	30%	30%	-17%	-18%
US Hatchery	18,992	26%	33%	-22%	-18%	9,742	36%	41%	-16%	-13%	14,367	29%	36%	-20%	-17%
Model Catch	184,262	19%	19%	-25%	-25%	134,497	35%	35%	-14%	-15%	159,379	26%	26%	-20%	-21%
Total Catch	229,941	19%	19%	-25%	-25%	167,839	35%	35%	-14%	-15%	198,890	26%	26%	-20%	-21%
CAN Stock Catch	74,543	16%	16%	-27%	-28%	83,236	37%	35%	-13%	-15%	78,889	27%	26%	-20%	-21%
US Stock Catch	109,719	20%	21%	-24%	-23%	51,262	33%	35%	-15%	-15%	80,490	24%	26%	-21%	-20%

Table D-2. Retrospective comparison of catches for model chinook stocks.

Alaska Net & Sport	Average Chinook Catch 1985-1996														
	1985 -1990					1991 - 1996					1985 - 1996				
Stock	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25
Alaska South SE	4,415	114%	113%	-20%	-20%	5,044	19%	18%	-45%	-46%	4,729	63%	62%	-33%	-34%
North/Central	6,776	108%	107%	-29%	-29%	11,001	34%	34%	-48%	-49%	8,888	62%	61%	-41%	-41%
Fraser Early	954	36%	33%	-45%	-46%	1,081	14%	-2%	-41%	-49%	1,018	25%	15%	-43%	-48%
Fraser Late	107	213%	223%	-17%	-17%	98	203%	216%	-26%	-22%	103	209%	220%	-21%	-19%
WCVI Natural	2,389	75%	74%	-35%	-36%	4,902	40%	39%	-41%	-43%	3,645	51%	50%	-39%	-41%
Georgia St. Upper	3,476	111%	110%	-29%	-31%	2,461	44%	42%	-46%	-50%	2,968	83%	82%	-36%	-39%
Georgia St. Lwr Nat	230	150%	179%	-46%	-34%	523	139%	164%	-43%	-15%	377	142%	168%	-44%	-21%
Pgt Sd NatF	48	161%	167%	-18%	-15%	59	51%	51%	-50%	-49%	54	100%	102%	-36%	-34%
Nooksack Spring	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
Skagit Wild	60	127%	128%	-30%	-30%	43	54%	53%	-50%	-52%	51	97%	97%	-38%	-39%
Stillaguamish Wild	44	173%	172%	-19%	-20%	80	76%	66%	-47%	-48%	62	110%	103%	-37%	-38%
Snohomish Wild	26	134%	137%	-27%	-27%	28	55%	55%	-48%	-50%	27	93%	94%	-38%	-39%
Col Upriver Brights	4,331	150%	151%	-14%	-14%	2,907	45%	45%	-45%	-46%	3,619	108%	109%	-27%	-27%
Lewis River Wild	326	118%	119%	-21%	-21%	271	33%	33%	-47%	-48%	298	80%	80%	-33%	-33%
Col River Summer	250	181%	182%	-11%	-12%	303	64%	64%	-44%	-47%	276	117%	117%	-29%	-32%
Oregon Coast	1,365	135%	135%	-19%	-19%	1,340	46%	48%	-43%	-43%	1,352	91%	92%	-31%	-31%
WA Coastal Wild	2,033	69%	69%	-36%	-36%	1,976	23%	23%	-46%	-46%	2,005	47%	47%	-41%	-41%
Snake Fall	9	188%	225%	-5%	7%	15	89%	248%	-30%	18%	12	127%	239%	-20%	14%
CAN Hatchery	4,721	75%	76%	-37%	-37%	9,954	43%	43%	-40%	-41%	7,337	53%	53%	-39%	-40%
US Hatchery	3,396	117%	127%	-24%	-21%	3,120	35%	38%	-46%	-46%	3,258	78%	84%	-35%	-33%
Model Catch	34,955	107%	108%	-27%	-27%	45,205	38%	37%	-44%	-45%	40,080	68%	68%	-37%	-37%
Total Catch	45,627	93%	94%	-31%	-30%	57,381	34%	33%	-44%	-45%	51,504	60%	60%	-38%	-38%
CAN Stock Catch	18,654	93%	93%	-33%	-33%	30,020	41%	40%	-44%	-45%	24,337	61%	60%	-40%	-40%
US Stock Catch	16,301	122%	124%	-21%	-20%	15,185	32%	33%	-45%	-46%	15,743	79%	80%	-33%	-33%

Table D-3. Retrospective comparison of catches for model chinook stocks.

North Troll	Average Chinook Catch 1985-1996														
	1985 -1990					1991 - 1996					1985 - 1996				
Stock	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25
Alaska South SE	491	-36%	-36%	-7%	-7%	254	-24%	-24%	27%	27%	372	-32%	-32%	5%	4%
North/Central	16,018	-32%	-32%	-8%	-8%	14,407	-19%	-19%	18%	17%	15,212	-26%	-26%	5%	4%
Fraser Early	8,928	-29%	-30%	-5%	-6%	7,110	-11%	-22%	24%	10%	8,019	-21%	-26%	8%	1%
Fraser Late	1,308	-24%	-22%	-8%	-9%	728	25%	28%	28%	31%	1,018	-6%	-4%	5%	6%
WCVI Natural	6,383	-28%	-28%	-3%	-4%	10,341	-26%	-26%	4%	1%	8,362	-27%	-27%	1%	-1%
Georgia St. Upper	6,554	-31%	-31%	-8%	-10%	2,710	-18%	-19%	12%	6%	4,632	-28%	-28%	-2%	-5%
Georgia St. Lwr Nat	686	-4%	4%	-8%	2%	956	43%	54%	32%	63%	821	23%	33%	15%	37%
Pgt Sd NatF	174	-23%	-21%	-2%	1%	115	-14%	-13%	17%	18%	145	-20%	-18%	5%	8%
Nooksack Spring	8	-10%	-8%	-4%	-10%	8	43%	52%	28%	24%	8	16%	21%	11%	6%
Skagit Wild	688	-31%	-30%	-10%	-10%	261	-8%	-7%	20%	17%	474	-24%	-24%	-2%	-2%
Stillaguamish Wild	33	-30%	-31%	-8%	-9%	21	0%	-6%	27%	26%	27	-19%	-21%	5%	4%
Snohomish Wild	302	-28%	-28%	-8%	-8%	175	-7%	-6%	22%	20%	238	-21%	-20%	3%	2%
Col Upriver Brights	25,086	-30%	-29%	-3%	-3%	8,635	-19%	-18%	18%	17%	16,861	-27%	-26%	3%	2%
Lewis River Wild	1,137	-27%	-27%	-2%	-3%	514	-21%	-20%	12%	12%	825	-26%	-25%	2%	2%
Col River Summer	1,861	-28%	-27%	-4%	-5%	1,115	-7%	-5%	29%	23%	1,488	-20%	-19%	9%	5%
Oregon Coast	33,194	-30%	-30%	-4%	-4%	16,822	-18%	-16%	17%	18%	25,008	-26%	-25%	3%	3%
WA Coastal Wild	10,811	-27%	-27%	-3%	-3%	7,038	-17%	-16%	16%	16%	8,924	-23%	-23%	4%	4%
Snake Fall	107	-23%	-14%	4%	13%	78	9%	103%	67%	172%	92	-10%	36%	31%	80%
CAN Hatchery	13,059	-28%	-28%	-5%	-6%	21,225	-24%	-24%	6%	4%	17,142	-26%	-25%	1%	0%
US Hatchery	26,873	-27%	-25%	-3%	-1%	14,681	-19%	-17%	12%	14%	20,777	-24%	-22%	2%	4%
Model Catch	153,701	-29%	-28%	-4%	-4%	107,189	-19%	-19%	14%	12%	130,445	-25%	-24%	3%	3%
Total Catch	171,886	-29%	-28%	-4%	-4%	119,868	-19%	-18%	14%	12%	145,877	-25%	-24%	3%	3%
CAN Stock Catch	52,936	-30%	-29%	-6%	-7%	57,476	-20%	-20%	12%	9%	55,206	-24%	-25%	3%	1%
US Stock Catch	100,765	-29%	-28%	-4%	-3%	49,713	-18%	-16%	16%	17%	75,239	-25%	-24%	3%	4%

Table D-4. Retrospective comparison of catches for model chinook stocks.

Central Troll	Average Chinook Catch 1985-1996														
	1985 -1990					1991 - 1996					1985 - 1996				
Stock	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25
Alaska South SE	4	-56%	-56%	8%	72%	2	-33%	-33%	11%	200%	3	-50%	-50%	9%	106%
North/Central	2,935	-45%	-45%	0%	71%	1,641	-8%	-8%	3%	192%	2,288	-31%	-32%	1%	115%
Fraser Early	1,406	-44%	-45%	2%	69%	673	2%	-12%	3%	174%	1,039	-29%	-34%	2%	103%
Fraser Late	11,024	-33%	-33%	5%	101%	5,157	17%	19%	22%	190%	8,090	-17%	-16%	10%	129%
WCVI Natural	2,843	-32%	-33%	4%	108%	3,380	-28%	-29%	6%	132%	3,111	-30%	-31%	5%	121%
Georgia St. Upper	2,966	-42%	-43%	4%	71%	926	-15%	-17%	4%	152%	1,946	-36%	-37%	4%	90%
Georgia St. Lwr Nat	696	-18%	-12%	2%	109%	718	54%	62%	3%	299%	707	19%	26%	2%	205%
Pgt Sd NatF	304	-34%	-34%	3%	94%	137	-4%	-4%	3%	195%	220	-25%	-24%	3%	125%
Nooksack Spring	8	-38%	-38%	0%	78%	4	41%	41%	0%	205%	6	-12%	-12%	0%	119%
Skagit Wild	594	-41%	-41%	2%	84%	160	5%	3%	4%	189%	377	-31%	-32%	2%	106%
Stillaguamish Wild	56	-44%	-44%	2%	79%	24	16%	7%	5%	213%	40	-26%	-29%	3%	120%
Snohomish Wild	284	-43%	-42%	2%	74%	106	6%	5%	3%	199%	195	-29%	-30%	2%	108%
Col Upriver Brights	5,877	-49%	-49%	4%	55%	1,079	-5%	-5%	4%	198%	3,478	-43%	-43%	4%	77%
Lewis River Wild	330	-34%	-34%	5%	92%	108	-1%	-1%	6%	205%	219	-26%	-26%	5%	120%
Col River Summer	1,158	-42%	-42%	4%	72%	444	1%	1%	11%	194%	801	-30%	-30%	6%	106%
Oregon Coast	953	-48%	-49%	3%	62%	260	-4%	-3%	5%	209%	607	-39%	-39%	4%	94%
WA Coastal Wild	1,757	-38%	-38%	5%	84%	811	-9%	-9%	5%	187%	1,284	-29%	-29%	5%	116%
Snake Fall	32	-45%	-39%	4%	85%	14	16%	114%	33%	544%	23	-27%	6%	12%	221%
CAN Hatchery	6,483	-32%	-32%	2%	106%	7,232	-24%	-24%	7%	143%	6,858	-28%	-28%	5%	125%
US Hatchery	7,534	-35%	-32%	9%	98%	2,427	2%	8%	15%	230%	4,980	-26%	-22%	11%	130%
Model Catch	47,243	-38%	-37%	4%	89%	25,300	-7%	-6%	10%	175%	36,272	-27%	-26%	6%	119%
Total Catch	37,122	-38%	-37%	4%	89%	19,881	-7%	-6%	10%	175%	28,502	-27%	-26%	6%	119%
CAN Stock Catch	28,352	-35%	-35%	3%	95%	19,726	-8%	-9%	10%	165%	24,039	-24%	-24%	6%	124%
US Stock Catch	18,891	-41%	-40%	6%	79%	5,574	-1%	1%	10%	211%	12,233	-32%	-30%	7%	109%

Table D-5. Retrospective comparison of catches for model chinook stocks.

