PACIFIC SALMON COMMISSION
JOINT CHINOOK TECHNICAL COMMITTEE
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List of Acronyms with Definitions

ADF&G	Alaska Department of Fish & Game
AEQ	Adult Equivalent
AWG	Analytical Working Group of the CTC
C&S	Ceremonial & Subsistence
CBC	Central British Columbia Fishing area - Kitimat to Cape Caution
CDFO	Canadian Department of Fisheries & Oceans
CNR	Chinook Nonretention - all species except chinook fisheries
CR	Columbia River
CRITFC	Columbia River Intertribal Fish Commission
CTC	Chinook Technical Committee
CUS	Columbia Upriver Spring chinook stock
CWT	Coded Wire Tag
ESA	U.S. Endangered Species Act
est+fw	Estuary Plus Fresh Water Area
FR	Fraser River
GS	Strait of Georgia
IDFG	Idaho Department of Fish & Game
IDL	InterDam Loss
LFR	Lower Fraser River
LGS	Lower Strait of Georgia
mar	Marine Area
mar+fw	Marine Plus Fresh Water Area
MRP	Mark-Recovery Program
MSY	Maximum Sustainable Yield for a stock, in adult equivalents
MSY ER	Exploitation Rate sustainable at the escapement goal for a stock, in AEQs
NA	Not Available
NBC	Northern British Columbia - Dixon Entrance to Kitimat including Queen Charlotte Islands
NCBC	North Central British Columbia - Dixon Entrance to Cape Caution
NMFS	National Marine Fisheries Service
NOC	Oregon Coastal North Migrating Stocks
NPS	North Puget Sound
NPS-S/F	North Puget Sound Summer/Fall chinook stock
NPS-Sp	North Puget Sound Spring chinook stock
NR	Not Representative
NWIFC	Northwest Indian Fisheries Commission
ODFW	Oregon Department of Fish & Wildlife
OTAC	Outside Troll Advisory Committee
PFMC	Pacific Fisheries Management Council
PS	Puget Sound
PSC	Pacific Salmon Commission
PSMFC	Pacific States Marine Fisheries Commission
PST	Pacific Salmon Treaty
QIN	Quinault Nation
SEAK	Southeast Alaska - Cape Suckling to Dixon Entrance
SPS	South Puget Sound
SSRAA	Southern Southeast Region Aqualculture Association
TBR	Transboundary Rivers
TBTC	Transboundary Technical Committee
UFR	Upper Fraser River
UGS	Upper Strait of Georgia
USFWS	U.S. Fish & Wildlife Service
UW	University of Washington
WA/OR	Ocean areas off Washington and Oregon North of Cape Falcon
WAC	North Washington Coastal Area (Grays Harbor northward)
WACO	Washington, Oregon, Columbia River chinook stock
WCVI	West Coast Vancouver Island - excluding Area 20
WDFW	Washington Department of Fisheries and Wildlife

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Preface
The Pacific Salmon Treaty Chinook Rebuilding Program

The Pacific Salmon Treaty includes a commitment to:

> "halt the decline in spawning escapements of depressed stocks; and attain by 1998, escapement goals established in order to restore production of naturally spawning chinook stocks, as represented by indicator stocks identified by the Parties, based on a rebuilding program begun in 1984."

The goal of the program is to rebuild depressed naturally-spawning stocks and restore production through progressive increases in spawning escapements achieved through a combination of catch ceilings in selected mixed-stock fisheries and harvest rate limitations in nonceiling, passthrough fisheries. The Pacific Salmon Commission instructed the Chinook Technical Committee to "develop procedures to evaluate progress in the rebuilding of naturally spawning chinook stocks." The February 1987 Chinook Technical Committee Report, "Assessing Progress Toward Rebuilding Depressed Chinook Stocks," established an evaluation framework that documented an indicator stock program, identified information requirements, and recommended analytical procedures for the assessment of rebuilding. The Committee also identified a number of policy issues that had to be resolved before final conclusions could be reached regarding the status of rebuilding on a regional or coastwide basis. Agreement on those issues has not yet been reached.

In assessing the status of individual stocks under the rebuilding program, the Committee identified three main elements that must be examined: 1) spawning escapement levels; 2) fishery harvest and stock-specific exploitation rates; and 3) production responses to increases in spawning escapements.

Due to time constraints, the CTC had to reduce the scope of this year's report. The report provides an evaluation using data through 1994, and includes recent catch in fisheries of concern to the Pacific Salmon Commission (Chapter 1), assessment of spawning escapements for 44 escapement indicator stocks (Chapter 2), and fishery-harvest and stock-specific-exploitation rates based on 35 exploitation rate indicator stocks (Chapter 3).

EXECUTIVE SUMMARY

This report contains a partial assessment of the chinook rebuilding program through 1994. As directed by PSC Commissioners, the CTC was to complete the first three chapters of the Annual Report summarizing catch, escapements, and exploitation rates through 1994.

Key Points in the 1994 Annual Report

1. 1994 Chinook Catch (Chapter 1)

In 1994, the PSC did not agree on catch ceilings. Therefore, the CTC compared catches in each fishery with 1985 base-level ceilings. For all PSC ceiling fisheries in 1994, catches were below the base-level ceilings and substantially lower in the WCVI troll and Strait of Georgia troll and sport fisheries (Table 1-1, pg. 1). Cumulative deviations could not be calculated for 1993 and 1994, since PSC ceilings were not agreed on and some agencies set catch targets below the base ceiling levels due to reductions in chinook abundance or U.S. Endangered Species Act restrictions. Instead, cumulative deviations were calculated for 1987 through 1992 only (Table 1-3, pg. 3).

2. Escapement Assessment (Chapter 2)

This year's assessment of escapement trends included 44 naturally spawning escapement indicator stocks and the procedures used in last year's report (TCCHINOOK (94)-1). For the 36 stocks with escapement goals, 14 (39%) were assessed as Above Goal or Rebuilding and 22 (61%) were classified as Indeterminate or Not Rebuilding. Declines in escapement have not been halted for 8 of the 22 stocks classified as Indeterminate or Not Rebuilding. For the 36 stocks with escapement goals, the assessment shows an increasing proportion of stocks classified as Not Rebuilding since 1988 and a general decline in the proportion of stocks classified as Above Goal and Rebuilding since 1989 (see Figure 2-2, pg. 31). For the 8 stocks without escapement goals, declines in escapement have been halted for 7 and for 1 it could not be determined whether or not the decline had been halted.

The CTC recognizes limitations to assessing rebuilding based solely on escapement values and trends. Due to these concerns, some CTC members proposed an additional rebuilding assessment criterion based on the proportion of the maximum surplus production expected from recent escapements for each escapement indicator stock. The CTC agrees with the development and evaluation of production criteria to determine if one should be incorporated in future rebuilding assessments, but could not, at this time, evaluate the merit of any particular production criterion.

3. Exploitation Rate Assessment (Chapter 3)

The CTC conducted an extensive evaluation of alternative estimators of fishery indices. In recent years, concerns have been raised regarding limitations of the current CTC Fishery Index (FI), in particular regarding the inability to incorporate CWT data for stocks lacking base period data and potential difficulty in assessing stock exploitation due to changes in the conduct of fisheries (e.g., changes in seasonal patterns of fishing). The CTC examined time-area stratification of the SEAK troll fishery and different estimators for a fishery index. The CTC recommended the use of a new

stratified estimator in the SEAK troll fishery and the continued use of the CTC FI in other fisheries. The performance of alternative indices in these other fisheries can be evaluated but could not be completed in the time available. Details of the CTC evaluation are included in Chapter 3 and the new Stratified Proportional Fishery Index (SPFI) and the CTC FI values are presented for the SEAK troll fishery in Figure 3-3 (pg. 44).

Examination of coded-wire tag data for 18 of the 35 exploitation rate indicator stocks (identified in Table 3-5, pg. 40) indicated that:

a) In 1994, fishery indices were below base levels in each PSC ceiling fishery (Table 3-6, pg. 48). Fishery indices for 1994 were reduced from base period levels by 24% in the SEAK troll, 30% in NCBC troll, and 43% in WCVI troll. For the Strait of Georgia troll and sport fishery, the 1994 fishery index was 9% below base period levels and near the 1985-1994 average index value. The 1994 fishery indices for SEAK troll, NCBC troll, and GS troll and sport are higher than the projected indices from the 1984 CTC chinook model. The 1994 fishery indices for WCVI are lower than the 1984 projections (see Figures 3-4 through 3-7, pgs. 49-50).

b) In 1994 nonceiling fisheries, harvest rates were consistent with passthrough (as estimated by applying the nonceiling index described in Chapter 3). The nonceiling index described in this report adjusts for the problem of differential exploitation on hatchery and wild stocks in terminal areas. Nonceiling indices previously reported for the North Puget Sound summer/fall stock group are now reported for each stock. When evaluated in this way, harvest rates for each stock are now consistent with passthrough in 1993 and 1994 (as estimated by applying the nonceiling index).

c) Total mortality and reported catch brood exploitation rates declined in 1994 for all of the stock groups examined except LGS. Changes in brood exploitation rate indices relative to the base period varied widely between the seven stock groups examined. In four groups, exploitation rates based on total fishing mortalities presently indicate no reductions from the base period values (SEAK/TBR-I, WCVI, LGS, NPS-S/F). The three other groups (UGS, SPS-S/F, WACO) indicate about a 30 to 40% reduction in ocean exploitation rates relative to the base period. For three stocks, there are brood year exploitation rate projections from the 1984 CTC chinook model. The 1994 brood year exploitation rates for WCVI (Figure 3-18) and LGS (Figure 3-20) are higher than the 1984 projections. The 1994 brood year exploitation rates for WACO (Figure 3-23) are lower than the 1984 projections.

4. Appendices

Due to the limited scope of this report, stock catch distributions are not discussed in the text, but are only presented in Appendix D. Additional information on escapements, terminal runs, and the methods and data used to calculate the exploitation rate indices can be found in Appendices A, B, C and E.

Recommendations

Given the limited time available for this assessment and the partial evaluation conducted, the CTC did not discuss recommendations following from this report.

1. 1994 CHINOOK CATCH

1.1 1994 CHINOOK SALMON CATCHES IN FISHERIES WITH CEILINGS

Estimates of 1994 catches for each fishery supposed to be managed under a harvest ceiling established by the Pacific Salmon Commission (PSC) are presented in Table 1-1. Although there were no PSC ceilings in 1993 or 1994, 1985 "base ceilings" are given for comparison. The catch data are preliminary, but major changes are not expected. Catches in all chinook fisheries of interest to the PSC for the years 1991-1994 are documented in Table 1-2.

Table 1-1. Catches for PSC ceiling fisheries in 1994. There was no PSC agreement on 1994 ceiling levels, so differences from base level ceilings are given for comparison.

Area (Gear) [1]	Base Ceiling	Catch	Difference	
			Numbers	Percent
Southeast Alaska (T,N,S) [2]	263	232.5	-30.5	-11.6%
North/Central B.C. (T,N,S) [3]	263	250.9	-12.1	-4.6%
West Coast Vancouver Island (T)	360	145.8	-214.2	-59.5%
Strait of Georgia (T,S) [4]	275	83.8	-191.2	-69.5%

1 T=Troll; N=Net; S=Sport

2 The actual total catch was 264,300 chinook, including a hatchery add-on of 31,800.

3 Excludes 7,210 chinook caught in terminal areas.

4 Due to budget constraints, the catch in the Strait of Georgia recreational fishery was only estimated through October in 1994 (based on past averages, this period accounts for at least 95% of the annual catch).

1.2 CUMULATIVE DEVIATIONS FROM CATCH CEILINGS

A 7.5% cumulative management range was established by the PSC in 1987. In the absence of a PSC agreement for 1994 fisheries, cumulative deviations from ceilings do not include 1994. Annual catches (without add-on) for 1994 and deviations from catch ceilings for 1987-1993 are given in Table 1-3.

Table 1-2. Summary of the 1991-1994 total chinook catches (including terminal area exclusions and hatchery add-ons) in fisheries relevant to the U.S./Canada Pacific Salmon Treaty (numbers in thousands of fish).

Area	Troll				Net				Sport				Total			
	94	93	92	91	94	93	92	91	94	93	92	91	94	93	92	91
S.E. ALASKA [1]	**186**	**227**	**184**	**264**	**36**	**28**	**32**	**33**	**42**	**49**	**43**	**60**	**264**	**304**	**259**	**357**
BRITISH COLUMBIA [2,3]																
North/Cent. Coast	182	182	182	221	37	44	54	57	39	38	38	33	258	264	274	311
Outer WCVI [4]	145	274	347	203	-	-	-	-	32	63	44	43	177	337	391	246
Terminal WCVI [4]	0	0	0	0	2	28	9	6	14	10	9	43	16	38	18	49
Georgia St./Fraser [5]	13	33	37	32	14	16	9	15	56	106	95	96	83	155	141	143
Johnstone St. [6]	2	4	3	1	9	15	9	13	N/A	12	15	10	11	31	27	24
Juan de Fuca Strait	0	0	0	0	9	2	10	8	14	14	21	19	23	16	31	27
Subtotal	**342**	**493**	**569**	**457**	**71**	**105**	**91**	**99**	**155**	**243**	**222**	**244**	**568**	**841**	**882**	**800**
WASHINGTON Inside [7]																
Strait (mar) [8]	3	10	31	37	6	1	1	3	2	32	38	40	11	43	70	80
San Juans (mar) [9]	0	0	0	0	14	14	14	12	6	7	7	5	20	21	21	17
Other PS (mar+fw) [10]	0	0	0	0	59	55	63	89	44	47	55	49	103	102	118	138
Coastal (mar+fw) [10]	0	0	0	0	46	62	64	54	7	10	7	6	53	72	71	60
Subtotal	**3**	**10**	**31**	**37**	**125**	**132**	**142**	**158**	**59**	**96**	**107**	**100**	**187**	**238**	**280**	**295**
COLUMBIA RIVER [11,12]	-	-	-	-	**33**	**51**	**53**	**107**	**31**	**83**	**68**	**83**	**64**	**134**	**121**	**190**
WA/OR N OF FALCON [13]	**4**	**55**	**69**	**51**	-	-	-	-	**0**	**14**	**19**	**17**	**4**	**69**	**88**	**68**
OREGON Inside[14]	**<1**	**<1**	**<1**	**0**	-	-	-	-	**37**	**52**	**39**	**45**	**38**	**53**	**40**	**45**
GRAND TOTAL	**536**	**786**	**854**	**809**	**265**	**316**	**318**	**397**	**324**	**537**	**498**	**549**	**1125**	**1639**	**1670**	**1755**

1 Southeast Alaska troll chinook catches shown for Oct. 1 - Sept. 30 catch counting year.

2 British Columbia net catches include only adult fish (over 5 lb. round weight). Native food fishery catches are not included. North/Central Coast 1989-1994 includes catch from terminal gillnet fisheries.

3 Sport catches are for tidal waters only.

4 Outer WCVI sport catch from Area 23B (Barkley Sound)/Area 24 creel survey, July 15-Sept. 30, plus logbook catches. Terminal WCVI is catches in Alberni Inlet only.

5 GS sport catches from Areas 13-19, 28, 29 outside the Fraser River and are only estimated through October in 1994. Juan de Fuca Strait sport catches reported separately.

6 No creel survey was conducted in Johnstone Strait in 1994.

7 All WA inside sport numbers adjusted for punch card bias. See "1988 WA State Sport Catch Report" for details.

8 Strait troll catch includes all catch in Areas 5 and 6C and Area 4B outside the PFMC management period (Jan.-May and Oct.-Dec.).

9 San Juan net catch includes catch in areas 6, 6A, 7 and 7A; sport catch includes Area 7.

10 Coastal and Puget Sound sport catches include marine and freshwater, but only adults in freshwater.

11 Columbia River net catches include Oregon, Washington and treaty catches, but not ceremonial.

12 Columbia River sport catches include adults only, for Washington, Oregon, Idaho and Buoy 10 anglers.

13 North of Falcon troll catch includes catch in Area 4B during the PFMC management period (May-Sept.), and Area 2.2 (Grays Harbor) when Area 2 is open.

14 Troll = late season troll off Elk River mouth (Cape Blanco); sport = estuary and inland (preliminary for 1994).

Table 1-3. Annual catches and 1987-1992 cumulative deviations (in 1000s of fish) from Pacific Salmon Treaty catch ceilings.

	SEAK (T,N,S)			NCBC (T,N,S)			WCVI (T)		GS (T,S)	
	Ceiling	Base Catch	Add-On	Ceiling	Base Catch	Proposed Terminal Exclusion (Add-on)	Ceiling	Catch	Ceiling	Catch
1987	263	265.2	16.7	263	282.8		360	379.0	275	159.7
1988	263	255.2	23.7	263	247.1		360	408.7	275	139.6
1989	263	264.4	26.7	263	301.2	4.8	360	203.7	275	161.3
1990	302	313.2	53.7	302	253.0	5.5	360	298.0	275	146.3
1991	273	295.6	61.4	273	304.3	6.1	360	202.9	275	147.8
1992	263	221.7	38.3	263	267.5	6.7 (15.8)	360	346.8	275	153.9
1993	NA[4]	268.2	35.9	NA[4]	256.8	7.7 (4.8)	NA[4]	273.7	NA[4]	152.3[3]
1994	NA[4]	232.5	31.8	NA[4]	250.9	7.2	NA[4]	145.8	NA[4]	83.8[3]
Cumulative Deviation[1,2]										
Fish		-11.7			28.9			-27		-20.6
%		-4.4%			11%			-7.5%		-7.5%

1 Cumulative deviations calculated for 1987-1992, in absence of 1993-1994 PSC catch ceilings.

2 Percent deviation calculated from base ceiling level. Negative deviations below the 7.5% management range are not accumulated.

3 Due to budget constraints, catch in the Strait of Georgia sport fishery was only estimated through September in 1993 and October in 1994.

4 There were no PSC ceilings agreed to in 1993 or 1994. Management regimes for 1994 ceiling fisheries are discussed in Section 1.3.

1.3 REVIEW OF FISHERIES WITH CATCH CEILINGS

1.3.1 Southeast Alaska (SEAK) Fisheries

In 1994, SEAK fisheries were managed under the following provisions:

1) An all-gear base-catch ceiling not to exceed 263,000 chinook salmon.

2) An Alaska hatchery add-on calculated on the basis of coded-wire-tag (CWT) sampling.

3) To maintain a total cumulative deviation in numbers of fish since 1987 within the 7.5% management range. For SEAK, the management range is equivalent to +/- 19,700 chinook salmon for a ceiling of 263,000. The cumulative deviation cannot be calculated for 1993 or 1994 due to lack of agreed PSC ceilings.

4) To comply with a 240,000 ceiling which was established during the U.S. Endangered Species Act (ESA) consultation with the National Marine Fisheries Service.

5) To be consistent with the provisions of the Pacific Salmon Treaty, as required by the Salmon Fishery Management Plan of the North Pacific Fishery Management Council, which was established by the U.S. Magnuson Act.

Catch data for 1994 indicate the following:

1) The 1994 all gear harvest (commercial and recreational) of 264,300, including a hatchery add-on of 31,800, consisted of a commercial catch of 221,900 and a recreational catch of 42,400.

2) The total estimated catch of Alaska hatchery produced chinook salmon was 39,000 (14.8% of the total catch). The add-on was calculated by reducing this by 5,000 for the estimated pre-Treaty harvest of Alaska hatchery chinook and by 2,200 for risk adjustment.

1.3.1.1 Troll Fisheries

The troll fishery harvested a total of 186,300 chinook salmon of which 12,400 (6.7%) were of Alaska hatchery origin. Catch data are summarized in Table 1-4.

Table 1-4. 1994 chinook catches in the SEAK Alaska troll fisheries.

Troll Fishery	Total Catch	AK Hatchery Catch	AK Hatchery Percent
Winter Fishery (Oct. 11, 1993-Apr. 14, 1994)	56,400	2,000	3.6%
Hatchery Access (did not occur)	0	0	0.0%
Experimental and Terminal	11,400	5,000	43.9%
Summer Fishery (July 1-7, Aug. 29 - Sep. 2)	118,500	5,400	4.6%
Total Troll	186,300	12,400	6.7%

As in 1993, the winter troll fishery began on October 11. The fishery operated as in past years and continued through April 14. The total winter harvest was 56,400 chinook, with 2,000 (3.6%) from Alaska hatcheries.

Following the winter fishery, consultation occurred with NMFS in order to comply with the listing of Snake River Fall chinook salmon under the ESA. The Alaska Board of Fisheries eliminated the Hatchery Access fishery beginning in 1994. However, the experimental and terminal fisheries proceeded as usual. The experimental and terminal fisheries harvested 11,400 chinook, of which 5,000 (43.9%) were Alaska hatchery fish.

The general summer troll fishery opened on July 1 for seven days. The fishery remained open from July 8 to August 26 with chinook nonretention (CNR). During this period, areas of high chinook abundance were closed to minimize incidental hook and release mortality. The fishery reopened with retention of chinook from August 29 to September 2. The fishery then remained open with CNR until September 20. From September 21 through September 30, waters outside the 3-mile limit closed to all fishing while waters within the 3-mile state jurisdiction remained open with CNR. In addition, portions of Districts 1,2,3 and 4 were also closed. There were 12 days of chinook retention and 47 days of CNR. There were a total of 6,434 boat-days of chinook fishing effort and 35,718 boat-days of CNR.

1.3.1.2 Net Fisheries

The SEAK net fisheries have a guideline harvest of 20,000 non-Alaska hatchery chinook. The 1994 commercial net catch was 35,600 chinook, of which 17,200 (48.3%) were from Alaska hatcheries. Of these hatchery chinook, 9,800 were taken in terminal area fisheries. Net harvest of chinook salmon in the purse seine fishery is limited by a 28" (70 cm) size limit and the use of CNR regulations. Chinook between 21" and 28" may never be retained, while chinook below 21" may be retained at all times. Gillnet harvest of chinook is limited by a delayed season opening.

1.3.1.3 Recreational Fisheries

The recreational fishery harvested 42,400 chinook, of which 9,400 (2.2%) were from Alaska hatcheries. There was a one fish bag limit from April 15 to June 30. The bag limit was raised to two chinook from July 1 to July 29 and to three chinook on July 30. This fishery also has a 28" total length size limit.

1.3.2 North/Central British Columbia (NCBC)

Catch statistics for commercial fisheries are still preliminary for 1994, but no major changes are expected. The 1994 NCBC fisheries were managed under the following provisions:

1) An all-gear base-catch ceiling not to exceed 263,000 chinook salmon.

2) To maintain a total cumulative deviation in numbers of fish since 1987 within the 7.5% management range. For NCBC, the management range is equivalent to +/- 19,700 chinook salmon for a ceiling of 263,000. The cumulative deviation cannot be calculated for 1993 or 1994 due to lack of agreed PSC ceilings.

3) To manage the fisheries consistent with the spirit and intent of the Pacific Salmon Treaty and the chinook rebuilding program.

The estimated 1994 catch was 250,933 excluding terminal exclusions of 7,210 (Table 1-5).

Table 1-5. Proposed terminal exclusions.

Area	Base	1994 Catch	1994 Exclusion
Skeena	2,900	7,559	4,659
Bella Coola	2,950	5,501	2,551
Kitimat	2,400	Not Yet Available	0
Total			7,210

1.3.2.1 Troll Fisheries

The minimum size limit remained at 67 cm (26.5 inches fork length). The 1994 troll fishery opened for all species on July 1. By September 5 the chinook allocation was achieved and non-retention of chinook was in effect until September 14, when the north coast closed for the season. The reported catch in NCBC troll fisheries was 182,357 and involved nine days of CNR.

1.3.2.2 Net Fisheries

Catch of chinook in NCBC areas was 36,839. Catches by fishery were 4,569 in the Queen Charlotte Islands, 17,759 for the Skeena/Nass and 14,511 in Central British Columbia (CBC). These are the preliminary total catches of chinook greater than 5 pounds, including the catch eligible for terminal exclusion.

1.3.2.3 Recreational Fisheries

The tidal water sport fishery catch of chinook was 38,947. Catch by fishery was 28,973 for the Queen Charlotte Islands, 3,171 for the Skeena/Nass and 6,803 for the Central Coast.

1.3.3 West Coast Vancouver Island (WCVI) Troll

In 1994, the WCVI troll fishery was managed under the following provisions:

1) A base-catch ceiling not to exceed 360,000.

2) To maintain a total cumulative deviation in numbers of fish since 1987 within the 7.5% management range. For WCVI, the management range is equivalent to +/- 27,000 chinook salmon for a ceiling of 360,000. The cumulative deviation cannot be calculated for 1993 or 1994 due to lack of agreed PSC ceilings.

3) To manage the fishery consistent with the spirit and intent of the Pacific Salmon Treaty and the chinook rebuilding program.

The minimum size limit for troll fisheries remained at 67 cm (26.5 inches) fork length. The 1994 troll season started on July 1 and continued until September 5 with no CNR fisheries. The conservation Areas A to E, G, H, I to L, F1 and F2 were opened at the start of the season, while Area S remained closed (Figure 1-1).

When the troll fishery closed on September 5, it was estimated that 25,210 boat days had been expended during the season. This compares to 50,500 boat days for the 1985-1987 average. Chinook catch in 1994 for the WCVI troll fishery was 145,759.

1.3.4 Strait of Georgia (GS)

Chinook catch in 1994 for the combined GS troll and recreational fisheries was 83,805 but this total only accounts for recreational catch through October, 1994. Monitoring of this recreational fishery was limited due to continued budget reductions.

1.3.4.1 Troll

The minimum size limit remained at 62 cm (24.5 inches) fork length in the Strait of Georgia. The management objective was a domestic catch ceiling of 31,000 chinook. The ceiling was reduced to this level in 1988 to achieve a 20% harvest rate reduction, relative to 1987 levels, as part of a conservation plan for lower GS chinook. Troll fishery opened for chinook retention on July 1 and continued until September 15 without interruption. The 1994 GS troll catch was 12,966.

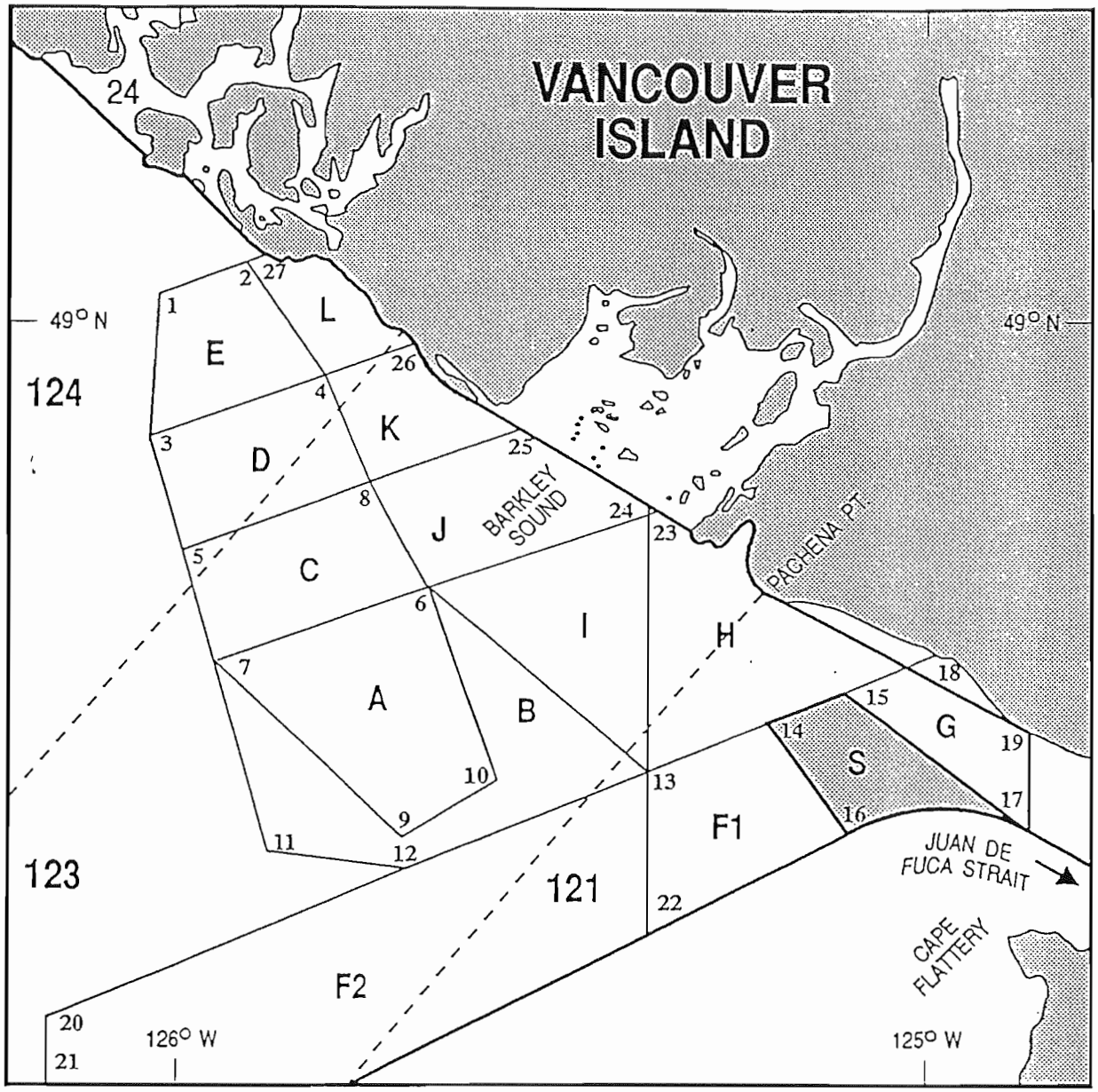
1.3.4.2 Recreational

The 1994 management objective for the GS recreational fishery was to maintain a 20% harvest rate reduction, relative to 1987 levels, on lower GS chinook. The management plan implemented in 1989 was continued in 1994. The plan's management actions are presented in Table 1-6.

Table 1-6. Strait of Georgia 1994 recreational fishery management plan.

Fishing Area	Daily Bag Limit		Annual Bag Limit			Size Limit (cm)	
	1989-1994	1985-1988	1989-1994	1988	1985-1987	1989-1994	1985-1988
Strait of Georgia (Areas 13-18, 19B, 28 & 29)	2	2	15	8	20	62	45
Juan de Fuca (Area 19A)	2	2	20	8	20	45	45
Johnstone Strait (Area 12)	2	4	15	30	30	62	45

The 1994 catch estimated from the creel survey in Areas 13 through 19, but excluding Juan de Fuca Area 19B+ and Johnstone Strait, was 56,467 through October. Fishing through October would be expected to account for at least 95% of the total year's catch, based on past creel survey data. Effort through October 1994 totaled 373,190 boat trips, which is very similar to 1990-1993 average effort levels (408,361). Catch in Juan de Fuca Strait (inside Sheringham Point) was 14,372 in 1994 from an effort of 87,939 boat days, which is very similar to the 1990-1993 average effort of 85,569.



CHINOOK AND COHO CONSERVATION AREAS

A	Chinook Conservation Area A	F1	Coho Conservation Area F1
B	Chinook Conservation Area B	F2	Coho Conservation Area F2
C	Chinook Conservation Area C	H	Coho Conservation Area H
D	Chinook Conservation Area D	I	Coho Conservation Area I
E	Chinook Conservation Area E	J	Coho Conservation Area J
G	Chinook Conservation Area G	K	Coho Conservation Area K
S	Chinook Conservation Area S	L	Coho Conservation Area L

Figure 1-1. West Coast of Vancouver Is. 1994 conservation areas for chinook and coho salmon.

1.4 REVIEW OF OTHER FISHERIES

1.4.1 Canadian Fisheries

1.4.1.1 Transboundary Rivers

Chinook catches in the Canadian gillnet fisheries were: Taku River, 2,065 chinook adults and 235 jacks, and Stikine River, 1,092 chinook adults and 159 jacks. The catch of chinook in these rivers is limited to incidental catch during fisheries targeting on sockeye salmon.

1.4.1.2 Southern British Columbia Fisheries

Commercial Net: The catch of chinook in the net fisheries is limited to incidental catch during fisheries targeting on sockeye, pink, or chum, with the exception of the August/September gillnet fisheries in Alberni Inlet (Area 23) and, in 1994, fisheries in Nootka Sound (Area 25). These fisheries are terminal gillnet fisheries for returns to the Robertson Creek Hatchery and Conuma Hatchery, respectively. Small numbers of chinook may also be harvested incidentally during gillnet and seine fisheries on sockeye salmon in Barkley Sound in July. Catches for 1994 are presented in Table 1-7.

Table 1-7. Southern British Columbia commercial net catches in 1994.

Area (Statistical Area)	Catch (chinook > 5 lb.)
Johnstone Strait (11-13)	8,968
Strait of Georgia (14-19) and Fraser R. (28,29)	14,078
Juan de Fuca Strait (20)	8,932
Barkley Sound (23)	1,041
Other WCVI (21,22,24-27)	1,322

The management objective of southern B.C. net fisheries is to reduce the base period harvest rate on chinook by 25% (an obligation in the PSC chinook rebuilding program). Further, the Johnstone Strait net fisheries have the added objective of reducing harvest rates since 1987 by an additional 20% as part of the conservation program for chinook stocks in the lower Strait of Georgia.

In all the fisheries, regulations and research programs are attempting to limit the incidental mortality of juvenile chinook and coho. Fishing time, location, and gear are limited in southern B.C. net fisheries to conserve juvenile and adult chinook salmon. In Johnstone Strait and Juan de Fuca Strait, known areas of high chinook vulnerability are closed and minimum depth strata are set to reduce the catch of juvenile chinook and coho. In Juan de Fuca Strait, a maximum number of juvenile chinook and coho salmon per set has been established, beyond which the fishing area is further restricted or even closed. Chinook catch in the Fraser River area is usually limited to gillnet fishing and chinook catch is incidental. Also, in recent years gillnet fishing in the Fraser

River has been restricted to limit fishing time during September in order to restrict catch of Harrison River chinook returning to spawn.

Area 12 Troll: Catch is reported as 2,207 chinook for 1994. This fishery is a small localized group of trollers at the southern limit of Queen Charlotte Sound. The fishery is limited to a catch ceiling of 5,000 chinook, which is included in the overall WCVI catch ceiling of 360,000.

Tidal Recreational: The outer WCVI sport fishery occurs primarily in the Barkley Sound area, outer Clayoquot Sound, and in Nootka Sound. The majority of the fishery effort occurs from mid-July through mid-September. A creel survey is conducted during the peak of this fishery from July 15 to September 30, corresponding to the return timing of Robertson Creek Hatchery chinook. The estimated catch in Barkley Sound area was 32,415 chinook; the catch in Alberni Inlet was 14,224 chinook. Problems in the 1994 creel survey in Area 24 (Clayoquot Sound) precluded estimation of catch in this area. Catch in Alberni Inlet is of Somass River stock only, and so is reported separately under terminal WCVI catch. No creel survey was conducted in Johnstone Strait in 1994.

Non-tidal Recreational: Non-tidal recreational fisheries occur in most B.C. rivers, including the Alsek, Skeena, Nass, Kitimat, Bella Coola, Somass and Fraser Rivers and various streams on the east coast of Vancouver Island. Most of these are small, localized fisheries to provide the local public with some access to salmon fishing. Recent fisheries in the Fraser River have been limited to the larger chinook populations that have responded well to the chinook rebuilding program and most are limited by catch ceilings.

Chinook catch was estimated as 197 in the Alsek, and 4,066 in northern B.C. rivers (Areas 1-10). Eleven small sport fisheries operate in the upper Fraser River. The 1994 catch was 2,475. Sport fisheries also occur in the Vedder-Chilliwack River and lower Fraser River mainstem but were not assessed.

Indian Fisheries: The catches in the 1994 Indian fisheries are summarized in Table 1-8. Each of these fisheries involves directed chinook fishing periods and the incidental catch of chinook during fisheries on other species. Small portions of the catch may be taken in marine waters, with the exception of the Stikine and Alsek catches. Catch in these fisheries is mostly limited by fishing time, but allocation to meet food fishing requirements is the first priority use of allowable catches. The Fraser River fisheries were managed for fixed allocations with the sale of catch permitted.

Table 1-8. Catches in the 1994 Indian fisheries.

Fishing Areas	Adult Catch	Jack Catch
North/Central B.C. [1]	17,609	
Somass River	16,300	
Fraser River [1,2]	19,225	
Stikine	698	191
Alsek	289	
Taku	119	
Cowichan	700	
Squamish	Not Yet Available	

1 Catch includes jacks.

2 Fraser catch includes Harrison. Catch above Sawmill Creek estimated during sockeye fishing only.

1.4.2 Southern U.S. Fisheries

1.4.2.1 Strait of Juan de Fuca and the San Juan Islands

As in past years, management measures were taken in the Strait of Juan de Fuca and other mixed stock areas to protect depressed spring chinook stocks. No commercial fisheries were opened during the spring chinook management period (April 16-June 15). The recreational fishery was restricted by a 30-inch maximum size limit for chinook effective during the spring chinook management period. The Strait of Juan de Fuca recreational fishery was closed from May 1 through October 31.

Forecasted low chinook and coho abundance resulted in severe restrictions placed on mixed stock fisheries that harvest chinook and coho. The Strait of Juan de Fuca treaty troll fishery in Areas 5 and 6 was closed between April 15 and October 31. Purse seine and reef net fisheries were restricted by a 28-inch chinook minimum size limit. Seine fisheries targeting species other than sockeye and pink salmon were required to have a 5-inch mesh strip to reduce the catch of small chinook. Gillnet fisheries had no chinook minimum size, but mesh size restrictions were used to reduce chinook catch. It was recognized that the combined actions for chinook salmon would also serve to protect depressed Canadian-origin chinook stocks (primarily Fraser River runs).

The preliminary estimate of the 1994 incidental chinook catch in the Strait of Juan de Fuca net fishery is 5,700 chinook, compared to 1,400 in 1993. In the San Juan Island fisheries, the incidental harvest of chinook was 13,700 in 1994 compared to 14,000 in 1993.

The Strait of Juan de Fuca tribal troll fishery harvested an estimated 2,800 chinook, compared to 9,800 chinook caught in 1993. This is a chinook directed fishery that has been greatly reduced in recent years. The previous 5-year (1988-92) average chinook catch in this fishery was 46,000.

Note that tribal troll catch estimates from this area do not include tribal catch in Area 4B during the May 1 to September 30 PFMC management period; catches during this period have been included in the North of Cape Falcon troll summary.

In 1994, the Area 4B state waters fishery, which occurs after the PFMC fishery, was kept closed due to poor status of many coho stocks. No chinook were harvested in this fishery in 1993. The total 1994 recreational catch estimate for Areas 5 and 6 is 1,600 chinook. This catch is much reduced from the 1993 catch of 32,200 chinook due to the fishery closure extending from May 1 to October 31. The estimated recreational chinook catch in the San Juan Island fishery was 5,800 in 1994, compared to 6,900 in 1993.

1.4.2.2 Puget Sound

Recreational and commercial fisheries in Puget Sound were regulated by unprecedented time and area closures to protect depressed spring and fall chinook and coho stocks. As a result of restrictions or closures placed on mixed stock fisheries, some terminal runs contained hatchery surpluses or harvestable returns of wild fish. To protect depressed summer/fall stocks, there were no large directed chinook commercial net fisheries in the Skagit and Stillaguamish/Snohomish terminal areas; however, some tribal Ceremonial and Subsistence (C&S) harvest occurred in these areas as well as an evaluation fishery to maintain annual fishery data. As was the case in the San Juan Islands, purse seine fisheries were restricted by a 28-inch chinook minimum size limit. In seine fisheries other than those targeting pink salmon, a 5-inch mesh strip was required to reduce the catch of small chinook. Gillnet fisheries had no chinook minimum size, but mesh restrictions were used to reduce chinook catch.

In 1994, the net catch of chinook continued to be low, although the total marine and freshwater catch was somewhat higher than the extremely low 1993 catch. Low catches were due to a combination of poor catch rates (in part due to low abundance) and management actions taken to protect both chinook and coho. Preliminary estimates of 1994 net catch in Puget Sound marine areas total 42,100 chinook, compared to 42,700 in 1993. Preliminary estimates of 1994 net catch in Puget Sound freshwater areas total 17,000 chinook, compared to 12,300 in 1993. Commercial marine catches in 1994 and 1993 represent only 41% and 42% of the previous 5-year average (1988-1992) of 102,359. Commercial freshwater catches represent 75% and 54% of the same 5-year average of 22,626.

Puget Sound recreational fisheries were also managed with the intent to protect depressed wild chinook and coho stocks. As a result, recreational fisheries were limited by substantial time and area closures. Remaining fisheries were designed with the intent to harvest available hatchery surpluses. The Puget Sound marine recreational catch estimate for 1994 is 40,800 chinook, compared to a total of 41,000 in 1993. The freshwater recreational catch estimate is 3,400, compared to 5,500 in 1993.

1.4.2.3 Washington Coast

Preliminary 1994 estimates of Grays Harbor and Willapa Bay net catch total 34,300 chinook, compared to 49,600 in 1993.

The 1994 commercial net fisheries in north coastal rivers have harvested an estimated 11,300 chinook, compared to 12,200 in 1993. Catches for the Humptulips and Chehalis rivers are included in the Grays Harbor marine net totals.

The 1994 recreational Willapa Bay and coastal river catch estimate is 7,000 chinook, compared to 9,700 in 1993.

1.4.2.4 Ocean Fisheries North of Cape Falcon

The U.S. ocean fisheries operating north of Cape Falcon, Oregon are typically constrained by coho and chinook quotas developed through the domestic regulatory process of the PFMC. In 1994, preseason forecasts indicated that many of Washington's critical chinook and coho stocks were expected to return at record low numbers. Many critical stocks were projected to return below spawning escapement goal levels, even in the absence of any 1994 fishing. In response to this unprecedented situation, extensive fishery closures were necessary in both preterminal and terminal areas to ensure the maximum return of these critical stocks to spawning areas.

All non-tribal recreational and commercial fisheries in the area north of Cape Falcon were closed in 1994. Ocean harvest North of Cape Falcon was limited to a tribal all-salmon-except-coho troll fishery during the period from May 1-June 30, 1994. This fishery had a quota of 16,400 chinook salmon. Effort and catch rates in this fishery were low and a total of 4,400 chinook were landed, which was 27% of the quota.

1.4.2.5 Columbia River

Since 1988, all in-river management of Columbia River fish runs and fisheries has been based on the Columbia River Fish Management Plan (CRFMP). "The purpose of this management plan is to provide a framework...to protect, rebuild, and enhance upper Columbia River fish runs while providing harvest for both Treaty Indian and non-Indian fisheries" (CRFMP, 1988, p.2). The CRFMP specifies management goals, season timing, catch limits, and maximum incidental impacts for all depressed upriver runs of anadromous fish in the Columbia River.

The 1994 in-river commercial catch of all chinook was 33,500, compared to 50,800 in 1993 and 53,200 in 1992. Preliminary freshwater recreational catch estimates for 1994 total 30,900 fish, compared to 82,500 in 1993 and 68,300 in 1992. The 1994 chinook catch in the Buoy 10 recreational fishery was zero due to a late opening of the fishery to protect early Columbia River coho and chinook nonretention in effect until early October.

The 1994 total catch of upriver spring chinook was 2,078 fish, consisting of 855 caught in the non-Indian sport and commercial fisheries, 1,115 caught in Zone 6 C&S fisheries, and 108 caught in C&S fisheries in Idaho. The Idaho C&S catch includes both spring and summer chinook. The CRFMP provides that for upriver spring chinook run sizes less than 128,800, the mainstem harvest below Bonneville Dam is limited to the 1983-1985 average impact (4.1%) on the upriver run. However, due to ESA concerns, the Columbia River Compact chose to limit the lower river impact to a maximum of 3.2% of the run. Under the CRFMP, treaty C&S fisheries in Zone 6 are limited to 7% of the run. Postseason estimates of 1994 impacts of lower river and treaty C&S fisheries are 4.3% and 5.3% respectively. Lower river impacts were greater than preseason

expectations because the upriver spring chinook return of 21,000 was less than half of the preseason forecast of 49,000 adults.

There has not been a mainstem fishery targeting upriver summer chinook since 1964. In the past, incidental harvest of summer chinook occurred during commercial sockeye fisheries. However, no commercial sockeye fisheries have occurred below McNary Dam since 1988. There is a very small catch of summer chinook in the mainstem treaty C&S sockeye fishery. The total 1994 catch of summer chinook in this fishery was 207 fish.

Commercial catch of Columbia River fall chinook in 1994 totaled 31,332 (1,658 in lower river non-treaty fisheries and 29,674 in treaty fisheries). An additional 5,700 fall chinook were caught in treaty C&S fisheries. Management constraints for the 1994 fall season included achieving a Spring Creek Hatchery return of 7,000 adults and an adult management goal of 46,000 Upriver Bright chinook over McNary Dam. By agreement of the CRFMP parties, the Upriver Bright management goal at McNary Dam for 1994 was increased to 46,000 adults to account for increased broodstock hatchery needs and to provide additional protection for Snake River fall chinook.

1.4.2.6 Ocean Fisheries Cape Falcon to Humbug Mountain

Ocean fisheries off Oregon's coast harvest predominately a mixture of southern chinook stocks not involved in the PSC rebuilding program; these stocks do not migrate north into PSC jurisdiction to any great extent. Some stocks originating in Oregon coastal streams do migrate into PSC fisheries, including the Northern Oregon Coast (NOC) and Mid-Oregon Coast (MOC) stock aggregates. The NOC stocks are harvested only incidentally in Oregon fisheries (probably <5% exploitation rate), while the catch distribution of MOC stocks in Oregon fisheries is thought to be much greater.

Catch statistics are readily available for only one population of the MOC group in a preterminal troll fishery. Recreational catch of these two stock groups occurs primarily in estuary and freshwater areas as mature fish return to spawn and are reported through a "punch card" accounting system. In 1994, the recreational chinook catch for the NOC and MOC groups was 28,400 and 8,600, respectively. The troll catch in the late season preterminal Elk River Fishery was estimated to be 371 chinook, compared to 649 chinook in 1993.

2. ESCAPEMENT ASSESSMENT OF REBUILDING THROUGH 1994

2.1 INTRODUCTION

The Pacific Salmon Treaty (PST) established a system of fishery specific catch and harvest rate restrictions intended to:

> "...halt the decline in spawning escapements of depressed stocks; and attain by 1998, escapement goals established in order to restore production of naturally spawning chinook stocks, as represented by indicator stocks identified by the Parties, based on a rebuilding program begun in 1984." (Annex IV, Chapter 3)

In this chapter, our objective is to use escapement data to evaluate the rebuilding status of naturally spawning chinook stocks with respect to these stated PST objectives of: 1) halting escapement declines, and 2) attaining escapement goals by 1998. It should be recognized that while coastwide chinook stocks were generally depressed before PST implementation, not all individual stocks were declining.

Because it was hoped that the decline in escapements would be quickly halted, most previous CTC analyses focused on evaluating the rate at which stocks were rebuilding to their escapement goals. However, as we near the end of the rebuilding program, it has become clear that many chinook stocks are at risk of failing to achieve their escapement goals by their rebuilding target dates. For these stocks, it is appropriate to ask, "Has the decline in spawning escapements at least been halted?" This question can also be asked of stocks without established escapement goals, even though rebuilding progress of these stocks can not be measured.

Escapement information has been compiled for a set of indicator stocks representing the majority of naturally spawning chinook stocks from central Oregon to Southeast Alaska (SEAK). Spawning escapements were assessed as one measure of rebuilding progress since implementation of management actions under the PST. Because escapements are a product of brood year adult abundance, freshwater and marine survival rates, and fishery harvest rates, the escapement assessment alone is not sufficient to determine if management actions since PST implementation have been effective in rebuilding chinook stocks. For a more complete picture, the results of this assessment should be considered together with the Exploitation Rate Assessment in Chapter 3.

The CTC used several methods to assess escapement declines and rebuilding progress for the indicator stocks. For stocks with escapement goals, the escapement assessment first identified stocks with escapements in recent years greater than their goals. For the remaining stocks with escapement goals, the assessment focused on: 1) comparison of recent escapements and the recent 5-year average escapement to a linear trend from the base period to the goal at the rebuilding target date, and 2) trends in recent escapements. This first portion of the assessment identified stocks that are and are not expected to rebuild by their target dates. For those not on schedule to rebuild, recent 5-year average escapements were compared to base period escapements to see if escapement declines have been halted. Stocks without escapement goals were also evaluated to see if escapement declines have been halted.

Two different rebuilding schedules are recognized in the PST. For SEAK and Transboundary River (TBR) stocks, conservation actions began in 1981 as part of a 15-year rebuilding program initiated by Alaska. The PST sets a target date of 1995 for the TBR Stikine and Taku stocks to achieve their escapement goals. For all other chinook stocks, the PST established a 15-year rebuilding program beginning in 1984 with a rebuilding target date of 1998. Although not specified by the PST, for all SEAK and TBR stocks, the target date of 1995 has always been used for analytical purposes.

Caution should be used when comparing escapement levels or goals among stocks since escapements are measured in different units. Annual escapement estimates used were measures of total escapement, where available, or indices of escapement. Due to the use of indices, differences in escapements may not represent differences among stocks in population size, but trends in escapement within a stock should reflect population changes.

2.2 FRAMEWORK

2.2.1 Escapement Indicator Stocks

This year's assessment included 44 naturally spawning escapement indicator stocks. These 44 stocks represent distinct populations or management groups that originate from individual rivers or watersheds. Some stocks represent several populations aggregated by region and life history type. Distribution of the indicator stocks by run timing and area of origin is shown in Table 2-1.

