PACIFIC SALMON COMMISSION
JOINT CHINOOK
TECHNICAL COMMITTEE REPORT

1995 AND 1996 ANNUAL REPORT
REPORT TCCHINOOK(99)-2

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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 Regional 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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EXECUTIVE SUMMARY

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)

This report of the Chinook Technical Committee (CTC) updates our previous comprehensive stock assessment report (TCChinook (96)-1, data through 1994). We provide a summary of fishery catches and management actions in 1995 and 1996, and an assessment of escapement and exploitation rates through 1996. Key points in the report are summarized below.

1995 and 1996 Chinook Catch and Fishery Management (Chapter 1)

The Chinook Annex of the PST implemented in 1985 established ceilings for the catch of all gear types in Southeast Alaska (SEAK; 263,000) and North/Central British Columbia (NCBC; 263,000), the West Coast Vancouver Island (WCVI; 360,000) troll fishery, and the Strait of Georgia (GS; 275,000) sport and troll fishery. These provisions for catches (referred to as base ceilings) subsequently expired and, in 1995 and 1996, the parties were unable to reach agreement on suitable replacements. Catches in 1995 and 1996 (not including hatchery add-on and terminal exclusions) were lower than the base ceilings, and retention of chinook was not permitted in the WCVI troll fishery in 1996.

Area	Base Ceiling (1,000s)	1995 Catch (1,000s)	1996 Catch (1,000s)
SEAK (troll, net, sport) [1]	263	178.7	149.0
NCBC (troll, net, sport) [2]	263	119.1	26.9
WCVI (troll)	360	81.0	0.0
GS (troll and sport)	275	61.5	74.9

[1] The total catch was 235,700 and 217,200 for 1995 and 1996, respectively. See Chapter 1 for a discussion of the computation of the hatchery add-on and terminal exclusion.

[2] The total catch was 120,800 and 43,000 for 1995 and 1996, respectively. See Chapter 1 for a discussion of the computation of terminal exclusion.

Escapement Assessment (Chapter 2)

The status of 42 naturally spawning escapement indicator stocks was assessed using prior CTC procedures and additional information presented by the relevant management agencies. This assessment indicates that:

a) In 1995, the SEAK/TBR stocks completed their defined 15-year rebuilding period. Substantial progress has been made towards rebuilding these stocks. At the end of their rebuilding period, there is no evidence of escapement declines relative to the base period.

Nine of the 10 stocks were Stable at Goal or had increased since the base period, and the other stock (Chickamin) had a recent escapement that was indistinguishable from base (*Table 2-8*). Five of the stocks (50%) were classified as Rebuilding or Stable at Goal, while 2 (20%) were Not Rebuilding in relation to the escapement goals the CTC used for the assessment (*Table 2-9*). The remaining 3 stocks (30%) were Indeterminate.

b) The other escapement indicator stocks, located in Canada south of the SEAK/TBR rivers and in the Pacific Northwest have a target date of 1998 for completion of their 15-year rebuilding program. These stocks included 24 stocks with escapement goals and 8 without goals. Thirty-one of these stocks were evaluated for changes in escapement relative to their respective base period; one stock (WCVI) was excluded from this analysis due to significant changes in escapement methodology. Of the 31 stocks evaluated through 1996, most (77%) have been Stable at Goal, have increased, or have remained indistinguishable in escapement magnitude relative to the base period (*Tables 2-4, 2-8*). However, seven (22%) of these stocks have shown escapement declines after 13 years of the rebuilding program. Of the 24 of these stocks with escapement goals, 11 (46%) were Stable at Goal, Above Goal, or Rebuilding, while 12 (50%) were Not Rebuilding or Declined Below Goal (*Table 2-9*). One stock was Indeterminate.

c) While assessment of progress toward attaining interim chinook escapement goals is the specific task of this chapter, some members of the CTC do not believe that application of the current algorithm results in an accurate assessment of rebuilding. The specific concerns of these members include: inconsistency in survey methodologies results in data sets of very different quality being treated equally; the numerous interim escapement goals may have no relevance to maximum sustained yield escapement goals; apparent erroneous conclusions may be reached if the algorithm is strictly applied; the current summarization of rebuilding progress does not distinguish between very small and very large stocks; and, the precision of the various escapement estimates has not been incorporated in the analysis.