WCVI Troll	Average Chinook Catch 1985-1996														
	1985 -1990					1991 - 1996					1985 - 1996				
Stock	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25
Alaska South SE	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
North/Central	857	-57%	-52%	-40%	-40%	628	-49%	-55%	-24%	-24%	743	-53%	-53%	-33%	-33%
Fraser Early	2,785	-55%	-50%	-38%	-39%	1,766	-44%	-59%	-19%	-29%	2,276	-50%	-53%	-31%	-35%
Fraser Late	59,032	-48%	-42%	-36%	-36%	31,189	-30%	-27%	-27%	-24%	45,110	-42%	-36%	-33%	-32%
WCVI Natural	5,602	-55%	-50%	-38%	-39%	18,352	-63%	-60%	-49%	-49%	11,977	-61%	-58%	-46%	-47%
Georgia St. Upper	264	-52%	-47%	-35%	-37%	124	-51%	-54%	-28%	-33%	194	-52%	-49%	-33%	-35%
Georgia St. Lwr Nat	541	-38%	-26%	-38%	-32%	691	-17%	-27%	-14%	3%	616	-26%	-27%	-25%	-12%
Pgt Sd NatF	11,640	-52%	-46%	-37%	-35%	6,075	-46%	-51%	-23%	-22%	8,857	-50%	-48%	-33%	-31%
Nooksack Spring	95	-52%	-45%	-39%	-39%	60	-23%	-33%	-24%	-20%	77	-41%	-40%	-33%	-31%
Skagit Wild	2,911	-54%	-48%	-38%	-38%	1,008	-42%	-49%	-23%	-25%	1,959	-51%	-48%	-34%	-35%
Stillaguamish Wild	233	-54%	-48%	-39%	-39%	145	-36%	-49%	-17%	-18%	189	-47%	-48%	-31%	-31%
Snohomish Wild	1,326	-54%	-48%	-38%	-38%	658	-42%	-50%	-21%	-23%	992	-50%	-48%	-33%	-33%
Col Upriver Brights	37,476	-55%	-49%	-37%	-37%	10,092	-47%	-56%	-21%	-22%	23,784	-54%	-51%	-33%	-33%
Lewis River Wild	3,449	-55%	-49%	-38%	-38%	1,202	-51%	-56%	-29%	-28%	2,325	-54%	-51%	-36%	-36%
Col River Summer	4,632	-54%	-48%	-37%	-38%	2,321	-45%	-51%	-23%	-26%	3,476	-51%	-49%	-32%	-34%
Oregon Coast	12,986	-55%	-49%	-37%	-37%	5,414	-48%	-54%	-23%	-22%	9,200	-53%	-51%	-33%	-33%
WA Coastal Wild	6,573	-54%	-49%	-37%	-37%	3,291	-49%	-55%	-26%	-26%	4,932	-53%	-51%	-34%	-33%
Snake Fall	580	-52%	-41%	-34%	-28%	355	-35%	2%	3%	67%	467	-46%	-24%	-20%	8%
CAN Hatchery	11,453	-56%	-51%	-40%	-40%	37,292	-63%	-60%	-48%	-48%	24,373	-61%	-58%	-46%	-46%
US Hatchery	150,441	-47%	-50%	-39%	-37%	53,832	-42%	-45%	-19%	-13%	102,136	-46%	-49%	-34%	-31%
Model Catch	312,872	-50%	-48%	-38%	-37%	174,495	-47%	-48%	-30%	-28%	243,684	-49%	-48%	-35%	-34%
Total Catch	313,873	-50%	-48%	-38%	-37%	175,053	-47%	-48%	-30%	-28%	244,463	-49%	-48%	-35%	-34%
CAN Stock Catch	80,533	-50%	-44%	-37%	-37%	90,043	-50%	-48%	-40%	-39%	85,288	-50%	-46%	-38%	-38%
US Stock Catch	232,339	-50%	-49%	-38%	-37%	84,452	-43%	-48%	-20%	-16%	158,396	-48%	-49%	-34%	-32%

Table D-6. Retrospective comparison of catches for model chinook stocks.

WCVI Sport	Average Chinook Catch 1985-1996														
	1985 -1990					1991 - 1996					1985 - 1996				
Stock	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25
Alaska South SE	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
North/Central	70	9%	-75%	2%	-81%	116	-35%	-85%	4%	-88%	93	-19%	-81%	3%	-86%
Fraser Early	202	18%	-74%	5%	-80%	304	-33%	-86%	3%	-90%	253	-13%	-81%	4%	-86%
Fraser Late	5,094	28%	-70%	9%	-81%	5,750	7%	-76%	23%	-86%	5,422	17%	-73%	17%	-84%
WCVI Natural	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
Georgia St. Upper	19	18%	-73%	5%	-80%	18	-32%	-85%	8%	-89%	19	-7%	-79%	7%	-84%
Georgia St. Lwr Nat	51	47%	-64%	4%	-80%	156	-3%	-76%	3%	-85%	103	9%	-73%	3%	-84%
Pgt Sd NatF	1,008	13%	-74%	6%	-81%	1,125	-33%	-84%	4%	-88%	1,066	-11%	-79%	5%	-85%
Nooksack Spring	9	23%	-72%	4%	-77%	15	-7%	-76%	2%	-86%	12	4%	-74%	3%	-83%
Skagit Wild	233	21%	-72%	3%	-80%	198	-29%	-83%	5%	-89%	215	-2%	-77%	4%	-84%
Stillaguamish Wild	20	20%	-74%	3%	-80%	32	-23%	-83%	6%	-89%	26	-6%	-79%	5%	-86%
Snohomish Wild	105	22%	-72%	4%	-80%	131	-28%	-83%	4%	-88%	118	-6%	-78%	4%	-85%
Col Upriver Brights	2,621	29%	-70%	5%	-77%	1,994	-32%	-84%	4%	-88%	2,307	3%	-76%	5%	-82%
Lewis River Wild	238	29%	-71%	4%	-78%	218	-36%	-85%	2%	-89%	228	-2%	-77%	3%	-83%
Col River Summer	350	21%	-72%	7%	-80%	406	-28%	-83%	11%	-88%	378	-5%	-78%	9%	-84%
Oregon Coast	971	22%	-72%	5%	-79%	1,020	-34%	-84%	5%	-88%	995	-6%	-78%	5%	-84%
WA Coastal Wild	570	14%	-74%	5%	-80%	664	-34%	-85%	3%	-88%	617	-12%	-80%	4%	-85%
Snake Fall	44	26%	-68%	13%	-76%	67	-17%	-63%	39%	-74%	55	0%	-65%	28%	-75%
CAN Hatchery	77	35%	-68%	3%	-79%	87	5%	-75%	3%	-85%	82	19%	-71%	3%	-82%
US Hatchery	13,164	29%	-70%	8%	-78%	10,871	-26%	-82%	11%	-87%	12,017	4%	-75%	9%	-82%
Model Catch	24,845	27%	-70%	8%	-79%	23,169	-19%	-81%	12%	-87%	24,007	5%	-75%	10%	-83%
Total Catch	26,898	27%	-70%	8%	-79%	25,085	-19%	-81%	12%	-87%	25,991	5%	-75%	10%	-83%
CAN Stock Catch	5,513	28%	-70%	9%	-81%	6,430	4%	-76%	21%	-86%	5,971	15%	-74%	15%	-84%
US Stock Catch	19,333	27%	-70%	7%	-78%	16,739	-28%	-83%	9%	-87%	18,036	1%	-76%	8%	-82%

Table D-7. Retrospective comparison of catches for model chinook stocks.

Geo St Troll & Sport	Average Chinook Catch 1985-1996														
	1985 -1990					1991 - 1996					1985 - 1996				
Stock	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25
Alaska South SE	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
North/Central	212	-66%	-66%	1%	-23%	0	0%	0%	0%	0%	106	-66%	-66%	1%	-23%
Fraser Early	5,695	-63%	-64%	3%	-26%	5,758	-64%	-68%	5%	-55%	5,727	-64%	-66%	4%	-41%
Fraser Late	110,113	-58%	-57%	6%	1%	68,237	-40%	-35%	26%	0%	89,175	-51%	-49%	14%	1%
WCVI Natural	505	-62%	-62%	5%	-29%	902	-61%	-60%	14%	-46%	703	-61%	-61%	11%	-40%
Georgia St. Upper	4,550	-63%	-63%	2%	-26%	2,866	-63%	-62%	7%	-49%	3,708	-63%	-63%	4%	-35%
Georgia St. Lwr Nat	11,112	-51%	-48%	2%	2%	19,261	-47%	-42%	5%	-5%	15,186	-48%	-44%	4%	-2%
Pgt Sd NatF	5,237	-62%	-62%	3%	-16%	3,063	-63%	-62%	5%	-36%	4,150	-63%	-62%	3%	-23%
Nooksack Spring	484	-60%	-59%	2%	7%	411	-40%	-37%	6%	-3%	448	-51%	-49%	4%	2%
Skagit Wild	2,578	-64%	-64%	1%	-14%	964	-60%	-59%	6%	-33%	1,771	-63%	-63%	2%	-19%
Stillaguamish Wild	259	-60%	-60%	3%	-28%	281	-57%	-59%	9%	-52%	270	-59%	-60%	6%	-40%
Snohomish Wild	1,202	-64%	-64%	1%	-15%	675	-61%	-60%	5%	-34%	938	-63%	-62%	3%	-21%
Col Upriver Brights	3,432	-66%	-66%	2%	2%	1,240	-65%	-64%	5%	-17%	2,336	-66%	-65%	3%	-3%
Lewis River Wild	92	-68%	-67%	4%	95%	30	-54%	-52%	9%	197%	61	-64%	-63%	5%	120%
Col River Summer	488	-65%	-65%	3%	26%	220	-57%	-56%	12%	50%	354	-63%	-63%	6%	33%
Oregon Coast	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
WA Coastal Wild	3,164	-64%	-64%	2%	-27%	1,646	-65%	-64%	4%	-53%	2,405	-64%	-64%	3%	-36%
Snake Fall	2	-69%	-54%	0%	-15%	1	-38%	-25%	63%	25%	2	-57%	-43%	24%	0%
CAN Hatchery	20,253	-60%	-59%	1%	-3%	12,197	-45%	-41%	6%	-8%	16,225	-55%	-52%	3%	-5%
US Hatchery	57,140	-62%	-60%	3%	-14%	27,311	-56%	-53%	12%	-29%	42,225	-60%	-58%	6%	-19%
Model Catch	226,517	-60%	-58%	4%	-5%	145,064	-47%	-43%	16%	-12%	185,790	-55%	-53%	9%	-8%
Total Catch	186,912	-60%	-59%	4%	2%	118,386	-47%	-43%	16%	-1%	152,649	-55%	-53%	9%	1%
CAN Stock Catch	152,439	-58%	-57%	5%	-1%	109,221	-44%	-40%	18%	-7%	130,830	-52%	-50%	10%	-3%
US Stock Catch	74,079	-62%	-61%	3%	-14%	35,843	-58%	-55%	10%	-30%	54,961	-61%	-59%	5%	-19%

Table D-8. Retrospective comparison of catches for model chinook stocks.