Table 2-1. Distribution of escapement indicator stocks by run timing and area of origin.

Area of Origin	Run Timing [1]					
	Spring	Spring/ Summer	Summer	Summer/ Fall	Fall	Total
Southeast Alaska	5					5
Transboundary	5					5
North/Central B.C.	1	3	3			7
Southern B.C.	1	1	1	1	3	7
Washington/Oregon/Idaho	3	2	2	3	10	20
Total	15	6	6	4	13	44

[1] These run timings are determined by management agencies; criteria used for categorization may differ among agencies.

2.2.2 Escapement and Terminal Run Data

2.2.2.1 Data Sources

The escapement and terminal run data used in this report were provided by management agencies in each jurisdiction. Data for each stock are presented in Appendix A tables and Appendix B graphs. For the 28 stocks with terminal harvest or broodstock removal, Table 2-2 lists the sources of mortality included in estimates of terminal run size.

2.2.2.2 Estimation Methods

Methods of estimating escapement varied depending on river characteristics and agency resources. Most escapement estimates were measures of actual spawner abundance, where available, or estimates (or indices) of abundance measured at a point of migration beyond the effect of major fisheries. Estimates were made using weirs and counting fences, aerial or foot surveys, dam passage counts, electronic counting devices, or mark-recapture studies. Escapements of the two Oregon Coast stock aggregates are estimates of the density of spawners per river mile for standard survey areas. For some stocks, estimates of natural spawners are adjusted to make them a more representative measure of natural stock escapements:

1) Many of the Canadian escapement indicator stocks are influenced, to some degree, by enhanced production. In most cases, this enhancement is an integral part of the rebuilding program and may increase the rate of rebuilding compared to a natural population. However, to account for this enhanced production during assessment of chinook rebuilding, the Canadian Department of Fisheries and Oceans (CDFO) has employed two procedures:

    a) Some streams with major enhancement programs are excluded from the escapement indices (e.g., Kitimat River in Area 6, Atnarko River in Area 8).

    b) In streams with more limited enhancement, collected broodstock is excluded from the natural spawners recorded, although enhanced returns that spawn naturally are included in these numbers (e.g., Yakoun, Lower Strait of Georgia, and Harrison).

2) For the Columbia upriver spring stock, mainstem dam counts adjusted for hatchery fish were used. Annual estimates of the total number of hatchery fish returning to the Columbia River were deducted from the total return in order to estimate the natural return.

3) For the North Oregon Coast (NOC) and Mid-Oregon Coast (MOC) aggregates, surveys conducted in areas influenced by enhancement have been excluded.

Table 2-2. Terminal run composition for 28 stocks with broodstock removal, rack sales or terminal fisheries.

Stock	Brood Stock /Rack Sales	Commercial Net	Ceremonial/ Subsistence	Freshwater Sport
Situk		✓	✓	✓
Alsek[1]		NI	NI	NI
Taku[1]		NI	NI	NI
Stikine[1]		NI	NI	NI
Nass			✓	✓
Skeena[2]		✓	✓	✓
WCVI[3]	NI		NI	NI
Lower Georgia Strait	✓		✓	NI
Fraser	NI	✓	✓	✓
Harrison		✓	✓	✓
Skagit spring[4]	NI	✓		
Skagit summer/fall[4]		✓		NI
Stillaguamish[4]	✓	✓		NI
Snohomish[4]		✓		NI
Green[4]	✓	✓		NI
Quillayute summer		✓	✓	✓
Quillayute fall		✓	✓	✓
Hoh spring/summer		✓	✓	✓
Hoh fall		✓	✓	✓
Queets spring/summer		✓	✓	✓
Queets fall[5]		✓	✓	✓
Grays Harbor spring		✓	✓	✓
Grays Harbor fall		✓	✓	✓
Col. Upriver spring		✓	✓	✓
Col. Upriver summer		✓	✓	✓
Col. Upriver bright		✓	✓	✓
Deschutes fall		✓	✓	✓
Lewis		✓	✓	✓

✓: A fishery occurs or broodstock is collected, and the take is included in the terminal run size estimate.
NI: A fishery occurs or broodstock is collected, but the take is not included in the terminal run size estimate.

1 Because this report only presents unexpanded index escapement estimates for TBR rivers, terminal run size estimates are not reported; terminal catch estimates can be found in TBTC (1994). Sport catch is Canadian only.

2 Includes catch from the River/Gap/Slough gillnet fishery.

3 WCVI terminal run size is not estimated.

4 Puget Sound estimates include reconstructed, stock-specific catches from Areas 8, 8a, 10, and 10a.

5 Escapement estimates include fish taken for brood stock.

2.2.2.3 Stock-specific Notes

Chilkat: This stock was removed from the 1990 rebuilding assessment when it was discovered through a 1991-1992 radio-tagging study that the previous index was not representative of the escapement to the entire Chilkat drainage. ADF&G has estimated total escapement to the Chilkat drainage since 1991. It is anticipated that these estimates will continue and that, despite the lack of base period data, the Chilkat will be included in future assessments when sufficient new data are available. Available data for this stock are included in Appendix A.

Area 6 Index: Future inclusion of this stock is currently under review due to inconsistent escapement enumeration.

Harrison: Escapement estimates for the Harrison stock are only reported since 1984. Prior to 1984, estimates were based on visual counts of escapement. Since 1984, escapement has been estimated using an annual mark-recapture program. The two estimation methods are not comparable.

Stillaguamish and Snohomish River: All harvest of the Stillaguamish and Snohomish stocks occurs incidental to the harvest of other species (see Section 1.4.2). Run reconstruction methods are used to allocate incidental harvest between the two stocks. Management actions taken in the terminal area to protect the Stillaguamish stock have been in effect since 1985, but run reconstruction methods do not reflect these management changes. As such, reported Stillaguamish terminal run sizes (and thus terminal catches) for 1985-1994 are likely overestimated, while those for Snohomish are likely underestimated.

Quillayute summers: For this stock, escapements represent a composite of naturally spawning fish from the summer stock and strays from enhancement. The designation "summer" is used to distinguish this native stock from an earlier nonnative enhanced spring run. While the summer run is managed for natural production, run timing of the two stocks overlaps to some extent.

Oregon Coast (NOC and MOC): River-specific spawner density indices (peak fish/mile) are calculated from observations made at several survey sites. A simple unweighted average across all rivers in the aggregate is then used as the annual measure for this analysis.

2.2.2.4 Changes Relative to the 1993 Annual Report

There were five notable changes from the 1993 report (CTC 1994). Minor updates to catch and escapement data, including updates to preliminary estimates for the most recent years, are not described.

King Salmon: ADF&G made corrections to the King Salmon historical escapement counts to make index counts prior to 1983 comparable to other counts.

Andrew Creek: ADF&G made corrections to the Andrew Creek historical escapement counts to reflect the fraction of total escapement counted in the index.

Alsek: The Transboundary Technical Committee modified the historical database for the Klukshu index to correctly account for broodstock, sport, and aboriginal removals from the total weir count.

WCVI: The escapement indicators for the WCVI include the Marble, Tashish, Artlish, Kauok, Tahsis, Gold, and Burman rivers. In recent reports, one additional river was erroneously included in the index. Escapements to the rivers, based on the Canadian escapement database, were used in this index. Average values (one year before and one year after) were used for years with no data.

Lower Georgia Strait: The escapement indicators for Lower Georgia Strait have been revised and now include the Nanaimo and Cowichan rivers only. All years of the LGS escapement data have been revised to remove the Squamish River escapements. The Squamish was removed due to inability to maintain a quantitative estimation procedure within available funds. Visual estimation of escapement in this glacial system is not considered to be reliable or repeatable among years.

2.2.3 Escapement Goals

2.2.3.1 Origin of Goals

The escapement goals provided by each management agency define long-term stock rebuilding objectives. Most of these goals were established by the managing agencies for each stock. The Transboundary Technical Committee (TTC) jointly determined goals for the three major transboundary rivers in 1991 (TBTC 1991) based on an index system; the goals are not expanded to represent the river-wide drainages. Where possible, agency goals were based on estimates of stock productivity, usable spawning habitat, or other factors, and represent estimates of escapement levels that produce maximum average production or sustained harvest.

For many stocks, interim escapement goals were developed prior to 1984. When developing these goals, it was recognized that data were insufficient or of poor quality and there was a lack of stock specific biological information for establishing escapement goals. For example, Canadian goals are interim targets based on a doubling of base period average escapements and SEAK goals were based on the highest escapement observed prior to 1981. Some goals have changed since 1984 and other goals may change as new information is acquired. The CTC has adopted guidelines for the acceptance of new indicator stocks and the revision of existing escapement goals for use in the CTC rebuilding assessment (CTC Technical Note 9403).

Eight of the indicator stocks have no specific escapement goals: NOC, MOC, Deschutes, Quillayute fall, Hoh spring/summer, Hoh fall, Queets spring/summer and Queets fall. These eight stocks, referred to as stocks without goals, are discussed separately in this chapter. The Washington coastal stocks are managed for escapement floors and inriver harvest rates; when terminal runs are predicted to exceed the escapement floor, terminal fisheries are managed on the basis of stepped harvest rates.

2.2.3.2 Changes Relative to the 1993 Annual Report
Changes to the WCVI and Lower Georgia Strait escapement indices resulted in escapement goal changes, because escapement goals for Canadian stocks are calculated as double the base period average escapement. An adjustment to the escapement in one base period year for Upper Georgia Strait also resulted in a minor goal change.

2.2.4 Assessment Period

For assessment purposes, a base period and a rebuilding assessment period were established for each stock. Base and rebuilding assessment periods differ among stocks:

SEAK and TBR Stocks: For SEAK and TBR stocks, a 15-year rebuilding program was initiated in 1981, prior to implementation of the PST. The target date for completion of rebuilding is 1995. For these stocks, the base period includes the years 1975-1980 and the rebuilding assessment period includes the years 1981-1994.

Harrison Stock: Since comparable pre-1984 escapement data are unavailable for the Harrison stock, the Harrison base period is defined as 1984 and the rebuilding assessment period includes the years 1985-1994.

All Other Stocks: For all other stocks, a 15-year rebuilding program was established for the years 1984-1998. For these stocks, the base period includes the years 1979-1982 and the rebuilding assessment period includes the years 1984-1994.

2.3 METHODS

All methods used in the escapement assessment were identical to those used in the 1993 Annual Report (CTC 1994).

2.3.1 Stocks Without Escapement Goals

While it is not possible to assess rebuilding progress for stocks without escapement goals, these stocks were included in the evaluation of escapement declines. Halting escapement declines is a stated PST objective; however, a review of escapement data shows that, in 1985, some indicator stocks did not have declining escapements. For such stocks, the CTC interpreted the PST language to mean that escapements should not decline after the start of the rebuilding program. Thus, the evaluation of escapement declines includes some stocks with stable escapements prior to 1985.

2.3.1.1 Evaluating escapement declines
To determine if escapement declines have been halted, the recent 5-year average escapement was compared to the average base period escapement. The standard error of the mean was calculated for each stock, based on the stock's 1975-1994 escapements (or all available escapements within this period). The standard error was used as a measure of stock specific escapement variability. For stocks with recent average escapements more than one standard error below the base period average, it was concluded that escapement declines have not been halted. For stocks with escapement increases more than one standard error above the base period average, it was

concluded that escapement declines have been halted. For stocks with recent average escapements within one standard error of the base period average, escapement variation was too great and/or the change in escapements was too small to determine if declines have been halted. Plus or minus one standard error was used as an arbitrary cut off; the lack of independence among years of escapement data precluded use of significance testing.

2.3.1.2 Other stock characteristics

The results of the escapement decline evaluation are reported, as well as: base period average escapements; recent 5-year average escapements; and recent 5-year average escapements, expressed as a percent of the base period average. These are included to provide some information about where stock escapements are now, relative to where they were before implementation of the rebuilding program.

2.3.2 Stocks With Escapement Goals

The CTC's escapement evaluation of stocks with escapement goals was intended to: 1) separate those stocks that are on or ahead of their rebuilding schedules from those stocks that are behind schedule, 2) determine if spawning escapement declines have been halted for stocks that are behind schedule, and 3) provide information to facilitate evaluation of the stocks behind schedule.

This approach used three levels of evaluation. First, stocks that are above goal were identified. Second, stocks that are meeting their rebuilding schedule were identified using short term criteria that assess rebuilding progress. For those stocks judged not to be meeting their rebuilding schedules, a third level of evaluation was performed to determine if escapement declines have been halted and to summarize attributes of these stocks.

This three-level system was implemented as follows:

1) *Stocks above goal were identified.* These were stocks with at least four of the last five escapements at or above goal and recent 5-year average escapements equal to or greater than the goal.

2) *For those stocks not above goal, those that were rebuilding were identified.* This determination was made using the following three criteria based on data from the last five years.

    a) *Mean Criterion.* A test value was calculated as the average of the 1990-1994 data points from the stock's base to goal line. This test value was then compared to the average observed escapement for the last five years. If the observed average was greater than or equal to the test value, a score of +1 was assigned. Otherwise, a score of -1 was assigned.

    b) *Line Criterion.* Observed escapements were compared with the base to goal line. If, in three or more of the last five years, the actual escapements were on or above the base to goal line, then a score of +1 was assigned. Otherwise, a score of -1

was assigned.

c) *Short Term Trend Criterion.* If in at least four of the last five years an escapement exceeded the previous year's escapement, a score of +1 was assigned. If in at least four of the last five years an escapement was equal to or below the previous year's escapement, a score of -1 was assigned. Otherwise, a score of 0 was assigned.

The scores of these three criteria were then added, resulting in a total score ranging from +3 to -3. Rebuilding classifications were assigned as follows:

Total Score	Classification
+2,	Rebuilding
0	Indeterminate
-2, -3	Not Rebuilding

Stocks were classified into four categories: Above Goal, Rebuilding, Indeterminate, and Not Rebuilding. Indeterminate stocks were further reviewed by the CTC and considered for a status change. After this review, all stocks classified as Rebuilding were considered to be on their rebuilding schedules, and no further assessment was performed.

3) *Those stocks that were classified as Indeterminate or Not Rebuilding were further characterized.* The third level consisted of an evaluation of whether or not escapement declines have been halted, and a tabulation of some stock characteristics.

a) *Evaluating escapement declines.* Escapement declines were evaluated in the same manner as for stocks without escapement goals (see Section 2.3.1).

b) *Other stock characteristics.* All of the stock characteristics presented for stocks without goals are also presented for stocks with goals (see Section 2.3.1). Also included are recent 5-year average escapements expressed as a percent of goal.

2.3.3 Comparison With Previous Years

Assessment results were graphed for the years 1987-1994 (using current assessment methods). A table was constructed to compare 1994 assessment results with 1993 results.

2.4 RESULTS

2.4.1 Stock Assessment

2.4.1.1 Stocks Without Escapement Goals

Escapement and terminal run data for stocks without escapement goals are graphed and tabled in the Appendices. Recent escapements and results from the evaluation of escapement declines are shown in Table 2-3. Escapement declines have been halted for 7 of the 8 stocks without escapement goals. The exception is the Queets Spring/Summer stock, for which it is not currently possible to conclude if the escapement decline has been halted or continues.

2.4.1.2 Stocks With Escapement Goals

Individual stock results for the rebuilding criteria are shown in Table 2-4, assessment scores and status are shown in Table 2-5. Stock escapements in 1994 ranged from 6% (Columbia River springs) to 212% (Situk) of escapement goals (Table 2-5).

Table 2-3. Summary of recent escapement data and analysis for escapement decline for the eight natural chinook indicator stocks without escapement goals. SE = Standard Error of the mean for 1975-1994 escapements.

Stock Name	Region	RunType	Esc. Floor[1]	1994 Esc.	Base Period Avg. Esc.	1990-94 Avg.	1990-94 Avg. as % of Base	SE of 1975-94 Esc's
Decline Halted: Stocks With Current Escapements Above Base								
Quillayute	WAC	fall	3000	5000	5925	7320	124%	832
Hoh Spr/sum	WAC	spr/sum	900	1700	1325	1820	137%	237
Hoh Fall	WAC	fall	1200	4000	3075	3360	109%	272
Queets Fall	WAC	fall	2500	3900	3875	5320	137%	549
Deschutes	CR	fall	NA	5455	3477	4445	128%	354
Mid-Oregon Coastal[2]	MOC	fall	NA	94	62	74	112%	4
North Oregon Coastal[2]	NOC	fall	NA	79	50	66	132%	6
Inconclusive: Stocks With Current Escapements Not Distinguishable From Base								
Queets Spr/sum	WAC	spr/sum	700	700	925	840	91%	123

1 Washington Coastal stocks are managed for escapement floors.

2 Assessment of Oregon Coastal indicator stocks is based upon an index of spawner density in units of fish per mile.

Table 2-4. Summary of recent escapement data (1990-1994) for the 36 natural chinook indicator stocks with escapement goals, for evaluation of the mean, line, and trend criteria used to assess rebuilding status.

						MEAN CRITERION			LINE CRITERION		TREND CRITERION	
						Mean	Mean	Mean	Comparison	with line	No. >	No. ≤
Stock Name	Region	Run Type	Esc. Goal	1994 Esc.	1994 % of Goal	Base Period Esc.	1990-94 Test Value	1990-94 Esc.	# Above	# Below	Year Before	Year Before
Situk	SEAK	spring	600	1270	212%	1299		1061				
King Salmon	SEAK	spring	250	224	90%	117	223	183	1	4	1	4
Andrew Creek	SEAK	spring	750	1144	153%	396		1390				
Blossom (index)	SEAK	spring	300	161	54%	102	260	222	2	3	1	4
Keta (index)	SEAK	spring	300	306	102%	255	291	353	3	2	1	4
Alsek	TBR	spring	4700	3620	77%	2377	4235	2401	0	5	3	2
Taku	TBR	spring	13200	9913	75%	4582	11476	11315	2	3	3	2
Stikine	TBR	spring	5300	6360	122%	1945	4629	6685	5	0	3	2
Unuk (index)	TBR	spring	875	711	81%	918	875	780	1	4	3	2
Chickamin (index)	TBR	spring	525	388	74%	314	483	435	2	3	1	4
Yakoun	NBC	summer	1580	2000	127%	788		1780				
Nass	NBC	spr/sum	15890	9061	57%	7944	12712	8446	1	4	2	3
Skeena	NBC	spr/sum	41770	48712	117%	20883		57562				
Area 6 Index	CBC	summer	5520	438	8%	2761	4416	446	0	5	2	3
Area 8 Index	CBC	spring	5450	1300	24%	2725	4360	2020	0	5	3	2
Rivers Inlet	CBC	spr/sum	4950	10000	202%	2475		8257				
Smith Inlet	CBC	summer	2110	700	33%	1055	1688	542	0	5	2	3
W. Coast Van. Is.	WCVI	fall	11499	7150	62%	5749	9199	6150	0	5	3	2
Upper Geor. St.	GS	sum/fall	5350	1166	22%	2675	4280	2734	1	4	2	3
Lower Geor. St.	GS	fall	15075	6086	40%	7538	12060	7581	0	5	2	3
Upper Fraser	FR	spring	24460	30527	125%	12229	19568	27027	4	1	2	3
Middle Fraser	FR	spr/sum	18430	32232	175%	9216		26029				
Thompson	FR	summer	55710	52229	94%	22059	42249	41319	3	2	3	2
Harrison	FR	fall	241670	91698	38%	120837	193355	121819	1	4	2	3
Skagit spring	PS	spring	3000	899	30%	1247	2299	1138	0	5	2	3
Skagit sum/fall	PS	sum/fall	14900	6231	42%	13265	14246	8608	1	4	3	2
Stillaguamish	PS	sum/fall	2000	954	48%	817	1527	1027	1	4	4	1
Snohomish	PS	sum/fall	5250	3626	69%	5028	5161	3469	0	5	2	3
Green	PS	fall	5800	4255	73%	5723	5769	5917	2	3	2	3
Quillayute sum.	WAC	summer	1200	1000	83%	1250	1200	1200	3	2	1	4
Grays Hrb. spr.	WAC	spring	1400	1400	100%	450	1020	1440	5	0	2	3
Grays Hrb. fall	WAC	fall	14600	14300	98%	8575	12190	15220	5	0	2	3
Col. Upr. spring	CR	spring	84000	5199	6%	28050	61620	19130	0	5	2	3
Col. Upr. sum.	CR	summer	85000	17400	21%	23075	60230	22060	0	5	2	3
Col. Upr. bright	CR	fall	40000	72800	182%	28325		48180				
Lewis	CR	fall	5700	11000	193%	13021		9180				

Table 2-5. Assessment scores and status through 1994 of the 36 natural chinook indicator stocks with escapement goals.

Stock Name	Region	Run type	Assessment Scores Mean	Line	Trend	Total	Rebuilding Status Through 1994	Status Change from 1993 [2]
Situk	SEAK	spring					Above Goal	
King Salmon	SEAK	spring	-1	-1	-1	-3	Not Rebuilding	
Andrew Creek	SEAK	spring					Above Goal	
Blossom	SEAK	spring	-1	-1	-1	-3	Not Rebuilding	Decline
Keta	SEAK	spring	1	1	-1	1	Rebuilding [1]	
Alsek	TBR	spring	-1	-1	0	-2	Not Rebuilding	
Taku	TBR	spring	-1	-1	0	-2	Not Rebuilding	Decline
Stikine	TBR	spring	1	1	0	2	Rebuilding	
Unuk	TBR	spring	-1	-1	0	-2	Not Rebuilding	Decline
Chickamin	TBR	spring	-1	-1	-1	-3	Not Rebuilding	Decline
Yakoun	NBC	summer					Above Goal	
Nass	NBC	spr/sum	-1	-1	0	-2	Not Rebuilding	
Skeena	NBC	spr/sum					Above Goal	
Area 6 Index	NBC	summer	-1	-1	0	-2	Not Rebuilding	
Area 8 Index	CBC	spring	-1	-1	0	-2	Not Rebuilding	
Rivers Inlet	CBC	spr/sum					Above Goal	
Smith Inlet	CBC	summer	-1	-1	0	-2	Not Rebuilding	
W. Coast Van. Is.	WCVI	fall	-1	-1	0	-2	Not Rebuilding	
Upper Geor. St.	GS	sum/fall	-1	-1	0	-2	Not Rebuilding	Decline
Lower Geor. St.	GS	fall	-1	-1	0	-2	Not Rebuilding	
Upper Fraser	FR	spring	1	1	0	2	Rebuilding	
Middle Fraser	FR	spr/sum					Above Goal	
Thompson	FR	summer	-1	1	0	0	Indeterminate	Improvement
Harrison	FR	fall	-1	-1	0	-2	Not Rebuilding	
Skagit spring	PS	spring	-1	-1	0	-2	Not Rebuilding	
Skagit sum/fall	PS	sum/fall	-1	-1	0	-2	Not Rebuilding	
Stillaguamish	PS	sum/fall	-1	-1	1	-1	Not Rebuilding	
Snohomish	PS	sum/fall	-1	-1	0	-2	Not Rebuilding	
Green	PS	fall	1	-1	0	0	Indeterminate	Decline
Quillayute summer	WAC	summer	1	1	-1	1	Rebuilding [1]	
Grays Harbor spr.	WAC	spring	1	1	0	2	Rebuilding	
Grays Harbor fall	WAC	fall	1	1	1	3	Rebuilding	
Col. UpR. spring	CR	spring	-1	-1	0	-2	Not Rebuilding	
Col. UpR. summer	CR	summer	-1	-1	0	-2	Not Rebuilding	
Col. UpR. bright	CR	fall					Above Goal	
Lewis River	CR	fall					Above Goal	

[1] The status of these stocks was changed from Indeterminate due to stock-specific circumstances.

[2] Changes between the Rebuilding and Above Goal categories are not footnoted.

Additional stock assessment information can be found in Figure 2-1, Table 2-6, and Table 2-7. Figure 2-1 summarizes 1994 escapements, expressed as a percent of goal, to provide a snapshot of rebuilding progress. In 1994, 18 stocks had escapements less than 76% of goal and 11 stocks had escapements above goal. Table 2-6 summarizes the distribution of stocks among the four rebuilding categories. A combined summary across all stocks is provided, as well as separate summaries for SEAK and TBR stocks and for other stocks. In 1994, 14 (39%) of the stocks with goals were Above Goal or Rebuilding, while 20 (56%) of the stocks were Not Rebuilding. A list of final rebuilding status is shown in Table 2-7.

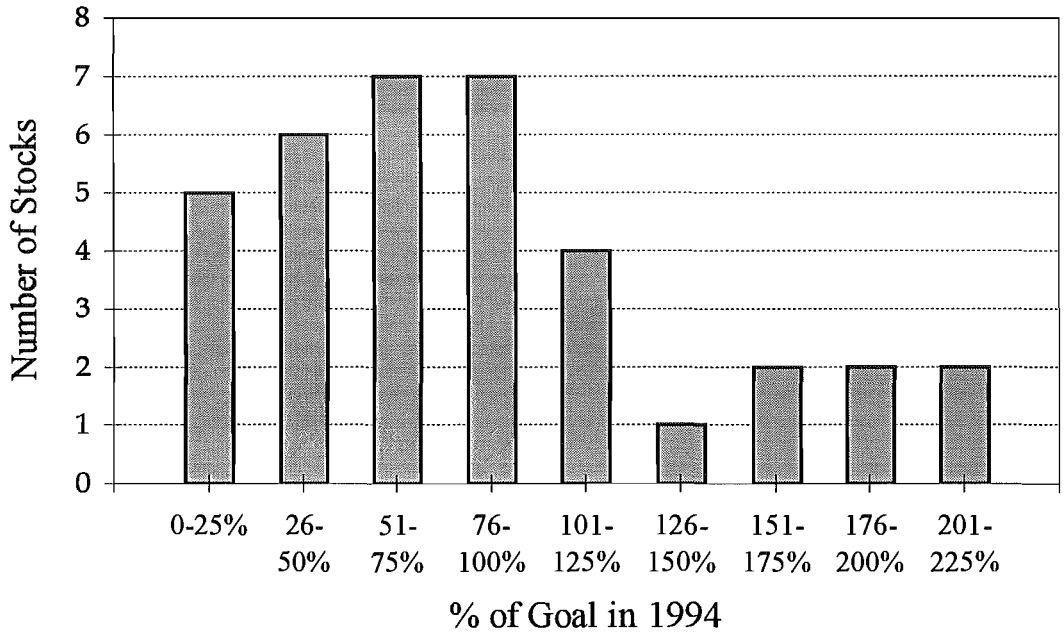


Figure 2-1 Summary of escapements in 1994, expressed as a percent of escapement goal, for the 36 escapement indicator stocks with escapement goals.

Table 2-6. Distribution of chinook escapement indicator stocks among the four rebuilding categories, based on data through 1994.

Category	SEAK and TBR		Other Stocks		Total	
	#	%	#	%	#	%
Above Goal	2	20%	6	23%	8	22%
Rebuilding	2	20%	4	15%	6	17%
Indeterminate	0	0%	2	8%	2	6%
Not Rebuilding	6	60%	14	54%	20	56%
Total	10	100%	26	100%	36	100%

Table 2-7. Rebuilding status through 1994 of natural chinook indicator stocks with escapement goals.

Rebuilding Status	Region	Run Type	Stock Group
STOCKS IN 14TH YEAR OF REBUILDING			
Above Goal			
Situk	SEAK	spring	SEAK/TBR-O
Andrew Creek	SEAK	spring	SEAK/TBR-I
Rebuilding			
Keta [1]	SEAK	spring	SEAK/TBR-I
Stikine	TBR	spring	SEAK/TBR-O
Not Rebuilding			
King Salmon	SEAK	spring	SEAK/TBR-I
Blossom	SEAK	spring	SEAK/TBR-I
Alsek	TBR	spring	SEAK/TBR-O
Taku	TBR	spring	SEAK/TBR-O
Unuk	TBR	spring	SEAK/TBR-I
Chickamin	TBR	spring	SEAK/TBR-I
STOCKS IN 11TH YEAR OF REBUILDING			
Above Goal			
Yakoun	NBC	summer	NCBC
Skeena	NBC	spring/summer	NCBC
Rivers Inlet	CBC	spring/summer	NCBC
Middle Fraser	FR	spring/summer	UFR
Col. Upriver Bright	CR	fall	WACO
Lewis River	CR	fall	WACO
Rebuilding			
Upper Fraser	FR	spring	UFR
Quillayute summer [1]	WAC	summer	WACO
Grays Harbor spring	WAC	spring	WACO
Grays Harbor fall	WAC	fall	WACO
Indeterminate			
Thompson	FR	summer	UFR
Green	PS	fall	SPS
Not Rebuilding			
Nass	NBC	spring/summer	NCBC
Area 6 Index	NBC	summer	NCBC
Area 8 Index	CBC	spring	NCBC
Smith Inlet	CBC	summer	NCBC
W. Coast Vancouver Island	WCVI	fall	WCVI
Upper Georgia Strait	GS	fall	UGS
Lower Georgia Strait	GS	summer/fall	LGS
Harrison	FR	fall	LFR
Skagit spring	PS	spring	NPS-Sp
Skagit summer/fall	PS	summer/fall	NPS-S/F
Stillaguamish	PS	summer/fall	NPS-S/F
Snohomish	PS	summer/fall	NPS-S/F
Col. Upriver spring	CR	spring	CUS
Col. Upriver summer	CR	summer	WACO

[1] Status of these stocks was altered from Indeterminate (see text for details).

Additional information about those 22 stocks classified as Indeterminate or Not Rebuilding is shown in Table 2-8. Escapement declines have been halted for 6 (27%) of these 22 stocks, while 8 (36%) have shown continued escapement declines. For the remaining 8 stocks (36%), it is not currently possible to determine if escapement declines have been halted or continue. Of the 22 stocks, 6 (27%) had recent 5-year average escapements that were below base period averages.

Table 2-8. Level 3 assessment for 22 natural chinook indicator stocks with escapement goals that were classified as Indeterminate or Not Rebuilding. SE=Standard Error of the Mean

Stock Name	Area	Run Type	Esc. Goal	Base Avg. Esc.	1990-94 Avg. Esc.	1990-94 Avg. as % Goal	1990-94 Avg. as % Base	SE of 1975-94 Esc's
Decline Halted: Stocks With Current Escapements Above Base								
Taku	TBR	spring	13200	4582	11315	86%	247%	745
King Salmon	SEAK	spring	250	117	183	73%	156%	17
Blossom	SEAK	spring	300	102	222	74%	218%	82
Chickamin	SEAK	spring	525	314	435	83%	139%	85
Thompson[1]	FR	summer	55710	22059	41319	74%	187%	2343
Stillaguamish	PS	sum/fall	2000	817	1027	51%	126%	96
Inconclusive: Stocks With Current Escapements Not Distinguishable From Base								
Alsek	TBR	spring	4700	2377	2401	51%	101%	157
Nass	NBC	spr/sum	15890	7944	8446	53%	106%	671
W. Coast Van. Is.	WCVI	fall	11040	5749	6150	53%	107%	423
Upper Geor. St.	GS	sum/fall	5350	2675	2734	51%	102%	777
Lower Geor. St.	GS	fall	15075	7538	7581	50%	101%	514
Harrison	FR	fall	241670	120837	121819	50%	101%	13634
Green[1]	PS	fall	5800	5723	5917	102%	103%	682
Skagit spring	PS	spring	3000	1247	1138	38%	91%	142
Continued Decline: Stocks With Current Escapements Below Base								
Unuk	SEAK	spring	875	918	780	89%	85%	113
Area 6 Index	CBC	summer	5520	2761	446	8%	16%	268
Area 8 Index	CBC	spring	5450	2725	2020	37%	74%	315
Smith Inlet	CBC	summer	2110	1055	542	26%	51%	101
Snohomish	PS	sum/fall	5250	5028	3469	66%	69%	283
Skagit sum/fall	PS	sum/fall	14900	13265	8608	58%	65%	954
Col. UpR. summer	CR	summer	85000	23100	19540	23%	85%	1362
Col. UpR. spr.	CR	spring	84000	28050	19130	23%	68%	4470

[1] Stocks with an Indeterminate rebuilding status. Blossom escapements and goal are index numbers.

2.4.2 Results Relative to Previous Years

Table 2-9 compares 1993 and 1994 escapement assessments. Figure 2-2 compares escapement results among all years since 1987 (using current assessment methods).

Table 2-9. Comparison of 1993 and 1994 assessment results for escapement indicator stocks with escapement goals.

Category	1993 Assessment		1994 Assessment	
	#	%	#	%
Above Goal	9	25%	8	22%
Rebuilding	9	25%	6	17%
Indeterminate	2	6%	2	6%
Not Rebuilding	16	44%	20	56%
Total	36	100%	36	100%

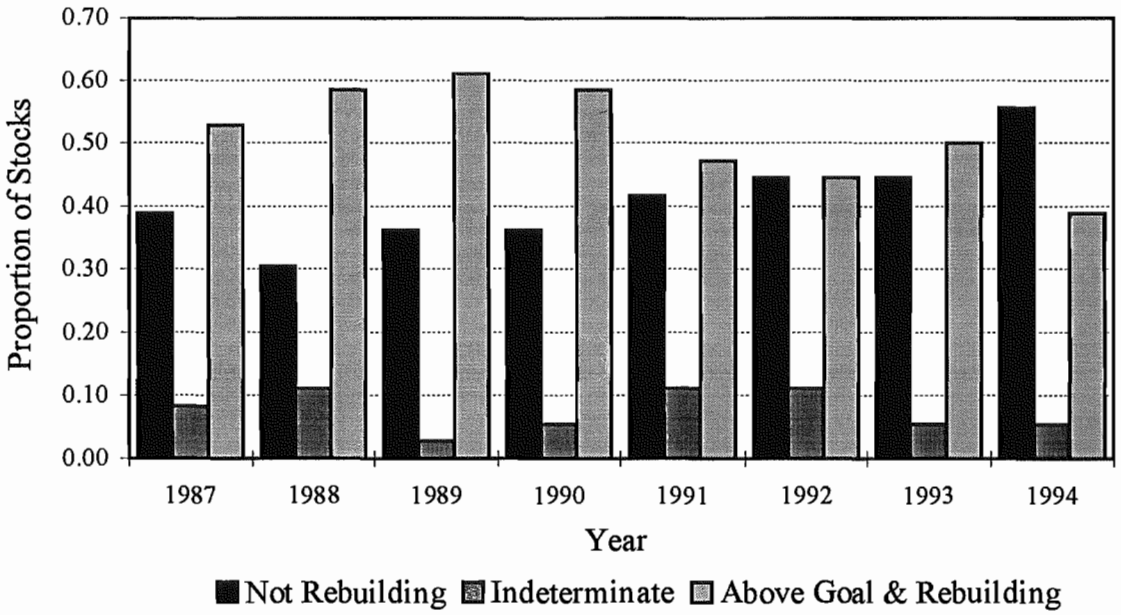


Figure 2-2 Distribution of stocks among rebuilding categories for the years 1987-1994. All years prior to 1993 were re-calculated using the methods implemented in 1993 and the new escapement goals.

2.5 STOCKS CONSIDERED FOR STATUS CHANGES

After the initial assessment, four stocks were classified as Indeterminate. The CTC examined each of these stocks and considered whether to change its status. The CTC decided to change the

status of both the Keta and Quillayute summers to Rebuilding. Both of these stocks have been above or only slightly below their escapement goals for at least the last seven years. The Thompson and Green remain in the Indeterminate category. Green terminal run has been above the goal in most recent years, although the goal has not been achieved in the last three years.

2.6 SUGGESTION FOR FUTURE EVALUATIONS

The CTC's present assessment of rebuilding, based on attaining escapement goals and the recent trends in escapements, has recognized limitations as exemplified in this 1994 evaluation. A stock's escapement may vary about its goal (e.g., the Unuk River, Appendix B-5), or may have shown substantial recovery since the implementation of rebuilding programs but remain slightly below the goal (e.g., the Taku River, Appendix B-4). These stocks would be classified as Not Rebuilding, just as stocks which are clearly Not Rebuilding (e.g., Smith Inlet or Harrison River, Appendix B). Some CTC members have proposed that the CTC incorporate an additional rebuilding assessment criterion based on the proportion of the maximum surplus production expected from recent escapements for each escapement indicator stock. A criterion based on production would be consistent with the ultimate rebuilding objectives of the PST chinook rebuilding program, i.e., "...attain by 1998, escapement goals established in order to restore production of naturally spawning chinook stocks."

Application of a production criterion would require an understanding of the relationship between adult production and spawning escapement for each indicator stock. Such relations are presently used by the CTC in the PSC chinook model and ADF&G has presented examples of stock-recruitment relationships for some SEAK indicator stocks. A production criterion could assist in addressing the inherent variability in adult returns observed in chinook salmon, due to natural variation in survival and fishing impacts. The present escapement assessment criteria are sensitive to these fluctuations and result in some stocks changing classification categories each year. Annual reclassifications might be reduced by use of a production criterion. For example, ADF&G presented an assessment of the production expected from the past five years of escapements to the Unuk River stock. Between 1990-1994, this stock has averaged 89% of its escapement goal but due to fluctuations about the goal, this stock is classified as Not Rebuilding. However, ADF&G estimated that adult returns from these escapements would be expected, assuming average survival, to be 96% of the production if the escapement goal had been achieved in each year. This results from the compensatory nature of stock-recruitment relations and the multiple age classes of chinook.

An additional rebuilding criterion based on production assessment has potential for improving the present escapement assessment of rebuilding and should continue to be explored. It would explicitly address a primary task of restoring production from naturally spawning stocks and would incorporate total production in our assessments, in addition to examining trends in spawning escapements. However, there are concerns that have to be examined. For example, such assessments assume that the stated escapement goals are the escapement levels which maximize a stock's surplus production (i.e., potential yield). Many of the escapement goals used in CTC assessments are acknowledged to be interim goals used as management targets for rebuilding and the assessment of productivity in these natural stocks. If future production is projected from past production relationships, it may not account for changes in survival which

would affect future production, sustainable exploitation rates, and escapement levels. The CTC has noted that many indicator stocks have recently experienced poor marine survival (CTC 1994). The CTC recommends the development and evaluation of production criteria to determine if one should be incorporated in future rebuilding assessments, but can not, at this time, evaluate the merit of this suggestion.

3. EXPLOITATION RATE ASSESSMENT
Based on CWT Recovery Data Through Calendar Year 1994

3.1 INTRODUCTION

The Exploitation Rate Assessment relies on CWT release and recovery data from a set of indicator stocks to estimate: 1) harvest rate indices for the ceiling fisheries and the U.S. South ocean sport and troll fishery, 2) exploitation rate indices of indicator stocks for naturally spawning stocks harvested in nonceiling fisheries and not achieving escapement goals, 3) brood year exploitation rates and indices, and 4) the distribution of catch and total mortality among fisheries. Methods of calculating the SEAK troll fishery index were modified to incorporate stratification of the fishery and nonceiling fishery index methods were modified to account for terminal fisheries.

Most of the statistics reported in the Exploitation Rate Assessment are based on cohort analysis. Cohort analysis simply reconstructs the production of a CWT group by starting with the escapement, catch, and incidental mortality of the oldest age class and working backwards in time to calculate the total abundance of ocean age 2 chinook at the beginning of fishing. These reconstructions are based on CWT recoveries by stock, age, and fishery. Quantitative estimates of CWT recoveries are unavailable for some fisheries (Table 3-1).

Table 3-1. Fisheries for which CWT recoveries are not available for inclusion in fishery or nonceiling fishery indices.

Fishery	Reason data are unavailable
Chinook Bycatch in Non-Salmon Fisheries	Limited and qualitative sampling
WCVI Sport	No base period sampling
Johnstone Strait Sport	Incomplete sampling
Canadian Freshwater Sport	Incomplete sampling
Canadian Freshwater Net	Incomplete sampling

3.1.1 Fishery Indices

It was expected when the PST was negotiated that catch ceilings and increases in stock abundance would reduce harvest rates in fisheries managed under PST catch ceilings. The fishery index provides a means to assess performance against this expectation. An index less than 1.0 represents a decrease from base period harvest rates while an index greater than 1.0 represents an increase. The relative magnitude of the change is the difference of the index from 1.0.

Fishery indices are presented for both reported catch and total mortalities (reported catch plus estimated incidental mortality). Both are expressed as adult equivalents (AEQ), where the AEQ factor is used as an adjustment to reflect the proportion of fish of a given age that would, in the absence of fishing, subsequently leave the ocean to spawn. The total mortality index provides a consistent means of representing changes in reported catch and incidental mortalities, including those associated with regulatory measures such as minimum size limits and chinook nonretention (CNR) periods. Direct estimates of incidental mortality cannot be obtained from CWT recoveries; mortality estimates are computed using estimates of the proportion of fish less than the

size limit, the relative contributions of indicator stocks during periods of chinook retention, and estimates of the total number of encounters with chinook during CNR periods.

In the SEAK and NCBC fisheries, indices are presented for troll gear only although the ceilings are applicable to net and sport gear as well. As in past years, only the recoveries from the troll fishery were used because the majority of the catch, and the most reliable CWT sampling, occurred in these fisheries. Because the allocation of the catch among gear types has changed in some fisheries (e.g., the proportion of the catch harvested by the sport fishery has increased in the SEAK and NCBC fisheries), the indices may not represent the harvest impact of all gear types. The CTC is evaluating how to include other gear types in the indices for the SEAK and NCBC fisheries.

3.1.2 Nonceiling Fishery Indices

The passthrough provision of the PST requires that "the bulk of depressed stocks preserved by the conservation program ... principally accrue to escapement." The ambiguity of the passthrough definition, and the lack of direction from the PSC, have prevented the CTC from analytically assessing if this provision of the PST has been satisfied. As an interim measure, this report includes a nonceiling index previously suggested by the CTC (CTC 1991) as a measure of passthrough. The index compares the expected AEQ mortalities (assuming base period exploitation rates and current abundance) with the observed AEQ mortalities, by calendar year, over all nonceiling fisheries of a Party (Table 3-2). Index values greater than 1.0 for nonceiling fisheries indicate that the exploitation rates have increased relative to the base period. Consistent with Canadian commitments to reduce harvest rates by 25% for Canadian nonceiling net fisheries, the index should be evaluated with respect to 0.75 for the Canadian nonceiling net fisheries. The CTC is unable to include the WCVI sport fishery in the index at this time because of the absence of base period data.

The wild stocks subject to the passthrough provision were identified from the list of escapement indicator stocks provided in Chapter 2. A stock was included in the analysis if the following three conditions were met: 1) the escapement goal was not achieved, 2) the stock was harvested in nonceiling fisheries (the same criteria for inclusion were used as for the fishery indices, CTC 1989), and 3) an exploitation indicator stock with base period tagging and estimates of escapement existed in the stock group.

Many of the CWT stocks used to compute the index are subject to different terminal area fisheries than are the naturally spawning stocks that the index is intended to represent. In this year's report, methods of calculating nonceiling fishery indices were modified to incorporate terminal harvest of naturally spawning stocks. Details of the modifications are discussed in Section 3.2.1.2.

Table 3-2. Fisheries included in the nonceiling fishery index.

Fisheries Included in Nonceiling Index	
United States	Canada
Washington/Oregon/California Ocean Troll	West Coast Vancouver Island Net
Puget Sound Northern Net	Juan de Fuca Net
Puget Sound Other Net	Johnstone Net
Washington Coastal Net	Fraser Net
Washington/Oregon/California Ocean Sport	Strait of Georgia Net
Puget Sound Northern Sport	
Puget Sound Southern Sport	
Freshwater Terminal Net	
Freshwater Terminal Sport	

3.1.3 Brood Exploitation Rates and Indices

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 total mortality to AEQ total mortality plus escapement. The numerator may be partitioned into components for AEQ reported catch and AEQ incidental mortality, with each component occurring in either ocean fisheries or all fisheries. In order to simplify the interpretation of trends in the estimates of brood exploitation rates, a brood exploitation rate index was computed by dividing the brood exploitation rate in each year by the average brood exploitation rate in the base period. A regional index was computed as the average of the indices for stocks within a stock group. Stocks within a stock group are listed in Table 3-5. The base period in this instance is defined in terms of the primary brood years that contributed to fisheries in 1979-1982; base period brood years were 1976-1979 for all stocks but Quinsam (1976-1980) and SEAK/TBR Inside Migrating (1978).

The exploitation rate on the indicator stock may differ from the exploitation rate on the wild stock it represents if the indicator stock is of hatchery origin and subject to terminal fisheries directed at harvesting surplus hatchery production. In the case of the brood exploitation rate, this difference was addressed by computing a rate for ocean fisheries and a total for all fisheries. Ocean fisheries were defined to include marine sport and troll fisheries, and CWT recoveries of ocean ages 2 and 3 fish in all nonterminal net fisheries. By partitioning the fisheries in this way, the most appropriate measure of brood exploitation rates on wild stocks could be selected. The method selected for each exploitation rate indicator stock is given in Table 3-5.

3.2 ESTIMATION OF EXPLOITATION RATES

Of the 35 exploitation rate indicator stocks, only 18 were used to calculate fishery indices, nonceiling indices, and/or brood exploitation rates, and those analyses are in this chapter. Catch distributions for these 18 stocks and an additional 12 exploitation rate indicator stocks can be found in Appendix D. Five exploitation rate indicator stocks were not used in this year's limited analysis. Also, three stocks in Idaho (Sawtooth Spring, Rapid River Spring, and McCall Summer)

and one in Washington (Leavenworth Spring) are tagged as PSC indicator stocks but are not analyzed because of the limited number of recoveries in ocean fisheries.

The composition of exploitation rate indicator stocks is shown in Table 3-3, all PSC indicator stocks are listed in Table 3-4, and the analyses performed using each indicator stock are shown in Table 3-5. Additional information on the indicator stocks and tag codes used in the analyses is detailed in Appendix C. Extrapolation of results to similar stocks and/or generalizations about fishery impacts will only be appropriate to the extent that the indicator stocks are representative of the array of stocks harvested in the fisheries or the stock groupings which they represent. As in previous years, the indicator stocks are dominated by stocks which migrate to terminal areas during fall (Table 3-3).

Table 3-3. Composition of Exploitation Rate Indicator Stocks.

Origin		Run Timing	
S.E. Alaska	1	Spring	5
British Columbia	9	Spring/Summer	3
Puget Sound	13	Summer	1
Washington Coast	2	Summer/Fall	10
Columbia River	9	Fall	16
Oregon Coast	1		

Table 3-4. List of exploitation rate indicator stocks, with their location, run type, and age of smolts at release.

Stock Name	Location	Run Type	Smolt Age
Alaska Spring	Southeast Alaska	Spring	Age 1
Kitsumkalum	North/Central BC	Spring/Summer	Age 0
Snootli Creek	North/Central BC	Spring/Summer	Age 0
Kitimat River	North/Central BC	Spring/Summer	Age 0
Robertson Creek	WCVI	Fall	Age 0
Quinsam	Georgia Strait	Fall	Age 0
Puntledge	Georgia Strait	Summer	Age 0
Big Qualicum	Georgia Strait	Fall	Age 0
Chehalis (Harrison Stock)	Lower Fraser River	Fall	Age 0
Chilliwack (Harrison Stock)	Lower Fraser River	Fall	Age 0
South Puget Sound Fall Yearling	South Puget Sound	Summer/Fall	Age 1
Squaxin Pens Fall Yearling	South Puget Sound	Summer/Fall	Age 1
University of Washington Accelerated	Central Puget Sound	Summer/Fall	Age 0
Samish Fall Fingerling	North Puget Sound	Summer/Fall	Age 0
Stillaguamish Fall Fingerling	Central Puget Sound	Summer/Fall	Age 0
George Adams Fall Fingerling	Hood Canal	Summer/Fall	Age 0
South Puget Sound Fall Fingerling	South Puget Sound	Summer/Fall	Age 0
Kalama Creek Fall Fingerling	South Puget Sound	Summer/Fall	Age 0
Elwha Fall Fingerling	Strait of Juan de Fuca	Summer/Fall	Age 0
Hoko Fall Fingerling	Strait of Juan de Fuca	Summer/Fall	Age 0
Skagit Spring Yearling	Central Puget Sound	Spring	Age 1
Nooksack Spring Yearling	North Puget Sound	Spring	Age 1
White River Spring Yearling	South Puget Sound	Spring	Age 1
Sooes Fall Fingerling	North Washington Coast	Fall	Age 0
Queets Fall Fingerling	North Washington Coast	Fall	Age 0
Cowlitz Tule	Columbia River (WA)	Fall Tule	Age 0
Spring Creek Tule	Columbia River (WA)	Fall Tule	Age 0
Bonneville Tule	Columbia River (OR)	Fall Tule	Age 0
Stayton Pond Tule	Columbia River (OR)	Fall Tule	Age 0
Upriver Bright	Upper Columbia River	Fall Bright	Age 0
Hanford Wild	Upper Columbia River	Fall Bright	Age 0
Leavenworth Spring [1]	Upper Columbia River	Spring	Age 1
Lewis River Wild	Lower Columbia River	Fall Bright	Age 0
Lyons Ferry	Snake River	Fall Bright	Age 0
Willamette Spring	Lower Columbia River	Spring	Age 1
Salmon River	North Oregon Coast	Fall	Age 0
Sawtooth Spring [1]	Idaho	Spring	Age 1
Rapid River Spring [1]	Idaho	Spring	Age 1
McCall Summer [1]	Idaho	Summer	Age 1

[1] Tagged PSC indicator stocks with too few recoveries for analysis.

Table 3-5. Indicator stocks, stock groups, analyses using each, and availability of quantitative escapement recoveries and base period tagging data.