In spite of these concerns, the CTC decided to use the available data and the escapement goals as presented by the agencies. However, in response to these concerns, the CTC has also presented information provided by the management agencies in addition to results from application of the assessment algorithm. The information appears under the escapement graph for each of the 44 chinook stocks. The information is included to assist the reader in understanding the relative quality of data and resultant assessment as well as to present the agency's assessment of stock status. In several instances this information was used by the CTC to adjust the rebuilding status derived from the CTC assessment algorithm.

Exploitation Rate Assessment (Chapter 3)

The 1996 season required that the CTC make several changes to the exploitation analysis methods. Prior to 1996, incidental mortalities during CNR fisheries were calculated using information from the chinook retention portion of the fishery. For the 1996 analysis, a new method was developed to estimate CNR mortality based on encounter rates during a base period (Section 3.2.1.2). In addition, the age 2-3 survival index for 1996 was converted to express all recoveries as spawner equivalents (AEQ). This conversion was implemented to compensate for the under-estimation of cohort survival resulting from the closure of some Canadian fisheries (a substantial portion of the age-2 and age-3 chinook recoveries are usually catch recoveries). The cohort analysis was further modified in 1996 to incorporate the incidental mortality rates for troll and sport fisheries recommended by the CTC (TCCHINOOK (97)-1)(Section 3.2.1.1)

Examination of coded-wire tag data for 18 of the 39 exploitation rate indicator stocks (*Table 3-3*) indicated that:

a) In 1996, fishery indices for both reported catch and total mortality were below base levels in all PSC ceiling fisheries (*Table 3-6, Figures 3-1 through 3-4*). Total mortality fishery indices for 1996 were reduced from base period levels by 52% in SEAK troll, 98% in NCBC troll, 95% in WCVI troll, and 17% in the Strait of Georgia troll and sport fisheries. Similarly, reported catch fishery indices for 1996 were reduced from base period levels by 61% in SEAK troll, 100% in NCBC troll, 99% in WCVI troll, and 32% in the Strait of Georgia troll and sport fisheries. The 1995 and 1996 total mortality and reported catch fishery indices for NCBC and WCVI troll were below the projected indices from the 1984 chinook model. The SEAK troll and Strait of Georgia total mortality indices were above the 1984 projected index in both 1995 and 1996. The total mortality and reported catch fishery indices for U.S. South ocean troll and sport were reduced 67 and 65% from the base period levels in the Columbia River stock group and increased 47 and 53% from base in the Puget Sound stock group.

b) In 1995 and 1996 nonceiling fisheries, harvest rates on wild stocks subject to the passthrough provision were below base period levels and therefore met the CTC's suggested interpretation of passthrough obligations (CTC 1991) (*Figures 3-7 through 3-14*). In 1995, nonceiling fishery indices were at or near zero for Upper Georgia Straight, just below 1.0 for Skagit, Snohomish, and Stillaquamish Summer/Fall, and ranged from 0.3-0.8 for Columbia River Summer, Grays Harbor, and Quillayute Summer. In 1996, nonceiling fishery indices were again near zero in the Straight of Georgia and ranged from 0.3-0.8 for the other fisheries.

c) Brood year 1992 exploitation rates declined from brood year 1991 rates for both total mortality and reported catch for all five of the ocean type (age 0 migrant) stock groups (*Figures 3-15 through 3-21*). In all stock groups except SEAK/TBR-I, brood year 1992 exploitation rates based on total fishing mortalities indicate a 10-70% reduction in ocean exploitation rates relative to the base period. For SEAK/TBR, the 1991 brood year total exploitation rate is 30% above the base period. Similarly, in all stock groups except SEAK/TBR-I, exploitation rates based on reported catch indicated a 30-100% reduction in ocean exploitation rates relative to the base period. For SEAK/TBR, the 1991 brood year total exploitation rate based on reported catch is 10% above the base period. The 1992 brood total mortality exploitation rate index for LGS is higher than the 1984 projection from the CTC chinook model. The 1992 brood total mortality exploitation rate indices for the WACO and WCVI stock groups are lower than projections from the CTC chinook model.

d) The age 2-3 survival indices are generally either declining or stable at levels indicating poor survival (*Appendix F*). An exception is the Columbia Upriver Bright index, which has been increasing from 1991 until 1993. However, the brood year 1994 age-2 index for this stock was not computed because there were no CWT recoveries reported in 1996. While it is true that major Canadian ocean-troll fisheries were closed to chinook retention in 1996, the CTC is concerned that a complete lack of CWT recoveries, including hatchery rack recoveries, may signal poor survival of the 1992 brood. Other stocks with no age-2 recoveries in 1996 include

Robertson Creek, Hoko Fall Fingerling, White River Spring Yearling, Cowlitz Fall, and Stayton Pond.