WA/OR Troll	Average Chinook Catch 1985-1996														
	1985 -1990					1991 - 1996					1985 - 1996				
Stock	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25
Alaska South SE	163	0%	-34%	-38%	-37%	81	-6%	-17%	-1%	0%	122	-2%	-28%	-25%	-25%
North/Central	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
Fraser Early	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
Fraser Late	26,444	26%	-21%	-35%	-35%	17,667	61%	13%	-17%	-14%	22,055	40%	-7%	-28%	-27%
WCVI Natural	19	6%	-43%	-47%	-46%	17	4%	-33%	-35%	-34%	18	5%	-38%	-41%	-40%
Georgia St. Upper	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
Georgia St. Lwr Nat	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
Pgt Sd NatF	2,721	13%	-37%	-45%	-42%	1,273	10%	-5%	-10%	-7%	1,997	12%	-27%	-33%	-31%
Nooksack Spring	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
Skagit Wild	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
Stillaguamish Wild	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
Snohomish Wild	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
Col Upriver Brights	5,101	5%	-30%	-38%	-38%	1,516	4%	-7%	-3%	-4%	3,308	5%	-25%	-30%	-30%
Lewis River Wild	2,059	7%	-32%	-41%	-40%	715	4%	-7%	-7%	-5%	1,387	6%	-25%	-32%	-31%
Col River Summer	361	11%	-33%	-40%	-41%	169	14%	1%	0%	-4%	265	12%	-22%	-28%	-29%
Oregon Coast	1,770	6%	-28%	-36%	-35%	859	5%	-12%	-12%	-10%	1,314	5%	-23%	-28%	-27%
WA Coastal Wild	1,886	6%	-37%	-43%	-42%	893	3%	-13%	-12%	-11%	1,389	5%	-29%	-33%	-32%
Snake Fall	408	13%	-22%	-38%	-30%	265	27%	105%	21%	101%	336	19%	28%	-15%	22%
CAN Hatchery	38	3%	-47%	-49%	-49%	36	3%	-36%	-36%	-36%	37	3%	-42%	-43%	-42%
US Hatchery	102,256	10%	-28%	-43%	-42%	46,827	10%	-12%	-17%	-14%	74,541	10%	-23%	-35%	-33%
Model Catch	143,224	12%	-27%	-41%	-40%	70,318	22%	-5%	-16%	-13%	106,771	16%	-20%	-33%	-31%
Total Catch	101,632	12%	-27%	-41%	-40%	49,898	22%	-5%	-16%	-13%	75,765	16%	-20%	-33%	-31%
CAN Stock Catch	26,501	26%	-21%	-35%	-35%	17,719	61%	13%	-17%	-14%	22,110	40%	-8%	-28%	-27%
US Stock Catch	116,723	9%	-29%	-42%	-41%	52,599	9%	-11%	-16%	-13%	84,661	9%	-23%	-34%	-32%

Table D-9. Retrospective comparison of catches for model chinook stocks.

Other CAN	Average Chinook Catch 1985-1996														
	1985 -1990					1991 - 1996					1985 - 1996				
Stock	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25
Alaska South SE	78	-43%	-43%	26%	28%	47	-44%	-44%	47%	52%	62	-44%	-43%	34%	37%
North/Central	45,825	-16%	-19%	40%	41%	60,371	-43%	-45%	-1%	2%	53,098	-31%	-34%	16%	19%
Fraser Early	32,176	4%	56%	6%	60%	18,037	6%	123%	7%	130%	25,107	5%	80%	7%	85%
Fraser Late	34,926	23%	33%	9%	16%	24,605	62%	132%	21%	93%	29,766	39%	74%	14%	48%
WCVI Natural	12,605	-1%	-15%	12%	0%	17,233	7%	-2%	23%	15%	14,919	3%	-7%	19%	9%
Georgia St. Upper	14,163	-19%	-19%	17%	34%	5,265	-18%	4%	9%	69%	9,714	-19%	-13%	15%	43%
Georgia St. Lwr Nat	17,824	36%	17%	3%	-2%	31,121	35%	25%	3%	20%	24,472	35%	22%	3%	12%
Pgt Sd NatF	2,991	2%	-19%	5%	-10%	1,210	-1%	11%	2%	24%	2,101	1%	-10%	5%	0%
Nooksack Spring	229	12%	-3%	2%	-11%	158	52%	71%	4%	25%	194	29%	27%	3%	4%
Skagit Wild	2,325	-11%	-21%	11%	19%	837	-5%	10%	2%	58%	1,581	-10%	-13%	8%	30%
Stillaguamish Wild	275	-8%	-12%	12%	14%	211	-2%	3%	12%	35%	243	-5%	-6%	12%	23%
Snohomish Wild	1,139	-13%	-23%	10%	16%	572	-5%	13%	2%	65%	855	-10%	-11%	7%	33%
Col Upriver Brights	19,060	-24%	-42%	12%	7%	4,632	-12%	1%	12%	86%	11,846	-22%	-33%	12%	23%
Lewis River Wild	998	-14%	-40%	12%	-6%	290	-19%	-7%	2%	44%	644	-15%	-33%	10%	5%
Col River Summer	1,914	-15%	-14%	28%	46%	1,287	-18%	-12%	6%	49%	1,600	-16%	-13%	19%	47%
Oregon Coast	1,359	-30%	-30%	26%	46%	703	-18%	-12%	33%	90%	1,031	-26%	-24%	29%	61%
WA Coastal Wild	2,086	-12%	-13%	10%	19%	1,112	-6%	5%	13%	48%	1,599	-10%	-7%	11%	29%
Snake Fall	68	-5%	-22%	10%	4%	30	20%	191%	46%	285%	49	2%	42%	21%	89%
CAN Hatchery	47,261	4%	-12%	6%	-6%	50,222	22%	11%	18%	20%	48,741	13%	0%	12%	8%
US Hatchery	33,930	-2%	-15%	8%	4%	10,382	11%	32%	10%	59%	22,156	1%	-4%	9%	17%
Model Catch	271,232	0%	-1%	14%	18%	228,323	6%	20%	10%	37%	249,777	3%	9%	12%	27%
Total Catch	267,846	-1%	-2%	12%	15%	216,746	9%	23%	13%	39%	242,296	4%	9%	12%	26%
CAN Stock Catch	204,780	4%	7%	15%	22%	206,854	6%	20%	10%	34%	205,817	5%	13%	12%	28%
US Stock Catch	66,452	-10%	-24%	10%	7%	21,469	0%	17%	10%	62%	43,960	-8%	-14%	10%	21%

Table D-10. Retrospective comparison of catches for model chinook stocks.

Other US	Average Chinook Catch 1985-1996														
	1985 -1990					1991 - 1996					1985 - 1996				
Stock	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25
Alaska South SE	3	-19%	-44%	6%	-25%	2	-9%	-45%	27%	0%	2	-15%	-44%	15%	-15%
North/Central	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
Fraser Early	5,308	7%	-8%	6%	-8%	3,301	7%	21%	6%	22%	4,305	7%	3%	6%	3%
Fraser Late	22,675	24%	31%	8%	12%	15,038	51%	91%	21%	54%	18,856	35%	55%	13%	29%
WCVI Natural	288	5%	-13%	8%	-11%	309	8%	0%	14%	3%	298	7%	-6%	11%	-4%
Georgia St. Upper	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
Georgia St. Lwr Nat	416	56%	51%	4%	4%	564	69%	118%	4%	66%	490	63%	90%	4%	40%
Pgt Sd NatF	41,353	13%	-10%	8%	-13%	24,647	14%	0%	7%	-4%	33,000	14%	-6%	7%	-10%
Nooksack Spring	121	21%	4%	3%	-15%	94	58%	82%	5%	20%	107	38%	38%	4%	0%
Skagit Wild	3,998	13%	26%	4%	14%	1,311	22%	97%	7%	68%	2,654	15%	44%	5%	27%
Stillaguamish Wild	456	13%	25%	4%	18%	375	29%	57%	11%	46%	415	20%	39%	7%	31%
Snohomish Wild	4,077	16%	18%	4%	5%	2,428	21%	47%	6%	26%	3,253	18%	29%	5%	13%
Col Upriver Brights	124,643	2%	-51%	7%	-49%	24,730	2%	-8%	6%	-7%	74,686	2%	-44%	7%	-42%
Lewis River Wild	21,689	2%	-50%	4%	-50%	15,442	3%	-63%	5%	-63%	18,565	2%	-55%	4%	-55%
Col River Summer	953	9%	12%	7%	8%	384	17%	106%	15%	91%	668	11%	39%	9%	32%
Oregon Coast	25,934	6%	-17%	9%	-14%	15,988	6%	-13%	10%	-11%	20,961	6%	-15%	9%	-13%
WA Coastal Wild	38,603	8%	7%	8%	6%	28,985	7%	8%	7%	7%	33,794	7%	8%	7%	6%
Snake Fall	764	20%	-24%	25%	-25%	342	38%	201%	47%	180%	553	25%	46%	32%	38%
CAN Hatchery	1,179	21%	6%	4%	-8%	929	35%	41%	12%	24%	1,054	27%	21%	8%	6%
US Hatchery	439,197	15%	-5%	12%	-9%	196,674	22%	33%	13%	26%	317,935	17%	7%	12%	2%
Model Catch	731,655	12%	-13%	10%	-16%	331,541	18%	22%	11%	16%	531,598	14%	-2%	10%	-6%
Total Catch	768,470	12%	-11%	10%	-14%	352,370	19%	24%	11%	18%	560,420	14%	0%	10%	-4%
CAN Stock Catch	29,865	21%	23%	7%	7%	20,140	43%	77%	17%	46%	25,003	30%	45%	11%	23%
US Stock Catch	701,790	11%	-14%	10%	-17%	311,401	17%	18%	11%	14%	506,595	13%	-4%	10%	-8%

Table D-11. Retrospective comparison of catches for model chinook stocks.