Indicator Stock Name	Stock Group[1]	Fishery Index	NC Index	Brood Exp[6]	Esc	Base Tagging
Alaska Spring	SEAK/TBR-I	yes	—	Total	yes	yes
Kitsumkalum[5]	NCBC	—	—	—	—	yes
Snootli Creek[5]	NCBC	—	—	—	—	—
Kitimat River[5]	NCBC	—	—	—	—	—
Robertson Creek	WCVI	yes	—	Ocean	yes[2]	yes
Quinsam	UGS	yes	yes	Total	yes	yes
Puntledge	LGS	yes	—	Total	yes	yes
Big Qualicum	LGS	yes	yes	Total	yes	yes
Chehalis[5]	LFR	—	—	—	—	—
Chilliwack[3, 5]	LFR	—	—	—	—	—
South Puget Sound Fall Yearling		yes	[4]	[4]	yes[2]	yes
Squaxin Pens Fall Yearling		—	[4]	[4]	yes[2]	—
Univ of Washington Accelerated		yes	[4]	[4]	yes[2]	yes
Samish Fall Fingerling	NPS-S/F	yes	yes	Ocean	yes[2]	yes
Stillaguamish Fall Fingerling	NPS-S/F	—	—	—	—	—
George Adams Fall Fingerling		yes	[4]	[4]	yes[2]	yes
South Puget Sound Fall Fingerling	SPS-S/F	yes	—	Ocean	yes[2]	yes
Kalama Creek Fall Fingerling	SPS-S/F	—	—	—	—	yes
Elwha Fall Fingerling		—	—	—	—	—
Hoko Fall Fingerling		—	—	—	yes	—
Skagit Spring Yearling	NPS-Sp	—	—	—	yes[2]	—
Nooksack Spring Yearling	NPS-Sp	—	—	—	yes[2]	—
White River Spring Yearling		—	—	—	yes[2]	yes
Sooes Fall Fingerling	WACO	—	—	—	yes	—
Queets Fall Fingerling	WACO	—	—	—	—	yes
Cowlitz Tule	CRT	yes	[4]	[4]	yes	yes
Spring Creek Tule	CRT	yes	[4]	[4]	yes	
Bonneville Tule	CRT	yes	[4]	[4]	yes	yes
Stayton Pond Tule	CRT	yes	[4]	[4]	yes	yes
Upriver Bright	WACO	yes	yes	Ocean	yes	yes
Hanford Wild	WACO	—	—	—	yes	—
Lewis River Wild	WACO	yes	yes	Ocean	yes	yes
Lyons Ferry	WACO	—	—	—	yes	—
Willamette Spring		yes	—	[4]	yes	yes
Salmon River	WACO	yes	yes	Ocean	yes	yes

NC Index = index for nonceiling fisheries; Brood Exp = brood exploitation rates; Esc = quantitative estimates of escapement.

1 Acronyms and descriptions for stock groups:

SEAK-TBR/I:	SEAK and Transboundary rivers, inside migrating
NCBC:	NCBC spring/summer
WCVI:	WCVI fall
UGS:	UGS summer/fall
LGS:	LGS fall
LFR:	Lower Fraser fall
NPS-S/F:	North Puget Sound summer/fall
SPS-S/F:	South Puget Sound summer/fall
NPS-Sp:	North Puget Sound spring
CRT:	Columbia River Tule hatchery stock
WACO:	Washington Coastal Spring/Summer/Fall, non-Tule Columbia River Fall, North Oregon Coast, and Mid-Oregon Coast.

2 Only hatchery rack recoveries are included in escapement.

3 Harrison stock only.

4 Hatchery stock not used to represent wild stock.

5 Not used in this year's analyses.

6 Lists the appropriate statistic to consult when using the indicator stock to represent the regional stock group.

3.2.1 Theory and Procedures

3.2.1.1 Modifications of SEAK Troll Fishery Index

The CTC uses fishery indices to reflect changes in fishery impacts relative to a base period (1979-1982). In recent years, concerns have been raised regarding limitations of the existing fishery index, in particular, the inability to incorporate CWT data for stocks lacking base period data and the potential difficulty of reflecting changes in stock exploitation resulting from changes in the conduct of fisheries. The form of the CTC fishery index itself limits consideration of stocks to those with adequate tagging during the base period. Fishing patterns for some fisheries have changed substantially. One of the most striking examples of this is the SEAK troll fishery where the catch during the winter season has increased, the spring fishery has been largely curtailed, and the summer season has become markedly shorter. Because stock complexes are dynamic throughout the year, impacts of the SEAK fishery have likely changed over time as season structure has been altered. To determine if different stock complexes are exploited during different times of year, the AWG examined concentrations (CWT recoveries of a given stock-age group) for several time-area strata for the SEAK troll fishery. Six strata with significant differences were found. The AWG evaluated a number of alternative estimators to determine if strata considerations and additional tag recovery data could be incorporated into a fishery index. Details of the AWG analysis will be documented in a separate report. A summary of results is presented here.

To evaluate the performance of alternative estimators for the fishery index, the AWG developed a computer model to simulate the harvest, escapement, survival, and sampling of CWTs. The model incorporated 15 tagged and untagged stocks and a set of nine fisheries. The simulations incorporated variability in survivals, harvest rates, stock distributions, and sampling rates to evaluate the performance of alternative estimators under a variety of situations. Other types of variability, such as maturity rates and abundance of initial cohort sizes, were also incorporated into the model. Two types of fisheries were evaluated: a nonstratified fishery, where the harvest rates vary proportionately over the catch strata, and a stratified fishery, where the distribution of the stocks and harvest rates vary disproportionately over the catch strata.

The AWG determined that a useful fishery index should reflect both changes in harvest rates and stock distribution. Three general, desirable characteristics were identified: 1) the index should measure changes in fishery harvest rates if the distribution of stocks is unchanged from the base period; 2) the index should have an expected value of 1.0 for random variation around the base period fishery harvest rate, cohort size, and stock distributions; and 3) the index should weight changes in stock distribution by abundance. The simulation model was designed to compare the fishery index estimates with a "true" value calculated from known values in the simulation. After exploring several alternatives, the AWG concluded that the best estimate for a fishery index would consist of the product of a fishery harvest rate index and an index of stock abundance weighted by average distribution (i.e., the proportion of a cohort vulnerable to the fishery). This estimate was selected as the "true" value, since it was the only one with all three desirable characteristics.

The simulation model was used to evaluate the performance of six fishery index estimators, as measured against this "true" value. The formulas for the true value and the six estimators are presented in Appendix E. True index values were calculated using the known values of harvest rate, abundance,

and distribution of the stocks. These true values were compared to the current CTC estimator and five alternative estimators. All estimators are based on CWT recoveries of tagged stocks. The performance of the six estimators was evaluated against four criteria: 1) the average deviation from the true value (or bias), 2) the average absolute difference from the true value, 3) the average squared deviation from true value (or MSE), and 4) average absolute error as a proportion of the true value. Relative performance of the estimators against these criteria was similar. The AWG relied upon MSE as the principal criterion for evaluating estimator performance.

Three estimators, the CTC fishery index (FI), the proportional harvest rate index (PFI), and the stratified proportional harvest rate index adjusted for untagged stocks (SPFI) had the smallest MSE under a variety of simulation scenarios. Variations in survival rates, sampling rates, and harvest rates affected the accuracy and precision of all estimators in a similar manner. The primary factor responsible for differences in estimator performance was the amount of variability in stock distribution (the proportion of a stock-age group that is vulnerable to a fishery). Each of the three estimators performed better than the others under certain circumstances. For a nonstratified fishery, the PFI was marginally better when the coefficient of variation (CV) of the distribution parameters was less than 70%, and the FI performed increasingly better when the CV was greater than 100% (Figure 3-1). For a stratified fishery, the SPFI had a consistently lower MSE than the FI for CVs less than 150%, but the FI was consistently better for CVs greater than 150% (Figure 3-2). Both the SPFI and the FI performed better than the PFI for all levels of variability in the stratified fishery.

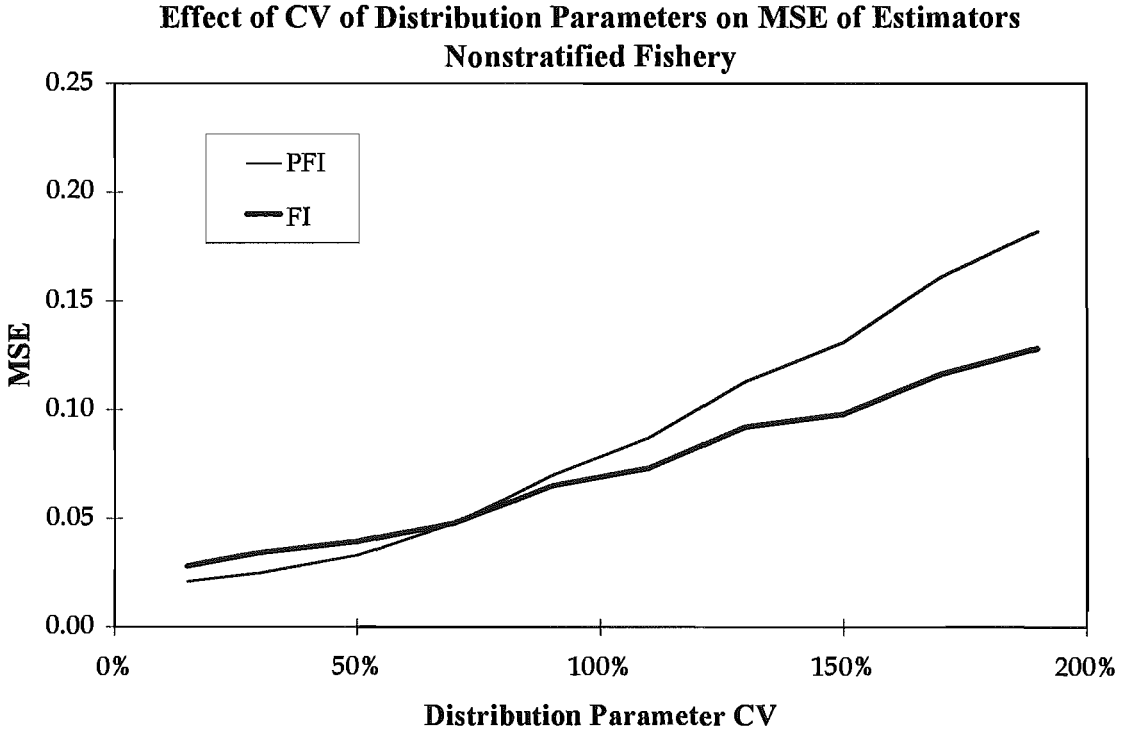


Figure 3-1. Effect of CV of fishery distribution parameters on MSE of fishery index estimators for a nonstratified fishery.

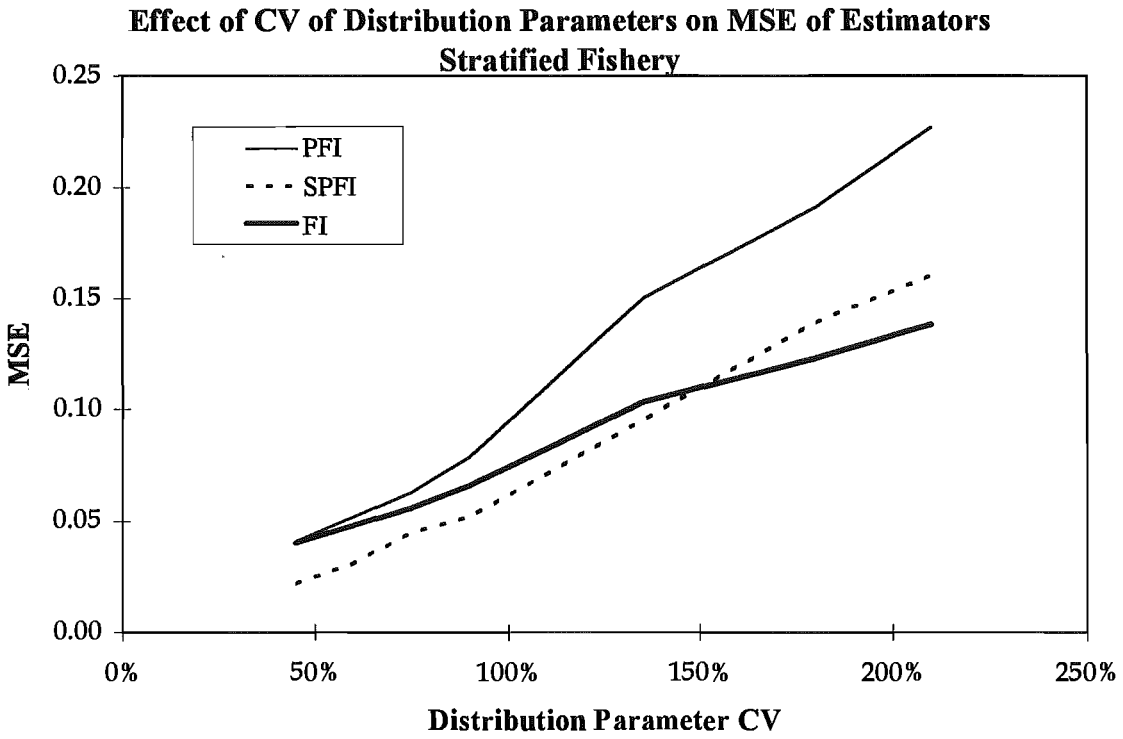


Figure 3-2. Effect of CV of fishery distribution parameters on MSE of fishery index estimators for a stratified fishery.

In order to choose the estimator most likely to have the best performance for SEAK stratified fisheries, the variability in the distribution of stocks was examined. Two rough measures of the CV for the distribution parameters were devised. One measure looked at the distribution of the CVs of the concentration of stock/ages in the SEAK troll fishery strata. Another measure consisted of the CVs of the estimated annual distribution parameters of the stock/age groups in the SEAK troll fishery strata about the average, accounting for the effect of measurement error due to variability in CWT recoveries. Both these indirect measures are believed to overestimate the underlying variability in stock distributions because measurement error and variation in other processes have not been accounted for. Both measures suggest that the true CV in the distribution of stocks in the Alaska troll fishery is likely less than 50%. Therefore, the AWG selected the SPFI as the preferred estimator for the SEAK troll fishery. Note that in computing the SEAK troll fishery index, the absence of August-September fisheries in several years necessitated the consolidation of the August-September and July-outside catch strata. Although the CTC adopted the SPFI as the preferred fishery index for the SEAK troll fishery, the FI is also provided for purposes of comparison (Figure 3-3).

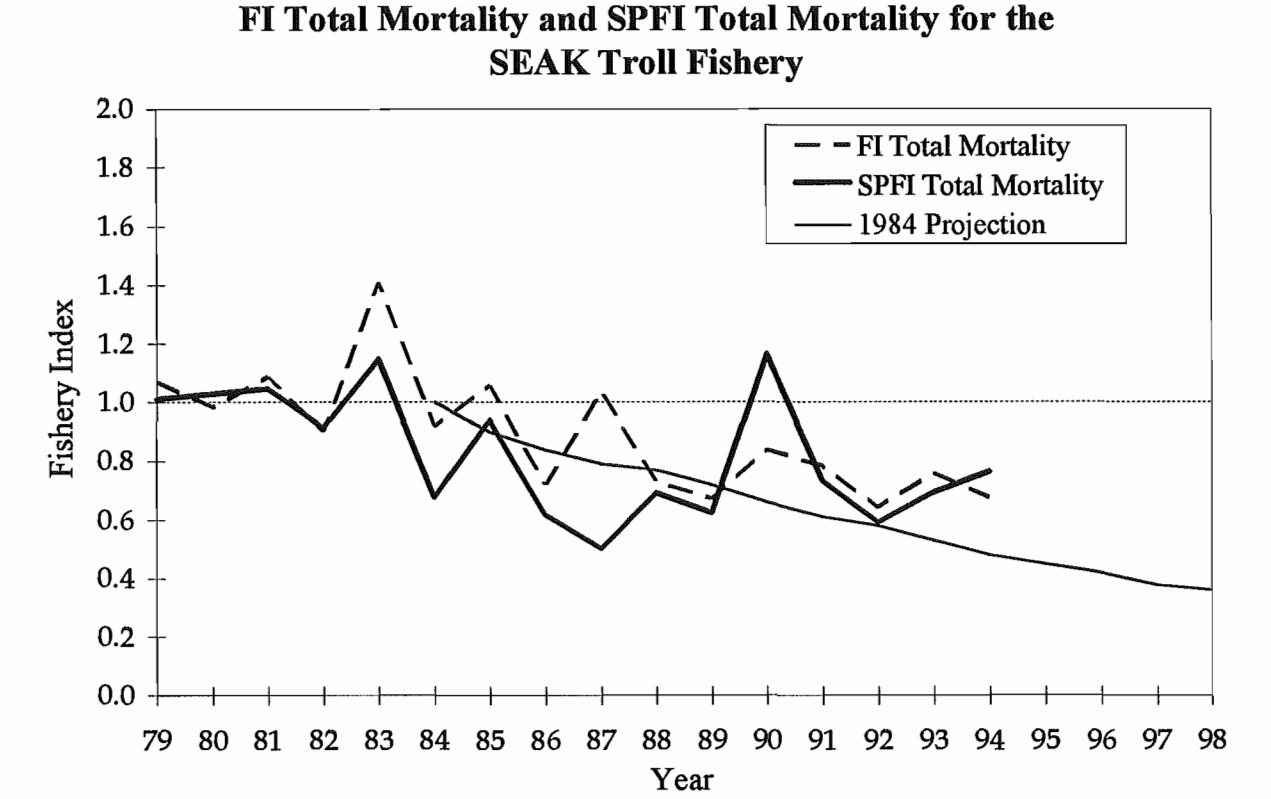


Figure 3-3. Comparison of fishery indices for the SEAK troll fishery using the new stratified proportional fishery index (SPFI) and the CTC fishery index (FI).

The CTC continues to use the FI for fisheries except SEAK troll. The performance of alternative fishery indices for other fisheries could not be evaluated within the available time frame; future analyses will include: 1) development and evaluation of appropriate stratification criteria and proposed stratification for other fisheries, 2) development of methods to account for size limit changes (resulting in changes in vulnerability of younger age fish to the fishery), and 3) estimation of the CV of the distribution parameters of stock/ages in other fisheries.

3.2.1.2 Modifications of Nonceiling Fishery Indices

Nonceiling fishery indices are used by the CTC to assess the impacts on depressed naturally spawning stocks of fisheries not subject to PSC ceiling management. Computation of the index requires including both ocean and terminal (freshwater) fisheries into a single index. This is problematic in that exploitation rates for these fisheries are not additive because ocean and terminal fisheries are operating on different cohorts. The nonceiling index used by the CTC for the past several years avoided this problem by computing an index based on expected catches under base period exploitation rates. The previous nonceiling index was the ratio of actual catches of an appropriate Exploitation Rate indicator stock to catches of that stock expected under base period exploitation rates.

The problem with using the index as described above is that many of the CWT stocks used to compute the index are subject to different terminal area fisheries than are the naturally spawning stocks that the index is intended to represent. URBs, for example, are used to represent fishery impacts on wild stocks in the WACO stock group. However, URBs are subject to significant net and sport harvest in the Columbia River. Because of different run timing and harvest policies, the naturally spawning Columbia River Summer stock that the URB stock represents is not subject to these freshwater fisheries. The ocean exploitation of URBs can be used to represent Columbia River summers, but the freshwater harvest cannot. A similar problem occurs with the Grays Harbor fall stock. URBs are subject to Columbia River fisheries that do not affect the Grays Harbor stock, and the Grays Harbor stock is subjected to a terminal net fishery that does not impact URBs.

Since the exploitation rate indicator stock and the wild stock in many cases are not subject to the same freshwater fisheries, the CTC has only been reporting nonceiling indices based on the fisheries common to both stocks. This year the CTC revised the nonceiling index to include the effects of fisheries that only operate on the wild stock. The new index, like the old, is the ratio of 'actual' to 'expected' catch of the exploitation rate indicator stock. For mixed stock fisheries, actual and expected catches are computed the same way as for the old index. For terminal fisheries, however, the 'actual' catch is computed by applying terminal harvest rates of the wild stock (derived from outside sources) to the terminal population of the exploitation rate indicator stock. In other words, the 'actual' terminal catch is the catch of the exploitation rate indicator stock that would have occurred in the terminal area if the exploitation rate indicator stock had been subjected to the same harvest rates as the wild stock. 'Expected' catches in the terminal fisheries are computed by multiplying the terminal population of the exploitation rate indicator stock by the base period terminal harvest rates for the wild stock. The nonceiling index is the ratio of the 'actual' catch to the 'expected' catch of the exploitation rate indicator stock.

Nonceiling indices previously reported for the North Puget Sound summer/fall stock group are now reported for each stock.

3.2.2 Assumptions of the Analyses

Assumptions for the cohort analysis and other procedures used in the Exploitation Rate Assessment are summarized below. Detailed discussions of assumptions and parameter values have been reported previously (CTC 1988).

3.2.2.1 Cohort Analysis

The primary assumptions of the cohort analysis are:

1) CWT recovery data are obtained in a consistent manner from year to year or can be adjusted to make them comparable. Many of the analyses rely upon indices that are computed as the ratio of a statistic in a particular year to the value associated with a base period. Use of ratios may reduce or eliminate the effect of data biases that are consistent from year to year.

2) For ocean age 2 and older fish, natural mortality varies by age but is constant across years.

3) All stocks within a fishery have the same size distribution for each age and the size distribution at age is constant among years.

4) The catch distribution of sublegal-sized fish is the same as legal-sized fish.

5) Incidental mortality rates per encounter are constant and are equal to 30% for troll and sport fisheries and 90% for net fisheries.

6) In the absence of an independent estimate of incidental mortality during nonretention periods, the procedure for estimating the mortality of CWT fish of legal size assumes that the stock distribution remains unchanged from the period of legal catch retention. Gear and/or area restrictions during the CNR fishery are believed to reduce the number of encounters of legal-sized fish. To account for this, the number of legal encounters during the nonretention fishery was adjusted by a selectivity factor. A factor of 0.34 was used for the WCVI and GS troll fisheries. This value is the average selectivity factor calculated from 3 years of observer data in the Alaska troll fishery (Mel Seibel, pers. comm.). A factor of 0.20 is used in the NCBC troll fishery. This factor corresponds to the proportion of fishing areas that remain open during nonretention periods. Note that this parameter in itself is not used to estimate the number of encounters during the CNR period; instead, the selectivity parameter is used in conjunction with the gear days data presented in Appendix C. A selectivity factor is not required for the SEAK troll fishery since an independent estimate of encounters is used.

7) Maturation rates for broods for which all ages have not matured (incomplete broods) are equal to the average of the available estimates.

3.2.2.2 Fishery Indices

The temporal and spatial distributions of stocks in and between fisheries are assumed to be stable from year to year.

3.2.3 Reported Catch Versus Total Mortalities

Fishery indices are presented for both reported catch and total mortality. The difference between reported catch and total mortality is incidental mortality, which includes the mortality of legal-sized fish in CNR fisheries and the mortality of sublegal-sized fish in retention and CNR fisheries. Management strategies have changed considerably for fisheries constrained by PSC catch ceilings. Regulatory changes that have been implemented include size limit changes and extended periods of CNR. Estimates of incidental mortality are crucial for assessment of total fishery impacts, yet they cannot be determined directly from CWT recovery data. Procedures to estimate these incidental mortality losses and incorporate them into the Exploitation Rate Assessment have been previously described (CTC 1988).

3.3 FISHERY INDICES FOR CEILING FISHERIES

3.3.1 Overview

Successful completion of the rebuilding program requires a substantial initial reduction in the harvest rates in ceiling fisheries combined with further reductions over time. The initial reduction

was expected to occur as a result of implementing a ceiling for each fishery that would reduce catches below pre-Treaty levels. Hence, if abundance remained stable or increased, the harvest rate would decline. Further reductions in harvest rates for PSC ceiling fisheries were expected as the rebuilding program progressed, due to decreases in harvest rates in previous years and increases in production resulting from higher spawning escapements.

Fishery indices provide a means to assess the effectiveness of the PSC ceilings in reducing harvest rates. The fishery indices were computed for both reported catch and total mortality. The total mortality index includes the mortality of legal-sized fish from CNR fisheries and from sublegal sized fish in the retention and CNR periods. Given a stable age structure, the fishery index for reported catch and the index for total mortality index should give similar results in the absence of regulatory changes that alter the ratio of reported catch to incidental fishing mortality (e.g., size limit changes, CNR fishing periods).

In 1994, fishery indices were below base levels in each PSC ceiling fishery (Table 3-6). Fishery indices for 1994 were reduced from base period levels by 24% in the SEAK troll, 30% in NCBC troll, and 43% in WCVI troll. For the Strait of Georgia troll and sport fishery, the 1994 fishery index was 9% below base period levels and near the 1985-1994 average index value. The 1994 fishery indices for SEAK troll, NCBC troll, and GS troll and sport are higher than the projected indices from the 1984 CTC chinook model. The 1994 fishery indices for WCVI are lower than the 1984 projections (see Figures 3-4 through 3-7).

Table 3-6 provides a summary of the fishery indices for reported catch and total fishing mortality for each year since 1985 as well as the 1985-1994 average. In addition, Figures 3-4 through 3-7 graph the indices for total mortality for PSC ceiling fisheries.

Estimates of the indices presented in this report for years prior to 1994 may differ from previous estimates, particularly for more recent years, due to a number of factors including: 1) addition of new stocks in the index, 2) revised estimates of nonretention mortality, 3) revised estimates of CWT recoveries, or 4) revised estimates of the cohort size for broods that were previously incomplete.

Table 3-6. Percent change from the 1979-1982 base period in the fishery index for reported AEQ catch, total AEQ mortality, and the 1979-1984 and 1985-1994 averages for these statistics.

	SEAK Troll		NCBC Troll		WCVI Troll		GS Sport/Troll		U.S. South Ocean Sport/Troll			
									Columbia R. Stocks		Puget Sound Stocks	
Year	Reported	Total	Reported	Total	Reported	Total	Reported	Total	Reported	Total	Reported	Total
1979	5%	1%	- 2%	- 1%	- 1%	- 1%	- 9%	- 9%	- 4%	- 6%	- 30%	- 31%
1980	11%	3%	10%	9%	0%	- 1%	9%	9%	- 2%	- 3%	6%	6%
1981	4%	5%	19%	20%	- 15%	- 15%	35%	35%	- 7%	- 6%	4%	2%
1982	- 21%	- 9%	- 24%	- 24%	12%	12%	- 26%	-27%	11%	11%	23%	23%
1983	- 2%	15%	- 4%	- 8%	21%	19%	- 24%	-24%	- 40%	- 41%	9%	6%
1984	- 32%	- 32%	1%	0%	54%	51%	11%	12%	- 77%	- 78%	- 24%	- 25%
1979-1984 Average	- 6%	- 3%	- 0%	- 1%	12%	11%	- 1%	-1%	- 20%	- 21%	- 2%	- 3%
1985	- 27%	- 6%	- 5%	- 9%	- 8%	- 7%	- 37%	- 37%	- 45%	- 42%	- 47%	-48%
1986	- 47%	- 38%	- 14%	- 18%	5%	3%	3%	8%	- 48%	- 51%	24%	21%
1987	- 57%	- 50%	- 10%	- 17%	- 28%	- 24%	- 27%	- 26%	- 44%	- 43%	254%	250%
1988	- 35%	- 31%	- 46%	- 43%	- 8%	1%	- 40%	- 40%	- 29%	- 29%	302%	299%
1989	- 45%	- 37%	- 29%	- 31%	- 54%	- 51%	- 36%	- 19%	- 8%	- 5%	337%	347%
1990	- 18%	16%	- 23%	- 26%	- 9%	- 10%	- 35%	- 26%	- 29%	- 29%	408%	425%
1991	- 32%	- 27%	- 23%	- 25%	- 30%	- 29%	- 14%	3%	- 50%	- 51%	370%	380%
1992	- 51%	- 41%	- 17%	- 18%	- 11%	- 7%	-1%	20%	- 27%	- 22%	503%	505%
1993	- 44%	- 31%	- 27%	- 29%	- 11%	- 3%	22%	44%	14%	14%	263%	250%
1994	- 45%	- 24%	- 25%	- 30%	- 45%	- 43%	- 21%	- 9%	- 93%	- 92%	-53%	-66%
1985-1994 Average	- 40%	- 27%	- 22%	- 25%	- 20%	- 17%	- 19%	- 8%	- 36%	-35%	236%	236%

3.3.2 Southeast Alaska

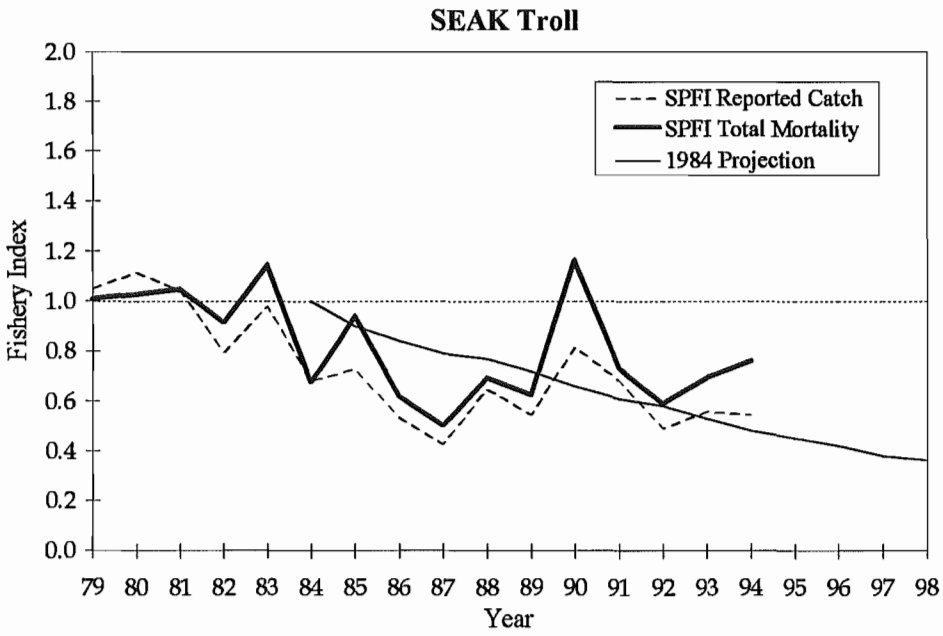


Figure 3-4. Estimated stratified proportional fishery indices for reported catch and total mortality in the SEAK troll fishery, and projected indices from the 1984 CTC chinook model.

3.3.3 North/Central B.C.

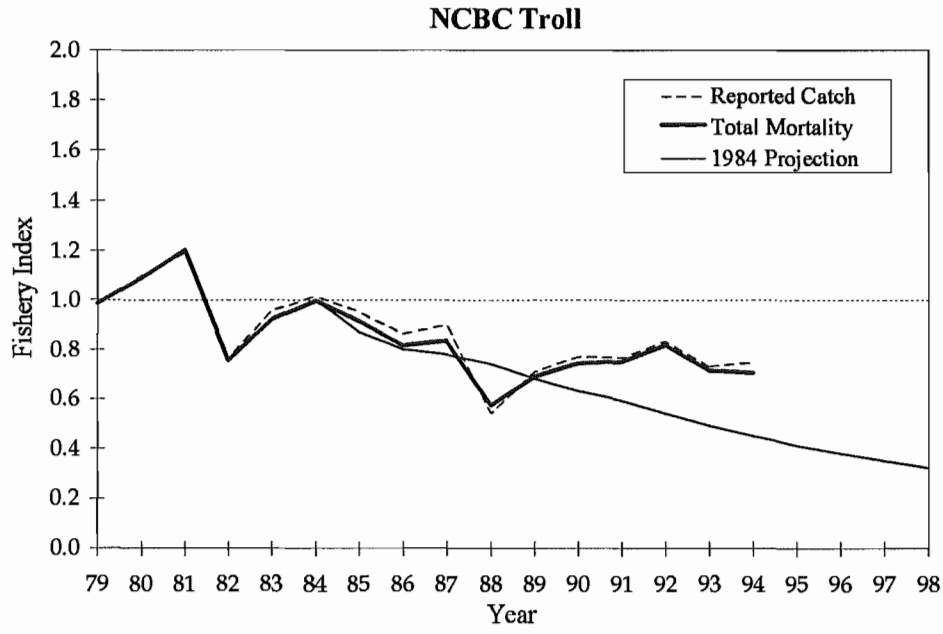


Figure 3-5. Estimated fishery indices for reported catch and total mortality in the NCBC troll fishery, and the projected indices from the 1984 CTC chinook model.

3.3.4 West Coast Vancouver Island

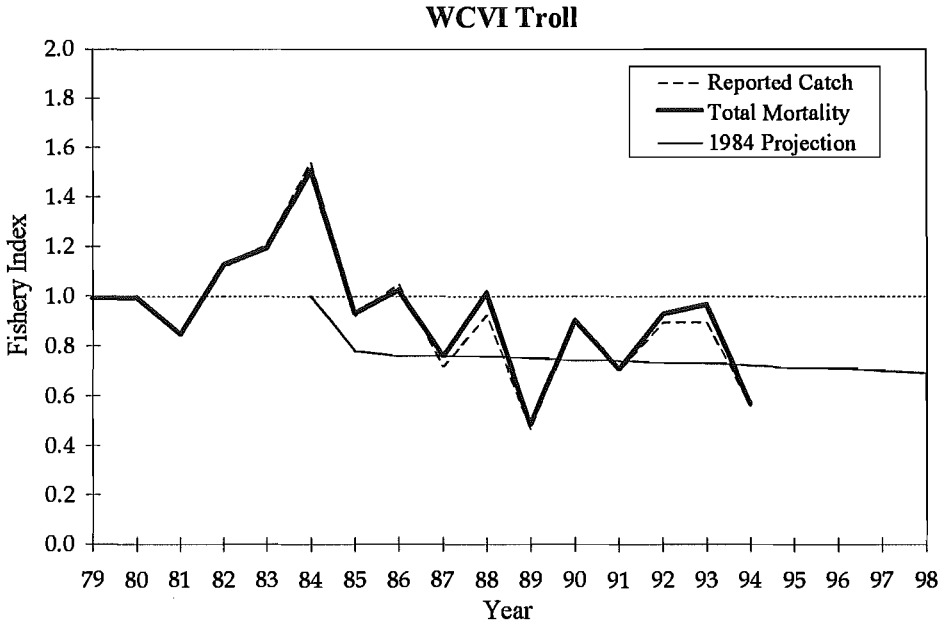


Figure 3-6. Estimated fishery indices for reported catch and total mortality for the WCVI troll fishery, and the projected indices from the 1984 CTC chinook model.

3.3.5 Strait of Georgia

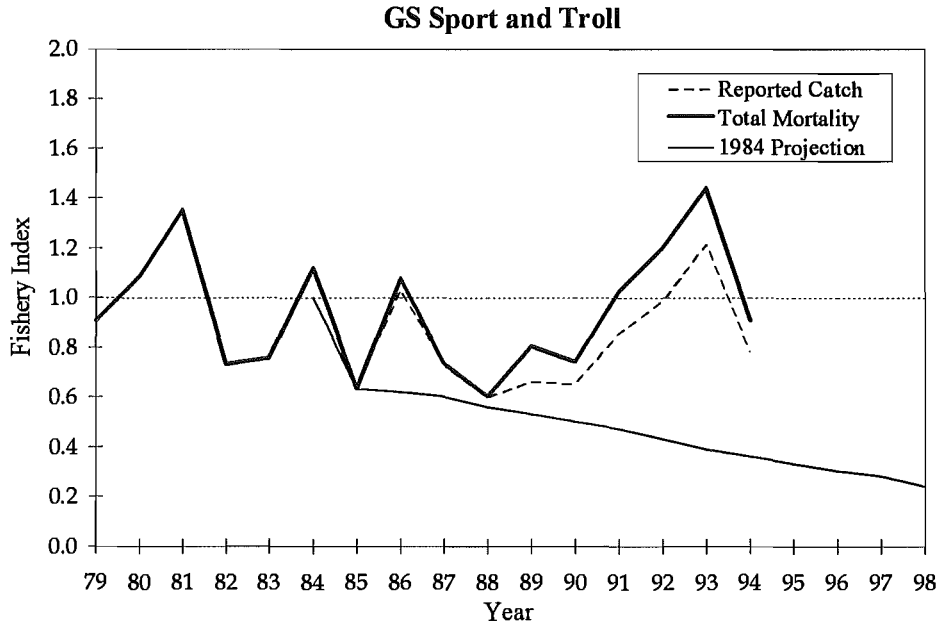


Figure 3-7. Estimated fishery indices for reported catch and total mortality for the GS sport and troll fishery, and the projected indices from the 1984 CTC chinook model.

3.4 NONCEILING FISHERIES

Estimates of the nonceiling fishery indices for U.S. and Canadian fisheries are presented in Figures 3-8 through 3-14. Each figure provides the estimated indices for wild stocks represented by an exploitation rate indicator stock. For example, the LGS wild stock is represented by two exploitation rate indicator stocks (Puntledge and Big Qualicum; Table 3-3). Although the passthrough provision applies to all depressed wild stocks harvested in a nonceiling fishery, insufficient CWT recoveries were available to estimate the index for Canadian stocks in U.S. nonceiling fisheries and U.S. stocks in Canadian nonceiling fisheries. Nonceiling fishery indices could not be estimated for the Skagit Spring, Columbia Upriver Spring, and Harrison River stocks because of the absence of a suitable exploitation rate indicator stock.

For U.S. nonceiling fisheries, indices that are less than 1.0 indicate that exploitation rates have been reduced relative to the base period. For the Canadian nonceiling fisheries, indices that are 0.75 or less indicate that exploitation rates in nonceiling net fisheries have been reduced to the target of 25% below the base period. The WCVI sport fishery is not included in the index since estimated recoveries during the base period are not available. Since this fishery has grown since the base period, failure to include it may lead to an underestimate of the index.

Nonceiling indices previously reported for the North Puget Sound summer/fall stock group are now reported for each stock. When evaluated in this way, harvest rates for each stock are now consistent with passthrough in 1993 and 1994 (as estimated by applying the nonceiling index).

Since the CTC is frequently asked questions about the U.S. South ocean sport and troll fisheries (including the Strait of Juan de Fuca troll), the indices for these fisheries are presented separately in Figures 3-15 and 3-16. These fisheries are one component of the aggregate of U.S. nonceiling fisheries to which the passthrough provision is applicable, and are included in the nonceiling index discussed above. The indices for the U.S. South ocean sport and troll fishery are presented separately for Columbia River and Puget Sound stocks, since these stocks are harvested in different areas. Columbia River stocks are primarily harvested in fisheries off the coasts of Washington and Oregon while the Puget Sound stocks are primarily harvested in the Strait of Juan de Fuca.

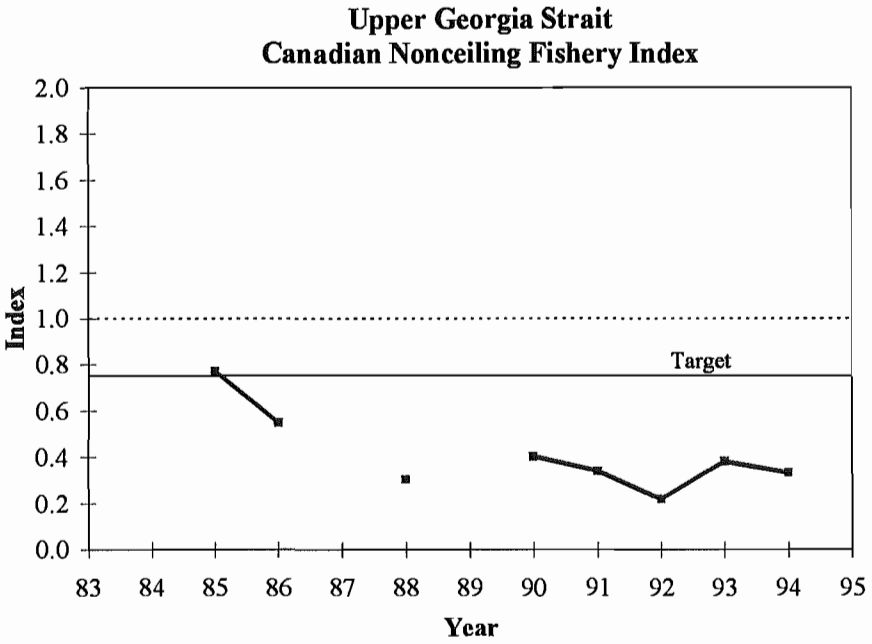


Figure 3-8. Estimated nonceiling fishery indices for the UGS stock in Canadian fisheries. Indices were not computed for 1987 and 1989 because escapement exceeded goal.

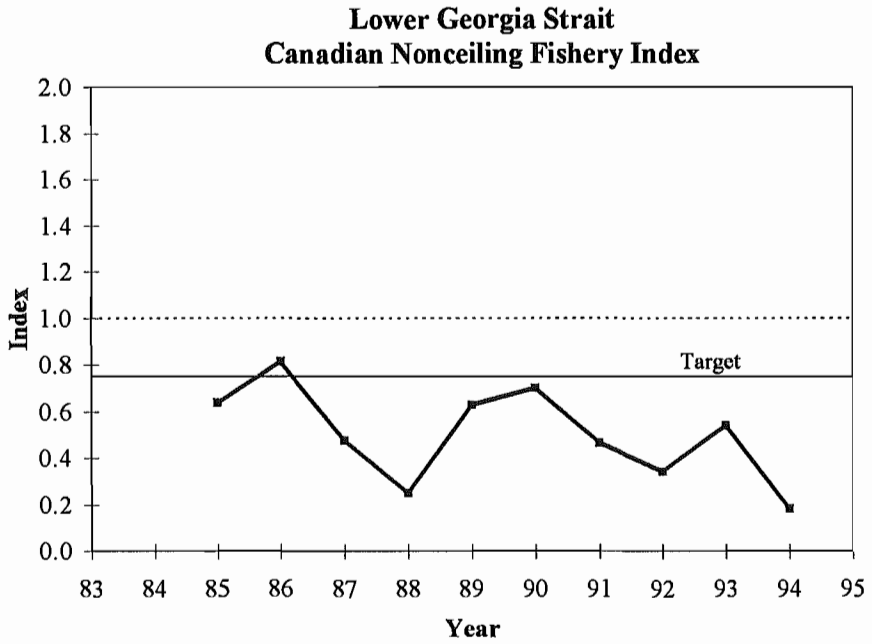


Figure 3-9. Estimated nonceiling fishery indices for the LGS stock in Canadian fisheries.

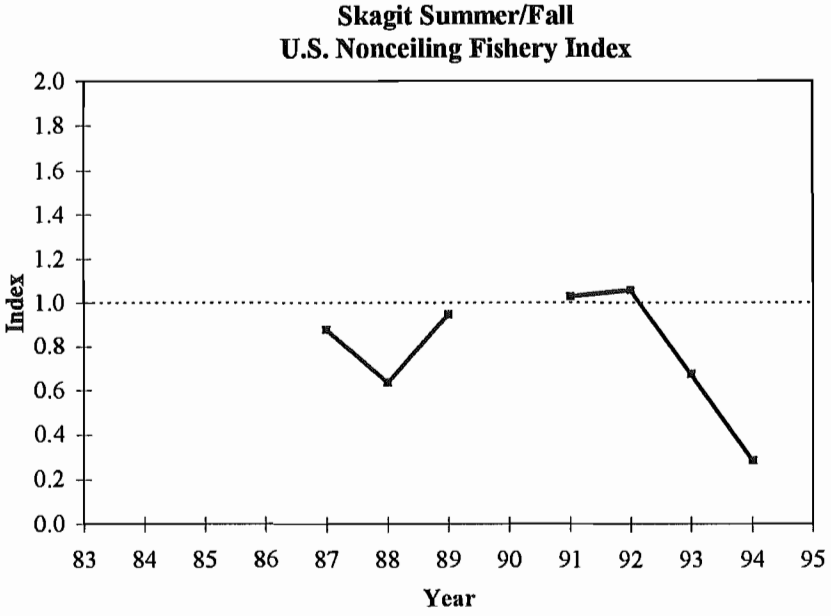


Figure 3-10. Estimated nonceiling fishery indices for the Skagit summer/fall stock in U.S. fisheries. An index was not computed for 1990 because escapement exceeded goal.

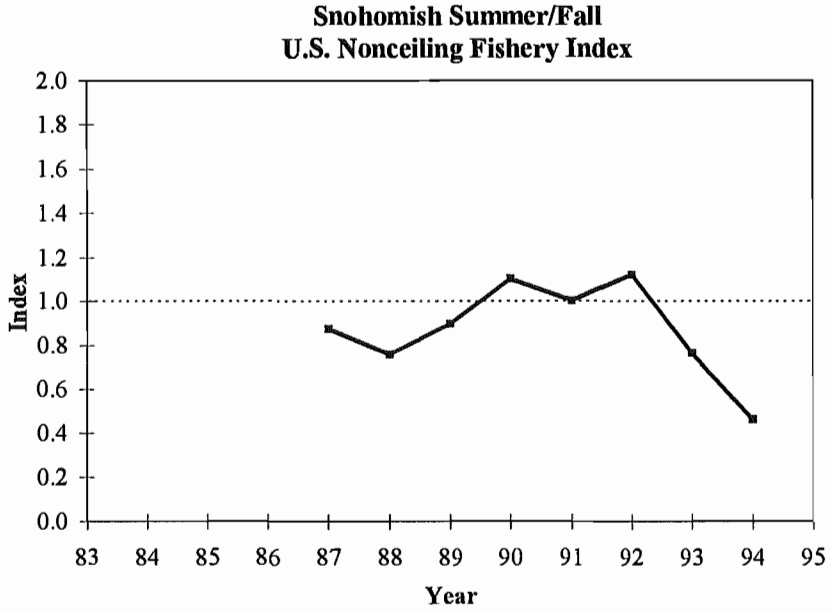


Figure 3-11. Estimated nonceiling fishery indices for the Snohomish summer/fall stock in U.S. fisheries.

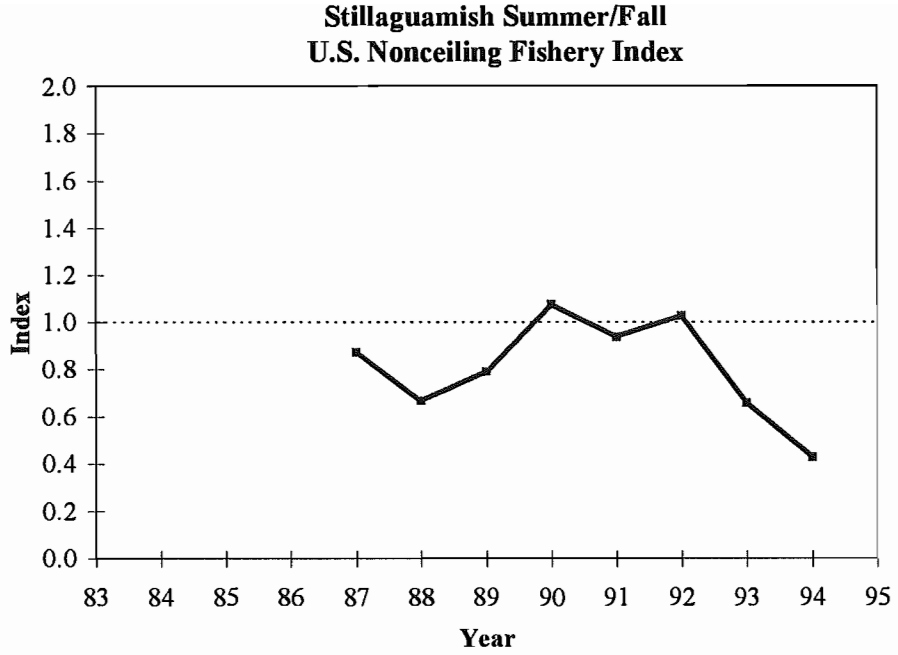


Figure 3-12. Estimated nonceiling fishery indices for the Stillaguamish summer/fall stock in U.S. fisheries.

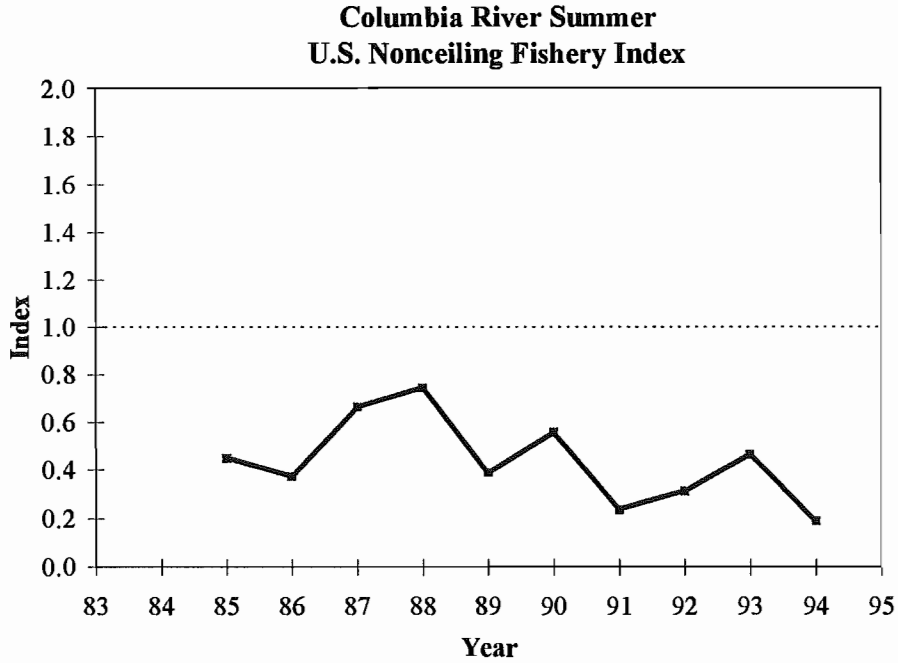


Figure 3-13. Estimated nonceiling fishery indices for the Columbia River summer stock in U.S. fisheries.