Total CAN	Average Chinook Catch 1985-1996														
	1985 -1990					1991 - 1996					1985 - 1996				
Stock	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25
Alaska South SE	573	-37%	-37%	-2%	-2%	302	-27%	-27%	30%	31%	438	-34%	-33%	9%	10%
North/Central	65,917	-22%	-24%	25%	29%	77,163	-37%	-39%	2%	9%	71,540	-30%	-32%	13%	18%
Fraser Early	51,191	-13%	19%	1%	33%	33,648	-13%	45%	9%	64%	42,419	-13%	29%	4%	45%
Fraser Late	221,498	-39%	-38%	-5%	-3%	135,666	-14%	-2%	13%	15%	178,582	-30%	-24%	2%	4%
WCVI Natural	27,938	-22%	-28%	-3%	2%	50,207	-29%	-31%	-8%	-4%	39,072	-27%	-30%	-6%	-2%
Georgia St. Upper	28,515	-32%	-32%	7%	17%	11,908	-29%	-20%	8%	31%	20,212	-31%	-28%	8%	22%
Georgia St. Lwr Nat	30,909	1%	-8%	2%	2%	52,902	5%	1%	4%	15%	41,906	3%	-3%	3%	10%
Pgt Sd NatF	21,355	-44%	-47%	-19%	-27%	11,725	-43%	-50%	-10%	-24%	16,540	-44%	-48%	-16%	-26%
Nooksack Spring	833	-37%	-41%	-3%	-4%	655	-14%	-10%	3%	2%	744	-27%	-27%	0%	-1%
Skagit Wild	9,328	-42%	-45%	-10%	-8%	3,428	-33%	-34%	-3%	2%	6,378	-39%	-42%	-8%	-6%
Stillaguamish Wild	876	-38%	-40%	-6%	-11%	713	-31%	-36%	5%	-10%	795	-35%	-38%	-1%	-11%
Snohomish Wild	4,359	-41%	-44%	-9%	-9%	2,316	-33%	-34%	-2%	5%	3,338	-38%	-41%	-7%	-4%
Col Upriver Brights	93,551	-40%	-44%	-12%	-13%	27,672	-30%	-35%	1%	12%	60,612	-38%	-42%	-9%	-7%
Lewis River Wild	6,244	-39%	-44%	-19%	-19%	2,361	-37%	-42%	-11%	-3%	4,302	-39%	-43%	-17%	-15%
Col River Summer	10,403	-38%	-39%	-11%	-3%	5,792	-28%	-32%	0%	15%	8,097	-35%	-37%	-7%	4%
Oregon Coast	49,462	-36%	-36%	-12%	-12%	24,218	-25%	-27%	8%	9%	36,840	-32%	-33%	-5%	-5%
WA Coastal Wild	24,961	-38%	-38%	-10%	-9%	14,562	-29%	-31%	4%	6%	19,761	-35%	-36%	-5%	-3%
Snake Fall	832	-40%	-37%	-22%	-19%	544	-22%	22%	20%	88%	688	-33%	-14%	-5%	24%
CAN Hatchery	98,585	-23%	-29%	-2%	-2%	128,255	-19%	-22%	-5%	2%	113,420	-21%	-25%	-4%	0%
US Hatchery	289,082	-39%	-46%	-19%	-23%	119,503	-35%	-39%	-2%	-9%	204,292	-38%	-44%	-14%	-19%
Model Catch	1,036,410	-33%	-35%	-7%	-6%	703,540	-23%	-20%	2%	8%	869,975	-29%	-29%	-4%	0%
Total Catch	1,004,537	-33%	-35%	-8%	-7%	675,019	-22%	-19%	2%	9%	839,778	-28%	-28%	-4%	0%
CAN Stock Catch	524,553	-28%	-26%	1%	6%	489,749	-19%	-13%	3%	12%	507,151	-24%	-20%	2%	9%
US Stock Catch	511,858	-39%	-44%	-16%	-18%	213,790	-33%	-37%	-1%	-3%	362,824	-37%	-42%	-11%	-14%

Table D-12. Retrospective comparison of catches for model chinook stocks.

Total US	Average Chinook Catch 1985-1996														
	1985 -1990					1991 - 1996					1985 - 1996				
Stock	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25
Alaska South SE	14,840	39%	39%	-24%	-24%	11,078	16%	15%	-27%	-27%	12,959	29%	29%	-25%	-25%
North/Central	31,954	33%	33%	-29%	-29%	33,701	33%	32%	-26%	-27%	32,828	33%	32%	-27%	-28%
Fraser Early	16,031	14%	8%	-18%	-23%	11,947	25%	16%	-14%	-16%	13,989	19%	12%	-16%	-20%
Fraser Late	49,671	26%	4%	-15%	-13%	32,983	57%	50%	0%	17%	41,327	38%	22%	-9%	-1%
WCVI Natural	14,081	28%	27%	-26%	-27%	21,747	39%	38%	-18%	-20%	17,914	35%	34%	-21%	-23%
Georgia St. Upper	10,129	52%	52%	-27%	-28%	5,464	39%	38%	-29%	-34%	7,797	48%	47%	-28%	-30%
Georgia St. Lwr Nat	852	87%	96%	-18%	-11%	1,439	106%	140%	-18%	22%	1,145	99%	124%	-18%	10%
Pgt Sd NatF	44,252	14%	-12%	4%	-15%	26,054	14%	0%	6%	-4%	35,153	14%	-7%	5%	-11%
Nooksack Spring	121	21%	4%	3%	-15%	94	58%	82%	5%	20%	107	38%	38%	4%	0%
Skagit Wild	4,306	15%	28%	1%	11%	1,450	24%	93%	4%	59%	2,878	18%	44%	2%	23%
Stillaguamish Wild	535	28%	38%	0%	12%	504	40%	58%	-1%	26%	520	34%	48%	0%	18%
Snohomish Wild	4,161	17%	19%	4%	4%	2,508	22%	48%	5%	25%	3,334	19%	30%	4%	12%
Col Upriver Brights	175,181	10%	-29%	-2%	-42%	43,550	15%	9%	-5%	-13%	109,366	11%	-21%	-3%	-36%
Lewis River Wild	26,288	6%	-40%	-2%	-46%	17,491	5%	-53%	2%	-58%	21,889	5%	-45%	0%	-51%
Col River Summer	4,700	27%	24%	-19%	-20%	2,720	44%	57%	-10%	-2%	3,710	33%	36%	-16%	-13%
Oregon Coast	55,515	15%	4%	-9%	-20%	31,291	20%	11%	-4%	-13%	43,403	17%	6%	-7%	-18%
WA Coastal Wild	49,523	13%	11%	0%	-2%	36,656	11%	12%	1%	1%	43,090	12%	11%	0%	-1%
Snake Fall	1,272	19%	-16%	1%	-26%	689	38%	166%	32%	137%	980	26%	48%	12%	31%
CAN Hatchery	26,845	27%	26%	-27%	-28%	43,835	40%	39%	-17%	-19%	35,340	35%	34%	-21%	-22%
US Hatchery	563,841	15%	-7%	0%	-15%	256,362	20%	25%	6%	16%	410,101	17%	3%	2%	-5%
Model Catch	1,094,095	16%	-5%	-4%	-21%	581,560	24%	23%	-2%	0%	837,828	19%	4%	-3%	-14%
Total Catch	1,145,670	16%	-2%	-3%	-19%	627,488	25%	26%	-3%	1%	886,579	19%	8%	-3%	-12%
CAN Stock Catch	149,562	29%	20%	-22%	-23%	151,115	41%	39%	-16%	-13%	150,338	35%	30%	-19%	-18%
US Stock Catch	944,533	14%	-10%	-1%	-21%	430,446	18%	17%	2%	5%	687,489	15%	-1%	0%	-13%

Appendix E. Total AEQ Mortalities by Stock and Fishery

List of Tables

Table E-1. Retrospective comparison of AEQ mortalities including catch, shakers, legal CNR, and sublegal CNR for model chinook stocks.

Alaska Troll	Average Number of Chinook Mortalities 1985-1996														
	1985 -1990					1991 - 1996					1985 - 1996				
Stock	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25
Alaska South SE	11,239	4%	3%	-21%	-21%	6,584	7%	7%	-8%	-7%	8,911	5%	5%	-16%	-16%
North/Central	31,839	8%	7%	-22%	-22%	31,789	23%	24%	-8%	-8%	31,814	16%	16%	-15%	-15%
Fraser Early	12,526	12%	10%	-22%	-23%	10,896	27%	7%	-12%	-24%	11,711	19%	8%	-17%	-23%
Fraser Late	662	42%	47%	-16%	-16%	282	149%	161%	16%	25%	472	74%	81%	-7%	-4%
WCVI Natural	13,952	15%	14%	-19%	-19%	20,785	31%	30%	-8%	-9%	17,369	24%	24%	-12%	-13%
Georgia St. Upper	7,547	17%	17%	-22%	-23%	3,401	29%	28%	-12%	-17%	5,474	21%	20%	-19%	-21%
Georgia St. Lwr Nat	234	75%	94%	-24%	-12%	430	112%	134%	-12%	15%	332	99%	120%	-16%	6%
Pgt Sd NatF	158	24%	26%	-20%	-16%	90	30%	30%	-14%	-12%	124	26%	27%	-18%	-14%
Nooksack Spring	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
Skagit Wild	266	18%	18%	-24%	-24%	105	42%	42%	-13%	-14%	185	24%	25%	-21%	-21%
Stillaguamish Wild	40	36%	35%	-19%	-19%	57	57%	49%	-10%	-11%	48	49%	43%	-14%	-14%
Snohomish Wild	64	33%	34%	-20%	-19%	59	43%	44%	-13%	-13%	61	38%	39%	-17%	-16%
Col Upriver Brights	64,352	12%	13%	-16%	-16%	20,328	24%	25%	-11%	-10%	42,340	15%	16%	-15%	-15%
Lewis River Wild	2,538	21%	22%	-18%	-18%	1,224	28%	30%	-13%	-13%	1,881	23%	24%	-16%	-16%
Col River Summer	3,530	18%	18%	-21%	-22%	2,134	43%	44%	-6%	-10%	2,832	27%	28%	-15%	-18%
Oregon Coast	33,414	14%	14%	-19%	-19%	16,325	28%	30%	-10%	-8%	24,869	18%	19%	-16%	-15%
WA Coastal Wild	8,407	18%	19%	-19%	-19%	5,843	29%	30%	-12%	-11%	7,125	23%	23%	-16%	-15%
Snake Fall	100	25%	38%	-15%	-9%	74	63%	204%	19%	96%	87	41%	109%	-1%	36%
CAN Hatchery	29,789	12%	12%	-19%	-20%	47,598	29%	28%	-5%	-7%	38,693	22%	22%	-11%	-12%
US Hatchery	22,165	21%	28%	-18%	-13%	11,442	29%	34%	-12%	-8%	16,804	24%	30%	-16%	-11%
Model Mortalities	242,820	13%	14%	-19%	-19%	179,446	27%	27%	-9%	-9%	211,133	19%	19%	-14%	-15%
CAN Stock Mortalities	96,549	12%	11%	-20%	-21%	115,181	28%	26%	-7%	-9%	105,865	21%	19%	-13%	-15%
US Stock Mortalities	146,272	14%	15%	-18%	-17%	64,265	25%	28%	-10%	-9%	105,268	17%	19%	-16%	-15%

Table E-2. Retrospective comparison of AEQ mortalities including catch, shakers, legal CNR, and sublegal CNR for model chinook stocks.

Alaska Net & Sport	Average Number of Chinook Mortalities 1985-1996														
	1985 -1990					1991 - 1996					1985 - 1996				
Stock	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25
Alaska South SE	5,628	92%	103%	-29%	-29%	5,832	12%	12%	-48%	-48%	5,730	51%	57%	-39%	-39%
North/Central	17,467	85%	106%	-40%	-40%	29,193	26%	30%	-55%	-56%	23,330	48%	59%	-49%	-50%
Fraser Early	3,097	-40%	62%	-77%	-78%	2,034	-6%	-3%	-58%	-65%	2,565	-26%	36%	-70%	-73%
Fraser Late	391	244%	260%	-20%	-19%	282	271%	290%	-24%	-19%	337	255%	273%	-22%	-19%
WCVI Natural	4,661	49%	83%	-48%	-48%	8,219	25%	42%	-51%	-52%	6,440	34%	57%	-50%	-51%
Georgia St. Upper	4,725	88%	107%	-38%	-40%	2,752	38%	40%	-49%	-53%	3,739	70%	82%	-42%	-44%
Georgia St. Lwr Nat	320	105%	213%	-58%	-48%	705	124%	185%	-50%	-25%	513	118%	194%	-53%	-33%
Pgt Sd NatF	71	164%	173%	-19%	-15%	79	49%	49%	-52%	-51%	75	103%	108%	-36%	-34%
Nooksack Spring	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
Skagit Wild	66	116%	123%	-33%	-33%	43	53%	53%	-52%	-53%	55	91%	95%	-41%	-41%
Stillaguamish Wild	42	177%	179%	-19%	-19%	78	77%	68%	-48%	-49%	60	112%	107%	-37%	-38%
Snohomish Wild	26	122%	129%	-31%	-31%	28	53%	53%	-51%	-51%	27	86%	90%	-41%	-41%
Col Upriver Brights	16,148	127%	143%	-26%	-26%	6,926	34%	36%	-52%	-53%	11,537	99%	111%	-34%	-34%
Lewis River Wild	447	83%	114%	-35%	-35%	307	26%	32%	-50%	-51%	377	60%	81%	-41%	-42%
Col River Summer	287	183%	183%	-11%	-13%	337	66%	66%	-44%	-48%	312	119%	120%	-29%	-32%
Oregon Coast	3,072	102%	137%	-34%	-34%	2,176	36%	47%	-49%	-49%	2,624	75%	99%	-40%	-40%
WA Coastal Wild	3,278	39%	77%	-50%	-50%	2,514	15%	25%	-53%	-53%	2,896	28%	54%	-51%	-51%
Snake Fall	9	192%	233%	-8%	2%	14	91%	269%	-28%	20%	11	130%	255%	-20%	13%
CAN Hatchery	12,918	51%	89%	-49%	-49%	23,709	25%	46%	-52%	-53%	18,313	34%	61%	-51%	-52%
US Hatchery	5,042	101%	136%	-32%	-27%	3,967	30%	41%	-51%	-50%	4,505	70%	94%	-40%	-37%
Model Mortalities	77,696	83%	111%	-39%	-39%	89,194	27%	37%	-53%	-53%	83,445	53%	72%	-46%	-46%
CAN Stock Mortalities	43,580	64%	98%	-46%	-46%	66,894	27%	40%	-53%	-54%	55,237	42%	62%	-50%	-51%
US Stock Mortalities	34,116	107%	128%	-30%	-29%	22,300	26%	31%	-51%	-51%	28,208	75%	90%	-38%	-38%

Table E-3. Retrospective comparison of AEQ mortalities including catch, shakers, legal CNR, and sublegal CNR for model chinook stocks.

North Troll	Average Number of Chinook Mortalities 1985-1996														
	1985 -1990					1991 - 1996					1985 - 1996				
Stock	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25
Alaska South SE	464	-34%	-34%	-6%	-6%	246	-23%	-23%	27%	27%	355	-30%	-30%	5%	5%
North/Central	17,504	-25%	-25%	-5%	-6%	17,667	-8%	-7%	18%	18%	17,586	-16%	-16%	7%	6%
Fraser Early	9,866	-23%	-25%	-3%	-5%	8,608	-2%	-17%	24%	8%	9,237	-13%	-22%	10%	1%
Fraser Late	1,528	-3%	-1%	-3%	-3%	938	70%	76%	38%	44%	1,233	24%	28%	13%	15%
WCVI Natural	6,910	-21%	-21%	0%	-1%	11,501	-19%	-19%	6%	4%	9,206	-20%	-20%	3%	2%
Georgia St. Upper	6,127	-28%	-28%	-7%	-9%	2,595	-16%	-16%	12%	6%	4,361	-25%	-25%	-1%	-4%
Georgia St. Lwr Nat	643	3%	13%	-8%	4%	971	55%	69%	31%	66%	807	34%	47%	16%	41%
Pgt Sd NatF	188	-18%	-16%	-1%	3%	124	-11%	-10%	16%	18%	156	-15%	-14%	6%	9%
Nooksack Spring	9	-10%	-8%	-6%	-8%	8	45%	55%	28%	26%	8	16%	22%	10%	8%
Skagit Wild	629	-29%	-28%	-9%	-9%	237	-4%	-4%	21%	18%	433	-22%	-22%	-1%	-2%
Stillaguamish Wild	28	-29%	-30%	-8%	-9%	18	0%	-6%	25%	23%	23	-18%	-21%	5%	4%
Snohomish Wild	267	-27%	-26%	-7%	-7%	155	-4%	-4%	22%	20%	211	-18%	-18%	3%	3%
Col Upriver Brights	32,565	-23%	-23%	-1%	-1%	10,499	-10%	-9%	19%	19%	21,532	-20%	-19%	4%	4%
Lewis River Wild	1,106	-25%	-24%	-2%	-2%	500	-19%	-17%	12%	12%	803	-23%	-22%	3%	2%
Col River Summer	1,637	-25%	-24%	-2%	-4%	998	-3%	-2%	30%	23%	1,318	-16%	-16%	10%	6%
Oregon Coast	34,601	-25%	-25%	-3%	-3%	18,190	-13%	-10%	17%	19%	26,396	-21%	-20%	4%	5%
WA Coastal Wild	11,204	-22%	-22%	-1%	-1%	7,431	-13%	-11%	16%	16%	9,317	-18%	-18%	5%	6%
Snake Fall	103	-21%	-11%	5%	14%	77	11%	108%	66%	172%	90	-7%	40%	31%	81%
CAN Hatchery	16,216	-18%	-18%	-1%	-2%	27,224	-14%	-14%	8%	7%	21,720	-15%	-15%	5%	4%
US Hatchery	26,546	-22%	-19%	-1%	2%	14,725	-14%	-12%	13%	15%	20,635	-19%	-17%	4%	6%
Model Mortalities	168,140	-23%	-22%	-2%	-2%	122,711	-11%	-11%	15%	14%	145,425	-18%	-17%	5%	5%
CAN Stock Mortalities	58,794	-22%	-22%	-3%	-4%	69,504	-10%	-11%	13%	11%	64,149	-15%	-16%	6%	4%
US Stock Mortalities	109,346	-24%	-23%	-2%	-1%	53,207	-12%	-10%	16%	18%	81,277	-20%	-19%	4%	5%

Table E-4. Retrospective comparison of AEQ mortalities including catch, shakers, legal CNR, and sublegal CNR for model chinook stocks.

Central Troll	Average Number of Chinook Mortalities 1985-1996														
	1985 -1990					1991 - 1996					1985 - 1996				
Stock	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25
Alaska South SE	4	-54%	-54%	4%	65%	2	-33%	-33%	11%	200%	3	-49%	-49%	6%	100%
North/Central	3,113	-43%	-43%	-4%	65%	1,961	-12%	-13%	-4%	176%	2,537	-31%	-32%	-4%	108%
Fraser Early	1,571	-42%	-43%	0%	64%	821	0%	-16%	-2%	160%	1,196	-27%	-34%	-1%	97%
Fraser Late	12,184	-27%	-26%	3%	102%	6,440	25%	27%	18%	185%	9,312	-9%	-8%	8%	131%
WCVI Natural	2,870	-31%	-32%	1%	105%	3,556	-30%	-31%	3%	123%	3,213	-30%	-31%	2%	115%
Georgia St. Upper	2,941	-41%	-42%	2%	69%	917	-16%	-18%	3%	148%	1,929	-35%	-36%	2%	88%
Georgia St. Lwr Nat	643	-15%	-9%	1%	109%	713	56%	65%	0%	297%	678	22%	30%	0%	208%
Pgt Sd NatF	320	-33%	-32%	2%	91%	144	-5%	-6%	1%	188%	232	-24%	-24%	1%	121%
Nooksack Spring	7	-41%	-41%	0%	82%	4	29%	33%	0%	181%	5	-17%	-15%	0%	117%
Skagit Wild	534	-40%	-40%	1%	84%	144	5%	3%	2%	187%	339	-30%	-31%	1%	106%
Stillaguamish Wild	48	-43%	-45%	1%	78%	21	14%	7%	4%	212%	35	-26%	-29%	2%	118%
Snohomish Wild	248	-41%	-41%	1%	73%	94	6%	5%	2%	196%	171	-29%	-29%	2%	107%
Col Upriver Brights	7,705	-45%	-45%	0%	44%	1,253	-8%	-8%	-2%	188%	4,479	-40%	-40%	-1%	64%
Lewis River Wild	339	-33%	-33%	3%	89%	111	-2%	-2%	5%	199%	225	-25%	-25%	4%	116%
Col River Summer	1,109	-41%	-41%	3%	70%	431	1%	0%	10%	189%	770	-29%	-29%	5%	104%
Oregon Coast	953	-46%	-47%	2%	58%	269	-7%	-6%	1%	196%	611	-38%	-38%	2%	89%
WA Coastal Wild	1,883	-36%	-37%	3%	80%	865	-11%	-11%	2%	179%	1,374	-28%	-28%	2%	111%
Snake Fall	29	-44%	-39%	2%	84%	12	18%	118%	37%	552%	20	-26%	7%	12%	221%
CAN Hatchery	7,125	-31%	-32%	-3%	101%	8,588	-28%	-28%	1%	126%	7,856	-29%	-30%	0%	115%
US Hatchery	8,917	-33%	-29%	6%	88%	2,629	1%	7%	13%	223%	5,773	-25%	-21%	7%	119%
Model Mortalities	52,540	-35%	-34%	2%	83%	28,973	-7%	-6%	6%	164%	40,756	-25%	-24%	3%	112%
CAN Stock Mortalities	30,446	-32%	-32%	1%	94%	22,997	-8%	-8%	6%	154%	26,721	-22%	-22%	3%	119%
US Stock Mortalities	22,095	-39%	-37%	3%	69%	5,976	-3%	0%	7%	204%	14,035	-31%	-30%	4%	98%

Table E-5. Retrospective comparison of AEQ mortalities including catch, shakers, legal CNR, and sublegal CNR for model chinook stocks.

WCVI Troll	Average Number of Chinook Mortalities 1985-1996														
	1985 -1990					1991 - 1996					1985 - 1996				
Stock	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25
Alaska South SE	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
North/Central	872	-50%	-47%	-35%	-36%	831	-48%	-52%	-25%	-27%	851	-49%	-49%	-30%	-31%
Fraser Early	3,144	-49%	-46%	-34%	-35%	2,540	-43%	-58%	-21%	-34%	2,842	-46%	-51%	-28%	-35%
Fraser Late	69,734	-38%	-32%	-30%	-30%	41,512	-22%	-18%	-24%	-21%	55,623	-32%	-27%	-28%	-27%
WCVI Natural	5,838	-52%	-48%	-35%	-36%	19,368	-64%	-61%	-49%	-50%	12,603	-61%	-58%	-46%	-47%
Georgia St. Upper	274	-49%	-44%	-32%	-34%	131	-50%	-53%	-28%	-33%	202	-49%	-47%	-31%	-34%
Georgia St. Lwr Nat	500	-34%	-21%	-36%	-29%	749	-14%	-20%	-16%	1%	624	-22%	-21%	-24%	-11%
Pgt Sd NatF	11,854	-48%	-42%	-34%	-32%	6,480	-45%	-50%	-24%	-23%	9,167	-47%	-45%	-31%	-29%
Nooksack Spring	84	-49%	-43%	-37%	-37%	55	-22%	-30%	-25%	-20%	70	-39%	-38%	-32%	-30%
Skagit Wild	2,653	-51%	-45%	-36%	-36%	938	-41%	-47%	-23%	-25%	1,795	-48%	-46%	-33%	-33%
Stillaguamish Wild	209	-51%	-46%	-37%	-37%	136	-35%	-47%	-18%	-20%	173	-45%	-46%	-30%	-30%
Snohomish Wild	1,172	-50%	-45%	-36%	-36%	601	-41%	-48%	-22%	-24%	886	-47%	-46%	-31%	-32%
Col Upriver Brights	46,228	-45%	-40%	-28%	-29%	13,590	-47%	-52%	-23%	-25%	29,909	-45%	-43%	-27%	-28%
Lewis River Wild	3,145	-51%	-46%	-35%	-36%	1,114	-51%	-54%	-29%	-29%	2,129	-51%	-48%	-34%	-34%
Col River Summer	4,478	-50%	-45%	-35%	-36%	2,328	-45%	-49%	-23%	-27%	3,403	-48%	-46%	-31%	-33%
Oregon Coast	13,200	-49%	-44%	-33%	-33%	6,116	-48%	-52%	-25%	-25%	9,658	-49%	-46%	-30%	-30%
WA Coastal Wild	6,518	-49%	-45%	-34%	-34%	3,478	-49%	-53%	-27%	-27%	4,998	-49%	-48%	-31%	-31%
Snake Fall	548	-50%	-38%	-32%	-26%	347	-34%	7%	2%	66%	447	-44%	-21%	-19%	9%
CAN Hatchery	13,609	-53%	-49%	-37%	-37%	45,256	-64%	-61%	-49%	-49%	29,433	-61%	-58%	-46%	-46%
US Hatchery	156,027	-30%	-40%	-32%	-30%	59,628	-40%	-42%	-20%	-14%	107,828	-33%	-41%	-29%	-25%
Model Mortalities	340,087	-38%	-40%	-32%	-31%	205,197	-45%	-45%	-31%	-28%	272,642	-40%	-42%	-31%	-30%
CAN Stock Mortalities	93,970	-41%	-36%	-31%	-32%	110,386	-47%	-45%	-39%	-38%	102,178	-45%	-41%	-35%	-35%
US Stock Mortalities	246,117	-36%	-41%	-32%	-30%	94,811	-42%	-45%	-21%	-18%	170,464	-38%	-42%	-29%	-27%

Table E-6. Retrospective comparison of AEQ mortalities including catch, shakers, legal CNR, and sublegal CNR for model chinook stocks.