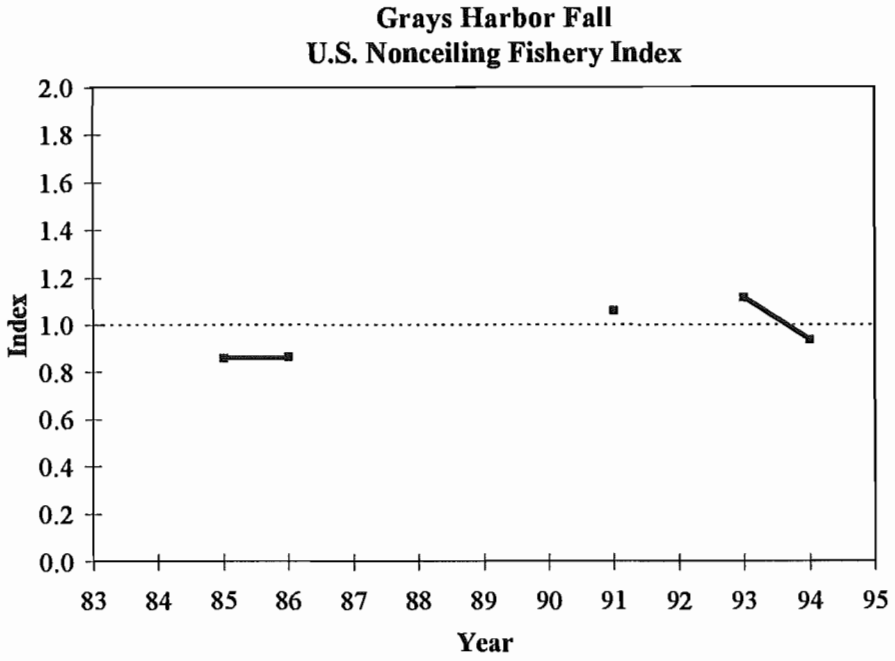


Figure 3-14. Estimated nonceiling fishery indices for Grays Harbor fall stock in U.S. fisheries. Indices were not computed for 1987-1990 and 1992 because escapement exceeded goal.

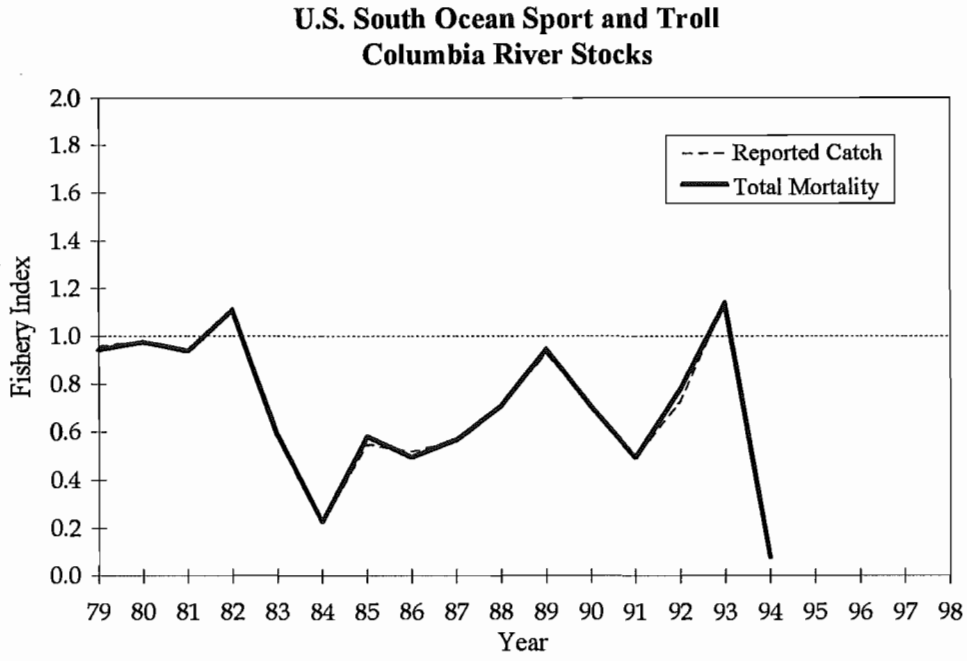


Figure 3-15. Estimated fishery indices for reported catch and total fishing mortality for the U.S. South ocean sport and troll fishery for Columbia River stocks.

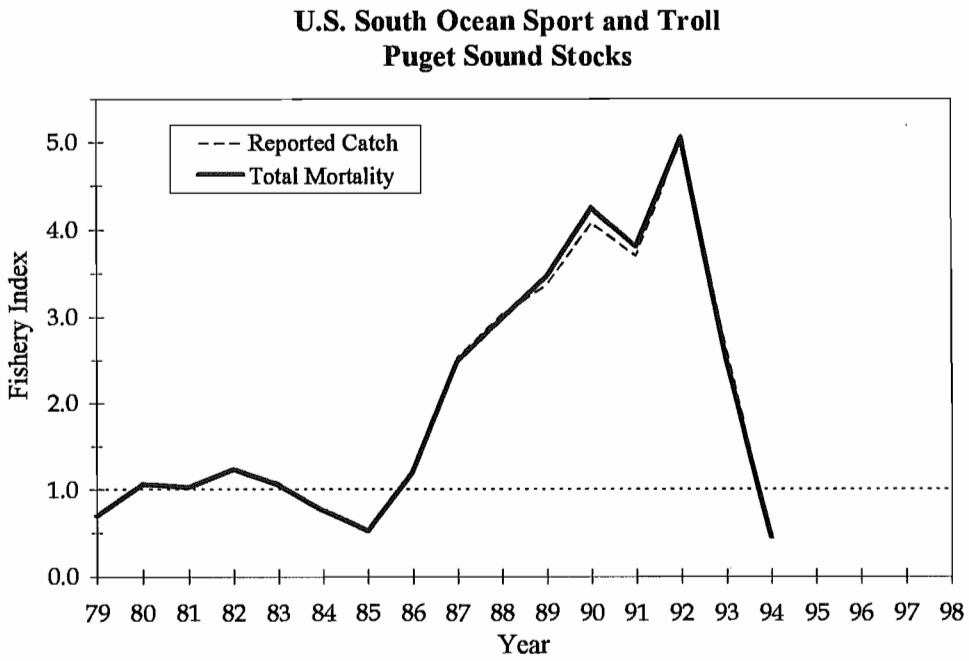


Figure 3-16. Estimated fishery indices for reported catch and total fishing mortality for the U.S. South ocean sport and troll fishery for Puget Sound stocks.

3.5 BROOD EXPLOITATION RATES

Sections 3.5.1-3.5.7 provide estimates of the brood exploitation indices for each of the seven stock groups with an exploitation rate indicator stock. Also included, where available, are the projected brood year indices from the 1984 CTC chinook model. Projected indices are not available for all stock groups because the 1984 model included only four stocks.

Total mortality and reported catch brood exploitation rates declined in 1994 for all of the stock groups examined except LGS. Changes in brood exploitation rate indices relative to the base period varied widely between the seven stock groups examined. In four groups, exploitation rates based on total fishing mortalities presently indicate no reductions from the base period values (SEAK/TBR-I, WCVI, LGS, NPS-S/F). The three other groups (UGS, SPS-S/F, WACO) indicate about a 30 to 40% reduction in ocean exploitation rates relative to the base period. For three stocks, there are brood year exploitation rate projections from the 1984 CTC chinook model. The 1994 brood year exploitation rates for WCVI (Figure 3-18) and LGS (Figure 3-20) are higher than the 1984 projections. The 1994 brood year exploitation rates for WACO (Figure 3-23) are lower than the 1984 projections.

3.5.1 Southeast Alaska/Transboundary Rivers Inside Stock Group (SEAK/TBR-I)

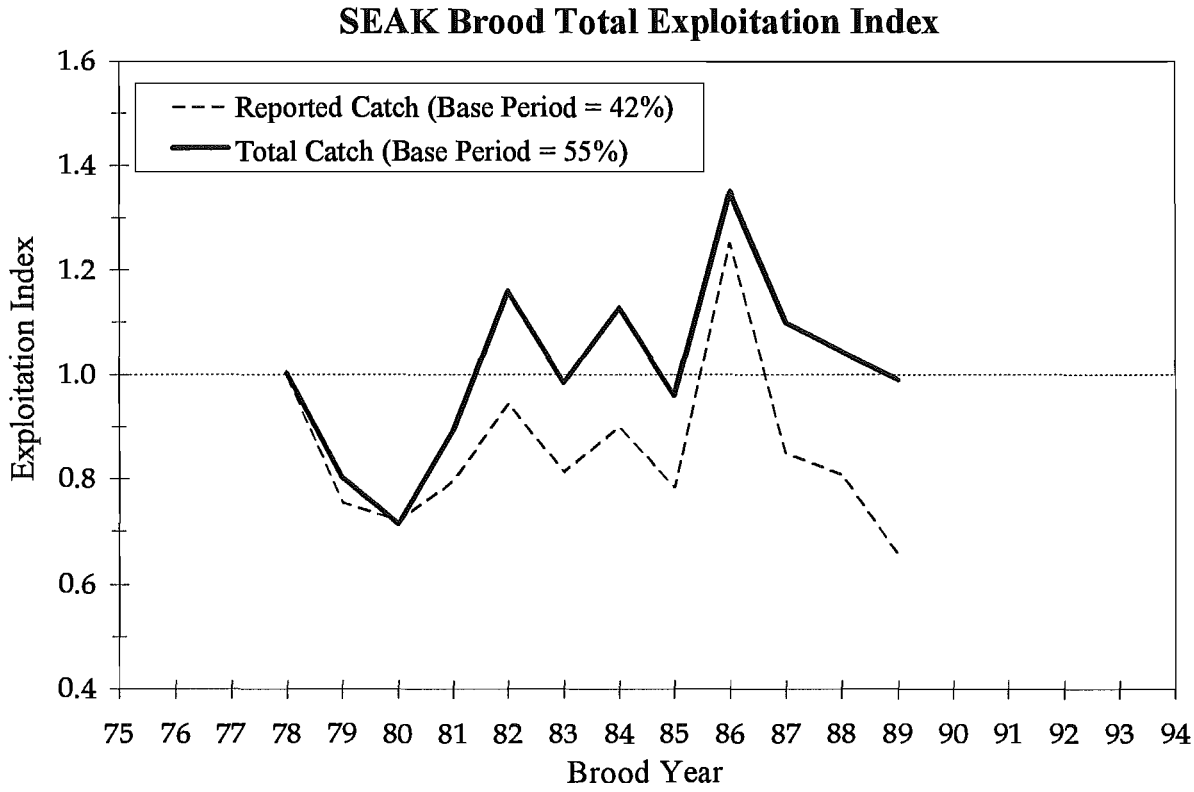


Figure 3-17. Estimated brood total exploitation indices for the SEAK/TBR-I stock group.

Table 3-7. Estimated brood total exploitation rates for Alaska Spring stock.

Brood Year	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Reported Catch	0.42	0.32	0.30	0.33	0.40	0.34	0.38	0.33	0.53	0.36	0.34	0.28
Total Mortality	0.55	0.44	0.39	0.49	0.64	0.54	0.62	0.53	0.74	0.60	0.57	0.54

3.5.2 West Coast Vancouver Island Stock Group (WCVI)

The 1983 broods were not included in Fig. 3-8 due to difficulties in estimating incidental mortality. Current CTC procedures do not estimate incidental mortality well when survival rates are near zero, as was the case with the 1983 brood of the Robertson Creek indicator stock.

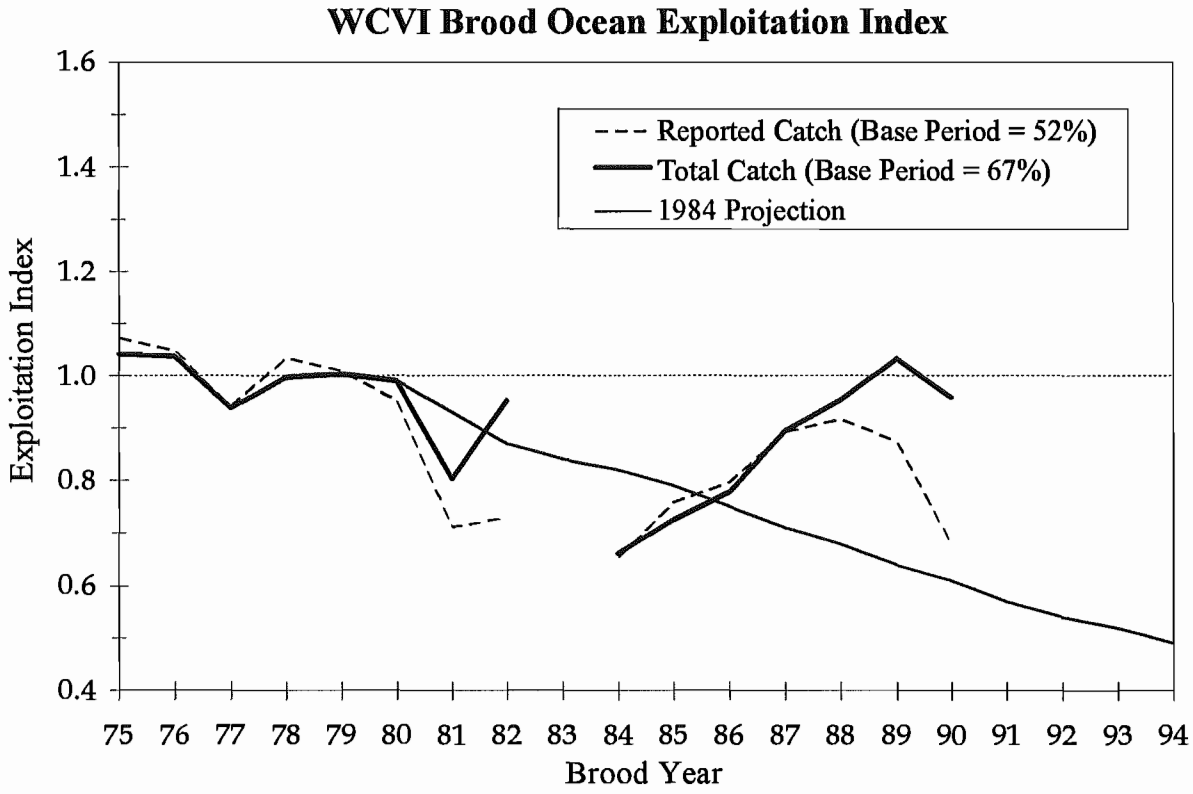


Figure 3-18. Estimated brood ocean exploitation indices for the WCVI stock group and the projected indices from the 1984 CTC chinook model.

Table 3-8. Estimated brood ocean exploitation rates for Robertson Creek stock.

Brood Year	1979	1980	1981	1982	1984	1985	1986	1987	1988	1989	1990
Reported Catch	0.52	0.50	0.37	0.38	0.34	0.39	0.41	0.46	0.48	0.45	0.35
Total Mortality	0.67	0.66	0.54	0.64	0.44	0.49	0.52	0.60	0.64	0.69	0.64

3.5.3 Upper Strait of Georgia Summer/Fall Stock Group (UGS)

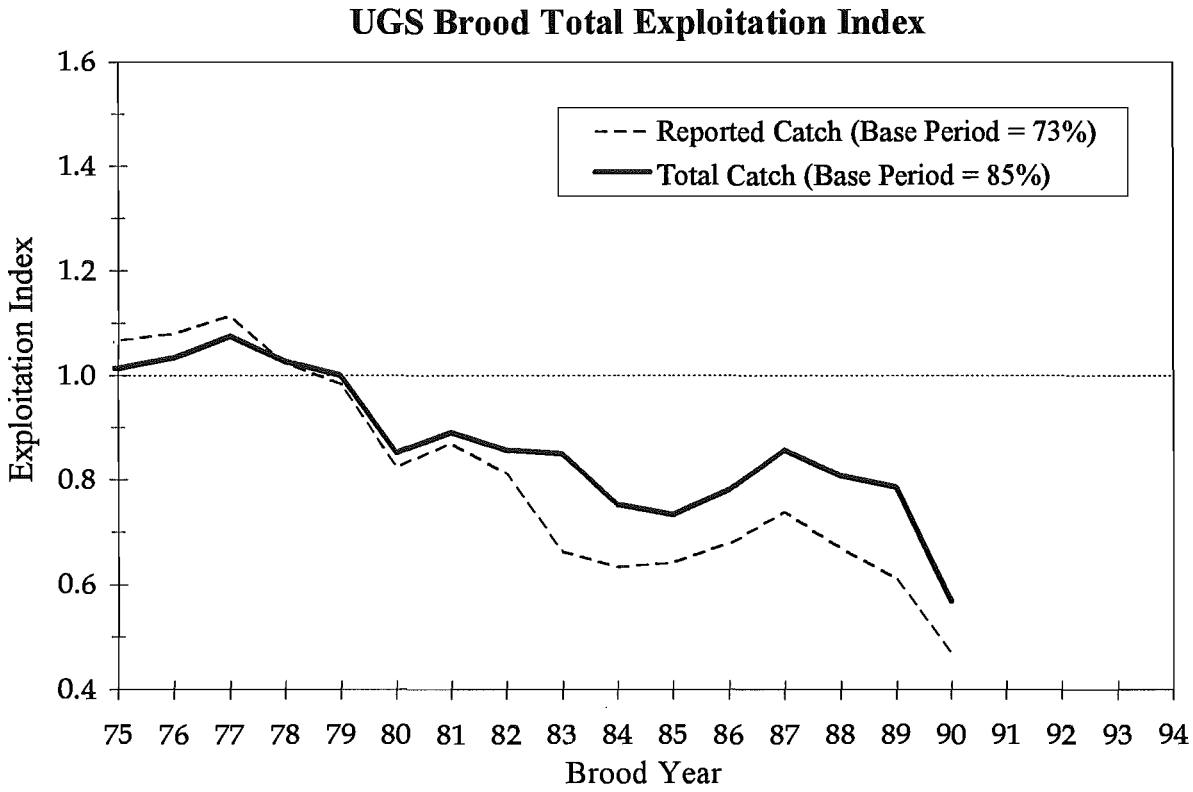


Figure 3-19. Estimated brood total exploitation indices for the UGS stock group.

Table 3-9. Estimated brood total exploitation rates for Quinsam stock.

Brood Year	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Reported Catch	0.72	0.60	0.63	0.59	0.48	0.46	0.47	0.49	0.54	0.49	0.45	0.34
Total Mortality	0.85	0.72	0.76	0.73	0.72	0.64	0.62	0.66	0.73	0.69	0.67	0.48

3.5.4 Lower Strait of Georgia Fall Stock Group (LGS)

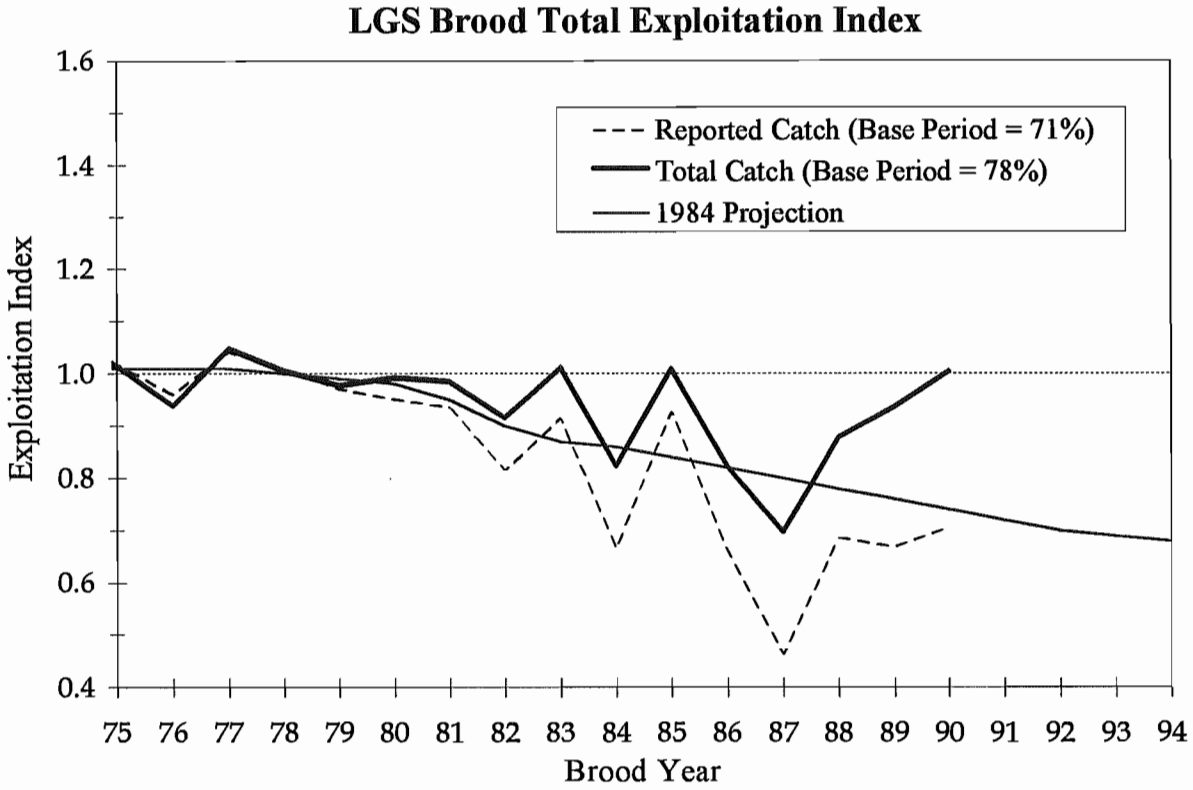


Figure 3-20. Estimated brood total exploitation indices for the LGS stock group and the projected indices from the 1984 CTC chinook model.

Table 3-10. Estimated brood total exploitation rates for Big Qualicum stock.

Brood Year	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Reported Catch	0.72	0.68	0.67	0.59	0.66	0.50	0.56	0.52	0.46	0.51	0.52	0.45
Total Mortality	0.80	0.80	0.80	0.74	0.80	0.68	0.71	0.71	0.72	0.75	0.80	0.77

Table 3-11. Estimated brood total exploitation rates for Puntledge stock.

Brood Year	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Reported Catch	0.66	0.53	0.58	0.56	0.64	0.44	0.75	0.42	0.20	0.46	0.43	0.55
Total Mortality	0.73	0.64	0.69	0.70	0.79	0.61	0.87	0.58	0.39	0.63	0.67	0.80

3.5.5 North Puget Sound Summer/Fall Stock Group (NPS-S/F)

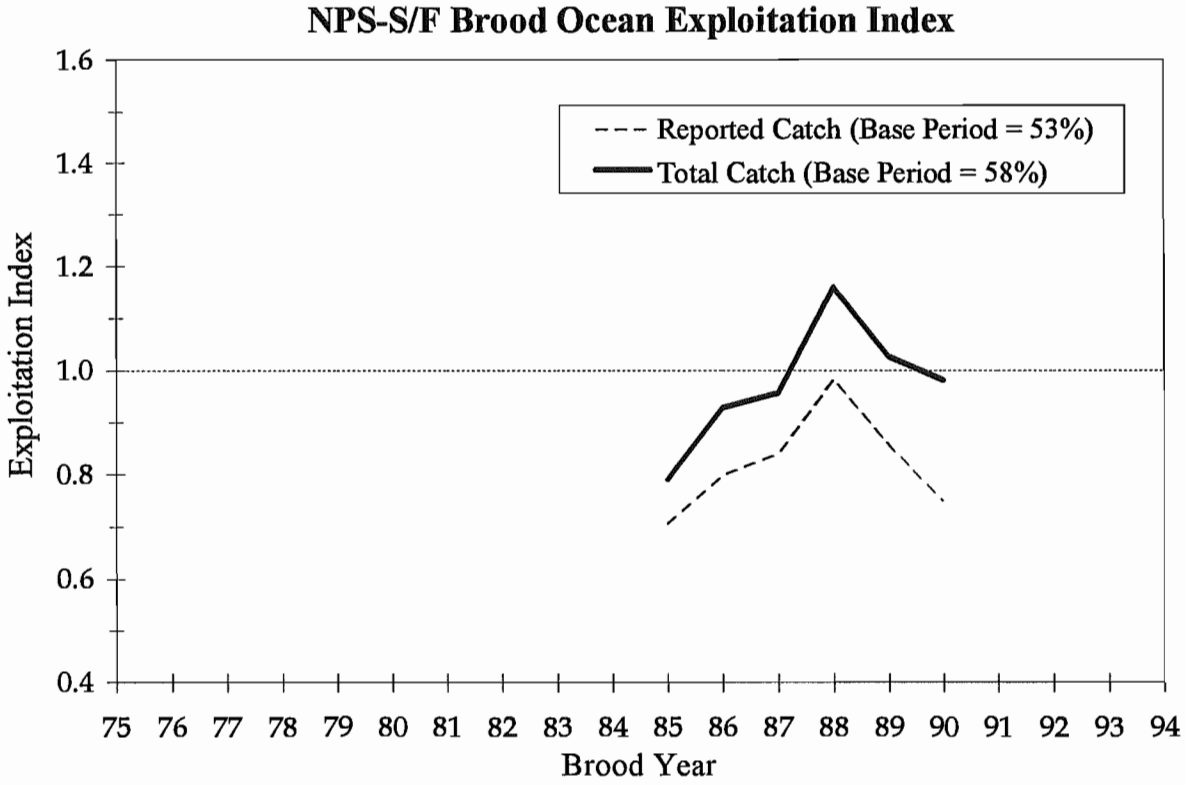


Figure 3-21. Estimated brood ocean exploitation indices for the NPS-S/F stock group.

Table 3-12. Estimated brood ocean exploitation rates for Samish Fall Fingerling stock.

Brood Year	1985	1986	1987	1988	1989	1990
Reported Catch	0.37	0.42	0.44	0.52	0.45	0.40
Total Mortality	0.46	0.54	0.55	0.67	0.59	0.57

3.5.6 South Puget Sound Summer/Fall Stock Group (SPS)

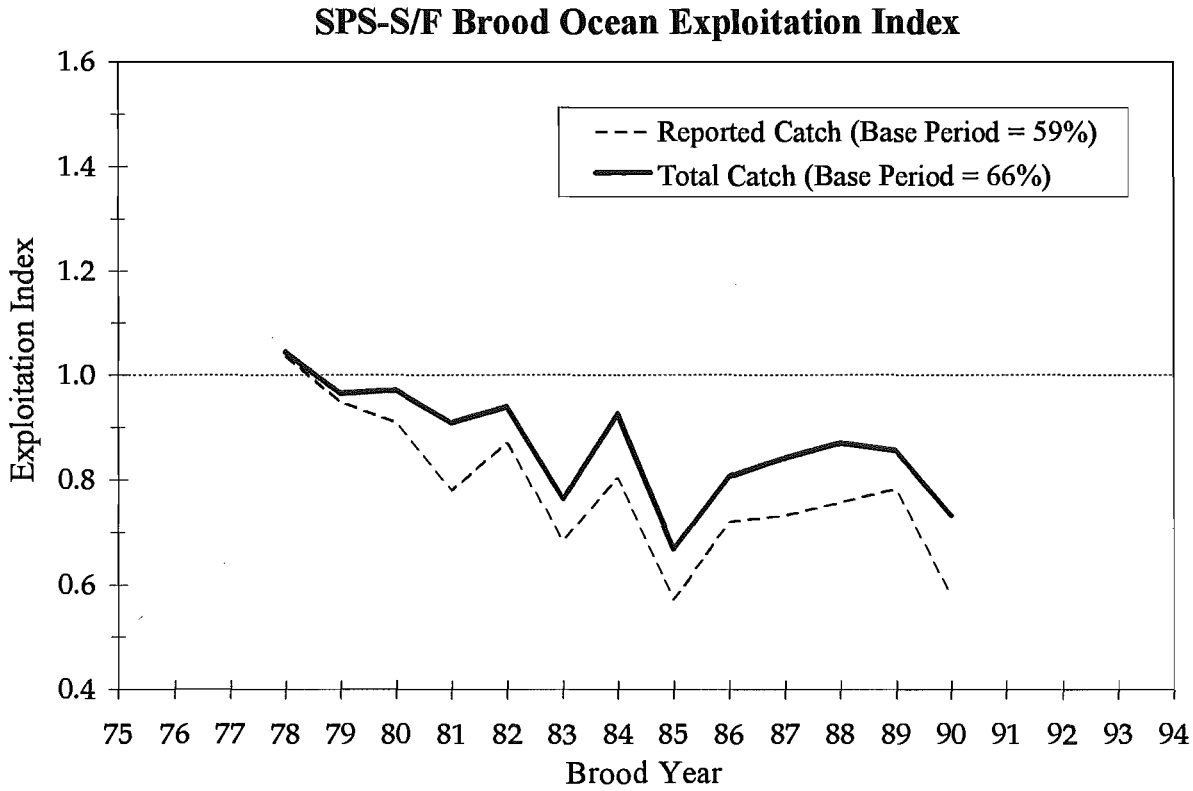


Figure 3-22. Estimated brood ocean exploitation indices for the SPS-S/F stock group.

Table 3-13. Estimated brood ocean exploitation rates for South Puget Sound Fall Fingerling stock.

Brood Year	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Reported Catch	0.56	0.54	0.46	0.51	0.40	0.47	0.34	0.42	0.43	0.45	0.46	0.34
Total Mortality	0.64	0.64	0.60	0.62	0.50	0.61	0.44	0.53	0.56	0.57	0.56	0.48

3.5.7 Washington Coastal Spring/Summer/Fall, Columbia River Summer/Fall, and North Oregon Coast Stock Group (WACO)

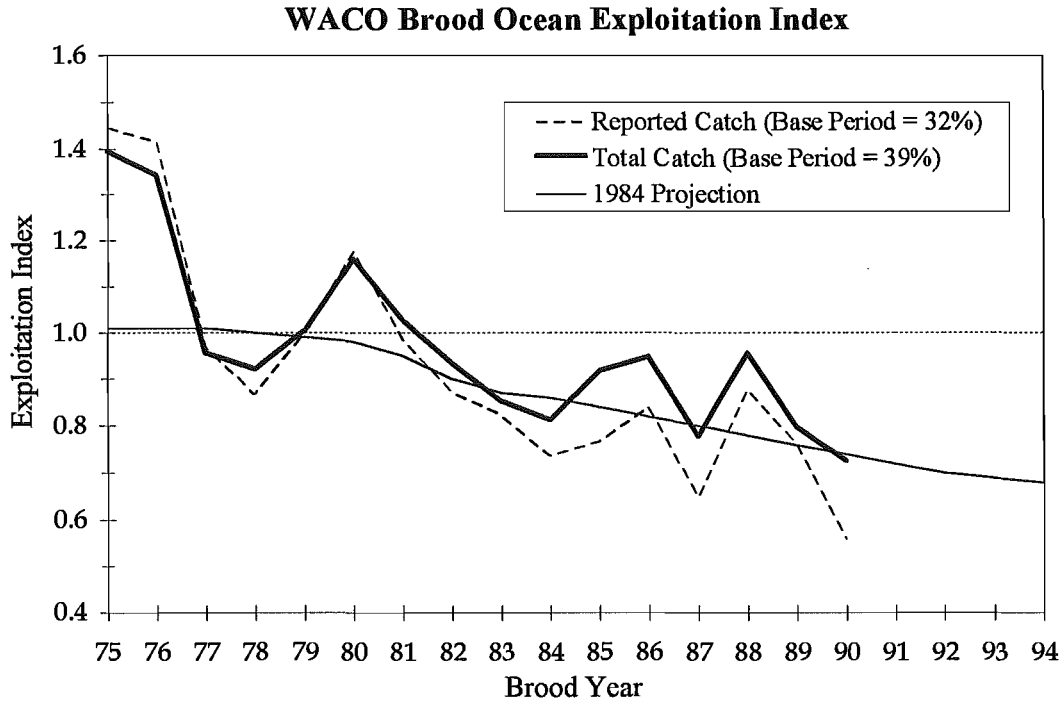


Figure 3-23. Estimated brood ocean exploitation indices for the WACO stock group in ocean fisheries and the projected indices from the 1984 CTC chinook model.

Table 3-14. Estimated brood ocean exploitation rates for Columbia River Upriver Bright stock.

Brood Year	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Reported Catch	0.29	0.45	0.32	0.29	0.33	0.28	0.23	0.26	0.18	0.32	0.30	0.22
Total Mortality	0.35	0.52	0.40	0.37	0.43	0.40	0.38	0.40	0.30	0.40	0.35	0.34

Table 3-15. Estimated brood ocean exploitation rates for Lewis River Wild stock.

Brood Year	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Reported Catch	0.27	n/a	n/a	0.22	0.27	0.18	0.20	0.20	0.19	0.20	0.11	0.10
Total Mortality	0.33	n/a	n/a	0.27	0.33	0.23	0.26	0.25	0.24	0.27	0.15	0.17

Table 3-16. Estimated brood ocean exploitation rates for Salmon River stock.

Brood Year	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Reported Catch	0.43	0.34	n/a	0.34	0.18	0.25	0.32	0.37	0.27	0.35	0.35	0.22
Total Mortality	0.50	0.43	n/a	0.48	0.23	0.33	0.44	0.47	0.37	0.47	0.46	0.36

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APPENDIX A: ESCAPEMENTS AND TERMINAL RUNS, 1975-1994

List of Tables

Table A-1. Escapements and terminal runs of Southeast Alaska natural chinook escapement indicator stocks.

Year	Situk		King Salmon	Andrew	Blossom Index	Keta Index
	esc.	t.run	esc.	esc.	esc.	esc.
1975	1510	2099	67	520	146	203
1976	1433	2676	104	404	68	84
1977	1732	2833	214	456	112	230
1978	814	1456	91	388	143	392
1979	1400	2735	114	327	54	426
1980	905	2284	112	282	89	192
1981	702	1752	144	536	159	329
1982	434	772	366	672	345	754
1983	592	1043	245	366	589	822
1984	1726	2439	265	389	508	610
1985	1521	2597	175	640	709	624
1986	2067	2393	255	1414	1278	690
1987	1884	2698	196	1576	1349	768
1988	885	1453	208	950	384	575
1989	652	1081	240	1060	344	1155
1990	676	756	179	1328	257	606
1991	878	1978	134	800	239	272
1992	1580	3413	99	1556	150	217
1993	899	2154	280	2120	303	362
1994	1270	4690	224	1144	161	306
Goal	600		250	750	300	300

Table A-2. Escapements and terminal runs of Transboundary Rivers natural chinook escapement indicator stocks.

Year	Alsek (Klukshu)	Taku (6 stocks)	Stikine (L.Tahltan)	Unuk Index	Chickamin Index	Chilkat
	esc.	esc.	esc.	esc.	esc.	esc.
1975		2089	1400		370	
1976	1064	4726	800		157	
1977	2698	5671	1600	974	363	
1978	2530	3305	1264	1106	308	
1979	3104	4156	2332	576	239	
1980	2487	7544	4274	1016	445	
1981	1963	9786	6668	731	384	
1982	1969	4813	5660	1351	571	
1983	2237	2062	1188	1125	599	
1984	1572	3909	2588	1837	1102	
1985	1283	7208	3114	1184	956	
1986	2607	7520	2891	2126	1745	
1987	2491	5743	4783	1973	975	
1988	1994	8626	7292	1746	786	
1989	2202	9480	4715	1149	934	
1990	1698	12249	4392	591	564	
1991	2223	10153	4506	655	487	5897
1992	1243	11058	6627	874	346	5284
1993	3221	13204	11449	1068	389	4472
1994	3620	9913	6360	711	388	6795
Goal	4700	13200	5300	875	525	

Table A-3. Escapements and terminal runs of Northern B.C. natural chinook escapement indicator stocks.

Year	AREA 1	AREA 3		AREA 4				AREA 9	AREA 10
	Yakoun	Nass		Skeena		AREA 6	AREA 8	Rivers	Smith
	esc.	esc.	t.run	esc.	t.run	Index	Index	Inlet	Inlet
1975	1500	6025		20319		2225	4425	3280	960
1976	700	5590		13078		2765	3550	1640	1000
1977	800	9060	11460	29018	39606	1820	3600	2225	1050
1978	600	10190	11975	22661	35055	3912	4000	2800	2100
1979	400	8180	9788	18488	28166	3455	4600	2150	500
1980	600	9072	11186	23429	38626	1935	2529	2325	1200
1981	750	7950	9443	24523	42018	1502	3550	3175	1020
1982	1400	6575	8426	17092	35185	4150	220	2250	1500
1983	600	8055	13949	23562	39510	2845	650	3320	1050
1984	300	12620	14380	37598	53516	1914	4700	1400	770
1985	1500	8002	11121	53599	76544	1509	4550	3371	230
1986	500	17390	22775	59968	87566	2615	3362	7623	532
1987	2000	11431	15849	59120	76349	1566	1456	5239	1050
1988	2000	10000	14140	68705	102563	3165	1650	4429	1050
1989	2800	12525	17526	57202	83439	998	2535	3265	225
1990	2000	12123	15607	55976	89447	281	2385	4039	510
1991	1900	4017	12162	52753	79343	709	2470	6635	500
1992	2000	7312	18003	63392	92184	340	3247	10000	500
1993	1000	9715	16850	66977	96018	462	700	10610	500
1994	2000	9061	16044	48712	68127	438	1300	10000	700
Goal	1580	15890		41770		5520	5450	4950	2110

Table A-4. Escapements and terminal runs of Southern B.C. and Fraser River natural chinook escapement indicator stocks.

	Southern B.C.				Fraser River					
Year	W. Coast Vancouver I.	Lower Geo. Strait		Upper Geo. Strait	Upper Fraser	Middle Fraser	Thompson	Fraser spr/sum	Harrison	
	esc.	esc.	t.run	esc.	esc.	esc.	esc.	t.run	esc.	t.run
1975	1200	5475	6390	11800	7028	15050	37035	119081		
1976	1100	4340	5390	15150	7612	10975	14875	98691		
1977	3835	6530	7590	3880	10135	13320	30321	132553		
1978	6250	6495	7035	6150	14015	13450	28465	109119		
1979	2851	10450	11209	4127	12495	8595	25145	104568		
1980	6724	8400	10519	1367	15796	9625	19330	68973		
1981	5610	5710	7607	1945	9021	8175	23375	65677		
1982	7812	5590	6657	3260	11603	10470	20385	82820		
1983	4200	6100	6862	3770	17185	15404	20381	72999		
1984	5362	8000	8861	4600	21938	13957	29972	95878	120837	131757
1985	5200	4150	5242	4600	34527	17595	39997	124380	174778	179255
1986	4660	1900	3144	1630	41207	27349	45130	145652	162596	176740
1987	3170	1600	3044	6450	39420	27330	36730	127582	79038	82025
1988	5270	6150	7937	3300	34400	25924	47103	128654	35116	39487
1989	6901	6150	8123	5550	25310	15095	37975	107136	74685	75090
1990	5480	6575	7620	2320	35902	26060	41995	134022	177375	180758
1991	6060	10800	12613	3340	27317	21150	36483	112527	90638	93472
1992	7330	8293	10647	5268	23853	24779	45008	111206	130411	132478
1993	4730	6150	9227	1574	17534	25926	30880	104975	118974	120340
1994	7150	6086	8527	1166	30527	32232	52229	147897	91698	93595
Goal	11499	15075		5350	24460	18430	55710		241670	

Table A-5. Escapements and terminal runs of Puget Sound natural chinook escapement indicator stocks.

Year	Skagit spring		Skagit sum/fall		Stillaguamish		Snohomish		Green	
	esc.	t.run	esc.	t.run	esc.	t.run	esc.	t.run	esc.	t.run
1975	803	803	11555	24625	1198	1635	4485	6123	3394	6238
1976	812	812	14479	23306	2140	4002	5315	9889	3140	7732
1977	1049	1049	9497	17693	1475	2549	5565	9618	3804	5366
1978	1220	1220	13209	20030	1232	1959	7931	12591	3304	4349
1979	968	968	13605	21243	1042	2366	5903	12706	9704	10730
1980	1803	1803	20345	28938	821	2647	6460	16688	7743	10608
1981	1250	1250	8670	19675	630	2783	3368	8968	3606	4912
1982	965	965	10439	21022	773	3058	4379	8470	1840	3850
1983	710	710	9080	14671	387	925	4549	10386	3679	13290
1984	747	747	13239	15005	374	883	3762	8480	3353	5381
1985	3249	3249	16298	25075	1409	2641	4873	9005	2908	7444
1986	1978	1978	18127	21585	1277	2416	4534	8267	4792	5784
1987	1979	1979	9647	13037	1321	1906	4689	6670	10338	11724
1988	2064	2064	11954	14647	717	1176	4513	7389	7994	9207
1989	1515	1924	6776	12787	811	1642	3138	6142	11512	15000
1990	1592	1627	17206	19172	842	1739	4209	8345	7035	15200
1991	1411	1448	6014	8425	1632	2913	2783	4964	10548	14967
1992	1001	1025	7671	9201	780	1254	2708	4319	5267	9941
1993	788	818	5916	6879	928	1294	4019	5602	2479	5202
1994	899	942	6231	6471	954	1275	3626	4848	4255	8297
Goal	3000		14900		2000		5250		5800	

Table A-6. Escapements and terminal runs of Washington Coast natural chinook escapement indicator stocks.

Year	Quillayute summer		Quillayute fall		Hoh spr/sum		Hoh fall		Queets spr/sum		Queets fall		Grays Harbor spring		Grays Harbor fall	
	esc.	t.run	esc.	t.run	esc.	t.run	esc.	t.run	esc.	t.run	esc.	t.run	esc.	t.run	esc.	t.run
1975																
1976	1300	1700	2500	4700	600	1300	2400	3000	500	700	1200	2500	600	1000	1800	8900
1977	3800	5300	3300	7600	1000	2000	2100	3800	700	1200	3600	5500	800	1700	5200	13200
1978	2300	2700	4700	6200	1400	2500	1900	2800	1100	1400	2200	3100	1000	1600	4600	10600
1979	2100	3900	3900	6600	1400	2300	1600	2200	900	1400	3900	4700	400	1100	9400	12100
1980	900	1500	6700	7600	800	1100	2200	2800	1000	1200	3200	5800	200	600	11700	22000
1981	800	1700	6000	7100	1500	2000	3100	4000	1000	1300	4300	8000	600	900	7600	13400
1982	1200	2700	7100	9700	1600	2100	4500	5700	800	1200	4100	6200	600	700	5600	14600
1983	1400	1800	3100	5500	1700	2200	2500	3300	1000	1200	2600	3800	800	900	5500	9900
1984	600	1000	9100	10400	1400	2000	1800	2800	1000	1200	3900	5300	1100	1100	21000	23700
1985	600	700	6100	8400	1000	1400	1800	2900	700	900	3700	5200	1200	1200	9500	16900
1986	600	1000	10000	13500	1200	1900	5000	6300	900	1200	7800	8900	2000	2000	13700	23300
1987	600	1600	12400	20700	1700	2500	4000	6100	600	1500	6500	10000	900	1100	18800	34600
1988	1300	2600	15200	22200	2600	3700	4100	6800	1800	2300	8400	11000	3500	3600	28200	39600
1989	2400	3400	10000	17100	4700	6900	5100	8000	2600	4000	8700	11200	2100	2400	25700	56000
1990	1500	1800	13700	16900	3900	5300	4200	6300	1800	2500	10100	12300	1500	1600	17200	40100
1991	1200	1500	6300	7700	1100	1700	2300	3500	600	800	4500	5900	1300	1500	14400	33200
1992	1000	1300	6300	7900	1000	1400	4000	5100	400	500	4700	6300	1700	1700	16900	33200
1993	1300	1500	5300	6000	1400	2100	2300	3800	700	800	3400	5100	1300	1400	13300	33900
1994	1000	1200	5000	5700	1700	2300	4000	4900	700	700	3900	6000	1400	1500	14300	29900
Goal	1200												1400		14600	
Floor			3000		900		1200		700		2500					

Table A-7. Escapements and terminal runs of Columbia River natural chinook escapement indicator stocks.

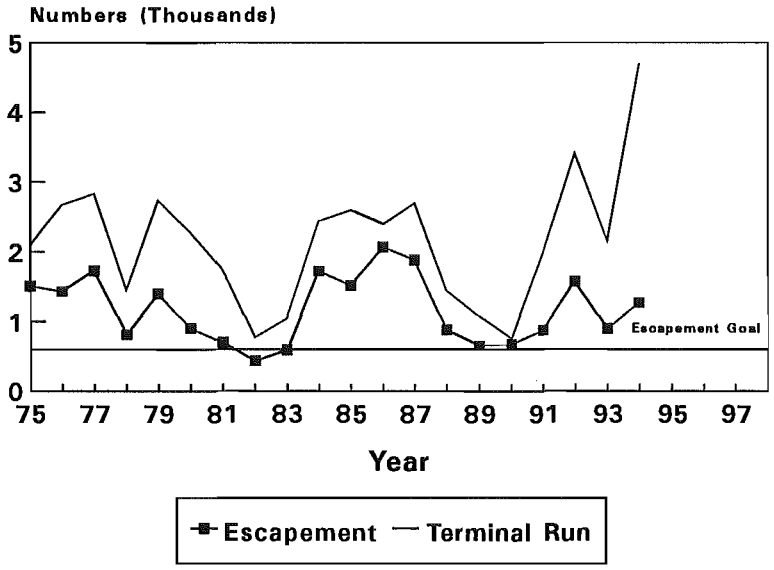
Year	Col. Upriver spring		Col. Upriver summer		Col. Upriver bright		Lewis		Deschutes	
	esc.	t.run	esc.	t.run	esc.	t.run	esc.	t.run	esc.	t.run
1975			33000	33000	29600	112500	13859	36800		
1976			26700	26700	28800	115100	3371	14900		
1977	64900	92700	33300	34300	37600	95100	6930	29800	5631	7492
1978	89600	95300	37600	38700	27300	85300	5363	18500	4154	6125
1979	22300	23300	26700	27700	31200	89200	8023	32700	3291	4883
1980	26700	27600	25800	27000	29900	76800	16394	38800	2542	4493
1981	31500	33700	21000	22400	21100	66600	19297	25000	3183	5020
1982	31700	34800	18800	20100	31100	79000	8370	13000	4890	6906
1983	23600	25200	17700	18000	48700	86100	13540	16800	3669	5165
1984	18600	20400	21900	22300	61000	131400	7132	13300	2025	2995
1985	27200	28800	22800	24200	90800	196400	7491	13300	2645	3452
1986	36500	39800	25100	26200	109900	281500	11983	24500	3801	4954
1987	41400	45000	31300	33000	149700	420600	12935	37900	4097	6154
1988	35100	40700	29800	31300	110400	340000	12059	41700	3520	5911
1989	27000	30000	28700	28800	92900	261100	21199	38600	4770	6500
1990	20100	22900	24900	25000	55200	153600	17506	20300	2224	3194
1991	15500	17300	18700	18900	44400	102100	9060	19900	3532	3686
1992	26500	28700	15000	15100	48800	80600	6307	12600	2776	2813
1993	28350	30550	21700	22000	52500	102900	7025	13400	8239	8250
1994	5199	5781	17400	17600	72800	132900	11000	12300	5455	5524
Goal	84000		85000		40000		5700		NA	

Table A-8. Index escapements of Oregon natural chinook escapement indicator stocks.