WCVI Sport	Average Number of Chinook Mortalities 1985-1996														
	1985 -1990					1991 - 1996					1985 - 1996				
Stock	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25
Alaska South SE	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
North/Central	64	5%	-76%	1%	-82%	114	-38%	-85%	2%	-89%	89	-22%	-82%	2%	-86%
Fraser Early	218	17%	-74%	5%	-80%	345	-34%	-87%	3%	-90%	281	-14%	-82%	3%	-86%
Fraser Late	5,381	29%	-70%	10%	-81%	6,272	7%	-75%	23%	-86%	5,827	17%	-73%	17%	-84%
WCVI Natural	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
Georgia St. Upper	20	16%	-73%	3%	-81%	19	-33%	-85%	7%	-89%	20	-8%	-79%	5%	-85%
Georgia St. Lwr Nat	49	47%	-64%	3%	-80%	151	-3%	-75%	3%	-85%	100	9%	-73%	3%	-84%
Pgt Sd NatF	1,006	12%	-74%	6%	-81%	1,133	-33%	-84%	4%	-88%	1,069	-12%	-79%	5%	-85%
Nooksack Spring	8	27%	-69%	4%	-81%	13	-6%	-75%	2%	-88%	11	6%	-73%	3%	-85%
Skagit Wild	218	21%	-72%	4%	-80%	184	-29%	-83%	5%	-89%	201	-2%	-77%	4%	-84%
Stillaguamish Wild	19	22%	-72%	4%	-81%	30	-22%	-82%	7%	-88%	24	-5%	-78%	5%	-86%
Snohomish Wild	96	23%	-72%	4%	-80%	120	-28%	-83%	4%	-88%	108	-5%	-78%	4%	-85%
Col Upriver Brights	2,671	30%	-70%	5%	-77%	2,049	-34%	-84%	3%	-88%	2,360	2%	-76%	4%	-82%
Lewis River Wild	218	29%	-71%	4%	-78%	201	-36%	-85%	2%	-89%	209	-2%	-78%	3%	-83%
Col River Summer	345	21%	-73%	7%	-80%	401	-28%	-83%	11%	-88%	373	-6%	-78%	9%	-84%
Oregon Coast	917	23%	-72%	6%	-79%	998	-35%	-85%	5%	-88%	957	-7%	-78%	5%	-84%
WA Coastal Wild	545	14%	-74%	5%	-81%	641	-35%	-85%	3%	-88%	593	-13%	-80%	4%	-85%
Snake Fall	43	26%	-68%	12%	-76%	65	-17%	-64%	38%	-74%	54	0%	-65%	28%	-75%
CAN Hatchery	73	36%	-67%	3%	-79%	83	5%	-75%	2%	-85%	78	19%	-71%	3%	-82%
US Hatchery	13,480	30%	-70%	8%	-77%	10,997	-27%	-82%	11%	-87%	12,238	4%	-75%	10%	-82%
Model Mortalities	25,368	28%	-70%	8%	-79%	23,814	-19%	-81%	12%	-87%	24,591	5%	-75%	10%	-83%
CAN Stock Mortalities	5,804	29%	-70%	10%	-81%	6,983	4%	-76%	21%	-86%	6,394	15%	-73%	16%	-84%
US Stock Mortalities	19,564	28%	-70%	7%	-78%	16,831	-29%	-83%	9%	-87%	18,197	2%	-76%	8%	-82%

Table E-7. Retrospective comparison of AEQ mortalities including catch, shakers, legal CNR, and sublegal CNR for model chinook stocks.

Geo St Troll & Sport	Average Number of Chinook Mortalities 1985-1996														
	1985 -1990					1991 - 1996					1985 - 1996				
Stock	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25
Alaska South SE	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
North/Central	154	-66%	-67%	1%	-24%	0	0%	0%	0%	0%	77	-66%	-67%	1%	-24%
Fraser Early	5,949	-63%	-64%	2%	-27%	8,759	-68%	-73%	1%	-60%	7,354	-66%	-69%	2%	-47%
Fraser Late	128,045	-54%	-53%	7%	-1%	105,121	-38%	-34%	25%	-10%	116,583	-47%	-45%	15%	-5%
WCVI Natural	546	-62%	-62%	4%	-31%	1,074	-63%	-63%	11%	-47%	810	-63%	-63%	9%	-42%
Georgia St. Upper	4,597	-63%	-63%	2%	-28%	3,051	-63%	-63%	7%	-51%	3,824	-63%	-63%	4%	-37%
Georgia St. Lwr Nat	10,245	-50%	-45%	2%	0%	21,791	-47%	-43%	3%	-14%	16,018	-48%	-44%	3%	-9%
Pgt Sd NatF	5,068	-62%	-61%	3%	-16%	3,238	-63%	-63%	3%	-37%	4,153	-63%	-62%	3%	-24%
Nooksack Spring	452	-58%	-58%	2%	4%	408	-39%	-36%	6%	-9%	430	-49%	-47%	4%	-2%
Skagit Wild	2,309	-64%	-64%	1%	-15%	919	-59%	-59%	6%	-35%	1,614	-63%	-62%	2%	-21%
Stillaguamish Wild	249	-60%	-60%	3%	-28%	283	-57%	-59%	9%	-52%	266	-59%	-60%	6%	-40%
Snohomish Wild	1,047	-63%	-63%	1%	-15%	628	-61%	-60%	5%	-36%	838	-62%	-62%	3%	-23%
Col Upriver Brights	3,956	-65%	-65%	2%	2%	1,755	-67%	-66%	0%	-27%	2,855	-66%	-65%	1%	-7%
Lewis River Wild	90	-66%	-65%	4%	92%	31	-49%	-48%	7%	186%	60	-62%	-61%	5%	116%
Col River Summer	426	-65%	-64%	3%	30%	204	-55%	-54%	12%	52%	315	-61%	-61%	6%	37%
Oregon Coast	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
WA Coastal Wild	2,973	-65%	-65%	2%	-28%	1,721	-67%	-66%	2%	-54%	2,347	-65%	-65%	2%	-38%
Snake Fall	2	-64%	-45%	9%	-9%	1	-29%	-14%	71%	0%	2	-50%	-33%	33%	-6%
CAN Hatchery	18,965	-59%	-57%	1%	-6%	13,098	-46%	-42%	4%	-15%	16,031	-54%	-51%	3%	-10%
US Hatchery	59,024	-62%	-59%	3%	-15%	31,024	-57%	-54%	11%	-31%	45,024	-60%	-58%	6%	-21%
Model Mortalities	244,094	-57%	-56%	5%	-7%	193,104	-46%	-43%	16%	-19%	218,599	-52%	-50%	10%	-12%
CAN Stock Mortalities	168,499	-55%	-54%	6%	-3%	152,893	-42%	-39%	18%	-15%	160,696	-49%	-47%	12%	-9%
US Stock Mortalities	75,595	-62%	-60%	3%	-14%	40,211	-59%	-56%	9%	-32%	57,903	-61%	-59%	5%	-20%

Table E-8. Retrospective comparison of AEQ mortalities including catch, shakers, legal CNR, and sublegal CNR for model chinook stocks.

WA/OR Troll	Average Number of Chinook Mortalities 1985-1996														
	1985 -1990					1991 - 1996					1985 - 1996				
Stock	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25
Alaska South SE	153	0%	-34%	-38%	-37%	76	-8%	-19%	-1%	0%	114	-3%	-29%	-25%	-25%
North/Central	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
Fraser Early	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
Fraser Late	31,623	28%	-23%	-37%	-37%	22,915	57%	11%	-17%	-15%	27,269	40%	-9%	-29%	-27%
WCVI Natural	18	2%	-47%	-48%	-48%	17	-3%	-39%	-38%	-38%	17	0%	-43%	-43%	-43%
Georgia St. Upper	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
Georgia St. Lwr Nat	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
Pgt Sd NatF	2,806	12%	-38%	-45%	-42%	1,312	8%	-6%	-9%	-7%	2,059	11%	-28%	-34%	-31%
Nooksack Spring	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
Skagit Wild	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
Stillaguamish Wild	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
Snohomish Wild	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
Col Upriver Brights	5,950	3%	-31%	-38%	-38%	1,755	-4%	-10%	-2%	-3%	3,853	2%	-26%	-30%	-30%
Lewis River Wild	1,841	6%	-32%	-41%	-41%	630	3%	-6%	-6%	-4%	1,235	5%	-26%	-32%	-32%
Col River Summer	359	11%	-33%	-40%	-41%	170	13%	0%	0%	-4%	265	12%	-22%	-27%	-29%
Oregon Coast	1,659	4%	-30%	-36%	-36%	838	-1%	-15%	-12%	-11%	1,248	2%	-25%	-28%	-27%
WA Coastal Wild	1,738	4%	-38%	-43%	-43%	831	0%	-15%	-12%	-12%	1,285	3%	-31%	-33%	-33%
Snake Fall	375	13%	-22%	-38%	-30%	244	27%	105%	22%	101%	310	19%	28%	-15%	22%
CAN Hatchery	43	-5%	-52%	-52%	-51%	43	-10%	-44%	-40%	-40%	43	-8%	-48%	-46%	-46%
US Hatchery	104,858	6%	-35%	-41%	-39%	48,272	7%	-13%	-17%	-14%	76,565	7%	-28%	-33%	-32%
Model Mortalities	151,424	11%	-32%	-40%	-39%	77,102	21%	-5%	-16%	-14%	114,263	14%	-23%	-32%	-30%
CAN Stock Mortalities	31,684	28%	-23%	-37%	-37%	22,974	57%	11%	-17%	-15%	27,329	40%	-9%	-29%	-27%
US Stock Mortalities	119,740	6%	-34%	-41%	-39%	54,127	6%	-13%	-16%	-13%	86,934	6%	-28%	-33%	-31%

Table E-9. Retrospective comparison of AEQ mortalities including catch, shakers, legal CNR, and sublegal CNR for model chinook stocks.

Other CAN	Average Number of Chinook Mortalities 1985-1996														
	1985 -1990					1991 - 1996					1985 - 1996				
Stock	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25
Alaska South SE	69	-44%	-44%	29%	30%	43	-11%	-10%	40%	44%	56	-32%	-31%	33%	35%
North/Central	37,303	-16%	-20%	38%	39%	49,117	-34%	-36%	-2%	2%	43,210	-26%	-29%	16%	18%
Fraser Early	32,079	5%	58%	6%	61%	18,189	8%	124%	6%	129%	25,134	6%	82%	6%	85%
Fraser Late	33,930	24%	38%	9%	17%	25,412	64%	132%	22%	90%	29,671	41%	78%	15%	48%
WCVI Natural	12,654	-1%	-14%	12%	-1%	17,513	8%	-1%	23%	14%	15,084	5%	-7%	18%	7%
Georgia St. Upper	11,864	-17%	-16%	19%	33%	4,673	-10%	11%	8%	61%	8,268	-15%	-8%	16%	41%
Georgia St. Lwr Nat	13,511	37%	19%	3%	-2%	23,954	38%	29%	3%	20%	18,733	38%	25%	3%	12%
Pgt Sd NatF	2,261	2%	-17%	6%	-7%	958	0%	13%	2%	23%	1,609	1%	-8%	5%	2%
Nooksack Spring	168	12%	-1%	2%	-9%	119	55%	71%	4%	23%	143	29%	29%	3%	4%
Skagit Wild	1,815	-10%	-19%	13%	22%	678	-3%	11%	2%	53%	1,246	-8%	-11%	10%	30%
Stillaguamish Wild	200	-7%	-12%	14%	15%	161	19%	21%	10%	30%	180	4%	3%	12%	22%
Snohomish Wild	864	-12%	-21%	12%	18%	451	-3%	14%	2%	60%	658	-9%	-9%	8%	33%
Col Upriver Brights	16,497	-25%	-40%	14%	12%	3,972	5%	18%	11%	80%	10,234	-19%	-29%	13%	25%
Lewis River Wild	749	-12%	-38%	15%	-5%	239	-16%	-5%	1%	33%	494	-13%	-30%	12%	4%
Col River Summer	1,543	-11%	-10%	34%	48%	1,127	-23%	-17%	5%	37%	1,335	-16%	-13%	22%	43%
Oregon Coast	1,180	-28%	-29%	30%	46%	674	2%	8%	30%	72%	927	-17%	-15%	30%	56%
WA Coastal Wild	1,733	-12%	-12%	11%	20%	981	5%	17%	12%	42%	1,357	-6%	-2%	11%	28%
Snake Fall	46	-6%	-24%	9%	4%	20	44%	233%	48%	281%	33	9%	54%	21%	88%
CAN Hatchery	42,266	5%	-11%	7%	-6%	47,533	20%	10%	19%	18%	44,899	13%	0%	13%	7%
US Hatchery	27,744	-2%	-13%	9%	6%	8,525	16%	38%	10%	57%	18,135	3%	-1%	9%	18%
Model Mortalities	238,475	1%	2%	14%	20%	204,337	11%	27%	11%	37%	221,406	6%	14%	12%	28%
CAN Stock Mortalities	183,609	5%	10%	14%	22%	186,391	11%	27%	11%	35%	185,000	8%	19%	13%	29%
US Stock Mortalities	54,867	-10%	-22%	12%	10%	17,947	8%	24%	10%	58%	36,407	-6%	-11%	11%	22%

Table E-10. Retrospective comparison of AEQ mortalities including catch, shakers, legal CNR, and sublegal CNR for model chinook stocks.

Other US	Average Number of Chinook Mortalities 1985-1996														
	1985 -1990					1991 - 1996					1985 - 1996				
Stock	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25
Alaska South SE	3	-19%	-31%	13%	-19%	2	0%	-45%	27%	0%	2	-11%	-37%	19%	-11%
North/Central	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
Fraser Early	5,316	6%	-8%	6%	-8%	3,382	6%	19%	5%	20%	4,349	6%	2%	5%	3%
Fraser Late	23,910	28%	33%	9%	12%	17,116	52%	89%	21%	52%	20,513	38%	56%	14%	28%
WCVI Natural	280	4%	-13%	8%	-11%	308	7%	-2%	14%	2%	294	6%	-7%	11%	-4%
Georgia St. Upper	0	0%	0%	0%	0%	0	0%	0%	0%	0%	0	0%	0%	0%	0%
Georgia St. Lwr Nat	378	60%	54%	3%	3%	546	71%	119%	3%	65%	462	66%	92%	3%	40%
Pgt Sd NatF	41,838	13%	-12%	8%	-15%	25,008	13%	-1%	6%	-5%	33,423	13%	-8%	7%	-11%
Nooksack Spring	122	22%	5%	4%	-15%	95	59%	82%	5%	20%	108	38%	39%	4%	0%
Skagit Wild	3,985	13%	27%	4%	14%	1,300	22%	98%	7%	69%	2,643	16%	44%	5%	28%
Stillaguamish Wild	415	13%	26%	4%	18%	339	29%	59%	11%	49%	377	21%	41%	7%	32%
Snohomish Wild	4,053	16%	18%	4%	5%	2,415	21%	48%	6%	27%	3,234	18%	29%	5%	13%
Col Upriver Brights	131,368	2%	-51%	7%	-50%	26,286	2%	-9%	5%	-8%	78,827	2%	-44%	6%	-43%
Lewis River Wild	22,566	2%	-52%	4%	-51%	16,340	3%	-65%	5%	-65%	19,453	2%	-57%	4%	-57%
Col River Summer	955	9%	11%	7%	7%	390	17%	102%	15%	87%	672	11%	37%	9%	30%
Oregon Coast	27,491	6%	-18%	9%	-15%	17,021	6%	-14%	10%	-12%	22,256	6%	-16%	9%	-14%
WA Coastal Wild	45,090	7%	7%	7%	6%	32,877	6%	7%	6%	6%	38,983	7%	7%	7%	6%
Snake Fall	764	20%	-24%	25%	-26%	344	38%	196%	47%	176%	554	25%	44%	32%	36%
CAN Hatchery	1,157	20%	5%	4%	-9%	947	31%	36%	11%	20%	1,052	25%	19%	7%	4%
US Hatchery	460,241	15%	-6%	12%	-10%	206,345	22%	31%	13%	25%	333,293	17%	6%	12%	1%
Model Mortalities	769,930	12%	-13%	10%	-16%	351,058	18%	21%	11%	15%	560,494	14%	-3%	10%	-7%
CAN Stock Mortalities	31,040	24%	25%	8%	7%	22,299	44%	76%	18%	46%	26,670	32%	46%	12%	23%
US Stock Mortalities	738,890	11%	-15%	10%	-17%	328,759	16%	17%	11%	12%	533,825	13%	-5%	10%	-8%

Table E-11. Retrospective comparison of AEQ mortalities including catch, shakers, legal CNR, and sublegal CNR for model chinook stocks.

Total Can	Average Number of Chinook Mortalities 1985-1996														
	1985 -1990					1991 - 1996					1985 - 1996				
Stock	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25
Alaska South SE	537	-36%	-36%	-2%	-1%	290	-21%	-21%	29%	30%	414	-30%	-30%	9%	10%
North/Central	59,010	-21%	-23%	22%	26%	69,690	-27%	-28%	3%	11%	64,350	-24%	-26%	12%	18%
Fraser Early	52,826	-13%	19%	1%	33%	39,263	-15%	33%	7%	48%	46,045	-14%	25%	4%	39%
Fraser Late	250,802	-35%	-34%	-3%	-4%	185,695	-16%	-7%	13%	5%	218,249	-27%	-22%	4%	0%
WCVI Natural	28,817	-20%	-26%	-2%	2%	53,012	-28%	-30%	-9%	-6%	40,915	-25%	-28%	-6%	-3%
Georgia St. Upper	25,824	-31%	-31%	7%	16%	11,385	-27%	-18%	8%	24%	18,604	-29%	-27%	7%	18%
Georgia St. Lwr Nat	25,589	-1%	-9%	2%	1%	48,329	-1%	-3%	3%	9%	36,959	-1%	-5%	3%	6%
Pgt Sd NatF	20,697	-43%	-45%	-18%	-25%	12,076	-44%	-50%	-12%	-27%	16,386	-43%	-47%	-16%	-26%
Nooksack Spring	727	-40%	-42%	-3%	-4%	607	-17%	-14%	3%	-4%	667	-29%	-29%	0%	-4%
Skagit Wild	8,158	-41%	-44%	-9%	-9%	3,098	-32%	-34%	-3%	-2%	5,628	-39%	-41%	-8%	-7%
Stillaguamish Wild	754	-39%	-42%	-6%	-13%	648	-28%	-34%	4%	-16%	701	-34%	-38%	-1%	-14%
Snohomish Wild	3,694	-41%	-43%	-9%	-9%	2,049	-33%	-34%	-2%	0%	2,871	-38%	-40%	-7%	-6%
Col Upriver Brights	109,621	-34%	-37%	-10%	-9%	33,117	-28%	-31%	-2%	5%	71,369	-33%	-36%	-8%	-6%
Lewis River Wild	5,646	-37%	-41%	-17%	-17%	2,196	-36%	-40%	-11%	-3%	3,921	-36%	-41%	-16%	-13%
Col River Summer	9,538	-36%	-37%	-11%	-3%	5,489	-28%	-33%	-1%	11%	7,514	-33%	-36%	-7%	2%
Oregon Coast	50,851	-31%	-31%	-9%	-10%	26,247	-21%	-22%	7%	8%	38,549	-28%	-28%	-4%	-4%
WA Coastal Wild	24,855	-34%	-35%	-8%	-7%	15,117	-27%	-28%	3%	5%	19,986	-31%	-32%	-4%	-3%
Snake Fall	770	-39%	-35%	-21%	-18%	521	-21%	24%	19%	83%	645	-32%	-11%	-5%	23%
CAN Hatchery	98,253	-22%	-28%	-2%	-2%	141,781	-22%	-24%	-7%	-2%	120,017	-22%	-26%	-5%	-2%
US Hatchery	291,736	-30%	-41%	-15%	-19%	127,528	-36%	-38%	-3%	-11%	209,632	-32%	-40%	-12%	-17%
Model Mortalities	1,068,704	-29%	-32%	-6%	-5%	778,136	-23%	-20%	2%	3%	923,420	-27%	-27%	-3%	-2%
CAN Stock Mortalities	541,121	-26%	-25%	1%	5%	549,154	-19%	-13%	3%	7%	545,138	-23%	-19%	2%	6%
US Stock Mortalities	527,582	-32%	-39%	-13%	-15%	228,983	-32%	-35%	-2%	-5%	378,282	-32%	-38%	-10%	-12%

Table E-12. Retrospective comparison of AEQ mortalities including catch, shakers, legal CNR, and sublegal CNR for model chinook stocks.