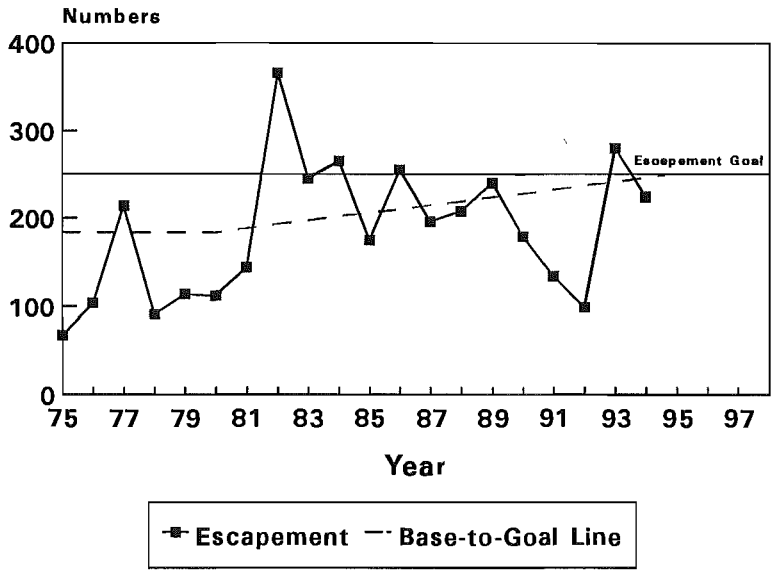
Year	Density Index	
	North Oregon Coast	Mid-Oregon Coast
1975	33	52
1976	25	30
1977	39	63
1978	40	61
1979	48	71
1980	51	70
1981	47	54
1982	54	71
1983	36	47
1984	68	45
1985	84	39
1986	87	51
1987	74	82
1988	127	97
1989	77	57
1990	61	43
1991	73	54
1992	78	96
1993	37	82
1994	79	94
Goal	NA	NA

APPENDIX B: STOCK SPECIFIC ESCAPEMENT FIGURES

Situk Chinook Escapements
Above Goal



King Salmon Chinook Escapements
Not Rebuilding



Andrew Creek Chinook Escapements
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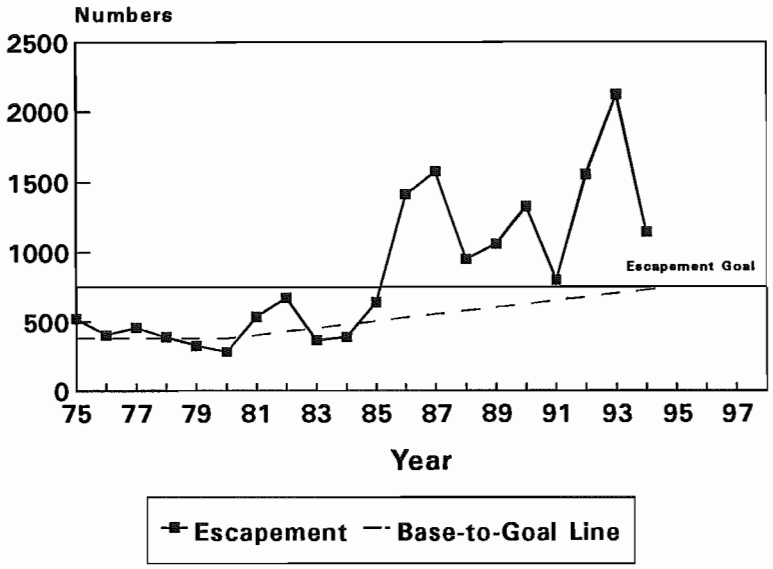
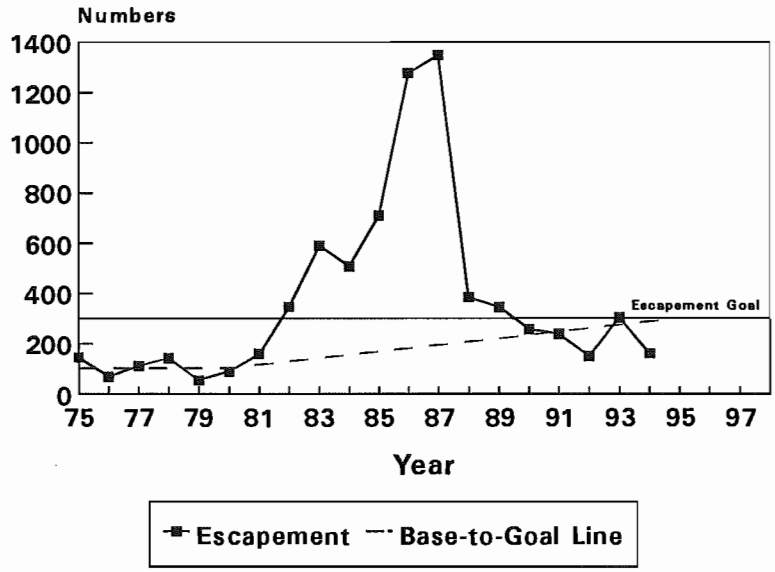
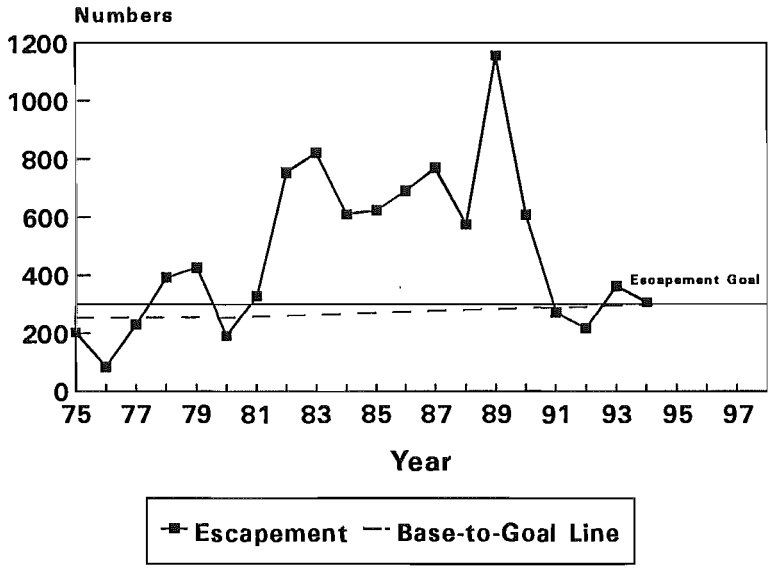


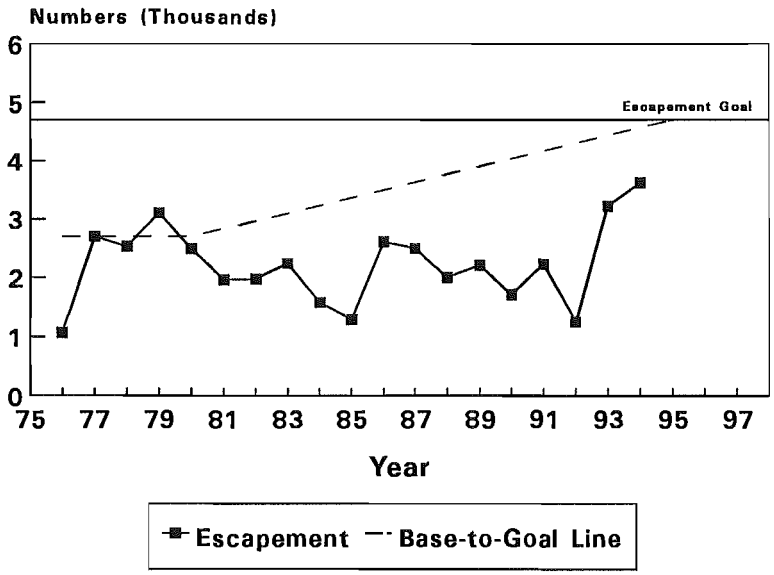
Blossom River Chinook Escapements
Not Rebuilding



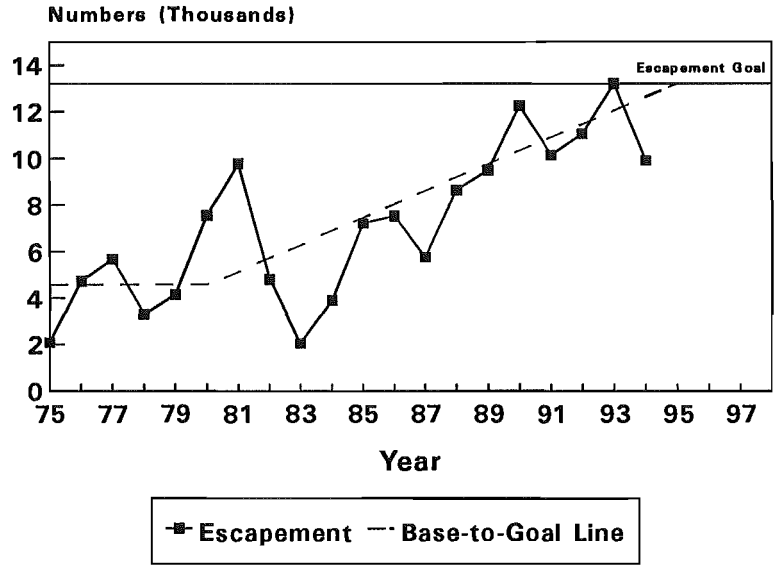
Keta River Chinook Escapements
Rebuilding



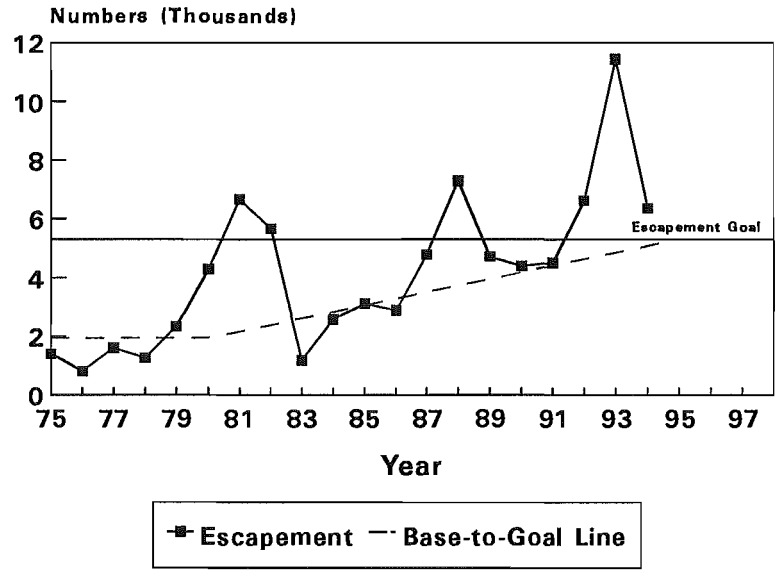
Alsek R. Chinook Escapements
Not Rebuilding



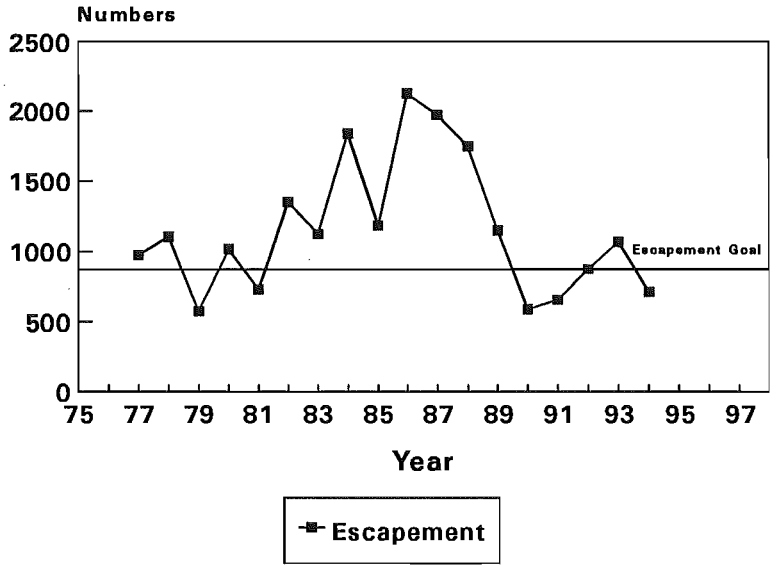
Taku Chinook Escapements
Not Rebuilding



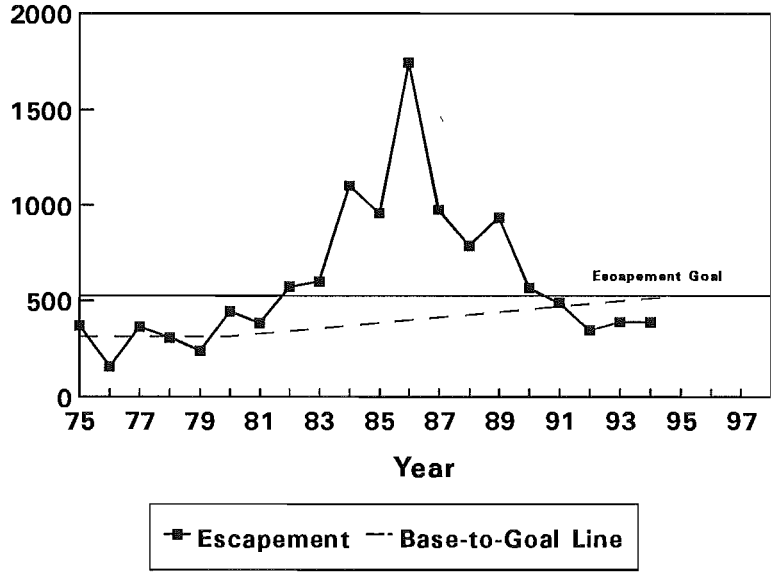
Stikine River Chinook Escapements
Rebuilding



Unuk River Chinook Escapements
Not Rebuilding



Chickamin River Chinook Escapements
Not Rebuilding



Yakoun River Chinook Escapements
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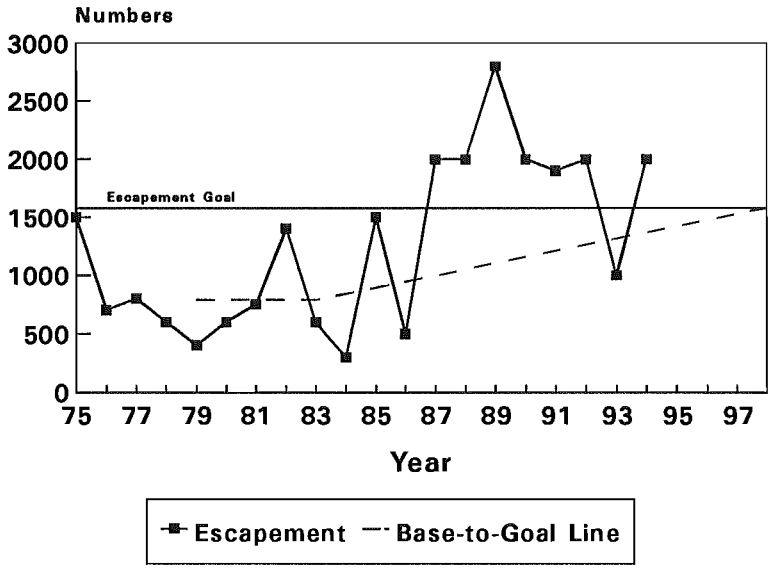
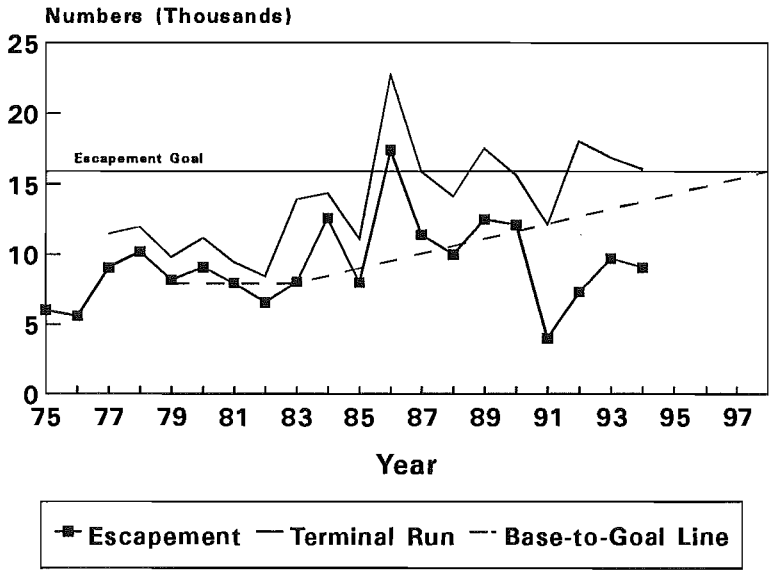


Nass River Chinook Escapements
Not Rebuilding



Skeena River Chinook Escapements
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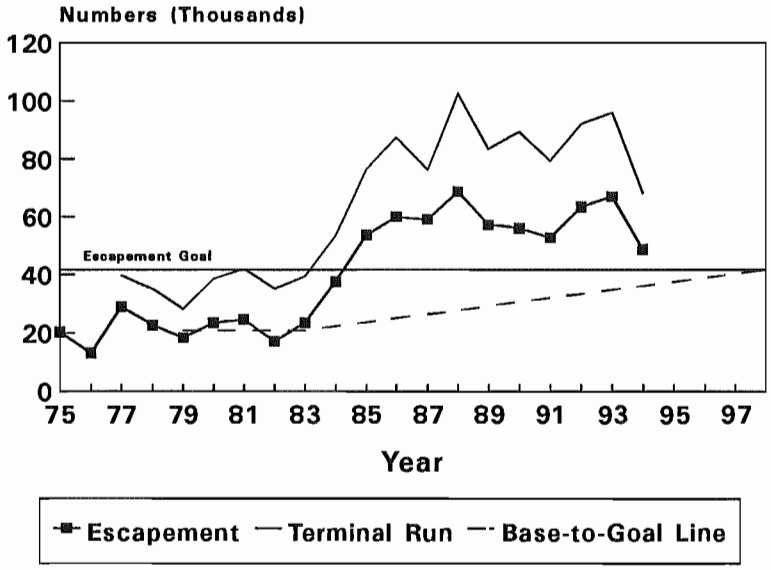
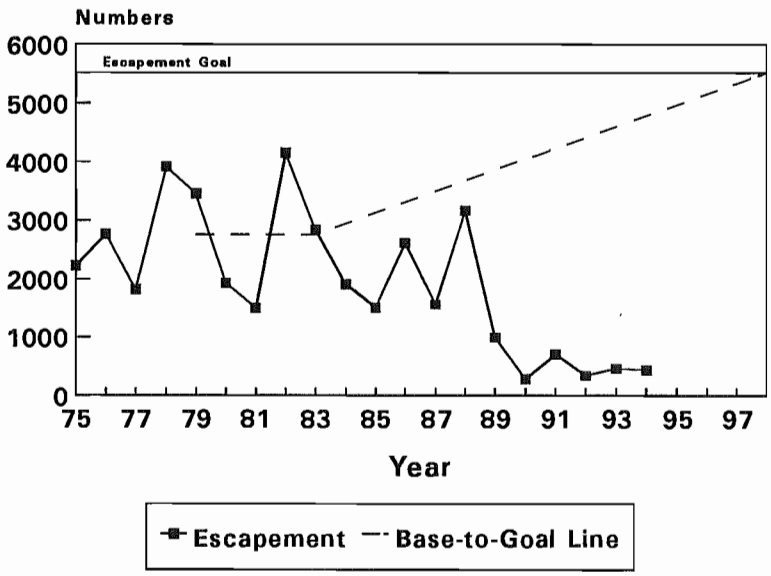
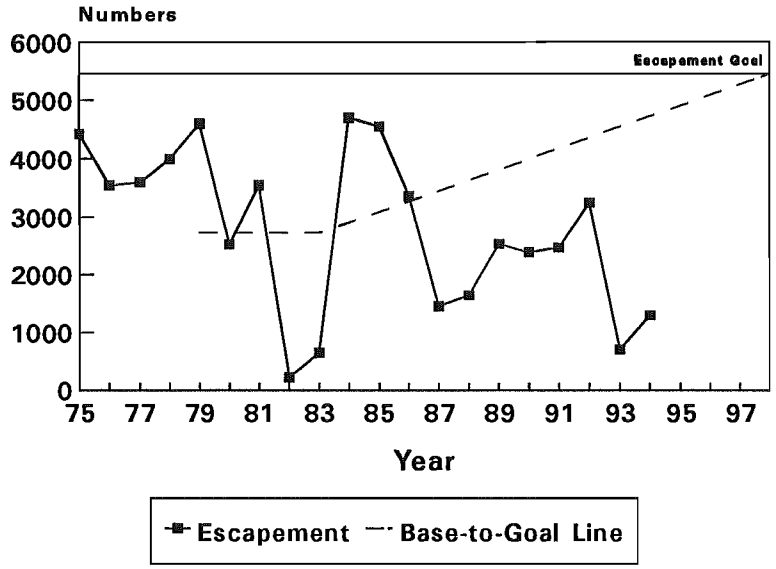


Area 6 Index Chinook Escapements
Not Rebuilding



Area 8 Index Chinook Escapements
Not Rebuilding



Rivers Inlet Chinook Escapements
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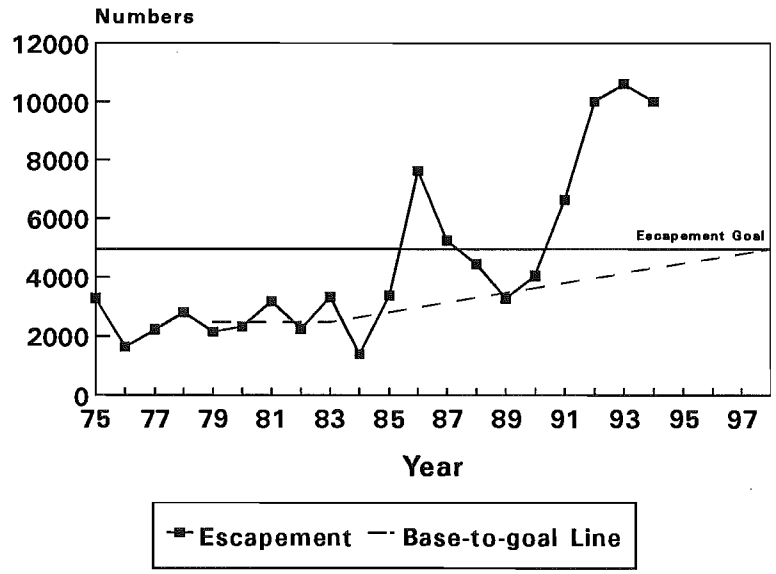
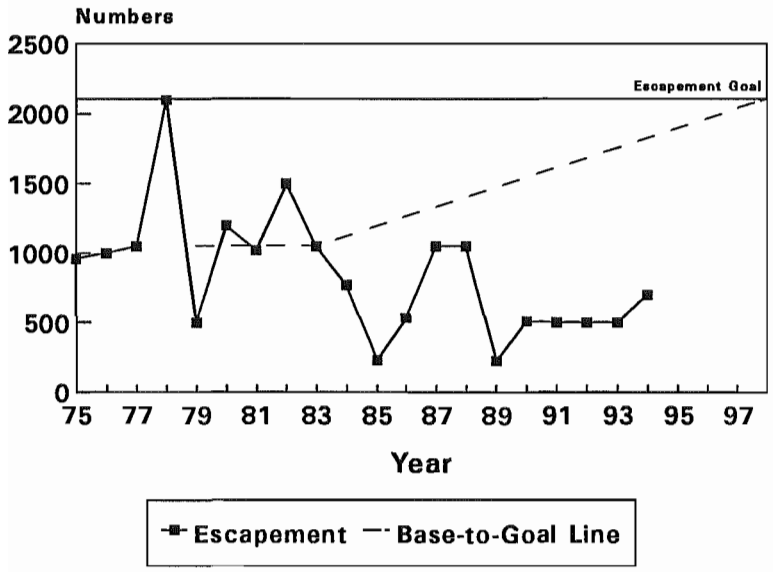
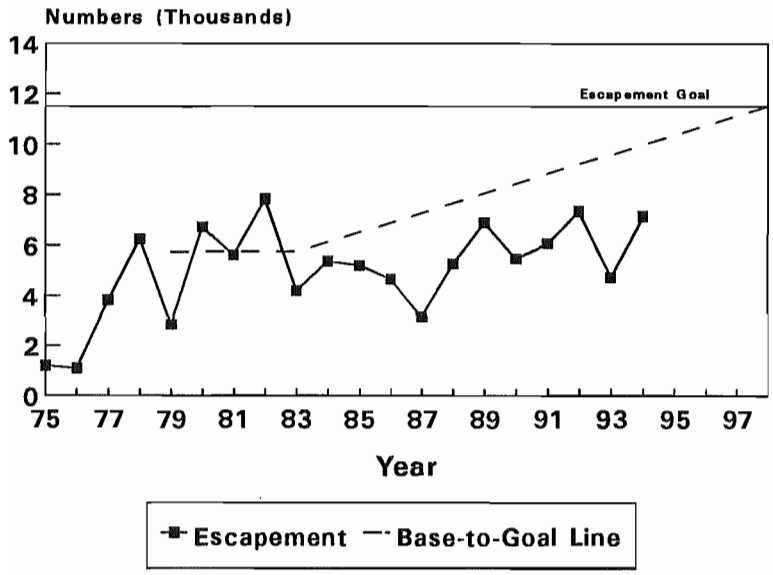


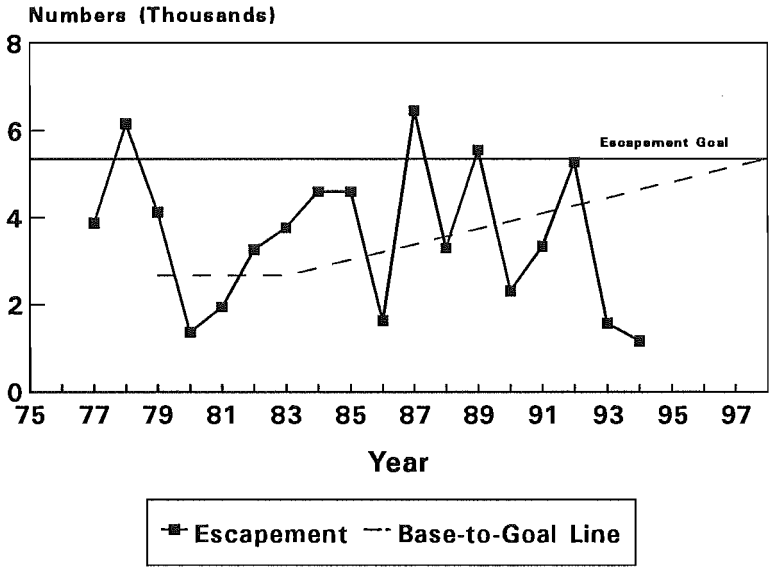
Smith Inlet Chinook Escapements
Not Rebuilding



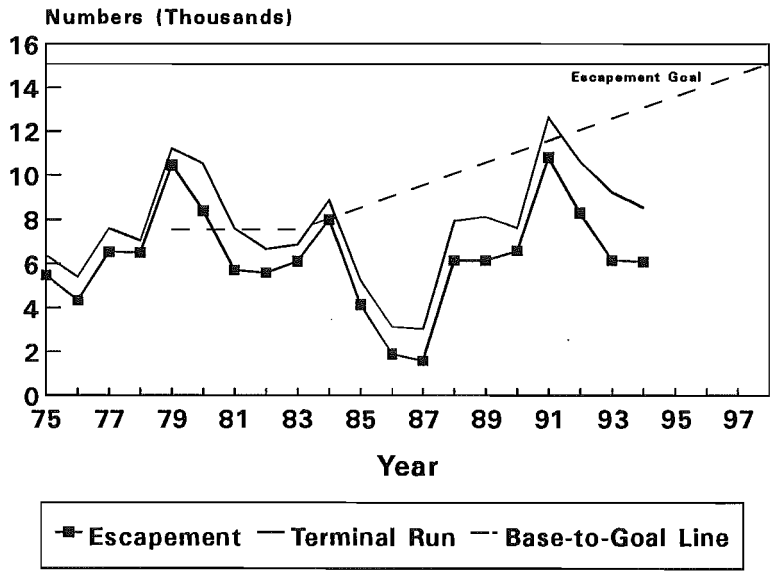
WCVI Chinook Escapements
Not Rebuilding



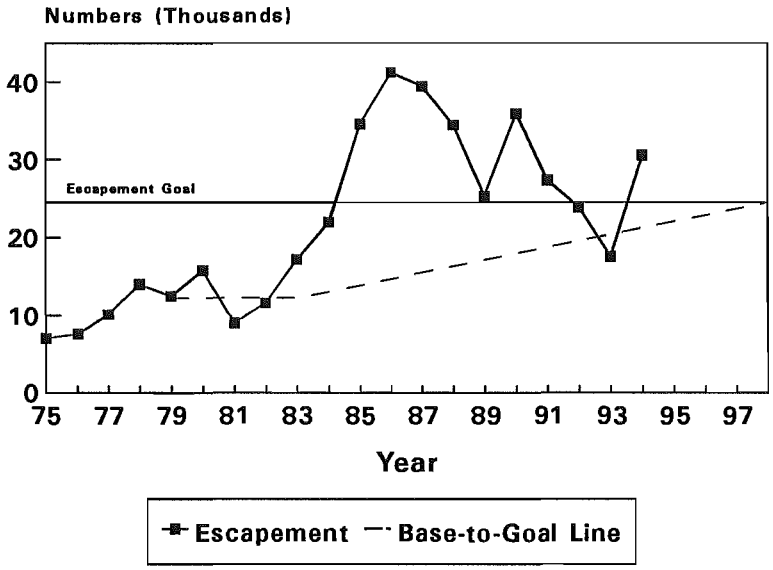
Upper Georgia Str. Chinook Escapements
Not Rebuilding



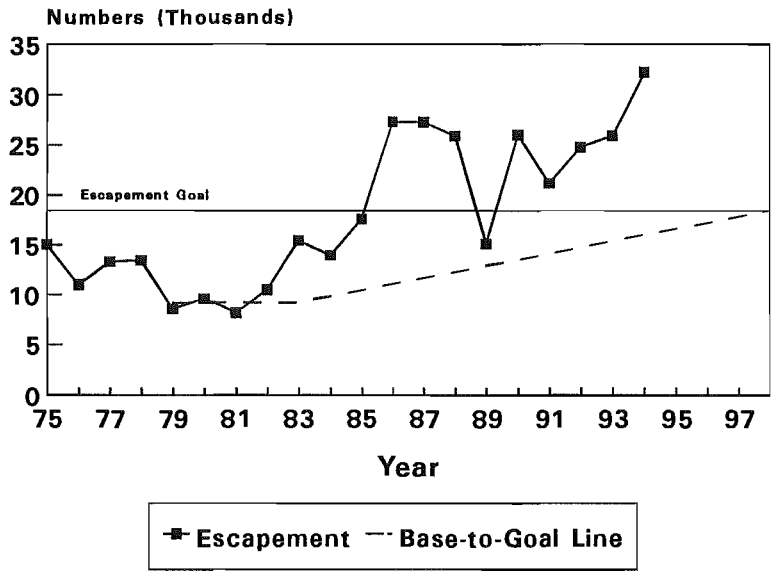
Lower Georgia Str. Chinook Escapements
Not Rebuilding



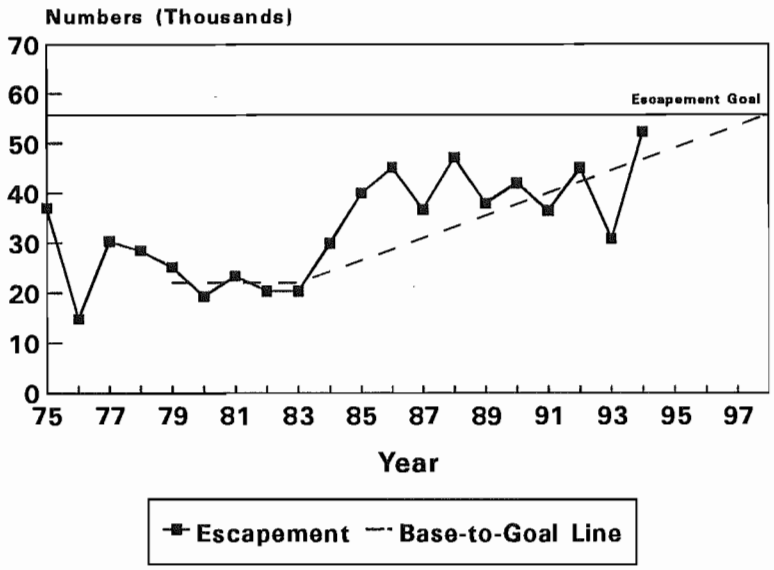
Upper Fraser R. Chinook Escapements
Rebuilding



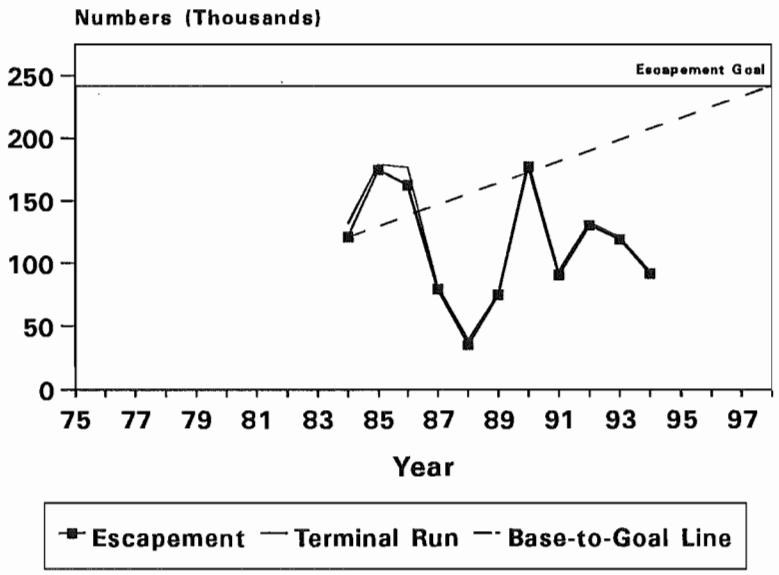
Middle Fraser R. Chinook Escapements
Above Goal



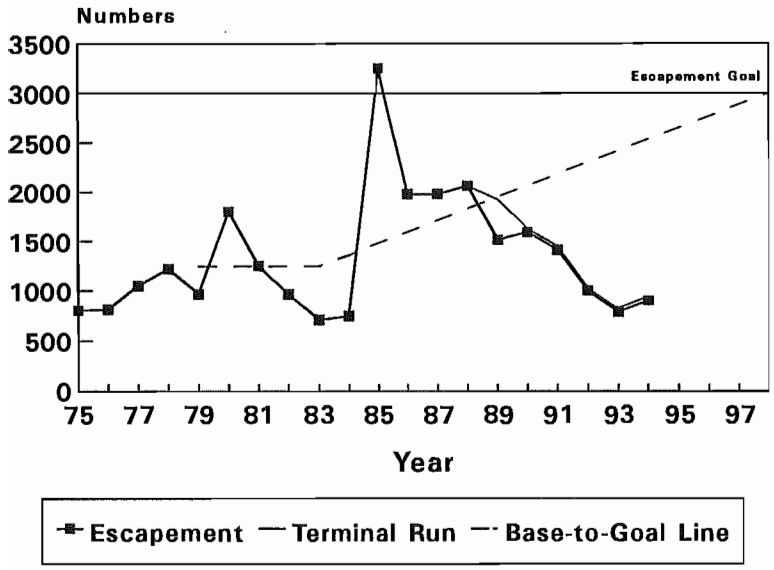
Thompson R. Chinook Escapements
Indeterminate



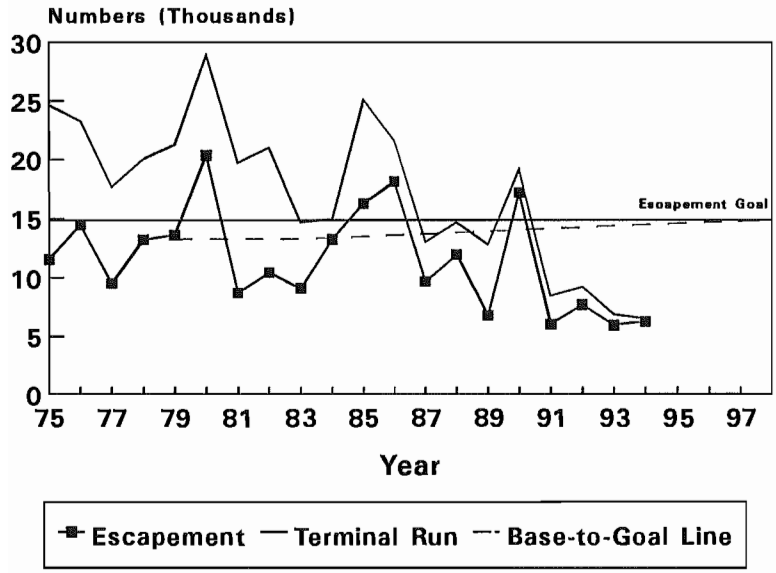
Harrison R. Chinook Escapements
Not Rebuilding



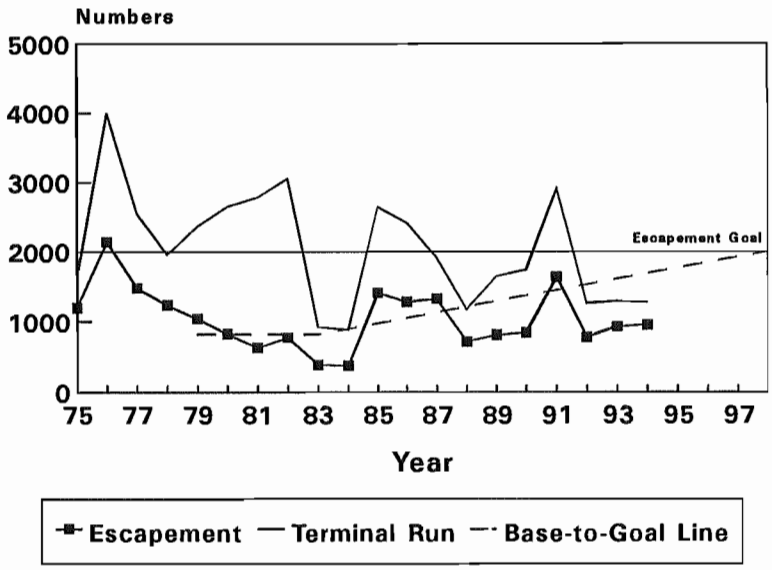
Skagit Spring Chinook Escapements
Not Rebuilding



Skagit Sum./Fall Chinook Escapements
Not Rebuilding



Stillaguamish River Chinook Escapements
Not Rebuilding



Snohomish River Chinook Escapements
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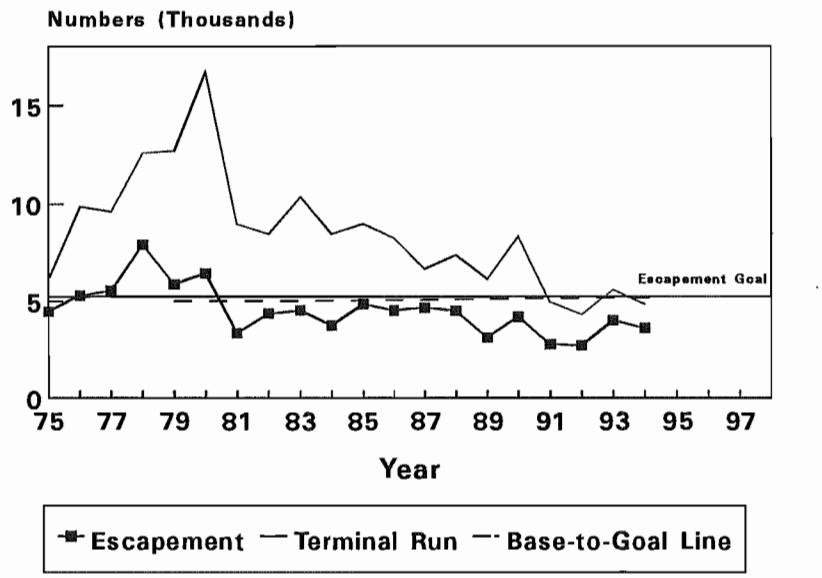
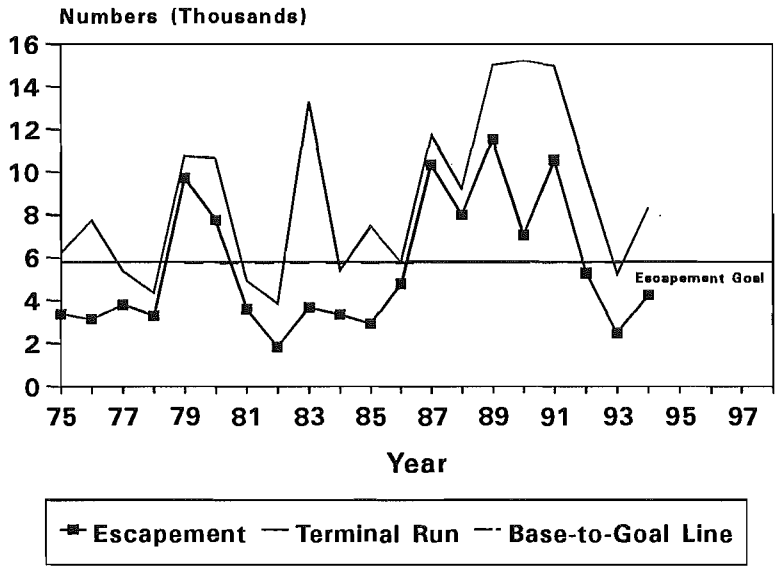
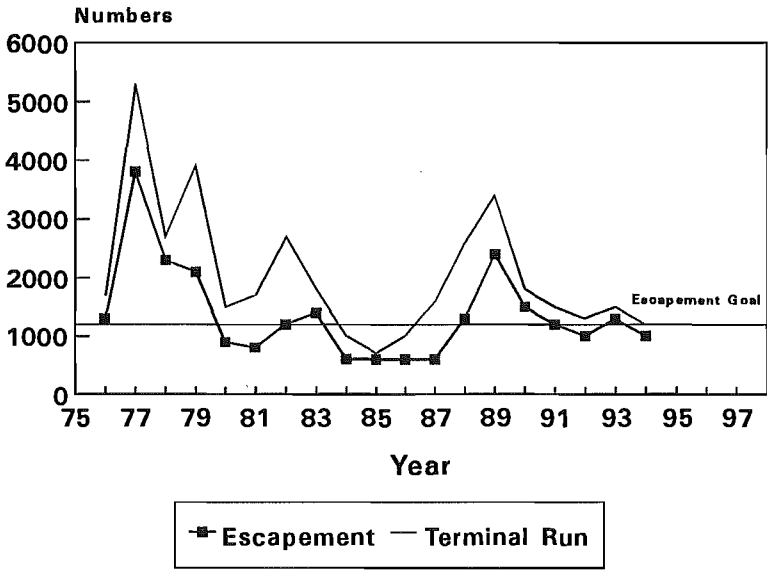


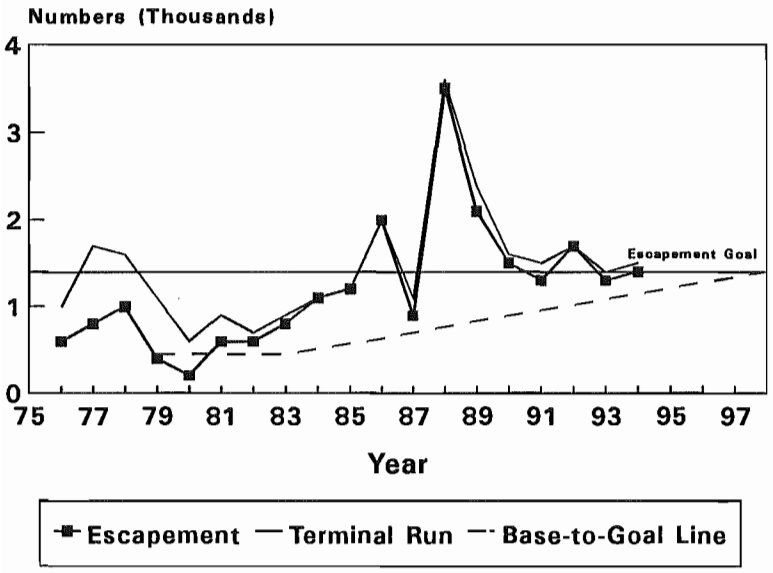
Green River Chinook Escapements
Indeterminate



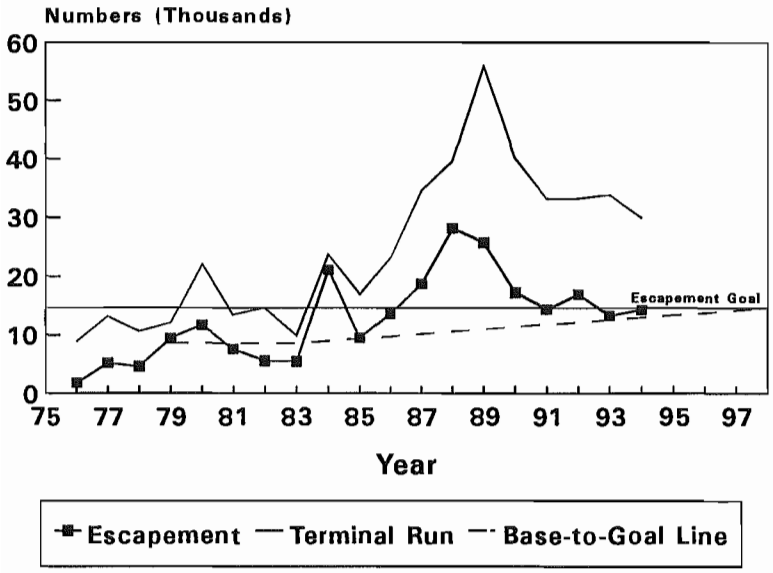
Quillayute Summer Chinook Escapements
Rebuilding



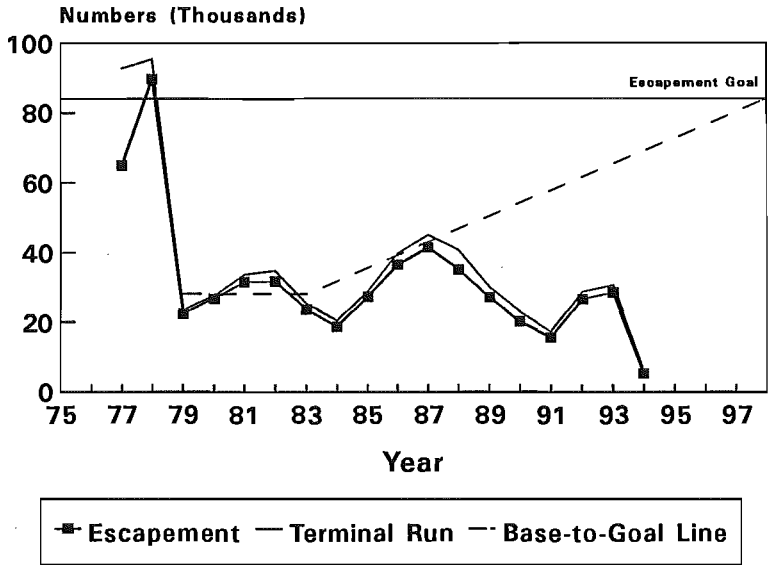
Grays Harbor Spring Chinook Escapement
Rebuilding



Grays Harbor Fall Chinook Escapements
Rebuilding



Columbia R. Spring Chinook Escapements
Not Rebuilding



Columbia R. Summer Chinook Escapements
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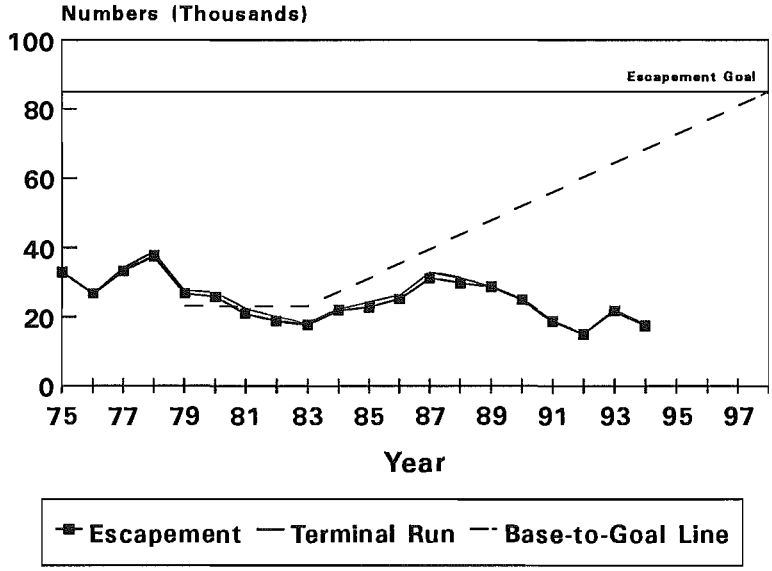
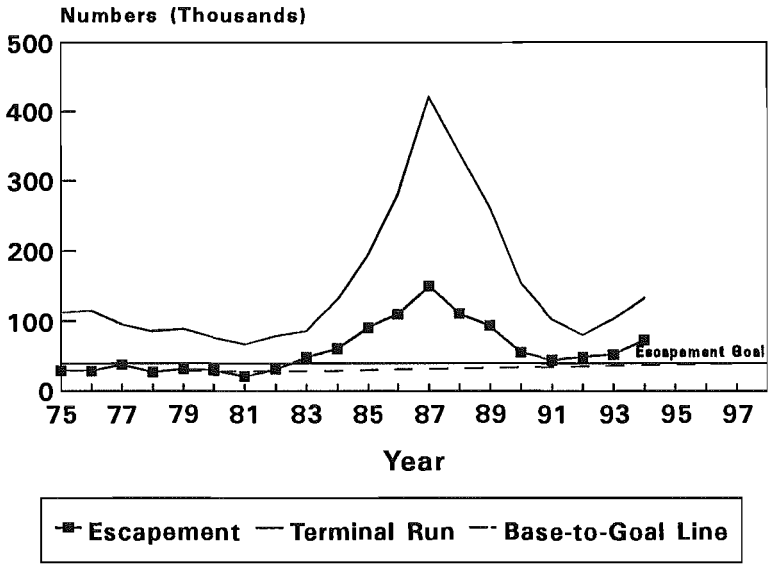
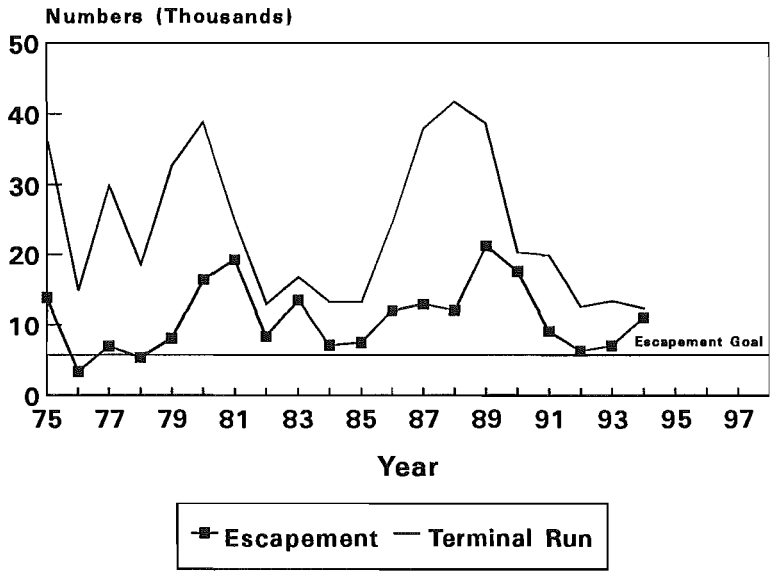