Total US	Average Number of Chinook Mortalities 1985-1996														
	1985 -1990					1991 - 1996					1985 - 1996				
Stock	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25
Alaska South SE	17,022	33%	36%	-24%	-24%	12,493	9%	9%	-26%	-26%	14,758	23%	25%	-25%	-25%
North/Central	49,306	35%	42%	-28%	-28%	60,982	25%	27%	-31%	-31%	55,144	29%	34%	-30%	-30%
Fraser Early	20,939	3%	13%	-23%	-27%	16,312	18%	8%	-14%	-20%	18,625	10%	11%	-19%	-24%
Fraser Late	56,586	29%	3%	-17%	-16%	40,595	57%	47%	-1%	14%	48,590	41%	22%	-10%	-3%
WCVI Natural	18,911	23%	31%	-25%	-26%	29,330	29%	33%	-20%	-21%	24,120	27%	32%	-22%	-23%
Georgia St. Upper	12,272	44%	51%	-28%	-30%	6,153	33%	34%	-29%	-33%	9,212	41%	45%	-28%	-31%
Georgia St. Lwr Nat	932	79%	118%	-25%	-18%	1,681	104%	151%	-23%	14%	1,306	95%	139%	-24%	3%
Pgt Sd NatF	44,873	13%	-13%	4%	-16%	26,489	13%	-1%	5%	-5%	35,681	13%	-9%	5%	-12%
Nooksack Spring	122	22%	5%	4%	-15%	95	59%	82%	5%	20%	108	38%	39%	4%	0%
Skagit Wild	4,317	15%	28%	1%	11%	1,448	24%	93%	4%	59%	2,883	18%	44%	2%	23%
Stillaguamish Wild	497	29%	40%	1%	12%	473	41%	60%	-1%	26%	485	35%	49%	0%	19%
Snohomish Wild	4,143	17%	19%	4%	4%	2,501	22%	48%	5%	25%	3,322	19%	30%	4%	12%
Col Upriver Brights	217,818	14%	-18%	-4%	-38%	55,294	14%	9%	-8%	-14%	136,556	14%	-12%	-5%	-33%
Lewis River Wild	27,393	5%	-41%	-2%	-47%	18,501	5%	-55%	2%	-59%	22,947	5%	-47%	0%	-52%
Col River Summer	5,131	25%	22%	-17%	-18%	3,031	40%	51%	-7%	-1%	4,081	31%	33%	-13%	-12%
Oregon Coast	65,637	14%	6%	-8%	-18%	36,359	17%	9%	-3%	-12%	50,998	15%	7%	-6%	-16%
WA Coastal Wild	58,513	11%	11%	-1%	-2%	42,066	10%	11%	0%	0%	50,289	10%	11%	-1%	-1%
Snake Fall	1,248	19%	-17%	3%	-26%	676	38%	166%	33%	137%	962	26%	47%	13%	31%
CAN Hatchery	43,907	24%	34%	-27%	-28%	72,296	28%	34%	-21%	-22%	58,102	26%	34%	-23%	-24%
US Hatchery	592,306	14%	-8%	1%	-15%	270,026	19%	24%	6%	16%	431,166	16%	2%	2%	-6%
Model Mortalities	1,241,871	16%	-3%	-5%	-21%	696,799	22%	21%	-5%	-3%	969,335	18%	6%	-5%	-15%
CAN Stock Mortalities	202,853	27%	26%	-24%	-25%	227,347	32%	33%	-19%	-18%	215,100	30%	30%	-22%	-21%
US Stock Mortalities	1,039,018	14%	-8%	-1%	-20%	469,452	17%	16%	2%	4%	754,235	15%	-1%	0%	-13%

Appendix F. Brood Exploitation Rates by Stock

List of Tables

Table F. Retrospective comparison of brood year exploitation rates for wild model chinook stocks.

	Average Brood Year Exploitation Rates from 1981-1992														
	1981 -1986					1987 - 1992					1981 - 1992				
Stock	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25
Alaska South SE	0.39	31%	33%	-21%	-21%	0.44	16%	16%	-25%	-25%	0.42	23%	24%	-23%	-23%
North/Central	0.36	6%	7%	0%	2%	0.46	-3%	-3%	-12%	-8%	0.41	1%	2%	-7%	-4%
Fraser Early	0.40	-9%	20%	-6%	17%	0.33	-7%	45%	-2%	46%	0.36	-8%	31%	-4%	30%
Fraser Late	0.69	-26%	-30%	-6%	-8%	0.62	-31%	-26%	-7%	-7%	0.65	-29%	-28%	-6%	-7%
WCVI Hatchery	0.51	-6%	-4%	-11%	-11%	0.57	-4%	-4%	-12%	-9%	0.54	-5%	-4%	-11%	-10%
WCVI Natural	0.49	-6%	-5%	-10%	-10%	0.52	-4%	-5%	-12%	-8%	0.50	-5%	-5%	-11%	-9%
Georgia St. Upper	0.67	-6%	-4%	-4%	1%	0.64	-6%	1%	-6%	6%	0.65	-6%	-2%	-5%	3%
Georgia St. Lwr Nat	0.77	-18%	-22%	-1%	-5%	0.72	-21%	-23%	-1%	-9%	0.74	-20%	-23%	-1%	-7%
Georgia St. Lwr Hat	0.79	-18%	-21%	0%	-5%	0.69	-21%	-24%	-1%	-9%	0.74	-19%	-23%	-1%	-7%
Nooksack Fall	0.89	-4%	-13%	-1%	-9%	0.78	-10%	-4%	-1%	0%	0.84	-7%	-9%	-1%	-5%
Pgt Sd Fing	0.73	-7%	-18%	-4%	-14%	0.66	-8%	-12%	-3%	-7%	0.70	-7%	-15%	-3%	-11%
Pgt Sd NatF	0.78	-5%	-24%	-3%	-20%	0.70	-7%	-19%	-3%	-15%	0.74	-6%	-22%	-3%	-18%
Pgt Sd Year	0.81	-8%	-15%	-1%	-8%	0.75	-10%	-11%	-1%	-4%	0.78	-9%	-13%	-1%	-6%
Nooksack Spring	0.54	-36%	-40%	-3%	-7%	0.47	-35%	-33%	1%	-5%	0.50	-35%	-37%	-1%	-6%
Skagit Wild	0.47	-19%	-16%	-4%	-1%	0.38	-24%	-6%	-7%	12%	0.42	-21%	-12%	-5%	4%
Stillaguamish Wild	0.54	-12%	-9%	-3%	-3%	0.52	-17%	-9%	-6%	-7%	0.53	-15%	-9%	-4%	-5%
Snohomish Wild	0.66	-9%	-9%	-2%	-2%	0.56	-11%	0%	-3%	8%	0.61	-10%	-5%	-2%	3%
WA Coastal Hat	0.57	-5%	-5%	-5%	-5%	0.68	-2%	-1%	-2%	-1%	0.63	-3%	-3%	-3%	-3%
Col Upriver Brights	0.65	-2%	-21%	-5%	-24%	0.54	-2%	-8%	-7%	-9%	0.60	-2%	-15%	-6%	-17%
Spring Creek Hat	0.85	-3%	-14%	-5%	-14%	0.79	-5%	-10%	-5%	-8%	0.82	-4%	-12%	-5%	-11%
Lwr Bonneville Hat	0.73	-8%	-19%	-10%	-17%	0.57	-20%	-5%	-16%	3%	0.65	-13%	-13%	-12%	-8%
Fall Cowlitz Hat	0.65	-8%	-22%	-13%	-22%	0.47	-11%	2%	-11%	6%	0.56	-9%	-12%	-12%	-10%
Lewis R Wild	0.65	-2%	-34%	-4%	-35%	0.77	-1%	-47%	-1%	-46%	0.71	-1%	-41%	-3%	-41%
Willamette River	0.65	-2%	-22%	-3%	-23%	0.57	-1%	-12%	-1%	-11%	0.61	-2%	-17%	-2%	-17%
Spr Cowlitz Hat	0.83	-1%	-38%	-2%	-38%	0.76	0%	-33%	1%	-31%	0.80	-1%	-36%	-1%	-35%
Col River Summer	0.41	-16%	-18%	-14%	-10%	0.36	-12%	-12%	-11%	2%	0.39	-14%	-15%	-13%	-4%
Oregon Coast	0.55	-5%	-10%	-7%	-13%	0.52	-2%	-8%	-4%	-10%	0.53	-3%	-9%	-5%	-12%
WA Coastal Wild	0.64	-3%	-3%	-3%	-3%	0.64	-1%	-1%	-1%	-1%	0.64	-2%	-2%	-2%	-2%
Snake Fall	0.79	-3%	-17%	-4%	-17%	0.68	-6%	-8%	-4%	-5%	0.73	-4%	-13%	-4%	-11%
Mid Col River Brights	0.63	-3%	-32%	-5%	-33%	0.48	-2%	-12%	-5%	-13%	0.55	-3%	-23%	-5%	-24%

Appendix G. Escapement by Stock

List of Tables

Table G. Retrospective comparison of wild chinook model escapements.

	Average Escapement of Chinook 1985-1996														
	1985-1990					1991-1996					1985-1996				
Stock	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25	Benchmark	US-ACT	US-25	CAN-ACT	CAN-25
Alaska South SE	26,805	-19%	-21%	14%	14%	15,818	-21%	-22%	23%	23%	21,311	-20%	-21%	17%	17%
North/Central	158,609	-2%	-4%	1%	0%	162,315	2%	1%	9%	6%	160,462	0%	-1%	5%	3%
Fraser Early	99,188	8%	-14%	6%	-12%	104,174	7%	-30%	4%	-30%	101,681	8%	-23%	5%	-21%
Fraser Late	134,318	78%	84%	21%	17%	104,658	140%	140%	36%	46%	119,488	105%	109%	27%	30%
WCVI Natural	48,290	7%	6%	12%	12%	61,683	13%	12%	22%	20%	54,987	10%	9%	18%	16%
Georgia St. Upper	19,071	15%	10%	8%	1%	10,454	17%	6%	15%	-4%	14,763	16%	9%	11%	-1%
Georgia St. Lwr Nat	7,329	105%	130%	5%	31%	15,105	121%	132%	4%	49%	11,217	116%	132%	4%	43%
Pgt Sd NatF	18,695	21%	89%	12%	76%	18,110	18%	44%	7%	33%	18,402	19%	67%	9%	55%
Nooksack Spring	744	49%	54%	4%	4%	775	98%	105%	5%	17%	759	74%	80%	4%	11%
Skagit Wild	15,430	16%	14%	4%	1%	7,824	24%	12%	6%	-6%	11,627	19%	13%	5%	-1%
Stillaguamish Wild	1,064	20%	15%	6%	6%	1,060	39%	22%	12%	13%	1,062	29%	18%	9%	9%
Snohomish Wild	4,282	18%	18%	4%	4%	3,533	22%	6%	6%	-9%	3,907	20%	13%	5%	-2%
Col Upriver Brights	159,124	4%	42%	10%	49%	71,514	4%	7%	10%	9%	115,319	4%	31%	10%	37%
Lewis River Wild	17,022	3%	50%	7%	53%	6,243	4%	104%	7%	105%	11,633	3%	65%	7%	67%
Col River Summer	20,484	13%	14%	11%	7%	14,258	23%	24%	21%	11%	17,371	17%	18%	15%	9%
Oregon Coast	76,429	8%	14%	12%	20%	52,754	7%	16%	12%	20%	64,591	8%	15%	12%	20%
WA Coastal Wild	29,004	9%	8%	9%	10%	22,823	6%	5%	6%	6%	25,914	8%	6%	8%	8%
Snake Fall	317	16%	91%	19%	87%	475	41%	168%	51%	150%	396	31%	138%	39%	125%
Total Wild	836,204	17%	26%	10%	17%	673,577	30%	26%	14%	12%	754,890	23%	26%	12%	15%
Number of Stocks															
< -30%		0	0	0	0		0	1	0	1		0	0	0	0
-30% to -10%		1	2	0	1		1	1	0	0		1	2	0	1
-10% to +10%		7	3	10	8		6	5	10	6		6	4	11	7
+10% to +30%		7	6	8	4		6	5	6	6		7	5	6	5
> +30%		3	7	0	5		5	6	2	5		4	7	1	5