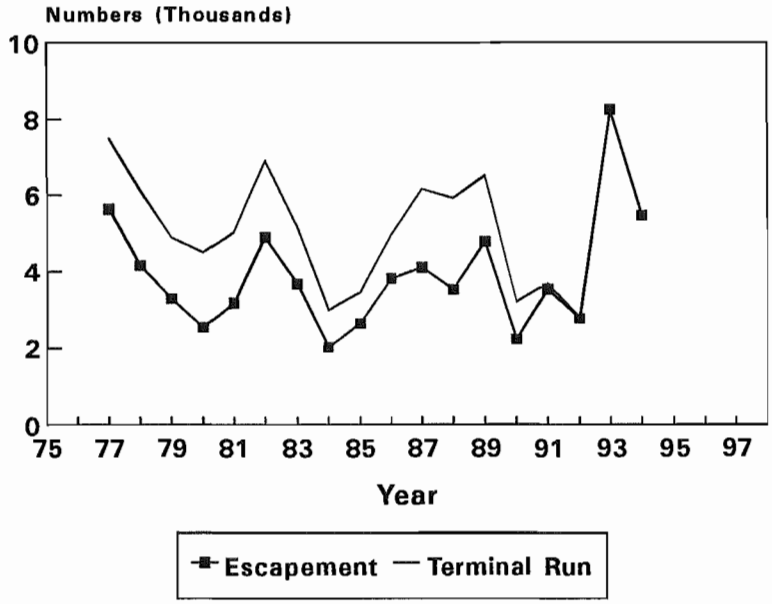
Columbia R. Bright Chinook Escapements
Above Goal



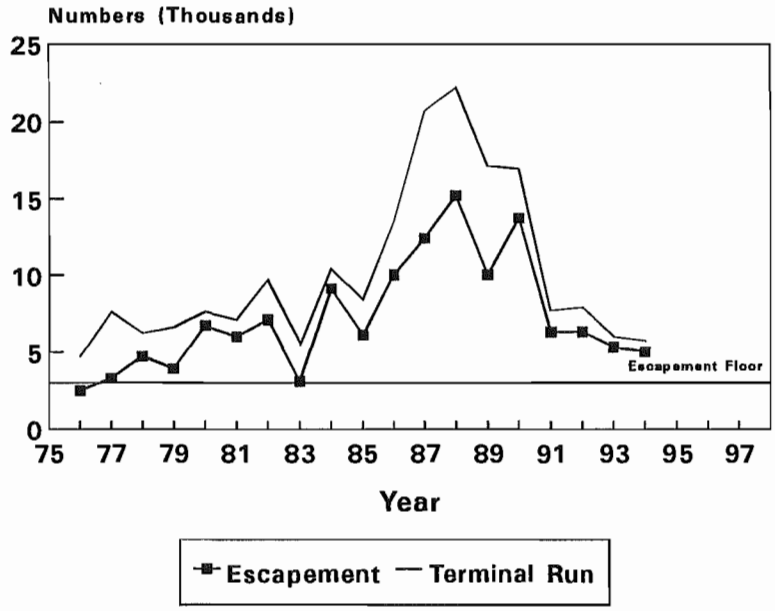
Lewis R. Fall Chinook Escapements
Above Goal



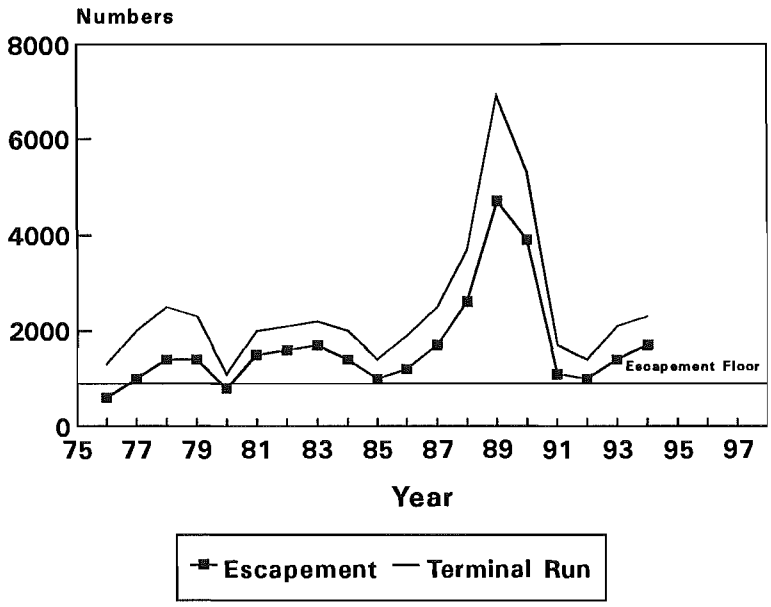
Deschutes R. Fall Chinook Escapements



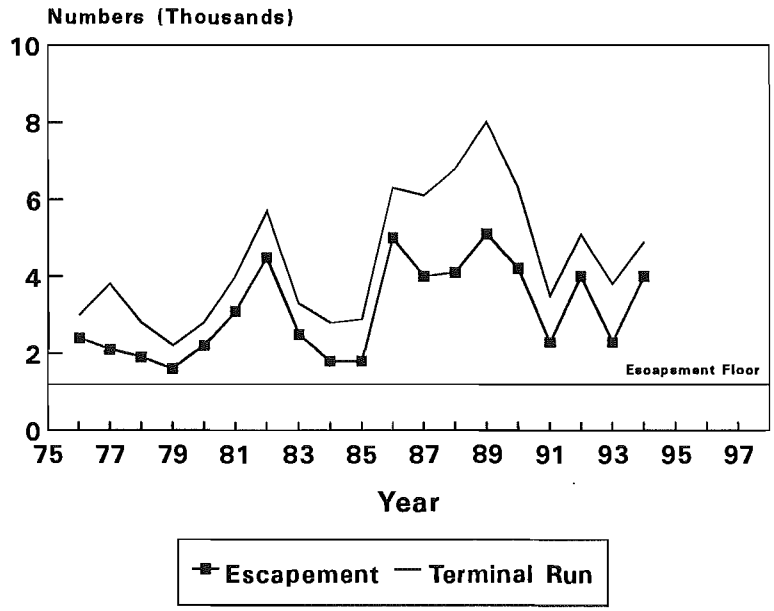
Quillayute Fall Chinook Escapements



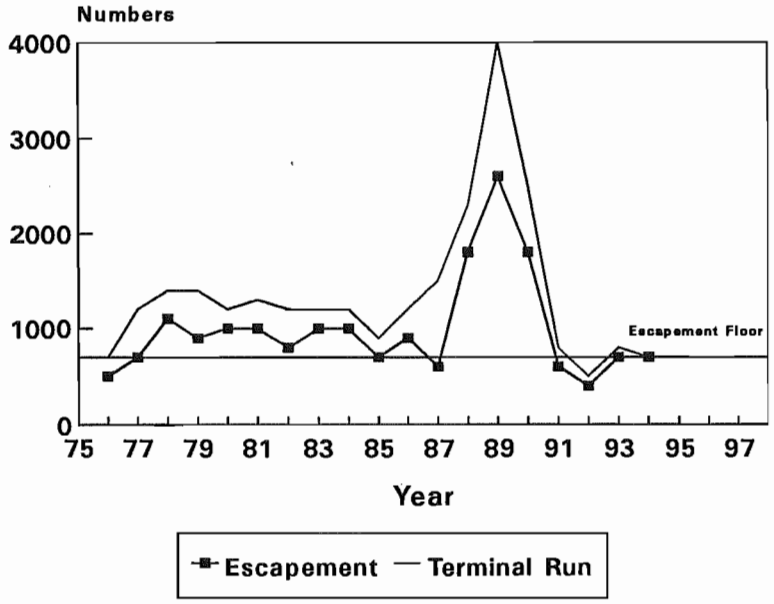
Hoh Spr/Sum Chinook Escapements



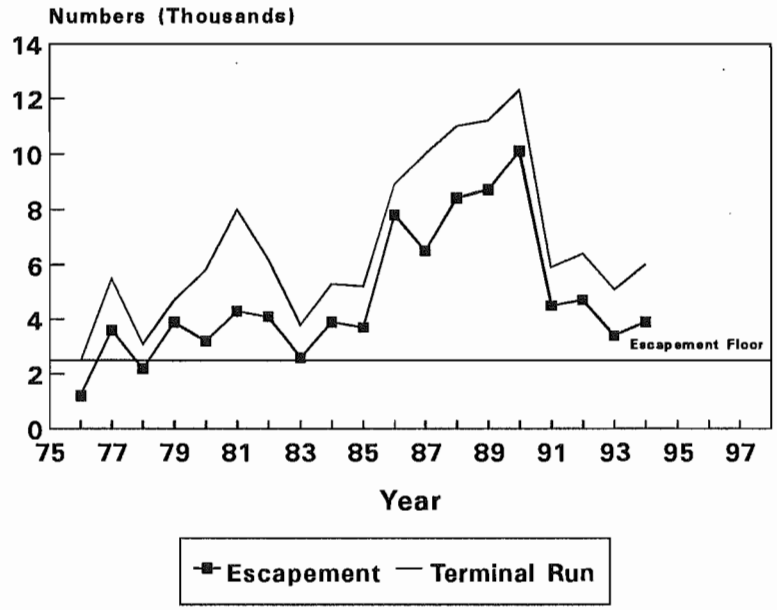
Hoh Fall Chinook Escapements



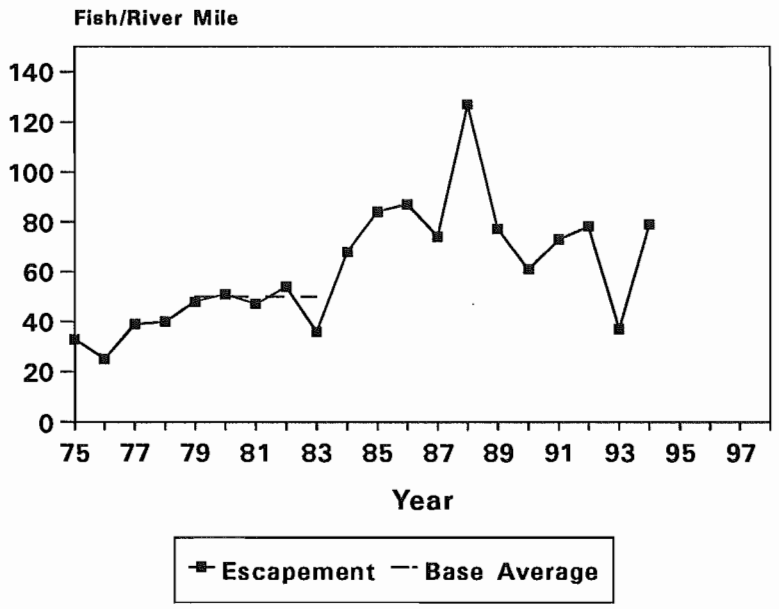
Queets Spr/Sum Chinook Escapements



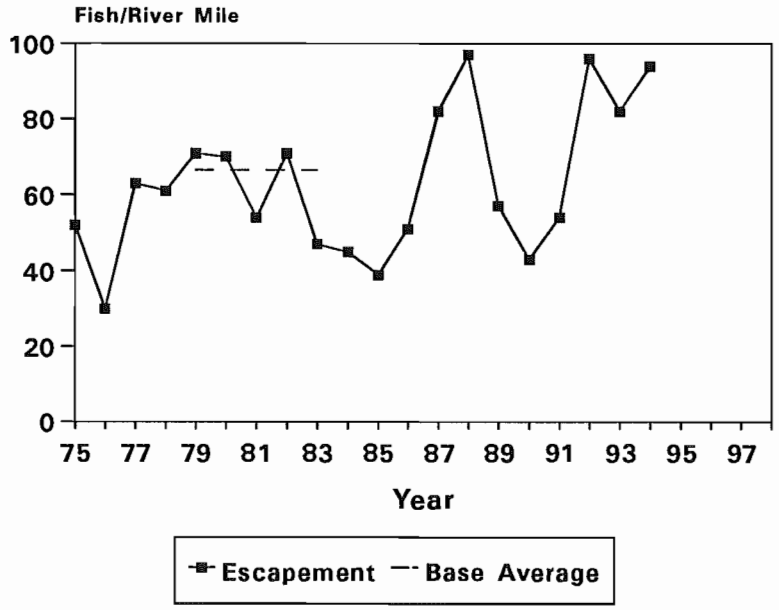
Queets Fall Chinook Escapements



North Oregon Coastal Chinook Escapements



Mid Oregon Coastal Chinook Escapements



APPENDIX C: CWT DATA AND METHODS USED

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List of Tables

C.1 Introduction

The Exploitation Rate Assessment provided in Chapter 3 relies upon CWT release and recovery data and estimates of CNR mortality to estimate a variety of statistics for the exploitation rate indicator stocks. This appendix discusses the CWT groups used in the analysis, the brood years represented for each indicator stock, the sources of the recovery data, and the estimates of CNR mortality provided by the management agencies.

C.2 CWT Groups Used and Brood Years Represented

The brood years for which CWT groups are available for the indicator stocks as well as the youngest age and oldest age are provided in Table C-1. Tag codes used in the Exploitation Rate Assessment are listed by stock and brood in Table C-2.

C.3 Sources of CWT Data Used

Sources of CWT recovery data and expansion procedures employed in the Exploitation Rate Assessment are summarized below. In a few cases, small samples from commercial fisheries have resulted in very large expansion factors. To avoid very large expansion factors associate with small samples, expansion factors were constrained to the range of 1 to 50.

C.3.1 Canadian Commercial Fisheries

Estimated recoveries for commercial fisheries in Canada were obtained from the Mark-Recovery Database maintained by CDFO at the Pacific Biological Station.

C.3.2 Canadian Sport Fisheries

Observed recoveries for sport fisheries in Canada were obtained from the Mark-Recovery Program (MRP) database maintained by CDFO at the Pacific Biological Station. As in the analyses of the previous three years, expansion factors were computed using the following procedures. Starting in 1980, recoveries made in GS and WCVI during the summer months (May-September) were expanded as documented in Kuhn et al. (1988). Recoveries made in other months were expanded using the average expansion factor for the summer period in the same recovery year. Recoveries in areas outside of GS or WCVI used the corresponding expansion factor for the average of GS and WCVI, unless an expansion factor based on creel survey data was available. Recoveries made prior to 1980 in GS continued to be expanded by the default value of four.

GS sport recoveries were expanded using these procedures because of potential tag expansion biases associated with inadequate sampling and infrequent overflights of the sport fishery during winter months. The application of GS expansion factors to sport recoveries in other areas was necessary because reliable catch and mark incidence estimates are normally unavailable for these areas.

As in last year's report, terminal sport recoveries for the Big Qualicum Hatchery stock have been removed from the Georgia Strait Sport (GSPT) catch region. Examination of sport location files in the CDFO Mark-Recovery Database identified that tags from the Big Qualicum River recovery location had been inconsistently recorded as freshwater or marine recoveries. Further, during this examination, a consistent pattern of terminal marine recoveries, off the mouth of the Big Qualicum River in late August and September, was identified. Recoveries from this time/area stratum have been almost exclusively of BQR origin. BQR recoveries in this terminal stratum and from freshwater sport fisheries have been removed from the GSPT catch region. The effect of this correction is to reduce the GSPT exploitation rate on this indicator stock; particularly during the base period when this correction had its greatest effect. However, since the CTC Fishery Index is created by dividing annual exploitation rates by the base period average values, these corrections tend to increase the Fishery Index values, for the BQR stock, compared to those reported prior to the 1993 Annual Report.

C.3.3 Canadian Escapement

Escapement data for Canadian stocks were determined directly from hatchery records, from the Salmon Stock Assessment database at the Pacific Biological Station, and from documents prepared through the Canadian key stream program. Details regarding the source of escapement data for each of the three Canadian hatcheries used in the fishery index analysis are as follows:

Robertson Creek. A proportion of the tagged fish returning to the Robertson Creek Hatchery spawn in the Stamp River; however, fish in the river have been sampled only since 1984. These recoveries have not been included in the exploitation rate analysis because comparable sampling was not conducted in the base period. Because the exploitation rate analysis for this stock assumes that a consistent portion of the return enters the hatchery, the exploitation rate will be overestimated. Further, native catch in the Somass River has increased recently, but this fishery is not sampled for coded-wire tags or included in the exploitation rate analysis. This nonreported catch will result in an overestimation of ocean exploitation rates and an underestimation of the total exploitation.

Big Qualicum. Since 1971, escapement for the Big Qualicum River has been enumerated and checked for CWTs at a counting fence, with two exceptions. First, the early part of the run, which was allowed to spawn naturally, was enumerated but not sampled for CWTs prior to 1988. This was accounted for by expanding the sampled fraction of the run to represent the total run (expansions were stratified by adult and jacks). Second, a few hundred fish which spawn below the fence (which is less than one kilometer above tidewater) were not enumerated or sampled. Fish in this latter group which had a CWT are excluded from the analysis.

Quinsam Hatchery. The Quinsam Hatchery obtains brood stock primarily by seining spawning adults from both the Campbell River (the main river) and the Quinsam River (a relatively small tributary). Brood stock captures are examined for marks and are added to the estimates of CWT escapement to the rivers. These are also stratified by sex for the purposes of sample expansions and for adjustments for lost pins and no data recoveries. Chinook entering the hatchery have not been an important factor until 1989. In addition, hatchery staff have sampled the carcasses in the

river for CWTs from 1978 to 1983. Since 1984, escapement has been estimated by a mark recapture program (Andrew et al. 1988; Bocking et al. 1990; Bocking 1991; Firth et al., 1993; Shardlow et al. 1986). Estimates of the CWT escapement to each river were made by expanding the CWTs recovered during the dead pitch by the fraction of the estimated total escapement which was sampled. Both the escapement and the dead pitch were stratified by sex, combining adult and jack males into a single stratum. CWTs recovered during carcass recovery prior to 1984 were expanded by using the average fraction sampled from the period 1984 to 1990, stratified by river with both sexes combined.

C.3.4 SEAK Fisheries

Recoveries from SEAK commercial fisheries were obtained from the MRP with the exception of recoveries in 1977 and 1978. The 1977 and 1978 commercial data and all estimated sport recoveries were obtained from ADF&G.

Data anomalies were corrected using procedures discussed in Appendix II of the 1987 CTC Annual Report (CTC 1988). Two important adjustments are:

1) CWT recoveries from commercial fisheries were expanded to account for unsampled catches by multiplying by the ratio of the total catch to the sampled catch. For net and trap gear, adjustments were computed for a district or group of districts by calendar year. For troll gear, a single adjustment factor was used for all time and area strata.

2) CWT recovery data for the SEAK sport fishery during the 1979-1982 base period are of poor quality due to very limited sampling. The sport fishery sampling program expanded from 1983 to 1986, resulting in more reliable estimates in recent years. To estimate CWT recoveries for this fishery in years prior to 1987, sport recoveries were estimated from troll recoveries and the relative size of the sport and troll catch (CTC 1990).

C.3.5 SEAK Escapement

Escapement data for the Alaska stock are provided by the following agencies: ADF&G (Crystal Lake Hatchery and Deer Mountain Hatchery), National Marine Fisheries Service (NMFS) (Little Port Walter) and Southern Southeast Regional Aquaculture Association (SSRAA) (Carroll Inlet, Neets Bay, and Whitman Lake). Methods used to compute the escapement for SEAK tag groups are summarized below in instances in which modifications from the agency reported escapement data were necessary. The escapement to SSRAA facilities includes recoveries from cost recovery fisheries since the catch in these terminal area fisheries is not included in the Alaska ceiling.

SSRAA. Marks on fish returning to SSRAA hatcheries were sampled using one of two methods:

1) Random sampling of fish for marks was conducted throughout the return for defined time periods of variable length. The target number of marks in each time period was 200; however, the actual numbers varied and the number of fish examined for marks was not always recorded.

2) Marked fish were deliberately selected from the return during each time period. The number of fish examined to obtain this select sample was not recorded. These marked fish were then randomly sampled for approximately 200 CWTs.

Neither of these methods provides a usable estimate of mark incidence. Hence the recoveries by tag code for these hatcheries were estimated as follows:

1) The tagged recoveries in each sample were expanded by the marked to total release ratio and summed across tag codes.

2) The total return (tagged and untagged) during each time period was then multiplied by the proportion of the expanded sum which belonged to each tag code. These estimates were then summed for all the return periods to obtain a total estimated return for each tag code.

3) As a result of this estimation procedure, the return estimates for each tag code include both the marked and unmarked portions of the release. To estimate the number of returning tags, this total estimate was divided by the release ratio.

This method assumes that the survival of marked and unmarked fish was equal.

Crystal Lake. The recoveries by tag code were estimated by expanding the CWT recoveries to the total return (tagged and untagged) using the same procedure as the SSRAA with the two following modifications.

1) The procedure was stratified by sex with separate estimations done for males, females, and jacks.

2) The total return of CWTs was known for all years and was used instead of sample data. However, returns from brood year 1979 were not recorded by tag code. The recoveries by tag code were estimated in the following manner. For each return-year brood-year combination, the estimated escapement by tag code was the product of the total recoveries of the brood and the proportion of the tagged brood release that belonged to each tag code. This method assumes that all tag codes in a brood year had equal survival from release.

Deer Mountain. The recoveries by tag code were estimated by expanding the CWT recoveries to the total return (tagged and untagged) using the same procedure as the SSRAA with the two following modifications.

1) A small number of fish were recovered in personal use fisheries in Ketchikan Creek each year. In some years these fish were sampled for CWTs; however, in some years only estimates of the total personal use catch were made. In these years, the breakdown of the personal use catch by tag code was estimated using the tag code breakdown at the rack.

2) The total returns of CWTs at the rack was known for all years and was used instead of sampled data. However, returns from brood years 1978, 1979, and 1980 were not broken down by tag code in the return years 1980, 1982, and 1983. The recoveries by tag code for these broods were estimated in the same manner as the 1979 Crystal Lake recoveries.

C.3.6 Southern U.S. Fisheries

Recoveries by Washington, Oregon, and California fisheries were obtained from the MRP database with the following exceptions: 1993 Columbia River tributary and terminal sport recovery data for Oregon fisheries were obtained from ODFW and 1994 Columbia River tributary and terminal sport data for Washington fisheries were obtained from WDFW. 1994 Puget Sound sport catch/sample expansion factors were obtained from WDFW.

Data were obtained directly from WDFW or ODFW only when those data had not yet been provided to CDFO through PSMFC. It should remain a high priority of all agencies to provide this information to PSMFC in a timely manner since the work of the CTC is slowed considerably when data must be sought and integrated from a number of individual agencies.

C.3.7 Southern U.S. Escapement

Escapement recovery data for southern U.S. stocks were obtained from the MRP database with the following exceptions:

1) Recoveries for tribal facilities in Puget Sound and the Washington Coast for 1994 were obtained from the NWIFC;

2) Recoveries to the U.S. Fish and Wildlife Service (USFWS) Makah National Fish Hatchery in 1994 were obtained from the USFWS;

3) Columbia River Basin escapements to Oregon facilities for 1993 were obtained from ODFW. Columbia River escapements for 1994 to Washington facilities were obtained from WDFW; and

4) Pre-1982 escapement data for the Stayton Pond and Willamette Spring stocks and escapement for the Bonneville stock through 1982 were obtained from ODFW. Pre-1979 escapements for the Spring Creek stock were obtained from USFWS.

Methods for calculating dam conversion rates and interdam loss (IDL: one minus the dam conversion rate) did not change from the 1991 annual report (CTC 1992). Currently, the conversion from Bonneville Dam to McNary Dam for Columbia Upriver Brights and Hanford Wild (URBs) is calculated for the exploitation rate analysis as:

$$\frac{\textit{McNary Count}}{\textit{(Bonneville URBs)} - \textit{(Zone 6 Comm Catch)} - \textit{(Deschutes Turnoff)}}$$

Bonneville Upriver Bright counts are calculated by WDFW by first calculating the stock composition of all brights above Bonneville Dam (URBs vs. mid-Columbia brights or MCBs), and then applying the proportion of URBs in the upriver run to the Bonneville Dam counts of brights based on visual observation of skin color. Zone 6 commercial catches are taken from the Columbia River Status Report (ODFW & WDFW 1993). Ceremonial, subsistence, and sport catches between Bonneville and McNary Dams are provided by Columbia River treaty tribes and WDFW. The number of fish returning to the Deschutes River is estimated annually by ODFW. Fish entering other tributaries below McNary Dam are not accounted for; this will result in a slight overestimate of IDL.

The Lyons Ferry Hatchery conversion rate is the product of the conversion rate of URBs and an additional conversion rate for losses between McNary Dam (the last dam before the Snake River) and Ice Harbor Dam (the first dam on the Snake River and where Lyons Ferry escapement is measured for the exploitation analysis). Estimation of conversion between McNary Dam and Ice Harbor Dam is complicated by extensive straying and fallback over Ice Harbor Dam. An estimate was calculated by averaging the Columbia River per pool conversion rate (from Bonneville Dam to McNary Dam) and the Snake River per pool conversion rate (from Lower Monumental Dam to Lower Granite Dam). Escapements of tagged fish above Ice Harbor Dam, tag recovery rates and Snake River conversion rates were used to estimate total escapement of tagged Lyons Ferry Hatchery fish at Ice Harbor Dam.

C.4 Estimates of Incidental Catch Mortality

Fishery-specific estimates of incidental mortality or parameters used to estimate incidental catch mortality have been provided by regional management agencies and are listed in Appendix tables C-3 through C-8.

Table C-1. Brood years included by stock for Exploitation Rate Assessment

Stock Name	Youngest Age	Oldest Age	Brood Year 71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92
Alaska Spring	3	6	-	-	-	-	-	-	-	x	x	x	x	x	x	x	x	x	x	x	x	x	x	-
Robertson Creek	2	5	-	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	-
Quinsam	2	6	-	-	-	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Puntledge	2	5	-	-	-	-	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Big Qualicum	2	5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
South Puget Sound Fall Yearling	2	5	-	-	-	-	-	-	-	x	x	x	x	-	-	-	-	x	x	x	x	x	x	x
Squaxin Pens Fall Yearling	2	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	x	x	x	-	-
Univ of Washington Accelerated	2	5	-	-	-	-	x	x	x	x	x	x	x	x	x	x	-	-	-	-	-	-	-	-
Samish Fall Fingerling	2	5	-	-	-	x	x	-	-	-	x	-	-	-	-	-	x	x	x	x	x	x	x	x
Stillaguamish Fall Fingerling	2	5	-	-	-	-	-	-	-	-	-	x	x	x	x	-	-	x	x	x	x	x	x	x
George Adams Fall Fingerling	2	5	-	-	-	x	x	-	-	x	x	x	x	-	-	-	x	x	x	x	x	x	x	x
SPS Fall Fingerling	2	5	-	-	x	x	x	-	-	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Kalama Fall Fingerling	2	5	-	-	-	-	-	-	-	-	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Elwha Fall Fingerling	2	5	-	-	-	-	-	-	-	-	-	-	-	x	x	x	x	x	-	x	x	x	x	x
Hoko Fall Fingerling	2	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	x	-	x	x	x	x
Skagit Spring Yearling	2	5	-	-	-	-	-	-	-	-	-	-	x	x	x	x	x	x	x	-	-	x	-	-
Nooksack Spring Yearling	2	5	-	-	-	-	-	-	-	-	-	-	x	x	-	x	-	x	x	x	x	x	-	x
White River Spring Yearling	2	5	-	-	-	-	-	-	-	-	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Sooes Fall Fingerling	2	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	x	-	x	x	x	x
Queets Fall Fingerling	2	6	-	-	-	-	-	-	x	x	x	x	x	x	x	-	x	x	x	x	x	x	x	-
Cowlitz Tule	2	5	-	-	-	-	-	-	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Spring Creek Tule	2	5	-	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Bonneville Tule	2	5	-	-	-	-	-	x	x	x	x	x	x	x	x	x	-	-	-	-	-	-	-	-
Stayton Pond Tule	2	5	-	-	-	-	-	-	-	x	x	x	x	x	x	x	x	x	x	x	x	x	x	-
Upriver Bright	2	5	-	-	-	-	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Hanford Wild	2	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	x	x	x	x	x
Lewis River Wild	2	5	-	-	-	-	-	-	x	x	x	-	-	x	x	x	x	x	x	x	x	x	x	x
Lyons Ferry	2	5	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	x	x	x	x	x	-	x
Willamette Spring	3	6	-	-	-	-	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	-
Salmon River	2	5	-	-	-	-	-	-	x	x	x	x	-	x	x	x	x	x	x	x	x	x	x	x

x= brood year used in analysis

Table C-2. Tag Codes Used for Exploitation Rate Assessment

Table C-2.1. Tag codes for Alaska Spring

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
							031661	031716	031753	031761	031655	031826	031901	031957	032027	032037	030116	030218	030227	030233	
							031703	031717	031754	031762	031807	031827	031902	031958	032028	032038	030119	030219	030228	032233	
							031704	041917	041944	031763	031808	031828	031903	031959	032029	032039	030121	030220	030229	032234	
							031705	041943	042121	031801	031809	031829	031904	031960	032030	032040	030122	030221	030230	032235	
							031706	041945	042202	031802	031810	031830	031905	031961	032031	032041	030125	030222	030231	036332	
							031707	042039	044005	031803	031811	031831	031906	031962	032032	032042	030216	030223	030332	036335	
							031708	042040		031804	031812	031832	031907	031963	032033	032043	030217	030224	031618	036337	
							031709	042042		036303	031813	031833	031908	032001	032034	032044	031947	030225	032216	036338	
							031710	042043		036304	031814	031834	031909	032002	032113	032045	032138	030226	032217	036339	
							031711	042045		036305	031815	031835	031910	032003	032114	032131	032141	032052	032218	036340	
							031712			042222	031816	031836	031911	032004	032116	032132	032201	032203	032219	036341	
							031713			042223	031817	031837	031912	032005	032119	032135	032202	032204	032220	036342	
							031714			042227	031818	031838	031913	032006	032121	036226	036237	032205	032221	036343	
							031715			042229	031819	031839	031914	032007	032122	036228	036238	032206	032222	036344	
							041932			042230	036306	031843	031915	032008	036213	036231	036329	032207	032223	036345	
							041938			B40907	036307	031844	031916	032009	036214	036232	036330	032208	032224	036346	
							041939			B40908	036308	031845	031917	032010	036216	036319	036331	032209	032225	036347	
							041940				036309	031846	031918	032011	036219	036321	043247	032210	032226	036348	
											042255	031847	031919	032012	036221	036322	043249	032211	032227	036349	
											042354	031848	031920	032013	036222	036323	043250	032212	032228	043859	
											042355	031849	031921	032014	036225	036324	043252	032213	032229	043904	
											042356	031850	031922	032015	036310	036325	043255	032214	032230	043905	
											042430	031851	031923	032016	036311	036326	043303	032215	032231	043933	
											042431	031852	031924	032017	036312	036327	043304	043232	032232	043934	
												031853	031925	032018	036313	036328	043305	043449	036333	043936	
												031854	031926	032019	036314	042737	043306	043450	036334	043937	
												031855	031927	032101	036315	042738	043319	043501	042945	043938	
												031856	031928	032102	036316	043027	043320	043502	043701	043939	
												031857	031929	032103	036317	043029	043323	043504	043702	044028	
												031858	031930	032104	042754	043030	043324	043507	043704	044029	
												031859	031931	042626	042908	043031	043406	043530	043705	044101	
												031860	031932	042628	042909	043032	043407	043531	043706	044102	
												031861	031933	042631	042960	043058		043532	043707	044104	
												031862	031934	042632	043101	043059		043533	043708		
												031863	031935	042633	043102	043141		043606	043745		
												040321	031936	042634	043104	043142		043607	043746		
												042463	031937	042713	043107	043144		043608	043747		
												042503	031938	042731	043108	043147			043748		
												042511	031939	042732		043149			043749		
												042512	031940	042733					043750		
												042513	031941	042825					043821		

Table C-2. Tag Codes Used for Exploitation Rate Assessment (continued)

Table C-2.1. Tag codes for Alaska Spring (continued)

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
													031942						043822		
													031943						043823		
													031944								
													031945								
													031946								
													031948								
													040329								
													040330								
													040331								
													040332								
													040333								
													040336								
													040342								
													040343								
													040344								
													040345								
													040346								
													040347								
													040348								
													040349								
													040350								
													042321								
													042530								
													042531								
													042534								
													042535								
													042536								
													042537								
													042538								
													042539								
													042540								

Table C-2. Tag Codes Used for Exploitation Rate Assessment (continued)

Table C-2.2. Tag codes for Robertson Creek

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
		020203	020606	020408	021629	022217	021615	021827	021661	022202	022541	022662	023131	023734	024256	024311	025014	020645	021549	180620	
		020406	020906	020409	021630	022218	021635	021829		022405	082225	022663	023132	023735	024257	024802	025836	020646	021550	180621	
		020506	021206	021305	021631							022708	023133	023736	024361	024809	025837	020950	021551	180622	
		020602	021406									022753	023134	023737	024362	024810	025838	020949	021552	180623	
												082247	023135	023738	024363	024951	025839	020948	021553	180802	
												082248	023136	023739	024401	024952	026055	020648	021208	180803	
													023142	023740		024958	026056	020647	021209	180804	
													023143	023741		024959	026057	020153		180805	
													023144			024960		020152			
													023145			024961		020151			
													023151			025326					
													023203			025327					
													023204			025328					
													023206			025329					
													023208								
													023304								

Table C-2.3. Tag codes for Quinsam

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
			020403	020108	021916	021736	021759	021757	021657	022303	022518	022631	023322	023522	024152	024419	025814	026062	020956	180422	181150
						021737		021758	021943	022304	022519	022632	023323	023523	024153	024420	025815	026063	020957	180421	181151
						021738			021950				023324	023524	024154	024421	025816	026101	020958	180420	181152
													023325	023525	024155	024956	025817	026102	020959	180419	181153
													023326	023554	024156	025358	025818	020361	021448	180418	181154
													023327	023555	024157	025359	025819	020360	021449	180417	181155
													023328	023556	024158	025360	025820	020359	021450	180416	181156
													023329	023557	024159	025361	025821	020358	021451	180415	181157
													023330	023558	024160	025362	025822	020357	026019	021331	181158

Table C-2.4. Tag codes for Puntledge

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
			021402	020308	021816	021634	021831	021845	021947	022302	022556	022710	023357	023727	024701	023701	026034	020809	180315	180817	181403
											022557	022711	023358		024702			020810	180316	180816	181404
													023359							180815	
													023360							180814	

Table C-2. Tag Codes Used for Exploitation Rate Assessment (continued)

Table C-2.5. Tag codes for Big Qualicum

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
		BLRD	021002	020206	021716	021726	021612	021824	021810	022223	022543	022661	023217	023742	024260	024416	026010	020660	021312	180863	180406
		021102				021727	021613	021825	021944	022306		022747	023320	023743	024261	024742	026047	020661	021313	180862	180407
		BLRDGN					021656	021826				022748	023321	023744	024262	024761	026048	020662	021314	180861	180408
												022824	023333	023745	024263	024762	026049	020663	021315	021335	180409
												022825	023334	024047	024357	024957	026050	020727	180253	021334	180410
												022826	023335	024048	024358	024962	026051	020952	180254	021333	180411
													023336	024049	024359	024963	026052	020953	180255	021332	181103
													023337	024050	024360	025001	026053	020954	180256		181104
													023338				026054				
													023345				026323				
																	026324				

Table C-2.6. Tag codes for South Puget Sound Fall Yearling

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
							632004	632015	632248	632147					634959	635502	630138	633926	634257	634528	635217
								632019	632302	632360											
								632054	632308	632416											
								632055													
								632056													
								H10204													

Table C-2.7. Tag codes for Squaxin Pens Fall Yearling

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
															634162	634202	635244	630455	633955		
																			634008		

Table C-2.8. Tag codes for University of Washington Accelerated

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
				110211	110116	111601	111603	111627	110634	111644	111655	633025	111718								
				110212	110117	111602	111604	111628	110635	111645	111656		111719								
				110213	110118		111605	111629	110636	111646	111657		111720								
				110214	110119		111606	111630	110637	111647	111658		111721								
				110301			111618	111631	110638	111648	111659		111722								
				110302			111624	111632	110639	111649	111660		111723								
									110640	111650											
									110641	111651											
									110642	111652											

Table C-2. Tag Codes Used for Exploitation Rate Assessment (continued)

Table C-2.9. Tag codes for Samish Fall Fingerling

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
			011305	130302				632042						633804	634122	634732	635242	630731	634025	634340	635009
			130104	130602				632101						633805							
			130215	130603				632102						633806							
														633807							
														634111							

Table C-2.10. Tag codes for Stillaguamish Fall Fingerling

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
									050843	051063	051427	211618			212221	212555	213147	211826	212026	212205	212251

Table C-2.11. Tag codes for George Adams Fall Fingerling

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
	150812		130303	130913			631752	632041	632146	632235				633501	634119	635208	635237	630450	630862	634023	634946
	151013						631915	632109	632262	632331				633502						634620	635057
									632161					633503							
														633504							

Table C-2.12. Tag codes for South Puget Sound Fall Fingerling

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
150010	151010	151312	011403	130604			631935	631943	632145	051047	051346	211622	211657	211901	211961	212542	213137	211831	634024	634339	212326
150109	151012	151313	011404				631936	631944	632233	632256				633643	634116	635221	635238	630261	212014	212217	634953
150111	151202						631940		632253	632158				633644	634121	635222					
150114							631945							633645							
150200														633646							
150203														634104							
150806																					

Table C-2.13. Tag codes for Kalama Fall Fingerling

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
								050722	050839	051048	051344	211628	211706	211759	211962	212541	213138	211836	211833	212206	212323
									050840	051049	051345	211629	211707	211761							

Table C-2. Tag Codes Used for Exploitation Rate Assessment (continued)

Table C-2.14. Tag codes for Elwha Fall Fingerling

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
											051363	211616	211658	211919	212208		213132	211827	212015	212215	212324
											632721	633038	633419	211920				211828			
											632722	633039	633420	211921							
														633543							
														633544							
														633547							
														633548							

Table C-2.15. Tag codes for Hoko Fall Fingerling

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
														211935	212216	211907		211829	212018	212218	212327

Table C-2.16. Tag codes for Skagit Spring Yearling

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
										632606	632607	632608	633353	633323	633314	634744			633114		
													633354			634902					
																635026					

Table C-2.17. Tag codes for Nooksack Spring Yearling

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
										632411	632546		633452		633247	634962	634422	635261	634123		634529
													633453		633248	635059					
															633336						

Table C-2.18. Tag codes for White River Spring Yearling

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
			130208	131010			631834	632047	632136	632341	632853	633049	632508	633131	633246	634702	630161	635542	635908	634224	634619
										632604	633009	633050	633060	633648	634145	634704	630162				
													633108								

Table C-2. Tag Codes Used for Exploitation Rate Assessment (continued)

Table C-2.19. Tag codes for Sooes Fall Fingerling

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
														051744	051907	051950		051955	052353	052822	053131
														051745					052354	052823	
														051746					052355	052824	
														051747					052356	052825	

Table C-2.20. Tag codes for Queets Fall Fingerling

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
						050361	050520	050661	050830	050962	051425	211621		211908	212101	212835	213144	211835	212010	212260	
							050521		050833	051016											
							050522														
							050525														

Table C-2.21. Tag codes for Cowlitz Tule

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
						631802	631942	632154	632156	632462	632503	633019	633235	634108	634126	635231	635250	630452	634056	634526	635015
									632255			633020	633236								
												633124	633237								
												633125	633238								

Table C-2.22. Tag codes for Spring Creek Tule

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
	050101	050401	050901	050202	054101	055501	050433	050639	050740	051050	051142	051151	051534	B50109	051855	051445	052013	052207	052106	052127	052133
	050201	050501	051001	050302	054201	055601	050434	050640	050741	051051	051143	051152	051535	B50110	051856	051449	052015	052208	052109	052129	052134
	050301	050601	051101	050402	054401	055701	050444	050641	050742	051052			051536	B50111	051857	051450	052016	052209	052110	052130	052146
			051201	050502	054501	056001	050446		050748				051537	B50112	051858	051451	052017	052210	052112	052544	052149
			051301	050602	054601	056201			050749				051538	B50113	051859	051659	052018	052211	052115	052545	052732
			051401	050702					050750				051539	B50114	051860	051660	052019	052212	052117	052553	052733
				050802					050751					B50115	051861	051661	052020	052213	052118	052554	052735
														B50208	051862	051662	052021	052214	052123	052557	052736
														B50209	051863	051910	052023	052215	052124	052558	052840
															051905	051912	052024	052216		052559	053045
															051906	051913	052025	052217		052560	
															051909	051914	052032	052218		052561	
																051923	052033	052335		052562	
																051924		052336		052563	
																051925				052605	
																				052606	

Table C-2. Tag Codes Used for Exploitation Rate Assessment (continued)

Table C-2.23. Tag codes for Bonneville Tule

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
					091605	071656	071842	072157	072156	072407	072729	073120	073322								075942
								072163	072329	072408	072730	073121	073323								076020
									072341	072411											
									072342												

Table C-2.24. Tag codes for Stayton Pond Tule

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
							071841	072055	072335	072662	072328	073144	073352	073818	074050	074526	075012	075218	075227	071601	075657
											072830	073145	073353	073819	074051	074527	075015	075219	075228	071602	075658
											072831	073146	073354	073820	074052	074528	075017	075220	075229	071603	070221
											072832	073147	073355	073821	074053	074529	075018	075221	075230	071606	070222
											072833	073148	073356	073822	074054	074530	075020	075222	075231	075905	070223
											072834										070224
																					076321

Table C-2.25. Tag codes for Upriver Bright

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
				130713	631662	631741	631821	631948	632155	632252	632611	632859	633221	634102	634128	635226	635249	630732	634057	634341	635010
				131101		631745			632261	632456	632612	632860	633222								
				131202																	

Table C-2.26. Tag codes for Hanford Wild

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
															634152	635232	635252	630755	634115	634527	635017

Table C-2.27. Tag codes for Lewis River Wild

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
						631611	631813	632123			632737	633126	633411	633821	634151	635061	630456	631350	634217	634206	634940
						631618	631858	632124			632738	633127	633412	633822	634153	635062					
						631619	631859	632125													
							631902	632207													
							631920	632208													
							632002	632214													
								632213													

Table C-2. Tag Codes Used for Exploitation Rate Assessment (continued)

Table C-2.28. Tag codes for Lyons Ferry

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
													633226	633638	634259	635214	630226	635544	634143		635012
													633227	633639	634261	635216	630228	635547	634160		
													633228	633640							
														633641							
														633642							

Table C-2.29. Tag codes for Willamette Spring

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
				090509	091701	071737	071925	072219	072237	072521	072863	073024	073163	073428	073707	074653	073721	075347	075021	075811	
					091703	071738	072042	072222	072418	072522	072905	072902	073201	073429	073708	074654	075158	075348	075346	070017	
					091621	071741	072047	072224	072422	072719	072930	073023	073202	073902	074962	075028	075159	075349	075452	075904	
					091622	071742	072049	072225	072517	072720			073203	073903	075002	075038	075160	075350	075626	071457	
					091623		072053	072226	072528				073651	073906	075004	075041	075161	075438	075627	075734	
					091624			072252	072529				073652	073907	075013	075042	075162	075439	075628	075735	
					091625			072253	072530				073653	073908		075047	075163	075501	075630	075655	
					091626			072254					073654	073909		075049	075202	075502	075643	073722	
					091627								073655	073910		075050	075203	075504	075644	076114	
					091628								073656	073911		075052	075205	075506	075656	076115	
					091629								073663	073944			075206	075514	075661	076116	
					091630								073701	073945			075207	075515		076117	
					091631								073702	073948			075208	075516		076118	
													073729	073949			075210	075522		076119	
													073730	073950			075211	075523		071458	
													073731	073951				075524		075732	
													073732	073952				075525		071459	
													073733	073953				075526		075921	
													073734					075527		075922	
													073735					075528		075923	
													073736							075924	
																				075933	
																				075934	

Table C-2.30. Tag codes for Salmon River

BY 71	BY 72	BY 73	BY 74	BY 75	BY 76	BY 77	BY 78	BY 79	BY 80	BY 81	BY 82	BY 83	BY 84	BY 85	BY 86	BY 87	BY 88	BY 89	BY 90	BY 91	BY 92
						071643	071849	072239	072504		072647	072726	073051	073329	073342	074629	075131	075458	075705	071559	070417
						071644	071850	072240	072505				073052	073330	074321	074635	075132	075459	075706	071560	070418
															074322	074636	075133	075460	075707	071561	070419
															074323	074637	075134	075461	075708	071562	070420
															074324	074638	075135	075462	075709	071563	070421
																	075136				

Table C-3. Sources and estimates of legal and sublegal encounters in the SEAK troll fishery during chinook nonretention fisheries.

ADJUSTED [1]

JULY INSIDE [2] ESTIMATES

YEAR	LEGAL CNR	SUBLEGAL CNR	CHINOOK	
1981	0	0	14,493	[3]
1982	37,267	37,990	27,102	[3]
1983	0	0	34,495	[3]
1984	1,956	1,994	14,181	[3]
1985	4,261	4,723	28,236	[4]
1986	7,599	10,113	22,886	[5]
1987	68,122	60,741	26,646	[6]
1988	28,086	42,040	35,766	[7]
1989	69,019	74,656	25,581	[8]
1990	5,287	5,672	46,050	[9]
1991	45,073	48,355	25,565	[9]
1992	8,404	9,016	11,389	[9]
1993	12,000	12,873	14,308	[9]
1994	13,190	14,150	9,015	[9]

JULY OUTSIDE [2] ESTIMATES

YEAR	LEGAL CNR	SUBLEGAL CNR	CHINOOK	
1981	0	0	47,694	[3]
1982	51,833	52,837	65,180	[3]
1983	0	0	83,734	[3]
1984	5,041	5,139	58,068	[3]
1985	25,255	27,994	86,090	[4]
1986	23,056	30,683	78,233	[5]
1987	123,834	110,415	103,533	[6]
1988	32,844	49,160	126,376	[7]
1989	81,581	88,244	141,911	[8]
1990	14,840	15,921	154,040	[9]
1991	63,990	68,649	128,455	[9]
1992	33,472	35,909	54,258	[9]
1993	27,895	29,926	86,819	[9]
1994	36,120	38,750	89,193	[9]

UNADJUSTED

JULY INSIDE [2] ESTIMATES

YEAR	LEGAL CNR	SUBLEGAL CNR	CHINOOK	
1981	0	0	14,493	[3]
1982	0	0	27,067	[3]
1983	0	0	34,495	[3]
1984	1,956	1,994	14,181	[3]
1985	4,261	4,723	28,236	[4]
1986	7,599	10,113	22,886	[5]
1987	27,117	24,178	26,644	[6]
1988	6,416	9,604	35,695	[7]
1989	23,477	25,394	25,581	[8]
1990	5,287	5,672	46,050	[9]
1991	9,414	10,099	25,565	[9]
1992	8,404	9,016	11,389	[9]
1993	12,000	12,873	14,308	[9]
1994	13,190	14,150	9,015	[9]

JULY OUTSIDE [2] ESTIMATES

YEAR	LEGAL CNR	SUBLEGAL CNR	CHINOOK	
1981	0	0	47,694	[3]
1982	0	0	65,164	[3]
1983	0	0	83,734	[3]
1984	5,041	5,139	58,068	[3]
1985	25,255	27,994	86,090	[4]
1986	23,056	30,683	78,233	[5]
1987	59,920	53,427	103,527	[6]
1988	12,103	18,116	126,376	[7]
1989	33,619	36,365	141,911	[8]
1990	14,840	15,921	154,040	[9]
1991	34,957	37,502	128,455	[9]
1992	33,472	35,909	54,258	[9]
1993	27,895	29,926	86,819	[9]
1994	36,120	38,750	89,193	[9]

Table C-3 (continued)

FALL [2]
ESTIMATES

LEGAL YEAR	SUBLEGAL CNR	CNR	CHINOOK	
1981	18,225	18,578	39,767	[3]
1982	0	0	0	[3]
1983	74,925	76,378	19,700	[3]
1984	80,078	81,631	10,957	[3]
1985	88,676	98,294	13,306	[4]
1986	48,108	64,023	59,287	[5]
1987	0	0	0	[6]
1988	0	0	0	[7]
1989	0	0	0	[8]
1990	78,791	84,528	11,855	[9]
1991	0	0	0	[9]
1992	79,748	85,555	6,941	[9]
1993	77,880	83,550	43,996	[9]
1994	70,346	75,468	20,224	[9]

FALL [2]
ESTIMATES

LEGAL YEAR	SUBLEGAL CNR	CNR	CHINOOK	
1981	18,225	18,578	39,767	[3]
1982	89,100	90,827	51	[3]
1983	74,925	76,378	19,700	[3]
1984	80,078	81,631	10,957	[3]
1985	88,676	98,294	13,306	[4]
1986	48,108	64,023	59,287	[5]
1987	104,920	93,551	8	[6]
1988	42,411	63,480	71	[7]
1989	93,504	101,141	0	[8]
1990	78,791	84,528	11,855	[9]
1991	64,692	69,402	0	[9]
1992	79,748	85,555	6,941	[9]
1993	77,880	83,550	43,996	[9]
1994	70,346	75,468	20,224	[9]

[1] Adjustment of the CNR encounters was necessary in some years when little or no landed catch was present in the Fall fishing strata. The cohort analysis requires landed catch in a fishery with CNR encounters in order to estimate the CNR by tag code. The Fall CNR encounters from these years were redistributed to the corresponding Inside July or Outside July fishing strata to avoid this problem.

[2] The total CNR encounter estimates for each year were distributed to each stratum which had CNR by multiplying the total encounter estimate for the year by the proportion of the total CNR effort that occurred in the stratum.

[3] Alaska Dept. Fish and Game and National Marine Fisheries Service. 1987. Associated fishing induced mortalities of chinook salmon in southeast Alaska. Alaska Dept. Fish Game, unpublished report.

[4] Davis, A., J. Kelley, and M. Seibel. 1986. Observations on chinook salmon hook and release in the 1985 southeast Alaska troll fishery. Alaska Dept. Fish Game, unpublished report.

[5] Davis, A., J. Kelley, and M. Seibel. 1987. Observations on chinook salmon hook and release in the 1986 southeast Alaska troll fishery. Alaska Dept. Fish Game, unpublished report.

[6] Seibel, M., A. Davis, J. Kelley, and J.E. Clark. 1988. Observations on chinook salmon hook and release in the 1987 southeast Alaska troll fishery. Alaska Dept. Fish Game, unpublished report.

[7] Seibel, M., A. Davis, J. Kelley, and J.E. Clark. 1989. Observations on chinook salmon hook and release in the 1988 southeast Alaska troll fishery. Alaska Dept. Fish Game, unpublished report.

[8] Data collected from a limited survey of the chinook nonretention fishery in 1989 indicated that encounter rates were similar to those which had occurred in previous years. For this reason, the number of encounters was estimated by multiplying the 1985-1988 average CNR encounters per gear day times the gear days for 1989. (Spreadsheet CNR90.WQ1, J. Carlile ADF&G, 2/2/91)

[9] The number of legal and sublegal encounters during the CNR fishery in 1990-1994 were estimated from a linear regression on the number of boat days of CNR effort.

Table C-4. Sources and estimates of legal and sublegal encounters in the SEAK net fishery during chinook nonretention fisheries.

Year	Legal CNR Encounters	Sublegal CNR Encounters	Source
1985	12,352	60,506	[1]
1986	13,773	26,850	[2]
1987	4,497	13,923	[3]
1988	8,574	28,357	[4]
1989	8,557	28,301	[4]
1990	6,383	22,601	[4]
1991	7,443	24,615	[4]
1992	12,783	42,277	[4]
1993	4,696	15,532	[4]
1994	8,094	26,770	[4]

[1] Van Alen, B.W. and M. Seibel. 1986. Observations on chinook salmon non-retention in the 1985 Southeast Alaska purse seine fishery. In, 1985 salmon research conducted in Southeast Alaska by the Alaska Department of Fish and Game in conjunction with the National Marine Fisheries Service Auke Bay Laboratory for joint U.S./Canada interception studies. Final Report Contract No./ 85-ABC-00142. Juneau, Alaska.

[2] Van Alen, B.W. and M. Seibel. 1987. Observations on chinook salmon non-retention in the 1986 Southeast Alaska purse seine fishery. In, 1986 salmon research conducted in Southeast Alaska by the Alaska Department of Fish and Game in conjunction with the National Marine Fisheries Service Auke Bay Laboratory for joint U.S./Canada interception studies. Final Report. Contract No. NA-87-ABH-00025. Juneau, Alaska.

[3] Rowse, M.L. and S. Marshall. 1988. Estimates of catch and mortality of chinook salmon in the 1987 southeast Alaska purse seine fishery. Alaska Department of Fish and Game, Regional Information Report 1J88-18.

[4] Computed by multiplying 1985-1987 average ratio of legal (or sublegal) encounters by the reported catch.

Table C-5. Number of days (or gear days) of chinook retention, chinook nonretention, and source of information for the NBC troll fishery.

Year	Chinook Retention	Chinook Nonretention	Source
1987	60	9	[1]
1988	43	17	[2]
1989	66	9	[3]
1990	18,964	6,431	[4]
1991	26,754	3,042	[4]
1992	15,798	5,778	[4]
1993	16,427	3,496	[4]
1994	22,159	2,490	[4]

[1] Chinook Technical Committee. 1987. Chinook Technical Committee report to the November, 1987 meeting of the Pacific Salmon Commission. Pacific Salmon Commission, TCCHINOOK (87)-5.

[2] Chinook Technical Committee. 1988. Preliminary review of 1988 fisheries. Pacific Salmon Commission, TCCHINOOK (88)-3.

[3] Chinook Technical Committee. 1990. 1989 annual report. Pacific Salmon Commission, TCCHINOOK (90)-3.

[4] Computed by multiplying the number of days during the chinook retention fishery by the ratio of the number of boat days during the nonretention fishery to the number of boat days during the chinook retention fishery.

Table C-6. Number of days (or gear days) of chinook retention, chinook nonretention, and source of information for the CBC troll fishery.

Year	Chinook Retention	Chinook Nonretention	Source
1987	60	9	[1]
1988	43	17	[2]
1989	66	9	[3]
1990	6,032	1,591	[4]
1991	4,891	641	[4]
1992	5,739	1,070	[4]
1993	2,867	1,153	[4]
1994	7,156	409	[4]

[1] Chinook Technical Committee. 1987. Chinook Technical Committee report to the November, 1987 meeting of the Pacific Salmon Commission. Pacific Salmon Commission, TCCHINOOK (87)-5.

[2] Chinook Technical Committee. 1988. Preliminary review of 1988 fisheries. Pacific Salmon Commission, TCCHINOOK (88)-3.

[3] Chinook Technical Committee. 1990. 1989 annual report. Pacific Salmon Commission, TCCHINOOK (90)-3.

[4] Computed by multiplying the number of days during the chinook retention fishery by the ratio of the number of boat days during the nonretention fishery to the number of boat days during the chinook retention fishery.

Table C-7. Number of days (or gear days) of chinook retention, chinook nonretention, and source of information for the WCVI troll fishery.

Year	Chinook Retention	Chinook Nonretention	Source
1985	105	5	[1]
1987	47	7	[2]
1988	55	15	[3]

[1] Anonymous. 1986. 1985 Canadian agency report on chinook salmon. Canadian Department of Fisheries and Oceans, unpublished report.

[2] Chinook Technical Committee. 1987. Chinook Technical Committee report to the November, 1987 meeting of the Pacific Salmon Commission. Pacific Salmon Commission, TCCHINOOK (87)-5.

[3] Chinook Technical Committee. 1988. Preliminary review of 1988 fisheries. Pacific Salmon Commission, TCCHINOOK (88)-3.

Table C-8. Sources and estimates of CNR parameters for the GS troll fishery.

Year	Legal CNR	Sublegal CNR	Retention	Nonretention	Source
1985	12,412	12,184			[1]
1986	5,151	17,834			[1]
1991			4,589	1,867	[2]
1992			3,744	2,414	[2]
1993			4,184	2,990	[2]
1994			6,340	626	[2]

[1] Anonymous. 1986. Data Report on Unaccounted for Sources of Fishing Associated Mortalities of Chinook Salmon in B.C. Fisheries (1977-1986). Canadian Department of Fisheries and Oceans, unpublished report. 47p. Data reported is number of encounters.

[2] Computed by multiplying the number of days during the chinook retention fishery by the ratio of the number of boat days during the nonretention fishery to the number of boat days during the chinook retention fishery.

APPENDIX D: CATCH DISTRIBUTIONS

Alaska Spring

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
83	94.5%	5.3%	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%
84	94.7%	3.8%	0.0%	0.0%	0.0%	0.0%	1.5%	0.0%	0.0%
85	96.6%	2.8%	0.0%	0.0%	0.0%	0.0%	0.6%	0.0%	0.0%
86	98.1%	1.7%	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%
87	98.1%	1.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
88	97.5%	2.4%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
89	98.0%	2.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
90	96.6%	3.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
91	98.3%	1.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
92	98.7%	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
93	98.8%	1.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
94	97.8%	2.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
(83-94)	97.3%	2.5%	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%
(85-94)	97.8%	2.1%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
83	95.8%	3.9%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%
84	95.7%	3.0%	0.0%	0.0%	0.0%	0.0%	1.3%	0.0%	0.0%
85	97.6%	2.0%	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%	0.0%
86	98.6%	1.2%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
87	98.6%	1.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
88	97.8%	2.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
89	98.4%	1.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
90	97.0%	3.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
91	98.5%	1.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
92	98.8%	1.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
93	99.1%	0.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
94	98.8%	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
(83-94)	97.9%	1.9%	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%
(85-94)	98.3%	1.6%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%

Robertson Creek

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
79	32.3%	43.3%	11.4%	2.4%	3.2%	7.5%	0.0%	0.0%	0.0%
80	45.4%	26.4%	9.4%	0.3%	14.1%	4.2%	0.0%	0.3%	0.0%
81	39.2%	30.5%	6.3%	1.2%	16.0%	6.4%	0.0%	0.5%	0.0%
82	35.7%	30.7%	6.7%	1.0%	17.4%	7.6%	0.1%	0.7%	0.2%
83	46.4%	22.7%	5.7%	0.3%	19.6%	5.0%	0.0%	0.3%	0.0%
84	35.5%	21.4%	7.0%	0.8%	18.5%	16.7%	0.0%	0.2%	0.0%
85	32.7%	34.6%	3.0%	1.2%	5.5%	23.1%	0.0%	0.0%	0.0%
86	30.4%	20.0%	6.7%	0.0%	2.1%	40.8%	0.0%	0.0%	0.0%
87	17.9%	26.2%	4.9%	1.2%	2.1%	47.8%	0.0%	0.0%	0.0%
88	26.2%	19.9%	7.7%	1.2%	15.3%	29.6%	0.0%	0.0%	0.0%
89	18.3%	16.7%	2.5%	1.2%	31.9%	29.4%	0.0%	0.0%	0.0%
90	31.6%	20.1%	10.8%	0.7%	17.7%	19.1%	0.0%	0.0%	0.0%
91	30.3%	19.8%	6.6%	0.5%	22.2%	20.5%	0.0%	0.0%	0.0%
92	32.6%	21.1%	31.5%	0.2%	1.1%	13.5%	0.0%	0.0%	0.0%
93	28.2%	16.3%	20.0%	0.9%	12.0%	22.4%	0.1%	0.0%	0.0%
94	34.0%	19.3%	8.0%	0.6%	5.2%	32.9%	0.0%	0.0%	0.0%
(79-94)	32.3%	24.3%	9.3%	0.8%	12.7%	20.4%	0.0%	0.1%	0.0%
(85-94)	28.2%	21.4%	10.2%	0.8%	11.5%	27.9%	0.0%	0.0%	0.0%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
79	36.5%	40.4%	10.9%	2.0%	2.7%	7.5%	0.0%	0.0%	0.0%
80	46.3%	26.4%	9.5%	0.3%	13.1%	4.0%	0.1%	0.3%	0.0%
81	43.4%	28.8%	6.1%	1.0%	13.7%	6.5%	0.0%	0.6%	0.0%
82	40.5%	28.9%	6.4%	0.9%	15.2%	7.2%	0.1%	0.7%	0.2%
83	51.8%	20.8%	5.3%	0.3%	17.1%	4.5%	0.0%	0.2%	0.0%
84	37.1%	21.2%	7.2%	0.8%	17.5%	16.1%	0.0%	0.2%	0.0%
85	45.9%	27.9%	2.5%	0.9%	4.2%	18.6%	0.0%	0.0%	0.0%
86	43.7%	19.6%	5.9%	0.0%	1.6%	29.2%	0.0%	0.0%	0.0%
87	23.4%	22.4%	4.4%	0.9%	1.4%	47.5%	0.0%	0.0%	0.0%
88	32.0%	19.6%	7.8%	1.1%	12.6%	26.8%	0.0%	0.0%	0.0%
89	27.3%	17.4%	2.7%	1.5%	24.8%	26.3%	0.0%	0.0%	0.0%
90	38.7%	20.1%	10.0%	0.9%	13.8%	16.6%	0.0%	0.0%	0.0%
91	35.3%	19.7%	6.7%	0.6%	19.0%	18.6%	0.0%	0.0%	0.0%
92	41.7%	18.9%	27.7%	0.2%	0.9%	10.6%	0.0%	0.0%	0.0%
93	32.7%	16.0%	19.8%	0.8%	10.5%	20.1%	0.1%	0.0%	0.0%
94	39.7%	17.6%	7.7%	0.6%	4.7%	29.8%	0.0%	0.0%	0.0%
(79-94)	38.5%	22.9%	8.8%	0.8%	10.8%	18.1%	0.0%	0.1%	0.0%
(85-94)	36.0%	19.9%	9.5%	0.7%	9.4%	24.4%	0.0%	0.0%	0.0%

Quinsam

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
79	13.6%	66.8%	0.0%	12.2%	7.5%	0.0%	0.0%	0.0%	0.0%
80	31.8%	50.7%	0.0%	7.6%	9.9%	0.0%	0.0%	0.0%	0.0%
81	21.5%	53.7%	0.7%	15.6%	8.5%	0.0%	0.0%	0.0%	0.0%
82	38.8%	46.0%	0.4%	5.0%	9.8%	0.0%	0.0%	0.0%	0.0%
83	31.4%	52.8%	0.8%	5.5%	9.6%	0.0%	0.0%	0.0%	0.0%
84	36.8%	41.8%	1.2%	11.1%	9.3%	0.0%	0.0%	0.0%	0.0%
85	53.8%	28.6%	0.1%	6.1%	11.4%	0.0%	0.0%	0.0%	0.0%
86	31.9%	51.0%	0.0%	8.7%	8.5%	0.0%	0.0%	0.0%	0.0%
87	27.2%	54.6%	0.6%	6.2%	10.9%	0.6%	0.0%	0.0%	0.0%
88	48.2%	33.3%	1.5%	7.4%	7.9%	1.7%	0.0%	0.0%	0.0%
89	35.1%	26.0%	0.5%	13.9%	24.6%	0.0%	0.0%	0.0%	0.0%
90	35.0%	49.1%	2.3%	6.2%	7.5%	0.0%	0.0%	0.0%	0.0%
91	25.6%	59.7%	0.8%	7.2%	5.4%	1.2%	0.0%	0.0%	0.0%
92	29.2%	59.6%	0.6%	6.3%	4.3%	0.0%	0.0%	0.0%	0.0%
93	20.2%	58.1%	1.7%	15.0%	5.0%	0.0%	0.0%	0.0%	0.0%
94	21.6%	57.5%	0.0%	12.8%	8.1%	0.0%	0.0%	0.0%	0.0%
(79-94)	31.4%	49.3%	0.7%	9.2%	9.3%	0.2%	0.0%	0.0%	0.0%
(85-94)	32.8%	47.8%	0.8%	9.0%	9.4%	0.3%	0.0%	0.0%	0.0%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
79	18.4%	64.0%	0.1%	10.5%	7.1%	0.0%	0.0%	0.0%	0.0%
80	32.9%	50.7%	0.0%	6.9%	9.5%	0.0%	0.0%	0.0%	0.0%
81	22.8%	53.9%	0.7%	14.4%	8.1%	0.0%	0.0%	0.0%	0.0%
82	43.5%	42.8%	0.4%	4.7%	8.6%	0.0%	0.0%	0.0%	0.0%
83	36.8%	48.9%	0.7%	5.3%	8.2%	0.0%	0.0%	0.0%	0.0%
84	38.9%	40.8%	1.2%	10.5%	8.6%	0.0%	0.0%	0.0%	0.0%
85	61.7%	24.0%	0.1%	5.0%	9.2%	0.0%	0.0%	0.0%	0.0%
86	40.5%	44.5%	0.0%	8.1%	6.9%	0.0%	0.0%	0.0%	0.0%
87	42.7%	44.0%	0.6%	4.5%	7.8%	0.4%	0.0%	0.0%	0.0%
88	51.3%	31.8%	1.5%	6.8%	7.0%	1.5%	0.0%	0.0%	0.0%
89	43.4%	22.8%	0.5%	13.4%	19.9%	0.0%	0.0%	0.0%	0.0%
90	40.6%	45.0%	2.2%	6.1%	6.2%	0.0%	0.0%	0.0%	0.0%
91	32.8%	53.8%	0.8%	7.1%	4.5%	1.0%	0.0%	0.0%	0.0%
92	35.3%	54.2%	0.5%	6.3%	3.6%	0.0%	0.0%	0.0%	0.0%
93	26.6%	50.7%	1.6%	17.2%	3.9%	0.0%	0.0%	0.0%	0.0%
94	29.9%	51.4%	0.0%	11.9%	6.7%	0.0%	0.0%	0.0%	0.0%
(79-94)	37.4%	45.2%	0.7%	8.7%	7.9%	0.2%	0.0%	0.0%	0.0%
(85-94)	40.5%	42.2%	0.8%	8.6%	7.6%	0.3%	0.0%	0.0%	0.0%

Puntledge

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
79	0.0%	28.2%	1.4%	60.6%	9.8%	0.0%	0.0%	0.0%	0.0%
80	0.0%	21.5%	7.8%	61.3%	9.3%	0.0%	0.0%	0.0%	0.0%
81	0.0%	23.0%	0.0%	70.8%	6.3%	0.0%	0.0%	0.0%	0.0%
82	0.0%	37.7%	2.8%	34.0%	25.5%	0.0%	0.0%	0.0%	0.0%
83	0.0%	50.7%	4.0%	41.1%	4.3%	0.0%	0.0%	0.0%	0.0%
84	0.0%	28.8%	4.9%	60.0%	6.3%	0.0%	0.0%	0.0%	0.0%
85	0.0%	36.8%	0.0%	54.4%	8.8%	0.0%	0.0%	0.0%	0.0%
86	0.0%	26.3%	4.3%	66.6%	2.8%	0.0%	0.0%	0.0%	0.0%
87	0.0%	57.9%	0.0%	33.3%	0.0%	8.8%	0.0%	0.0%	0.0%
88	0.0%	45.9%	0.0%	52.3%	1.8%	0.0%	0.0%	0.0%	0.0%
89	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
90	0.0%	57.4%	0.0%	27.1%	15.5%	0.0%	0.0%	0.0%	0.0%
91	0.0%	27.0%	0.0%	57.8%	15.2%	0.0%	0.0%	0.0%	0.0%
92	0.0%	16.6%	0.0%	61.9%	21.4%	0.0%	0.0%	0.0%	0.0%
93	0.0%	30.0%	0.0%	70.0%	0.0%	0.0%	0.0%	0.0%	0.0%
94	0.0%	10.0%	0.0%	85.0%	5.0%	0.0%	0.0%	0.0%	0.0%
(79-94)	0.0%	31.1%	1.6%	58.5%	8.3%	0.6%	0.0%	0.0%	0.0%
(85-94)	0.0%	30.8%	0.4%	60.8%	7.1%	0.9%	0.0%	0.0%	0.0%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
79	0.0%	30.6%	1.6%	58.2%	9.6%	0.0%	0.0%	0.0%	0.0%
80	0.0%	23.3%	8.6%	58.7%	9.4%	0.0%	0.0%	0.0%	0.0%
81	0.0%	25.1%	0.0%	68.6%	6.3%	0.0%	0.0%	0.0%	0.0%
82	0.0%	37.7%	2.9%	36.2%	23.2%	0.0%	0.0%	0.0%	0.0%
83	0.0%	52.4%	4.1%	39.3%	4.2%	0.0%	0.0%	0.0%	0.0%
84	0.0%	28.8%	5.0%	60.3%	5.8%	0.0%	0.0%	0.0%	0.0%
85	0.0%	36.7%	0.0%	55.5%	7.8%	0.0%	0.0%	0.0%	0.0%
86	0.0%	25.3%	4.2%	68.0%	2.5%	0.0%	0.0%	0.0%	0.0%
87	0.0%	61.5%	0.0%	30.6%	0.0%	8.0%	0.0%	0.0%	0.0%
88	0.0%	46.0%	0.0%	52.4%	1.6%	0.0%	0.0%	0.0%	0.0%
89	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
90	0.0%	54.3%	0.0%	32.2%	13.5%	0.0%	0.0%	0.0%	0.0%
91	0.0%	19.5%	0.0%	71.2%	9.3%	0.0%	0.0%	0.0%	0.0%
92	0.0%	13.1%	0.0%	70.5%	16.4%	0.0%	0.0%	0.0%	0.0%
93	0.0%	25.1%	0.0%	74.9%	0.0%	0.0%	0.0%	0.0%	0.0%
94	0.0%	8.2%	0.0%	87.8%	4.0%	0.0%	0.0%	0.0%	0.0%
(79-94)	0.0%	30.5%	1.7%	60.3%	7.1%	0.5%	0.0%	0.0%	0.0%
(85-94)	0.0%	29.0%	0.4%	64.3%	5.5%	0.8%	0.0%	0.0%	0.0%

Big Qualicum

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
79	6.9%	22.4%	3.2%	56.1%	11.3%	0.1%	0.0%	0.0%	0.0%
80	4.7%	21.5%	5.8%	54.4%	12.8%	0.0%	0.2%	0.4%	0.3%
81	2.9%	21.0%	1.8%	62.0%	11.1%	0.3%	0.0%	0.2%	0.7%
82	8.2%	27.9%	6.4%	37.5%	17.5%	0.0%	0.0%	1.6%	1.0%
83	9.1%	22.5%	1.4%	47.1%	19.1%	0.0%	0.0%	0.0%	0.8%
84	2.5%	22.1%	1.9%	65.5%	7.9%	0.0%	0.0%	0.0%	0.0%
85	8.3%	21.0%	2.1%	50.4%	18.2%	0.0%	0.0%	0.0%	0.0%
86	3.6%	30.4%	1.7%	55.3%	9.0%	0.0%	0.0%	0.0%	0.0%
87	16.8%	18.8%	6.8%	50.3%	7.3%	0.0%	0.0%	0.0%	0.0%
88	6.6%	24.3%	4.6%	53.2%	7.9%	3.4%	0.0%	0.0%	0.0%
89	11.7%	10.5%	7.2%	58.0%	12.6%	0.0%	0.0%	0.0%	0.0%
90	14.4%	26.2%	4.8%	38.4%	16.2%	0.0%	0.0%	0.0%	0.0%
91	4.7%	12.6%	3.1%	71.2%	8.4%	0.0%	0.0%	0.0%	0.0%
92	4.9%	29.4%	4.7%	56.0%	4.9%	0.0%	0.0%	0.0%	0.0%
93	3.9%	17.6%	2.5%	67.2%	8.8%	0.0%	0.0%	0.0%	0.0%
94	8.9%	16.9%	5.3%	64.6%	4.4%	0.0%	0.0%	0.0%	0.0%
(79-94)	7.4%	21.6%	4.0%	55.4%	11.1%	0.2%	0.0%	0.1%	0.2%
(85-94)	8.4%	20.8%	4.3%	56.5%	9.8%	0.3%	0.0%	0.0%	0.0%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
79	9.1%	23.7%	3.5%	52.7%	10.8%	0.1%	0.0%	0.0%	0.0%
80	5.3%	22.8%	6.3%	51.9%	12.7%	0.0%	0.2%	0.4%	0.3%
81	3.7%	22.6%	2.0%	59.3%	11.1%	0.3%	0.0%	0.2%	0.8%
82	10.4%	27.5%	6.4%	36.4%	16.7%	0.0%	0.0%	1.7%	0.9%
83	9.7%	22.2%	1.4%	48.1%	17.2%	0.0%	0.0%	0.0%	1.2%
84	4.2%	21.1%	1.8%	66.2%	6.7%	0.0%	0.0%	0.0%	0.0%
85	13.3%	19.7%	2.0%	50.5%	14.6%	0.0%	0.0%	0.0%	0.0%
86	6.2%	30.1%	1.7%	53.8%	8.2%	0.0%	0.0%	0.0%	0.0%
87	19.8%	18.6%	7.3%	47.5%	6.7%	0.0%	0.0%	0.0%	0.0%
88	9.1%	22.3%	4.9%	54.2%	6.5%	3.0%	0.0%	0.0%	0.0%
89	17.4%	8.9%	6.3%	58.5%	8.8%	0.0%	0.0%	0.0%	0.0%
90	19.2%	22.3%	4.1%	42.7%	11.8%	0.0%	0.0%	0.0%	0.0%
91	6.4%	10.4%	2.7%	74.6%	5.9%	0.0%	0.0%	0.0%	0.0%
92	6.4%	25.0%	4.1%	61.0%	3.6%	0.0%	0.0%	0.0%	0.0%
93	5.2%	14.1%	2.1%	72.7%	5.9%	0.0%	0.0%	0.0%	0.0%
94	9.2%	14.8%	5.1%	67.5%	3.5%	0.0%	0.0%	0.0%	0.0%
(79-94)	9.7%	20.4%	3.8%	56.1%	9.4%	0.2%	0.0%	0.1%	0.2%
(85-94)	11.2%	18.6%	4.0%	58.3%	7.6%	0.3%	0.0%	0.0%	0.0%

South Puget Sound Fall Yearling

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
82	0.0%	2.7%	3.1%	3.8%	0.0%	0.0%	1.2%	15.8%	73.5%
83	0.0%	1.9%	6.2%	0.5%	0.0%	0.0%	0.0%	10.5%	81.0%
84	0.0%	0.0%	8.4%	1.9%	0.0%	0.0%	0.0%	38.8%	50.9%
90	0.0%	0.3%	0.3%	0.0%	0.5%	0.0%	1.5%	36.3%	61.1%
91	0.0%	0.0%	7.0%	1.1%	0.0%	0.0%	4.6%	16.0%	71.4%
92	0.0%	0.0%	5.0%	0.9%	0.0%	0.9%	5.0%	31.0%	57.3%
93	0.0%	0.0%	1.8%	3.2%	0.0%	0.0%	1.4%	21.3%	72.4%
94	0.0%	0.0%	0.9%	0.4%	2.5%	0.4%	0.0%	23.8%	72.0%
(82-94)	0.0%	0.6%	4.1%	1.5%	0.4%	0.2%	1.7%	24.2%	67.4%
(85-94)	0.0%	0.1%	3.0%	1.1%	0.6%	0.3%	2.5%	25.7%	66.8%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
82	0.0%	1.5%	7.6%	0.0%	0.0%	0.0%	0.0%	9.1%	80.3%
83	0.0%	2.0%	7.8%	0.0%	0.0%	0.0%	0.0%	7.8%	82.4%
84	0.0%	0.0%	16.7%	0.0%	0.0%	0.0%	0.0%	50.0%	16.7%
90	0.0%	0.0%	14.3%	3.2%	0.0%	0.0%	9.5%	39.7%	31.7%
91	0.0%	0.0%	6.8%	1.5%	0.0%	0.0%	3.8%	6.1%	81.8%
92	0.0%	0.0%	12.8%	2.1%	0.0%	0.0%	10.6%	21.3%	51.1%
93	0.0%	0.0%	0.9%	6.7%	0.0%	0.0%	0.6%	1.5%	90.5%
94	0.0%	0.0%	1.3%	3.9%	0.0%	0.0%	0.0%	11.8%	83.0%
(82-94)	0.0%	0.4%	8.5%	2.2%	0.0%	0.0%	3.1%	18.4%	64.7%
(85-94)	0.0%	0.0%	7.2%	3.5%	0.0%	0.0%	4.9%	16.1%	67.6%

Squaxin Pens Fall Yearling

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
90	0.0%	0.1%	3.4%	0.8%	1.3%	0.4%	4.1%	33.6%	56.3%
91	0.0%	0.0%	4.4%	1.6%	0.6%	0.0%	9.5%	33.6%	50.4%
92	0.0%	0.7%	2.4%	3.9%	1.3%	0.6%	7.6%	23.5%	60.1%
93	0.0%	1.0%	11.0%	9.4%	1.6%	1.0%	15.3%	3.6%	56.2%
(90-93)	0.0%	0.4%	5.3%	3.9%	1.2%	0.5%	9.1%	23.6%	55.8%
(90-94)	0.0%	0.4%	5.3%	3.9%	1.2%	0.5%	9.1%	23.6%	55.8%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
90	0.0%	0.4%	4.3%	4.7%	0.4%	0.0%	6.8%	36.8%	46.6%
91	0.0%	0.0%	8.8%	4.4%	0.0%	0.0%	15.4%	29.7%	42.9%
92	0.0%	0.5%	0.9%	6.4%	0.0%	0.0%	2.7%	20.5%	68.0%
93	0.0%	0.0%	30.8%	26.9%	0.0%	0.0%	15.4%	15.4%	7.7%
(90-93)	0.0%	0.2%	11.2%	10.6%	0.1%	0.0%	10.1%	25.6%	41.3%
(90-94)	0.0%	0.2%	11.2%	10.6%	0.1%	0.0%	10.1%	25.6%	41.3%

University of Washington Accelerated

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
79	0.0%	0.4%	20.1%	8.5%	5.6%	0.1%	2.0%	9.5%	53.8%
80	0.0%	0.4%	8.6%	7.0%	1.8%	0.1%	1.4%	16.4%	64.3%
81	0.0%	0.7%	12.7%	6.8%	5.0%	0.0%	2.7%	14.8%	57.2%
82	0.2%	0.5%	24.5%	6.1%	1.3%	0.4%	3.4%	20.1%	43.7%
83	0.0%	1.6%	13.4%	6.5%	2.1%	0.1%	1.7%	32.5%	42.0%
84	0.0%	0.8%	25.1%	7.0%	1.3%	0.3%	2.5%	31.0%	32.1%
85	0.0%	0.5%	21.2%	6.9%	6.7%	1.8%	3.1%	21.1%	38.7%
86	0.0%	0.6%	22.3%	5.4%	9.4%	1.1%	1.8%	31.8%	27.4%
87	0.0%	0.4%	12.8%	7.5%	0.4%	1.4%	4.9%	57.0%	15.8%
(79-87)	0.0%	0.7%	17.9%	6.9%	3.7%	0.6%	2.6%	26.0%	41.7%
(85-94)	0.0%	0.5%	18.8%	6.6%	5.5%	1.4%	3.3%	36.6%	27.3%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
79	0.0%	0.6%	19.6%	0.3%	2.4%	0.0%	3.3%	16.6%	56.6%
80	0.0%	0.5%	11.6%	0.2%	0.8%	0.1%	2.2%	15.6%	68.8%
81	0.0%	0.6%	12.5%	0.3%	2.2%	0.0%	2.9%	12.2%	69.2%
82	0.0%	0.5%	32.0%	4.5%	0.5%	0.3%	6.3%	22.6%	33.1%
83	0.0%	0.8%	7.2%	4.6%	0.5%	0.1%	1.1%	27.0%	58.9%
84	0.0%	0.4%	14.5%	4.2%	0.4%	0.0%	1.4%	25.1%	53.7%
85	0.0%	0.8%	12.8%	5.6%	2.4%	0.8%	2.4%	12.8%	62.4%
86	0.0%	0.5%	20.3%	5.9%	3.2%	1.1%	2.7%	21.9%	44.9%
87	0.0%	3.3%	38.3%	1.7%	0.0%	0.0%	11.7%	40.0%	5.0%
(79-87)	0.0%	0.9%	18.8%	3.0%	1.4%	0.3%	3.8%	21.5%	50.3%
(85-94)	0.0%	1.6%	23.8%	4.4%	1.9%	0.6%	5.6%	24.9%	37.4%

Samish Fall Fingerling

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
89	0.1%	1.1%	8.3%	21.0%	4.0%	0.7%	9.1%	43.8%	11.9%
90	0.3%	0.9%	22.6%	16.8%	1.6%	0.9%	10.9%	37.1%	8.9%
91	0.0%	0.6%	18.4%	15.8%	3.5%	3.2%	12.5%	31.6%	14.6%
92	0.0%	0.9%	15.5%	22.0%	2.8%	0.7%	13.8%	21.1%	23.2%
93	0.0%	1.4%	16.7%	28.3%	2.9%	4.1%	4.9%	24.9%	17.0%
94	0.3%	1.1%	15.0%	19.4%	2.3%	5.1%	2.7%	50.3%	4.0%
(89-94)	0.1%	1.0%	16.1%	20.5%	2.8%	2.4%	9.0%	34.8%	13.3%
(89-94)	0.1%	1.0%	16.1%	20.5%	2.8%	2.4%	9.0%	34.8%	13.3%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
89	0.0%	0.7%	24.7%	35.1%	1.1%	0.7%	12.5%	13.6%	11.1%
90	0.0%	1.2%	41.6%	27.2%	0.6%	0.6%	15.0%	8.1%	5.8%
91	0.0%	0.0%	26.7%	34.9%	1.2%	2.3%	15.1%	7.0%	12.8%
92	0.0%	0.9%	7.7%	50.6%	0.4%	0.4%	6.0%	4.3%	29.8%
93	0.0%	0.9%	19.4%	57.3%	0.4%	1.3%	4.0%	6.6%	9.3%
94	0.0%	0.5%	14.2%	57.4%	0.5%	4.2%	2.1%	13.7%	6.8%
(89-94)	0.0%	0.7%	22.4%	43.7%	0.7%	1.6%	9.1%	8.9%	12.6%
(89-94)	0.0%	0.7%	22.4%	43.7%	0.7%	1.6%	9.1%	8.9%	12.6%

Stillaguamish Fall Fingerling

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
84	0.0%	29.8%	7.1%	16.7%	22.6%	0.0%	0.0%	4.8%	19.0%
85	12.6%	7.8%	28.2%	9.7%	10.7%	8.7%	0.0%	8.7%	15.5%
86	0.0%	4.8%	33.3%	22.6%	0.0%	0.0%	0.0%	17.9%	21.4%
90	0.0%	17.9%	26.1%	12.1%	5.7%	3.2%	6.8%	11.4%	16.8%
91	1.6%	1.6%	17.1%	12.8%	3.1%	5.8%	15.1%	19.8%	23.6%
92	0.0%	3.8%	23.4%	7.6%	3.4%	4.2%	7.6%	16.0%	34.3%
93	0.2%	8.2%	18.4%	18.2%	2.1%	6.7%	6.7%	2.3%	37.2%
94	2.9%	4.7%	17.0%	21.1%	24.6%	8.2%	0.0%	6.4%	15.2%
(84-94)	2.2%	9.8%	21.3%	15.1%	9.0%	4.6%	4.5%	10.9%	22.9%
(85-94)	2.5%	6.9%	23.3%	14.9%	7.1%	5.3%	5.2%	11.8%	23.5%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
84	7.1%	7.1%	17.9%	14.3%	7.1%	3.6%	0.0%	0.0%	35.7%
85	21.7%	4.3%	26.1%	8.7%	0.0%	4.3%	0.0%	4.3%	30.4%
86	0.0%	0.0%	66.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
90	0.0%	6.4%	20.5%	26.9%	1.3%	3.8%	12.8%	5.1%	23.1%
91	0.0%	1.7%	17.2%	29.3%	0.0%	3.4%	15.5%	5.2%	27.6%
92	0.0%	1.2%	18.0%	21.6%	0.4%	2.4%	5.2%	4.0%	46.4%
93	0.9%	4.7%	33.0%	35.8%	0.0%	1.9%	9.4%	0.0%	14.2%
94	4.5%	0.0%	27.3%	36.4%	13.6%	4.5%	0.0%	0.0%	13.6%
(84-94)	4.3%	3.2%	28.3%	21.6%	2.8%	3.0%	5.4%	2.3%	23.9%
(85-94)	3.9%	2.6%	29.8%	22.7%	2.2%	2.9%	6.1%	2.7%	22.2%

George Adams Fall Fingerling

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
82	0.0%	1.0%	26.6%	5.6%	0.5%	0.0%	3.9%	48.9%	13.7%
83	0.0%	3.8%	18.8%	5.6%	4.8%	0.6%	0.2%	35.4%	31.0%
84	0.1%	5.7%	21.3%	7.5%	1.4%	0.0%	2.6%	36.8%	24.4%
89	0.1%	0.3%	9.9%	4.4%	5.4%	0.6%	14.9%	44.6%	19.9%
90	0.2%	1.6%	21.5%	5.9%	0.8%	1.3%	16.7%	31.5%	20.6%
91	0.4%	0.0%	21.8%	2.9%	0.5%	3.9%	10.1%	39.4%	21.2%
92	0.0%	0.6%	17.3%	2.3%	5.2%	0.0%	23.1%	10.4%	41.0%
93	0.0%	0.0%	44.3%	5.7%	0.0%	4.5%	8.0%	6.8%	29.5%
94	0.0%	0.0%	0.0%	23.1%	0.0%	0.0%	0.0%	53.8%	23.1%
(82-94)	0.1%	1.4%	20.2%	7.0%	2.1%	1.2%	8.8%	34.2%	24.9%
(85-94)	0.1%	0.4%	19.1%	7.4%	2.0%	1.7%	12.1%	31.1%	25.9%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
82	0.0%	2.2%	23.9%	10.9%	2.2%	0.0%	2.2%	23.9%	34.8%
83	0.0%	0.9%	7.1%	4.2%	0.9%	0.3%	0.0%	17.5%	68.8%
84	0.0%	4.2%	31.3%	0.0%	0.0%	0.0%	6.3%	43.8%	10.4%
89	0.0%	1.4%	22.3%	12.1%	1.1%	1.8%	15.6%	19.5%	26.6%
90	0.6%	1.2%	42.6%	11.2%	0.0%	0.0%	24.3%	12.4%	6.5%
91	0.0%	0.0%	46.9%	4.1%	0.0%	2.0%	16.3%	14.3%	16.3%
92	0.0%	0.0%	42.9%	7.1%	0.0%	0.0%	35.7%	0.0%	14.3%
93	0.0%	0.0%	38.9%	5.6%	0.0%	5.6%	5.6%	5.6%	38.9%
94	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%	0.0%	37.5%	37.5%
(82-94)	0.1%	1.1%	28.4%	7.5%	0.5%	1.1%	11.8%	19.4%	28.2%
(85-94)	0.1%	0.4%	32.3%	8.8%	0.2%	1.6%	16.2%	14.9%	23.4%

South Puget Sound Fall Fingerling

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
82	0.3%	1.6%	25.6%	16.0%	1.8%	0.1%	3.1%	27.7%	23.8%
83	0.0%	3.7%	20.0%	6.6%	3.0%	0.3%	1.9%	31.6%	33.0%
84	0.4%	3.0%	25.0%	10.9%	1.2%	0.3%	1.8%	30.0%	27.4%
85	0.6%	1.0%	23.0%	7.7%	2.0%	0.9%	2.3%	35.9%	26.6%
86	0.0%	1.8%	26.6%	11.2%	2.4%	0.0%	5.7%	15.4%	36.9%
87	0.0%	0.0%	20.9%	20.9%	6.5%	0.0%	11.8%	22.4%	17.5%
88	0.2%	2.8%	8.0%	11.1%	5.6%	2.3%	10.7%	38.5%	20.7%
89	0.2%	1.0%	11.2%	6.8%	6.1%	1.2%	16.7%	32.3%	24.5%
90	0.1%	1.1%	30.7%	5.2%	1.1%	1.5%	12.1%	31.6%	16.5%
91	0.4%	0.2%	21.5%	2.3%	1.1%	2.3%	15.6%	39.6%	16.9%
92	1.0%	2.1%	20.4%	4.9%	3.3%	1.9%	12.1%	27.5%	26.7%
93	0.4%	1.2%	23.5%	8.1%	3.0%	3.5%	7.4%	21.7%	31.3%
94	0.0%	1.6%	20.2%	7.0%	9.2%	2.1%	1.4%	37.0%	21.8%
(82-94)	0.3%	1.6%	21.3%	9.1%	3.5%	1.3%	7.9%	30.1%	24.9%
(85-94)	0.3%	1.3%	20.6%	8.5%	4.0%	1.6%	9.6%	30.2%	23.9%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
82	0.0%	3.0%	29.2%	9.6%	0.8%	0.0%	3.0%	18.7%	35.3%
83	0.0%	2.8%	16.5%	6.2%	1.1%	0.2%	1.8%	18.9%	52.4%
84	1.1%	4.4%	39.9%	3.8%	0.0%	0.0%	4.4%	28.4%	18.0%
85	0.0%	0.0%	21.3%	4.3%	4.3%	0.0%	2.1%	29.8%	36.2%
86	0.0%	1.4%	18.8%	10.1%	1.4%	0.0%	4.3%	4.3%	59.4%
87	0.0%	0.0%	36.3%	19.8%	1.6%	0.0%	14.8%	4.9%	21.4%
88	0.6%	2.3%	16.1%	21.4%	1.0%	0.9%	9.9%	12.6%	35.2%
89	0.2%	2.2%	25.3%	18.4%	1.4%	0.2%	27.8%	13.9%	10.6%
90	0.3%	1.2%	49.2%	9.1%	0.6%	0.9%	14.9%	10.0%	13.7%
91	0.0%	0.0%	39.6%	6.9%	0.0%	1.0%	24.8%	12.9%	12.9%
92	0.7%	1.4%	15.8%	14.4%	1.1%	1.4%	8.8%	7.0%	49.6%
93	1.6%	0.5%	38.2%	20.9%	0.5%	1.0%	8.9%	7.9%	19.9%
94	0.0%	0.8%	9.1%	23.0%	1.9%	1.3%	0.5%	9.6%	53.5%
(82-94)	0.3%	1.5%	27.3%	12.9%	1.2%	0.5%	9.7%	13.8%	32.2%
(85-94)	0.3%	1.0%	27.0%	14.8%	1.4%	0.7%	11.7%	11.3%	31.2%

Kalama Fall Fingerling

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
83	0.0%	2.5%	16.5%	13.5%	6.0%	0.0%	4.5%	11.0%	46.0%
84	0.0%	0.0%	30.5%	2.1%	2.7%	0.0%	1.6%	40.1%	23.0%
85	0.0%	0.0%	30.8%	0.0%	6.2%	3.1%	7.7%	32.3%	21.5%
86	0.0%	0.0%	17.5%	15.5%	2.1%	0.0%	1.0%	43.3%	21.6%
87	0.0%	3.9%	12.4%	16.3%	0.8%	0.0%	6.2%	40.3%	21.7%
88	0.0%	7.3%	7.9%	25.7%	6.8%	0.0%	12.6%	25.1%	14.7%
89	0.0%	1.1%	5.1%	2.9%	4.1%	2.2%	15.2%	48.5%	20.9%
90	0.0%	0.3%	25.5%	4.0%	0.2%	1.7%	11.5%	43.0%	13.9%
91	0.0%	2.4%	9.7%	4.3%	2.9%	1.4%	19.8%	27.1%	32.4%
92	0.0%	1.8%	12.9%	4.9%	4.0%	4.5%	12.5%	30.8%	28.6%
93	0.0%	1.0%	18.6%	7.5%	3.1%	0.8%	4.1%	35.9%	28.4%
94	0.0%	0.2%	8.5%	4.6%	3.9%	0.4%	0.9%	46.2%	35.4%
(83-94)	0.0%	1.7%	16.3%	8.4%	3.6%	1.2%	8.1%	35.3%	25.7%
(85-94)	0.0%	1.8%	14.9%	8.6%	3.4%	1.4%	9.2%	37.3%	23.9%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
83	0.0%	0.0%	11.8%	2.4%	2.4%	0.0%	1.2%	5.9%	76.5%
84	0.0%	0.0%	34.4%	3.1%	0.0%	0.0%	3.1%	25.0%	31.3%
85	0.0%	0.0%	29.4%	0.0%	0.0%	5.9%	5.9%	23.5%	35.3%
86	0.0%	0.0%	26.7%	20.0%	0.0%	0.0%	0.0%	6.7%	40.0%
87	0.0%	5.1%	25.6%	17.9%	0.0%	0.0%	7.7%	7.7%	33.3%
88	0.0%	7.4%	4.1%	28.9%	1.7%	0.0%	6.6%	10.7%	38.8%
89	0.0%	1.0%	16.7%	12.5%	0.0%	0.0%	35.4%	27.1%	5.2%
90	0.0%	0.0%	50.0%	5.9%	0.0%	1.5%	16.2%	10.3%	14.7%
91	0.0%	3.7%	14.8%	11.1%	0.0%	0.0%	25.9%	7.4%	29.6%
92	0.0%	1.5%	5.4%	18.5%	0.8%	2.3%	5.4%	9.2%	57.7%
93	0.0%	0.0%	28.9%	23.3%	1.1%	0.0%	4.4%	13.3%	25.6%
94	0.0%	0.0%	1.7%	13.9%	0.4%	0.1%	0.1%	6.3%	77.3%
(83-94)	0.0%	1.6%	20.8%	13.1%	0.5%	0.8%	9.3%	12.8%	38.8%
(85-94)	0.0%	1.9%	20.3%	15.2%	0.4%	1.0%	10.8%	12.2%	35.8%

Elwha Fall Fingerling

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
86	30.2%	9.8%	19.9%	8.3%	1.6%	1.1%	1.1%	13.9%	14.9%
87	21.0%	15.5%	16.6%	12.8%	0.6%	2.3%	3.5%	7.6%	20.4%
88	12.7%	14.4%	25.0%	0.0%	0.8%	3.8%	8.1%	22.5%	13.1%
89	19.0%	19.7%	11.7%	0.0%	0.0%	0.0%	5.8%	21.9%	22.6%
90	0.0%	50.0%	50.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
91	0.0%	7.1%	14.3%	0.0%	0.0%	0.0%	7.1%	71.4%	0.0%
92	6.9%	5.2%	43.1%	0.0%	3.4%	3.4%	17.2%	0.0%	22.4%
93	8.1%	0.0%	20.9%	16.3%	0.0%	8.1%	4.7%	0.0%	40.7%
94	8.8%	26.5%	38.2%	17.6%	11.8%	0.0%	0.0%	0.0%	0.0%
(86-94)	11.9%	16.5%	26.6%	6.1%	2.0%	2.1%	5.3%	15.2%	14.9%
(86-94)	11.9%	16.5%	26.6%	6.1%	2.0%	2.1%	5.3%	15.2%	14.9%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
86	18.2%	20.0%	21.8%	9.1%	0.0%	1.8%	5.5%	3.6%	16.4%
87	30.0%	16.7%	25.0%	6.7%	0.0%	1.7%	5.0%	1.7%	11.7%
88	20.0%	15.0%	45.0%	0.0%	0.0%	0.0%	10.0%	5.0%	0.0%
89	0.0%	50.0%	50.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
90	0.0%	0.0%	50.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
91	0.0%	0.0%	27.8%	11.1%	0.0%	0.0%	11.1%	22.2%	22.2%
92	4.2%	4.2%	25.0%	16.7%	0.0%	4.2%	4.2%	0.0%	33.3%
93	12.5%	0.0%	25.0%	33.3%	0.0%	4.2%	4.2%	0.0%	20.8%
94	0.0%	20.0%	60.0%	40.0%	0.0%	0.0%	0.0%	0.0%	0.0%
(86-94)	9.4%	14.0%	36.6%	13.0%	0.0%	1.3%	4.4%	3.6%	11.6%
(86-94)	9.4%	14.0%	36.6%	13.0%	0.0%	1.3%	4.4%	3.6%	11.6%

Hoko Fall Fingerling

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
89	6.1%	20.0%	15.6%	2.8%	22.8%	0.0%	1.1%	1.1%	32.2%
90	19.4%	19.1%	29.1%	2.0%	3.4%	0.0%	0.9%	2.0%	24.5%
91	22.8%	21.6%	21.8%	1.2%	1.9%	1.0%	0.5%	3.4%	25.2%
92	30.8%	24.3%	32.0%	1.8%	0.0%	2.4%	0.0%	1.2%	8.3%
93	13.7%	26.5%	39.3%	2.6%	6.0%	0.0%	0.0%	0.0%	12.8%
94	15.8%	41.1%	26.7%	9.6%	3.4%	3.4%	0.0%	0.0%	0.0%
(89-94)	18.1%	25.4%	27.4%	3.3%	6.3%	1.1%	0.4%	1.3%	17.2%
(89-94)	18.1%	25.4%	27.4%	3.3%	6.3%	1.1%	0.4%	1.3%	17.2%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
89	26.5%	19.3%	27.7%	2.4%	1.2%	0.0%	0.0%	0.0%	18.1%
90	36.6%	22.0%	36.6%	0.0%	0.0%	0.0%	0.0%	0.0%	2.4%
91	15.8%	31.6%	36.8%	5.3%	0.0%	0.0%	0.0%	0.0%	5.3%
92	16.0%	28.0%	36.0%	8.0%	0.0%	0.0%	0.0%	0.0%	8.0%
93	20.0%	13.3%	40.0%	13.3%	0.0%	6.7%	0.0%	0.0%	0.0%
94	20.0%	37.5%	25.0%	15.0%	0.0%	0.0%	0.0%	0.0%	0.0%
(89-94)	22.5%	25.3%	33.7%	7.3%	0.2%	1.1%	0.0%	0.0%	5.6%
(89-94)	22.5%	25.3%	33.7%	7.3%	0.2%	1.1%	0.0%	0.0%	5.6%

Skagit Spring Yearling

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
85	0.0%	0.0%	7.3%	31.8%	29.1%	0.0%	0.0%	10.9%	21.8%
86	2.3%	13.5%	7.6%	52.6%	3.5%	7.0%	0.0%	4.1%	9.9%
87	0.0%	14.8%	4.9%	14.8%	7.4%	0.0%	2.5%	29.6%	25.9%
88	0.0%	7.9%	2.3%	19.9%	10.2%	3.8%	2.3%	36.0%	17.3%
89	0.0%	1.3%	5.2%	25.4%	4.8%	0.8%	6.5%	44.2%	12.0%
90	0.0%	4.9%	6.7%	21.5%	5.5%	4.1%	4.5%	21.1%	31.7%
(85-90)	0.4%	7.1%	5.7%	27.7%	10.1%	2.6%	2.6%	24.3%	19.8%
(85-94)	0.4%	7.1%	5.7%	27.7%	10.1%	2.6%	2.6%	24.3%	19.8%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
85	0.0%	11.1%	11.1%	33.3%	0.0%	0.0%	0.0%	0.0%	33.3%
86	12.5%	12.5%	6.3%	43.8%	0.0%	6.3%	0.0%	0.0%	25.0%
87	0.0%	4.8%	1.6%	17.7%	1.6%	0.0%	0.0%	6.5%	67.7%
88	0.0%	5.0%	10.0%	20.0%	5.0%	2.5%	7.5%	27.5%	22.5%
89	0.0%	1.9%	7.5%	58.9%	2.8%	0.9%	7.5%	6.5%	15.0%
90	0.0%	0.0%	13.8%	48.3%	0.0%	0.0%	13.8%	10.3%	6.9%
(85-90)	2.1%	5.9%	8.4%	37.0%	1.6%	1.6%	4.8%	8.5%	28.4%
(85-94)	2.1%	5.9%	8.4%	37.0%	1.6%	1.6%	4.8%	8.5%	28.4%

Nooksack Spring Yearling

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
86	0.0%	0.0%	0.0%	55.9%	26.5%	0.0%	0.0%	2.9%	14.7%
89	0.0%	0.0%	0.0%	23.3%	0.0%	0.0%	0.0%	50.0%	26.7%
90	0.0%	6.5%	0.0%	25.8%	12.9%	0.0%	3.2%	6.5%	45.2%
91	0.0%	1.1%	3.4%	53.6%	9.5%	7.8%	3.4%	13.4%	8.4%
92	1.3%	4.2%	39.1%	29.3%	2.4%	2.9%	2.4%	0.8%	17.7%
93	0.0%	5.3%	8.9%	34.1%	10.9%	7.3%	0.7%	11.3%	22.2%
94	1.1%	0.0%	9.3%	66.3%	1.8%	0.0%	0.7%	15.1%	6.1%
(86-94)	0.3%	2.4%	8.7%	41.2%	9.1%	2.6%	1.5%	14.3%	20.1%
(86-94)	0.3%	2.4%	8.7%	41.2%	9.1%	2.6%	1.5%	14.3%	20.1%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
86	0.0%	0.8%	5.0%	70.0%	1.7%	1.7%	0.8%	15.0%	5.0%
89	0.0%	0.0%	0.0%	58.8%	0.0%	0.0%	0.0%	11.8%	23.5%
90	0.0%	1.5%	10.6%	72.7%	1.5%	1.5%	1.5%	0.0%	9.1%
91	0.0%	0.0%	1.5%	85.8%	0.7%	2.2%	1.5%	1.5%	5.2%
92	1.2%	2.4%	27.9%	50.3%	0.0%	1.2%	1.2%	0.0%	15.8%
93	0.0%	0.0%	11.6%	83.7%	0.0%	0.0%	0.0%	4.7%	0.0%
94	0.0%	0.0%	25.0%	75.0%	0.0%	0.0%	0.0%	25.0%	0.0%
(86-94)	0.2%	0.7%	11.7%	70.9%	0.6%	0.9%	0.7%	8.3%	8.4%
(86-94)	0.2%	0.7%	11.7%	70.9%	0.6%	0.9%	0.7%	8.3%	8.4%

White River Spring Yearling

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
83	0.0%	2.1%	5.5%	0.0%	0.0%	0.0%	2.1%	14.4%	76.0%
84	0.0%	11.3%	8.8%	10.0%	0.0%	0.0%	5.0%	17.5%	48.8%
85	0.0%	0.0%	0.0%	0.0%	3.0%	2.3%	0.0%	31.9%	62.8%
86	0.0%	0.4%	0.7%	2.9%	2.2%	0.0%	0.4%	21.5%	72.0%
87	0.0%	0.0%	0.0%	2.7%	0.8%	0.0%	5.9%	21.1%	69.5%
88	0.0%	0.0%	0.4%	4.1%	0.3%	0.4%	2.1%	20.9%	72.1%
89	0.0%	0.0%	1.9%	1.9%	1.6%	0.0%	9.0%	20.5%	65.0%
90	0.0%	0.0%	2.8%	1.3%	0.9%	0.0%	7.5%	22.0%	65.7%
91	0.0%	0.0%	1.4%	2.3%	0.0%	1.9%	7.4%	19.4%	68.1%
92	0.0%	0.8%	3.7%	3.6%	3.6%	0.4%	3.7%	12.0%	72.4%
93	0.0%	0.0%	0.0%	3.7%	0.0%	0.0%	6.5%	11.1%	78.7%
94	0.0%	0.0%	0.0%	3.8%	1.9%	0.0%	0.0%	2.8%	92.5%
(83-94)	0.0%	1.2%	2.1%	3.0%	1.2%	0.4%	4.1%	17.9%	70.3%
(85-94)	0.0%	0.1%	1.1%	2.6%	1.4%	0.5%	4.3%	18.3%	71.9%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
83	0.0%	12.5%	12.5%	0.0%	0.0%	0.0%	0.0%	12.5%	62.5%
84	0.0%	2.6%	2.6%	2.6%	0.0%	0.0%	0.0%	2.6%	89.5%
85	0.0%	0.0%	0.0%	0.0%	0.9%	1.7%	0.0%	13.9%	84.3%
86	0.0%	1.9%	1.9%	1.9%	0.0%	0.0%	1.9%	15.4%	75.0%
87	0.0%	0.0%	0.0%	1.2%	0.0%	0.0%	1.7%	3.3%	93.8%
88	0.0%	0.0%	1.0%	2.0%	0.0%	0.0%	6.1%	21.2%	68.7%
89	0.0%	0.0%	3.3%	4.4%	1.1%	0.0%	12.1%	3.3%	75.8%
90	0.0%	0.0%	3.4%	3.4%	0.0%	0.0%	12.1%	5.2%	74.1%
91	0.0%	0.0%	1.5%	6.2%	0.0%	1.5%	6.2%	4.6%	81.5%
92	0.0%	0.0%	14.3%	14.3%	0.0%	0.0%	11.4%	11.4%	45.7%
93	0.0%	0.0%	0.0%	5.3%	0.0%	0.0%	2.6%	5.3%	86.8%
94	0.0%	0.0%	0.0%	10.7%	0.0%	0.0%	0.0%	3.6%	85.7%
(83-94)	0.0%	1.4%	3.4%	4.3%	0.2%	0.3%	4.5%	8.5%	77.0%
(85-94)	0.0%	0.2%	2.6%	4.9%	0.2%	0.3%	5.4%	8.7%	77.2%

Sooes Fall Fingerling

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
89	42.9%	25.0%	10.7%	0.0%	10.7%	14.3%	0.0%	0.0%	0.0%
90	15.9%	29.3%	30.5%	12.2%	3.7%	0.0%	2.4%	0.0%	6.1%
91	22.1%	38.5%	17.3%	0.0%	6.7%	0.0%	0.0%	0.0%	16.3%
92	5.8%	27.3%	47.1%	2.5%	8.3%	2.5%	0.8%	0.0%	5.8%
93	9.1%	40.3%	48.1%	0.0%	0.0%	0.0%	1.3%	0.0%	2.6%
94	37.3%	40.3%	23.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
(89-94)	22.2%	33.4%	29.6%	2.4%	4.9%	2.8%	0.8%	0.0%	5.1%
(89-94)	22.2%	33.4%	29.6%	2.4%	4.9%	2.8%	0.8%	0.0%	5.1%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
89	19.2%	26.9%	26.9%	3.8%	3.8%	0.0%	0.0%	0.0%	15.4%
90	29.4%	29.4%	29.4%	5.9%	0.0%	0.0%	0.0%	0.0%	0.0%
91	14.3%	28.6%	47.6%	4.8%	0.0%	0.0%	0.0%	0.0%	0.0%
92	26.3%	31.6%	42.1%	5.3%	0.0%	0.0%	0.0%	0.0%	0.0%
93	28.6%	14.3%	57.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
94	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
(89-94)	19.6%	21.8%	50.5%	3.3%	0.6%	0.0%	0.0%	0.0%	2.6%
(89-94)	19.6%	21.8%	50.5%	3.3%	0.6%	0.0%	0.0%	0.0%	2.6%

Queets Fall Fingerling

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
81	7.5%	25.4%	16.4%	0.0%	1.5%	0.0%	1.5%	44.8%	4.5%
82	18.8%	32.8%	16.1%	0.0%	0.0%	0.0%	0.0%	33.3%	0.0%
83	30.5%	11.0%	12.2%	0.0%	3.7%	0.0%	1.2%	41.5%	0.0%
84	19.2%	28.8%	10.6%	0.0%	0.0%	0.0%	2.9%	39.4%	0.0%
85	15.6%	53.1%	3.4%	0.0%	2.7%	0.0%	0.0%	24.5%	1.4%
86	31.0%	28.6%	15.1%	0.0%	2.4%	0.0%	0.0%	21.4%	0.0%
87	18.9%	29.5%	1.6%	0.0%	0.0%	0.0%	1.2%	48.0%	1.2%
88	6.5%	28.4%	10.8%	0.0%	0.0%	2.5%	0.0%	43.5%	8.6%
89	0.7%	22.7%	15.8%	0.0%	0.0%	0.0%	0.0%	57.9%	3.3%
90	6.1%	24.3%	22.2%	0.0%	0.0%	0.0%	0.0%	47.1%	0.3%
91	15.8%	29.0%	12.7%	0.0%	0.0%	0.0%	0.0%	41.7%	1.2%
92	15.8%	16.9%	31.6%	0.0%	0.0%	0.0%	0.0%	34.5%	1.4%
93	11.3%	30.6%	23.4%	0.0%	0.0%	0.0%	0.9%	28.8%	5.3%
94	22.2%	64.3%	11.1%	0.8%	0.0%	1.6%	0.0%	0.0%	0.0%
(81-94)	15.7%	30.4%	14.5%	0.1%	0.7%	0.3%	0.6%	36.2%	1.9%
(85-94)	14.4%	32.7%	14.8%	0.1%	0.5%	0.4%	0.2%	34.7%	2.3%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
81	31.3%	31.3%	12.5%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%
82	28.6%	35.7%	7.1%	0.0%	0.0%	0.0%	0.0%	14.3%	0.0%
83	68.8%	6.3%	6.3%	0.0%	6.3%	0.0%	0.0%	12.5%	0.0%
84	15.4%	53.8%	7.7%	0.0%	0.0%	0.0%	7.7%	7.7%	0.0%
85	16.7%	66.7%	3.3%	0.0%	0.0%	0.0%	0.0%	3.3%	3.3%
86	33.3%	33.3%	13.3%	0.0%	0.0%	0.0%	0.0%	6.7%	0.0%
87	15.0%	45.0%	25.0%	0.0%	0.0%	0.0%	0.0%	5.0%	10.0%
88	15.9%	40.9%	29.5%	0.0%	0.0%	0.0%	0.0%	6.8%	2.3%
89	19.6%	39.2%	33.3%	0.0%	0.0%	0.0%	0.0%	7.8%	0.0%
90	28.2%	33.3%	30.8%	0.0%	0.0%	0.0%	0.0%	7.7%	0.0%
91	32.3%	41.9%	22.6%	0.0%	0.0%	0.0%	0.0%	3.2%	3.2%
92	32.3%	21.0%	41.9%	0.0%	0.0%	0.0%	0.0%	3.2%	0.0%
93	18.2%	36.4%	36.4%	0.0%	0.0%	0.0%	0.0%	4.5%	0.0%
94	0.0%	60.0%	20.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
(81-94)	25.4%	38.9%	20.7%	0.0%	0.4%	0.0%	0.5%	6.8%	1.3%
(85-94)	21.1%	41.8%	25.6%	0.0%	0.0%	0.0%	0.0%	4.8%	1.9%

Cowlitz Fall Tule

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
81	9.1%	12.5%	22.7%	0.0%	3.4%	0.0%	13.6%	21.2%	18.2%
82	6.0%	6.0%	22.4%	0.0%	1.8%	1.4%	28.5%	14.9%	19.2%
83	6.1%	17.2%	27.7%	0.8%	0.8%	0.0%	10.8%	7.5%	29.1%
84	7.5%	15.9%	38.2%	0.0%	2.7%	0.0%	6.9%	23.6%	5.6%
85	8.6%	16.8%	22.7%	0.9%	2.4%	0.0%	8.8%	13.0%	27.1%
86	0.8%	2.3%	17.4%	0.5%	1.5%	0.0%	17.8%	42.6%	17.4%
87	5.4%	6.2%	11.9%	0.0%	0.9%	0.7%	13.9%	32.7%	28.3%
88	2.9%	2.8%	21.8%	0.0%	0.9%	0.0%	21.5%	33.0%	17.1%
89	7.7%	9.4%	12.7%	0.0%	2.0%	0.0%	34.4%	13.7%	20.4%
90	9.1%	15.2%	29.5%	0.0%	1.5%	0.0%	19.7%	0.0%	25.0%
91	19.1%	8.8%	10.3%	0.0%	0.0%	4.4%	19.1%	20.6%	17.6%
92	5.3%	7.9%	43.4%	0.0%	0.0%	0.0%	17.1%	13.2%	11.8%
93	8.4%	7.7%	15.4%	0.0%	0.0%	0.0%	37.8%	7.0%	24.5%
94	39.1%	17.4%	17.4%	0.0%	0.0%	0.0%	30.4%	0.0%	0.0%
(81-94)	9.7%	10.4%	22.4%	0.2%	1.3%	0.5%	20.0%	17.4%	18.7%
(85-94)	10.6%	9.4%	20.3%	0.1%	0.9%	0.5%	22.1%	17.6%	18.9%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
81	11.4%	2.9%	31.4%	0.0%	0.0%	0.0%	34.3%	8.6%	8.6%
82	10.0%	5.7%	25.7%	0.0%	0.0%	1.4%	32.9%	8.6%	12.9%
83	15.4%	17.3%	30.8%	0.0%	0.0%	0.0%	17.3%	1.9%	15.4%
84	8.3%	19.4%	44.4%	0.0%	0.0%	0.0%	11.1%	8.3%	5.6%
85	10.9%	12.5%	26.6%	1.6%	1.6%	0.0%	14.1%	6.3%	25.0%
86	2.4%	2.4%	23.1%	0.6%	0.6%	0.0%	27.8%	17.8%	25.4%
87	11.2%	11.2%	20.7%	0.0%	0.0%	0.0%	18.9%	12.4%	24.3%
88	3.9%	3.9%	44.2%	0.0%	0.0%	0.0%	32.5%	9.1%	6.5%
89	10.7%	10.7%	21.4%	0.0%	0.0%	0.0%	42.9%	3.6%	10.7%
90	10.5%	15.8%	36.8%	0.0%	0.0%	0.0%	21.1%	0.0%	21.1%
91	30.8%	7.7%	15.4%	0.0%	0.0%	0.0%	23.1%	7.7%	7.7%
92	6.3%	12.5%	50.0%	0.0%	0.0%	0.0%	18.8%	6.3%	6.3%
93	14.3%	7.1%	21.4%	0.0%	0.0%	0.0%	42.9%	3.6%	17.9%
94	25.0%	25.0%	25.0%	0.0%	0.0%	0.0%	25.0%	0.0%	0.0%
(81-94)	12.2%	11.0%	29.8%	0.2%	0.2%	0.1%	25.9%	6.7%	13.4%
(85-94)	12.6%	10.9%	28.5%	0.2%	0.2%	0.0%	26.7%	6.7%	14.5%

Spring Creek Tule

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
79	0.0%	1.2%	28.7%	1.7%	2.9%	0.1%	21.3%	28.0%	16.0%
80	0.1%	0.8%	29.1%	3.2%	1.1%	0.1%	26.8%	27.0%	11.7%
81	0.0%	0.5%	25.8%	1.8%	2.3%	0.2%	28.8%	25.3%	15.4%
82	0.0%	0.6%	25.2%	1.3%	0.2%	0.0%	22.5%	40.8%	9.5%
83	0.0%	0.5%	42.3%	2.2%	0.0%	0.7%	11.9%	28.6%	13.9%
84	0.0%	3.4%	38.6%	0.0%	1.8%	0.6%	8.5%	36.6%	10.5%
85	0.0%	0.3%	23.5%	0.0%	0.3%	1.1%	22.9%	45.0%	6.9%
86	0.0%	3.7%	27.0%	2.5%	2.1%	3.3%	3.3%	47.3%	10.8%
87	0.0%	0.0%	9.8%	0.0%	0.0%	0.0%	18.5%	47.8%	25.0%
88	0.0%	1.1%	26.8%	1.1%	2.2%	0.9%	21.0%	35.6%	11.9%
89	0.0%	0.2%	17.2%	0.5%	0.5%	1.2%	29.5%	41.1%	9.9%
90	0.0%	1.1%	24.5%	0.9%	0.9%	2.1%	19.9%	32.3%	18.3%
91	0.0%	0.5%	17.1%	0.3%	0.5%	1.3%	21.9%	44.2%	14.4%
92	0.0%	0.4%	17.5%	1.0%	0.7%	2.2%	39.2%	21.5%	17.4%
93	0.0%	0.0%	25.6%	0.0%	0.4%	2.6%	25.3%	30.8%	15.4%
94	0.0%	0.0%	33.9%	0.0%	1.3%	4.4%	6.5%	53.3%	0.6%
(79-94)	0.0%	0.9%	25.8%	1.0%	1.1%	1.3%	20.5%	36.6%	13.0%
(85-94)	0.0%	0.7%	22.3%	0.6%	0.9%	1.9%	20.8%	39.9%	13.1%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
79	0.0%	1.2%	35.7%	0.1%	1.3%	0.1%	33.1%	13.2%	15.0%
80	0.2%	0.9%	33.8%	0.1%	0.6%	0.1%	36.7%	14.6%	12.8%
81	0.0%	0.4%	28.3%	0.0%	1.4%	0.3%	40.7%	15.2%	13.9%
82	0.0%	0.6%	28.4%	0.4%	0.0%	0.0%	47.2%	19.9%	3.6%
83	0.0%	1.0%	44.0%	4.0%	0.0%	1.0%	15.0%	9.0%	27.0%
84	0.0%	2.0%	23.2%	0.0%	0.7%	0.0%	6.0%	14.6%	51.7%
85	0.0%	0.0%	25.7%	0.0%	0.0%	0.0%	46.5%	23.8%	3.0%
86	0.0%	4.3%	43.5%	4.3%	0.0%	4.3%	8.7%	26.1%	13.0%
87	0.0%	0.0%	11.9%	0.0%	0.0%	0.0%	21.4%	42.9%	26.2%
88	0.0%	1.2%	32.3%	1.8%	1.2%	1.2%	24.0%	13.8%	24.6%
89	0.0%	0.3%	28.5%	2.5%	0.3%	0.8%	39.7%	14.8%	13.4%
90	0.0%	0.8%	34.3%	3.0%	0.3%	2.2%	24.9%	9.7%	24.4%
91	0.0%	0.5%	29.1%	1.5%	0.2%	1.2%	31.5%	16.1%	19.3%
92	0.0%	0.7%	29.3%	2.0%	0.0%	0.5%	47.0%	7.1%	13.1%
93	0.0%	0.0%	37.1%	0.0%	0.0%	2.1%	34.3%	7.0%	18.2%
94	0.0%	0.0%	57.5%	0.0%	1.4%	5.5%	9.6%	26.0%	1.4%
(79-94)	0.0%	0.9%	32.7%	1.2%	0.5%	1.2%	29.2%	17.1%	17.5%
(85-94)	0.0%	0.8%	32.9%	1.5%	0.3%	1.8%	28.8%	18.7%	15.6%

Bonneville Tule

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
80	1.3%	2.1%	26.4%	0.9%	2.6%	0.9%	29.4%	11.1%	25.5%
81	0.0%	1.1%	36.3%	5.5%	4.3%	0.0%	37.2%	3.5%	11.8%
82	0.0%	1.7%	45.6%	0.0%	0.7%	1.0%	11.4%	31.6%	8.0%
83	0.0%	4.6%	54.7%	4.2%	0.8%	0.6%	14.1%	10.0%	11.2%
84	0.0%	7.4%	51.4%	0.0%	3.3%	0.0%	8.7%	23.8%	6.0%
85	0.0%	1.1%	53.6%	0.0%	2.7%	2.2%	23.5%	9.8%	7.7%
86	0.0%	0.0%	8.2%	4.6%	14.6%	5.8%	3.6%	39.2%	24.3%
87	0.0%	2.7%	33.9%	0.7%	0.3%	1.1%	21.8%	28.8%	10.7%
(80-87)	0.2%	2.6%	38.8%	2.0%	3.7%	1.4%	18.7%	19.7%	13.2%
(85-94)	0.0%	1.3%	31.9%	1.7%	5.9%	3.0%	16.3%	26.0%	14.2%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
80	0.0%	1.0%	42.3%	0.0%	1.9%	1.0%	37.5%	2.9%	13.5%
81	0.0%	1.0%	32.7%	0.0%	1.0%	0.0%	59.4%	2.0%	5.0%
82	0.0%	1.3%	56.0%	0.0%	0.0%	1.3%	21.3%	12.0%	8.0%
83	0.0%	5.3%	54.3%	3.2%	0.0%	0.0%	19.1%	5.3%	10.6%
84	0.0%	8.7%	50.0%	0.0%	2.2%	0.0%	10.9%	15.2%	13.0%
85	0.0%	0.0%	53.1%	0.0%	0.0%	0.0%	40.6%	3.1%	0.0%
86	0.0%	0.0%	1.8%	3.5%	1.6%	2.7%	1.0%	9.2%	79.7%
87	0.0%	3.5%	45.0%	0.0%	0.0%	0.0%	19.6%	15.8%	16.3%
(80-87)	0.0%	2.6%	41.9%	0.8%	0.8%	0.6%	26.2%	8.2%	18.3%
(85-94)	0.0%	1.2%	33.3%	1.2%	0.5%	0.9%	20.4%	9.4%	32.0%

Stayton Pond Tule

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
82	0.0%	3.0%	33.1%	1.3%	0.4%	0.6%	28.2%	20.2%	13.1%
83	0.0%	4.0%	50.3%	2.0%	0.8%	0.7%	18.4%	10.1%	13.8%
84	0.0%	2.8%	70.9%	2.5%	1.6%	0.5%	7.2%	10.4%	4.4%
85	0.0%	2.8%	46.5%	2.8%	1.8%	1.0%	28.0%	5.8%	11.6%
86	0.0%	2.7%	23.5%	5.7%	13.1%	4.5%	19.8%	12.9%	18.1%
87	0.0%	1.9%	35.6%	0.8%	0.3%	2.1%	21.0%	24.8%	13.5%
88	0.6%	0.5%	42.3%	0.0%	0.0%	1.4%	19.0%	31.1%	5.0%
89	0.0%	0.0%	27.3%	0.0%	4.1%	0.0%	47.1%	10.7%	10.7%
90	0.0%	0.7%	39.9%	0.0%	3.5%	0.0%	32.9%	0.7%	22.4%
91	0.0%	0.5%	24.6%	1.6%	6.0%	3.8%	22.4%	5.5%	36.1%
92	0.0%	0.9%	27.9%	0.0%	1.6%	2.2%	47.6%	1.3%	18.6%
93	0.0%	1.2%	34.1%	0.0%	0.0%	3.2%	36.9%	4.0%	20.6%
94	0.0%	0.0%	72.7%	27.3%	0.0%	0.0%	0.0%	0.0%	0.0%
(82-94)	0.0%	1.6%	40.7%	3.4%	2.6%	1.5%	25.3%	10.6%	14.5%
(85-94)	0.1%	1.1%	37.4%	3.8%	3.0%	1.8%	27.5%	9.7%	15.7%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
82	0.0%	2.4%	37.2%	3.2%	0.0%	0.0%	33.6%	13.6%	9.2%
83	0.0%	3.2%	48.7%	2.5%	0.0%	0.6%	22.2%	7.0%	15.8%
84	0.0%	3.2%	69.8%	2.4%	0.8%	0.0%	9.5%	5.6%	8.7%
85	0.0%	1.4%	43.8%	1.4%	0.0%	0.0%	39.7%	4.1%	6.8%
86	0.0%	2.3%	10.5%	7.5%	3.0%	3.3%	9.2%	4.6%	59.7%
87	0.0%	3.0%	55.0%	0.1%	0.0%	0.1%	21.8%	7.0%	13.0%
88	0.0%	1.0%	67.0%	0.0%	0.0%	0.0%	21.4%	8.7%	1.0%
89	0.0%	0.0%	37.5%	0.0%	0.0%	0.0%	54.2%	0.0%	8.3%
90	0.0%	0.0%	50.0%	0.0%	0.0%	0.0%	33.3%	0.0%	16.7%
91	0.0%	0.0%	21.2%	16.5%	1.2%	3.5%	18.8%	2.4%	35.3%
92	0.0%	1.0%	38.3%	0.0%	0.0%	0.5%	46.6%	0.5%	13.5%
93	0.0%	2.6%	51.3%	0.0%	0.0%	0.0%	35.9%	0.0%	7.7%
94	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
(82-94)	0.0%	1.5%	48.5%	2.6%	0.4%	0.6%	26.6%	4.1%	15.1%
(85-94)	0.0%	1.1%	47.5%	2.5%	0.4%	0.7%	28.1%	2.7%	16.2%

Columbia River Upriver Bright

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
79	28.7%	20.1%	15.5%	0.6%	0.9%	0.0%	1.7%	30.1%	2.4%
80	44.3%	19.9%	14.7%	2.0%	0.4%	0.0%	2.2%	12.8%	3.6%
81	47.5%	23.2%	11.1%	1.0%	1.4%	0.5%	1.4%	10.7%	2.9%
82	34.2%	23.6%	22.2%	0.0%	2.1%	0.0%	2.8%	12.0%	3.2%
83	36.9%	35.8%	7.7%	0.5%	0.3%	0.0%	0.8%	17.8%	0.0%
84	31.3%	22.2%	13.2%	0.3%	1.4%	0.4%	0.3%	27.9%	3.1%
85	16.2%	15.9%	11.4%	0.1%	1.7%	0.1%	0.6%	47.5%	6.5%
86	19.5%	15.5%	9.5%	0.2%	0.2%	0.1%	1.1%	50.5%	3.5%
87	19.9%	18.8%	9.9%	0.0%	0.1%	0.3%	1.8%	44.5%	4.7%
88	14.2%	10.3%	13.4%	0.0%	0.1%	0.0%	2.6%	56.3%	3.2%
89	15.0%	19.7%	9.3%	0.0%	0.9%	0.0%	1.5%	51.2%	2.5%
90	20.4%	15.8%	11.6%	0.0%	0.0%	0.0%	1.7%	47.6%	3.3%
91	15.7%	12.6%	18.9%	0.0%	0.0%	0.0%	1.6%	41.7%	9.4%
92	10.5%	11.2%	24.5%	0.0%	1.4%	1.4%	0.0%	36.4%	14.7%
93	19.4%	13.5%	29.6%	0.0%	0.0%	0.0%	3.0%	27.0%	7.9%
94	23.9%	22.7%	15.2%	0.0%	0.0%	0.7%	0.0%	31.4%	6.5%
(79-94)	24.8%	18.8%	14.9%	0.3%	0.7%	0.2%	1.4%	34.1%	4.8%
(85-94)	17.5%	15.6%	15.3%	0.0%	0.4%	0.3%	1.4%	43.4%	6.2%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
79	46.1%	19.7%	19.1%	0.6%	1.1%	0.0%	2.8%	7.3%	2.8%
80	59.7%	16.1%	13.7%	0.0%	0.0%	0.0%	2.4%	4.8%	1.6%
81	63.0%	18.5%	11.1%	0.0%	0.0%	0.0%	1.9%	1.9%	1.9%
82	52.9%	20.6%	16.2%	0.0%	1.5%	0.0%	4.4%	2.9%	1.5%
83	61.5%	28.4%	6.4%	0.0%	0.0%	0.0%	0.9%	2.8%	0.0%
84	51.5%	23.0%	13.9%	0.4%	0.7%	0.7%	0.4%	5.8%	4.4%
85	35.8%	16.8%	12.4%	0.0%	0.7%	0.0%	1.1%	20.4%	12.0%
86	32.8%	18.3%	17.8%	0.0%	0.0%	0.4%	3.7%	20.3%	6.2%
87	32.5%	29.9%	19.0%	0.0%	0.0%	0.0%	2.9%	12.2%	3.2%
88	27.5%	19.1%	30.5%	0.0%	0.0%	0.0%	4.6%	17.6%	1.5%
89	22.0%	32.0%	22.0%	0.0%	0.0%	0.0%	2.0%	18.0%	2.0%
90	30.8%	23.1%	23.1%	0.0%	0.0%	0.0%	3.8%	11.5%	3.8%
91	35.0%	20.0%	30.0%	0.0%	0.0%	0.0%	5.0%	10.0%	5.0%
92	24.1%	13.8%	34.5%	0.0%	0.0%	3.4%	0.0%	10.3%	13.8%
93	31.0%	15.5%	41.4%	0.0%	0.0%	0.0%	1.7%	6.9%	3.4%
94	26.1%	34.8%	30.4%	0.0%	0.0%	0.0%	0.0%	8.7%	0.0%
(79-94)	39.5%	21.8%	21.3%	0.1%	0.3%	0.3%	2.4%	10.1%	4.0%
(85-94)	29.8%	22.3%	26.1%	0.0%	0.1%	0.4%	2.5%	13.6%	5.1%

Hanford Wild Brights

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
90	16.3%	9.9%	15.9%	0.0%	0.4%	1.7%	0.9%	42.5%	13.3%
91	18.1%	18.8%	8.8%	1.6%	0.0%	0.0%	1.9%	42.8%	8.1%
92	30.8%	9.3%	25.3%	0.0%	0.0%	0.0%	1.6%	29.1%	4.4%
93	28.2%	7.8%	9.7%	0.0%	3.4%	1.9%	6.8%	29.6%	12.6%
94	33.8%	14.2%	10.1%	0.0%	0.6%	0.0%	1.6%	27.8%	12.3%
(90-94)	25.4%	12.0%	13.9%	0.3%	0.9%	0.7%	2.6%	34.4%	10.1%
(90-94)	25.4%	12.0%	13.9%	0.3%	0.9%	0.7%	2.6%	34.4%	10.1%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
90	36.0%	16.0%	20.0%	0.0%	0.0%	0.0%	8.0%	12.0%	8.0%
91	27.3%	31.8%	18.2%	4.5%	0.0%	0.0%	4.5%	4.5%	0.0%
92	43.8%	12.5%	31.3%	0.0%	0.0%	0.0%	0.0%	9.4%	3.1%
93	44.4%	7.4%	18.5%	0.0%	0.0%	0.0%	7.4%	7.4%	7.4%
94	52.0%	16.0%	16.0%	0.0%	0.0%	0.0%	0.0%	4.0%	4.0%
(90-94)	40.7%	16.7%	20.8%	0.9%	0.0%	0.0%	4.0%	7.5%	4.5%
(90-94)	40.7%	16.7%	20.8%	0.9%	0.0%	0.0%	4.0%	7.5%	4.5%

Lewis River Wild

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
81	16.5%	15.5%	14.2%	0.0%	1.7%	0.0%	4.9%	10.0%	37.5%
82	13.4%	8.9%	18.4%	0.7%	1.3%	0.0%	7.1%	10.6%	39.3%
86	9.4%	7.6%	10.9%	0.0%	0.0%	4.1%	5.3%	42.8%	19.7%
87	6.6%	10.4%	14.6%	0.0%	0.0%	0.8%	4.7%	44.6%	18.2%
88	6.9%	5.7%	14.5%	0.0%	0.2%	0.0%	7.6%	37.8%	27.5%
89	5.5%	16.1%	14.3%	0.0%	2.2%	0.9%	13.9%	26.7%	20.7%
90	15.1%	9.5%	36.5%	0.0%	0.0%	1.9%	11.6%	10.1%	15.6%
91	14.6%	12.0%	13.6%	0.0%	1.6%	0.0%	5.5%	36.6%	16.4%
92	4.4%	14.0%	13.6%	0.0%	0.0%	0.0%	6.4%	10.0%	52.0%
93	15.0%	13.1%	19.0%	0.0%	2.6%	0.0%	2.0%	17.0%	31.4%
94	38.1%	19.0%	21.4%	0.0%	9.5%	0.0%	4.8%	9.5%	0.0%
(81-94)	13.2%	12.0%	17.4%	0.1%	1.7%	0.7%	6.7%	23.2%	25.3%
(85-94)	12.9%	11.9%	17.6%	0.0%	1.8%	0.8%	6.9%	26.1%	22.4%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
81	24.4%	12.8%	20.9%	0.0%	1.2%	0.0%	8.1%	5.8%	26.7%
82	32.6%	11.6%	18.6%	0.0%	0.0%	0.0%	9.3%	4.7%	27.9%
86	15.2%	15.2%	28.3%	0.0%	0.0%	0.0%	10.9%	15.2%	15.2%
87	12.9%	15.7%	24.3%	0.0%	0.0%	1.4%	5.7%	20.0%	21.4%
88	10.0%	10.0%	27.1%	0.0%	0.0%	0.0%	12.9%	12.9%	27.1%
89	6.9%	22.4%	24.1%	0.0%	1.7%	0.0%	19.0%	8.6%	13.8%
90	17.0%	8.5%	51.1%	0.0%	0.0%	0.0%	12.8%	2.1%	6.4%
91	20.0%	12.0%	24.0%	0.0%	0.0%	0.0%	8.0%	8.0%	20.0%
92	5.9%	17.6%	23.5%	0.0%	0.0%	0.0%	11.8%	5.9%	35.3%
93	22.2%	16.7%	22.2%	0.0%	0.0%	0.0%	16.7%	5.6%	16.7%
94	14.3%	57.1%	14.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
(81-94)	16.5%	18.2%	25.3%	0.0%	0.3%	0.1%	10.5%	8.1%	19.1%
(85-94)	13.8%	19.5%	26.5%	0.0%	0.2%	0.2%	10.8%	8.7%	17.3%

Lyons Ferry

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
88	4.3%	6.4%	26.2%	0.0%	0.3%	0.0%	15.3%	41.9%	5.6%
89	4.8%	9.0%	21.5%	0.0%	1.6%	0.8%	16.6%	36.7%	9.0%
90	8.2%	5.8%	23.9%	0.0%	0.0%	0.0%	14.3%	39.2%	8.6%
91	11.3%	13.8%	22.6%	0.0%	2.1%	0.0%	10.2%	32.8%	7.2%
92	5.8%	13.6%	29.0%	0.0%	3.0%	5.3%	15.9%	22.5%	4.8%
93	7.6%	14.5%	23.5%	0.0%	2.6%	0.0%	17.4%	30.6%	3.7%
94	26.5%	21.9%	21.4%	2.0%	6.5%	0.0%	0.0%	21.8%	0.0%
(88-94)	9.8%	12.2%	24.0%	0.3%	2.3%	0.9%	12.8%	32.2%	5.5%
(88-94)	9.8%	12.2%	24.0%	0.3%	2.3%	0.9%	12.8%	32.2%	5.5%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
88	5.2%	7.3%	29.0%	0.0%	0.3%	0.1%	15.8%	37.0%	5.4%
89	6.8%	9.8%	23.2%	0.0%	1.4%	0.7%	16.9%	32.9%	8.3%
90	8.4%	6.0%	24.9%	0.0%	0.0%	0.0%	14.6%	37.8%	8.4%
91	14.6%	14.2%	23.0%	0.0%	2.0%	0.0%	10.2%	29.1%	7.0%
92	9.0%	14.1%	29.8%	0.0%	2.6%	5.1%	15.6%	18.7%	5.1%
93	13.7%	15.9%	23.4%	0.4%	2.2%	0.0%	15.2%	26.1%	3.2%
94	29.8%	20.8%	20.4%	1.9%	6.5%	0.0%	0.1%	20.3%	0.0%
(88-94)	12.5%	12.6%	24.8%	0.3%	2.1%	0.8%	12.6%	28.8%	5.3%
(88-94)	12.5%	12.6%	24.8%	0.3%	2.1%	0.8%	12.6%	28.8%	5.3%

Willamette Spring

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
80	26.9%	29.5%	11.9%	0.8%	0.0%	0.0%	3.0%	0.2%	27.8%
81	12.4%	20.4%	4.0%	0.4%	0.0%	0.0%	1.7%	21.4%	39.7%
82	12.4%	15.9%	11.4%	0.0%	0.1%	0.0%	2.5%	10.2%	47.5%
83	20.8%	17.6%	6.1%	1.3%	0.0%	0.0%	4.0%	11.3%	38.9%
84	11.9%	8.3%	5.4%	0.2%	0.3%	0.0%	2.3%	17.8%	53.8%
85	16.6%	2.9%	1.8%	0.4%	0.0%	0.0%	0.8%	36.3%	41.3%
86	5.5%	18.0%	6.0%	0.0%	0.0%	1.3%	0.5%	32.1%	36.6%
87	21.9%	14.9%	3.5%	0.0%	0.0%	0.4%	4.3%	9.0%	45.8%
88	15.5%	9.5%	4.5%	0.0%	0.0%	0.0%	3.1%	16.0%	51.5%
89	10.6%	3.9%	3.5%	1.0%	0.2%	0.2%	3.4%	30.4%	46.8%
90	12.9%	3.7%	3.2%	0.0%	0.1%	0.3%	1.9%	31.9%	45.9%
91	8.9%	3.2%	0.4%	0.3%	0.1%	0.1%	1.2%	12.2%	73.6%
92	12.4%	2.5%	5.8%	0.0%	0.1%	0.2%	5.3%	14.3%	59.6%
93	18.2%	2.3%	3.1%	0.3%	0.0%	0.2%	4.1%	2.0%	69.8%
94	10.7%	2.4%	1.6%	0.0%	0.0%	0.0%	0.3%	11.1%	74.0%
(80-94)	14.5%	10.3%	4.8%	0.3%	0.1%	0.2%	2.6%	17.1%	50.2%
(85-94)	13.3%	6.3%	3.3%	0.2%	0.1%	0.3%	2.5%	19.5%	54.5%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
80	25.6%	21.3%	7.8%	0.0%	0.0%	0.0%	2.5%	2.3%	40.4%
81	29.1%	24.6%	5.2%	0.0%	0.0%	0.0%	2.2%	3.0%	35.8%
82	20.6%	16.7%	13.1%	0.0%	0.0%	0.0%	3.2%	3.2%	42.9%
83	31.0%	17.4%	5.5%	0.9%	0.0%	0.0%	4.6%	3.5%	37.4%
84	15.4%	9.8%	5.9%	0.3%	0.3%	0.0%	2.6%	4.9%	62.1%
85	38.7%	3.3%	1.7%	0.0%	0.0%	0.0%	1.1%	7.7%	47.5%
86	13.3%	42.2%	15.6%	0.0%	0.0%	4.4%	2.2%	6.7%	15.6%
87	36.4%	14.3%	4.3%	0.0%	0.0%	0.4%	4.8%	1.3%	38.5%
88	23.4%	11.7%	5.0%	0.0%	0.0%	0.0%	3.0%	6.0%	50.8%
89	16.3%	7.5%	6.3%	4.4%	0.0%	0.6%	4.4%	9.4%	50.0%
90	37.9%	8.3%	8.8%	0.0%	0.0%	0.4%	3.8%	5.8%	35.0%
91	16.8%	5.0%	0.7%	1.3%	0.0%	0.0%	2.3%	5.0%	69.0%
92	29.5%	3.3%	10.3%	0.0%	0.0%	0.0%	8.6%	3.3%	44.7%
93	26.3%	2.8%	3.7%	0.9%	0.0%	0.2%	4.7%	0.5%	60.6%
94	20.5%	4.1%	3.4%	0.0%	0.0%	0.0%	0.3%	3.4%	68.5%
(80-94)	25.4%	12.8%	6.5%	0.5%	0.0%	0.4%	3.4%	4.4%	46.6%
(85-94)	25.9%	10.3%	6.0%	0.7%	0.0%	0.6%	3.5%	4.9%	48.0%

Salmon River

Distribution of Reported Catch

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
81	23.0%	44.3%	5.5%	0.0%	0.0%	1.3%	2.0%	0.0%	24.8%
82	22.3%	26.7%	11.6%	0.0%	0.0%	0.0%	4.3%	0.0%	35.1%
83	32.2%	30.9%	13.4%	0.0%	0.0%	0.0%	0.0%	0.0%	23.5%
84	18.9%	39.7%	5.8%	0.0%	1.4%	0.0%	0.5%	0.7%	33.0%
85	34.2%	31.1%	2.0%	0.0%	0.0%	0.0%	0.0%	0.0%	32.2%
86	35.8%	27.5%	4.4%	0.0%	0.0%	0.0%	0.0%	0.0%	32.8%
87	19.0%	27.3%	3.6%	0.0%	0.0%	0.0%	4.2%	0.0%	45.5%
88	24.2%	21.0%	9.7%	0.0%	0.0%	0.0%	2.0%	0.0%	42.8%
89	15.6%	20.9%	6.7%	0.0%	1.4%	0.0%	5.3%	0.0%	50.4%
90	20.2%	19.7%	11.5%	0.0%	0.4%	0.0%	4.6%	0.0%	43.5%
91	26.8%	25.2%	9.7%	0.0%	0.0%	0.0%	0.4%	0.0%	37.9%
92	6.8%	19.8%	32.4%	0.0%	0.0%	0.0%	4.3%	0.2%	36.4%
93	12.0%	23.2%	24.2%	0.0%	0.6%	0.0%	4.0%	0.0%	36.1%
94	18.0%	33.2%	9.5%	0.0%	0.0%	0.0%	2.5%	0.0%	36.8%
(81-94)	22.1%	27.9%	10.7%	0.0%	0.3%	0.1%	2.4%	0.1%	36.5%
(85-94)	21.3%	24.9%	11.4%	0.0%	0.2%	0.0%	2.7%	0.0%	39.4%

Distribution of Total Mortalities

Catch Year	Fisheries with ceilings: All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Other fisheries: Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
81	30.5%	35.6%	8.5%	0.0%	0.0%	0.0%	1.7%	0.0%	22.0%
82	30.5%	27.1%	13.6%	0.0%	0.0%	0.0%	5.1%	0.0%	23.7%
83	43.8%	28.1%	6.3%	0.0%	0.0%	0.0%	0.0%	0.0%	18.8%
84	36.7%	33.3%	6.7%	0.0%	0.0%	0.0%	0.0%	0.0%	26.7%
85	34.0%	24.0%	4.0%	0.0%	0.0%	0.0%	2.0%	0.0%	36.0%
86	31.3%	29.7%	9.4%	0.0%	0.0%	0.0%	3.1%	0.0%	25.0%
87	29.9%	40.3%	4.5%	0.0%	0.0%	0.0%	4.5%	0.0%	20.9%
88	35.9%	32.6%	14.1%	0.0%	0.0%	0.0%	2.2%	0.0%	14.1%
89	29.0%	34.5%	9.0%	0.0%	0.0%	0.0%	4.0%	0.0%	22.5%
90	29.2%	28.0%	14.3%	0.0%	0.0%	0.0%	4.2%	0.0%	23.8%
91	34.0%	33.5%	15.7%	0.0%	0.0%	0.0%	0.5%	0.0%	14.7%
92	8.4%	22.4%	36.4%	0.0%	0.0%	0.0%	4.0%	0.0%	28.0%
93	14.5%	23.5%	26.8%	0.0%	0.0%	0.0%	3.3%	0.0%	31.7%
94	17.6%	41.2%	16.0%	0.0%	0.0%	0.0%	3.8%	0.0%	19.8%
(81-94)	28.9%	31.0%	13.2%	0.0%	0.0%	0.0%	2.7%	0.0%	23.4%
(85-94)	26.4%	31.0%	15.0%	0.0%	0.0%	0.0%	3.2%	0.0%	23.7%

APPENDIX E: FISHERY INDEX EQUATIONS

Table of Contents

E.1 Notation

Variables

H = Harvest Rate
D = Stock Distribution (proportion of cohort vulnerable to a fishery)
N = Cohort Size
C = Catch (expressed in either nominal or adult equivalent terms)

Subscripts

s = stock-age class
B = base period
yr = index year
f = fishery
k = tagged stocks
u = untagged stocks

E.2 True Index

$$F = \left(\frac{H_{yr}}{H_B}\right)\frac{\sum_s D_{s,yr}N_{s,yr}}{\sum_s D_{s,B}N_{s,yr}}$$

E.3 Estimated Indices

The Average Index is the average ratio of exploitation rates:

$$\text{avg}_s \frac{\left(\frac{\sum_f \hat{C}_{s,f,yr}}{\hat{N}_{s,yr}}\right)}{\left(\frac{\sum_f \hat{C}_{s,f,B}}{\hat{N}_{s,B}}\right)}.$$

The Straight Index is the ratio between the total exploitation rate of all stock-age groups in a given year compared to the base period average total exploitation rate of all stock-age groups:

$$\frac{\left(\frac{\sum_{s,f}\hat{C}_{s,f,yr}}{\sum_{s}\hat{N}_{s,yr}}\right)}{\text{avg}\left(\frac{\sum_{s,f}\hat{C}_{s,f,B}}{\sum_{s}\hat{N}_{s,B}}\right)}.$$

The CTC Fishery Index (FI) is the ratio between stock-age specific exploitation rates during a given year and the base period averages for corresponding stock-age groups during the base period:

$$\frac{\sum_{s}\left(\frac{\sum_{f}\hat{C}_{s,f,yr}}{\hat{N}_{s,yr}}\right)}{\text{avg}\sum_{s}\left(\frac{\sum_{f}\hat{C}_{s,f,B}}{\hat{N}_{s,B}}\right)}.$$

The proportional fishery index (PFI) reflects the ratio between an estimated harvest rate during a given year and the base period average harvest rate. Harvest rates are estimated using an average stock distribution:

$$\frac{\left(\frac{\sum_{s,f}\hat{C}_{s,f,yr}}{\sum_{s}\hat{D}_s\hat{N}_{s,yr}}\right)}{\text{avg}\left(\frac{\sum_{s,f}\hat{C}_{s,f,B}}{\sum_{s}\hat{D}_s N_{s,B}}\right)}.$$

When fisheries are stratified, the proportional fishery index (PFI) can be estimated based on data for tagged stocks:

$$\frac{\left(\dfrac{\sum_{s,f}\hat{C}_{s,f,yr}}{\sum_{s,f}\hat{D}_{s,f}\,\hat{N}_{s,yr}}\right)}{\operatorname{avg}\left(\dfrac{\sum_{s,f}\hat{C}_{s,f,B}}{\sum_{s,f}\hat{D}_{s,f}\,\hat{N}_{s,B}}\right)}.$$

However, the fishery affects both tagged and untagged stocks. The fishery index based on both tagged and untagged stocks (SPFI) can be expressed as:

$$\hat{F} = \frac{\left(\dfrac{\sum_{s,f}\hat{C}_{s,f,yr(k)} + \sum_{s,f}\hat{C}_{s,f,yr(u)}}{\sum_{s,f}\hat{D}_{s,f,B(k)}\,\hat{N}_{s,yr(k)} + \sum_{s,f}\hat{D}_{s,f,B(u)}\,\hat{N}_{s,yr(u)}}\right)}{\operatorname{avg}\left(\dfrac{\sum_{s,f}\hat{C}_{s,f,B(k)} + \sum_{s,f}\hat{C}_{s,f,B(u)}}{\sum_{s,f}\hat{D}_{s,f,B(k)}\,\hat{N}_{s,B(k)} + \sum_{s,f}\hat{D}_{s,f,B(u)}\,\hat{N}_{s,B(u)}}\right)}.$$

In this index, no data are available to directly represent tagged stocks. The numerator in each term of the ratio simply represents total catch. The quantities

$$\sum_{s,f}\hat{D}_{s,f,B(u)}\,\hat{N}_{s,yr(u)} \quad \text{and} \quad \sum_{s,f}\hat{D}_{s,f,B(u)}\,\hat{N}_{s,B(u)}$$

are unknown. These quantities can be estimated using the assumption that harvest rates are the same for all vulnerable populations of stock-age groups. For example, for the base period

$$\hat{H}_{f,B} = \frac{\sum_{s}\hat{C}_{s,f,B(k)}}{\sum_{s,f}\hat{D}_{s,f,B(k)}\,\hat{N}_{s,B(k)}}.$$

Therefore,

$$\sum_{f} \frac{\sum_{s} \hat{C}_{s,f,B(u)}}{\hat{H}_{f,B}} = \sum_{s,f} \hat{D}_{s,f,B(u)} \hat{N}_{s,B(u)} .$$

A similar estimate can be generated for untagged stocks in the index year. These values can then be substituted into the original formulation for the SPFI.