Recommendations for Improved Stock Assessment

The 15-year rebuilding period for chinook salmon identified for the PST has or will soon conclude. Despite substantial reductions in fishery exploitation rates, 50% of the escapement indicator stock located in Canada south of the SEAK/TBR rivers and in the Pacific Northwest are currently classified as Not Rebuilding or Declined Below Goal. To evaluate and refine management options for these stocks, the CTC should:

1) improve the methods used to assess the status of the escapement indicator stocks;
2) identify the factors contributing to the status of stocks classified as Not Rebuilding or Declined Below Goal;
3) estimate the stock-recruit productivity relationship and escapement goals for the escapement indicator stocks; and
4) convene a workshop to foster understanding of recent developments in stock-recruit analysis and generate collaboration and consensus in CTC analyses.

Even with these improvements, the quality of the CTC assessments can be no better than the basic resource data collected by the management agencies. As previously noted by the CTC (1992):

> "Without a greater realization of the need for more accurate data and, following that, a commitment to better and consistent data collection, we will not be able to answer the increasingly complex questions that are asked about responsible utilization of chinook resources. The costs of poor data will only become more and more evident, obvious examples being: extinction of some chinook populations; loss of less productive stocks; and increased disruption to traditional fisheries. Without improved information, controversy over the utilization and conservation of the resource will increase and resource benefits to both Parties will be lost."

Appendices

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

1. 1995 and 1996 CHINOOK CATCH

1.1. 1995 AND 1996 CHINOOK SALMON CATCHES IN FISHERIES WITH CEILINGS

Estimates of the 1995 and 1996 catches for each fishery managed under a harvest ceiling established by the Pacific Salmon Commission (PSC) are presented in Table 1-1. There have been no annexes for the chinook salmon ceiling fisheries since 1992. Catch data for some fisheries is still preliminary, but major changes are not expected. Catches in all chinook fisheries of interest to the PSC for the years 1993 through 1996 are shown in Table 1-2.

Table 1-1. Catches for PSC ceiling fisheries in 1995 and 1996.

Area (Gear) [1]	Base Ceiling	1995	1996
Southeast Alaska (T,N,S) [2]	263	178.7	149.0
North/Central B.C. (T,N,S) [3]	263	120.3	30.4
West Coast Vancouver Island (T)	360	81.3	0.0
Strait of Georgia (T,S) [4]	275	61.5	74.9

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

2 The actual total catch was 235,700 and 217,200 for 1995 and 1996, respectively, including a hatchery add-on of 57,000 in 1995 and 65,500 plus an exclusion of 2,700 in 1996.

3 Catch excludes terminal exclusions of 1,702 (Area 8 only) in 1995 and 16,149 in 1996.

4 In 1995 and 1996, due to budget restraints, the catch in the Strait of Georgia recreational fishery was only estimated through September (based on past averages, this period accounts for approximately 92% of the annual catch). There was no troll catch in the Strait of Georgia.

1.2. CUMULATIVE DEVIATIONS FROM CATCH CEILINGS

A 7.5% cumulative management range was established by the PSC in 1987. In the absence of PSC agreed ceilings in 1993-1996, cumulative deviations can not be calculated. All catches since 1992 have been below the originally established base ceilings. Historical catches, add on, and terminal exclusions for ceilings fisheries for 1987 through 1996 are given in Table 1-3.

1.3. REVIEW OF FISHERIES WITH CATCH CEILINGS

1.3.1. Southeast Alaska Fisheries

In 1995 and 1996, SEAK fisheries were managed under the following provisions: base was originally managed not to exceed 230,000. However, a temporary restraining order issued by the United States District Court, Western District of Washington halted the fishery prior to this.

In 1996, to comply with the June 24, 1996 "Letter of Agreement regarding an Abundance-Based Approach to Managing Chinook Salmon Fisheries in Southeast Alaska." The all-gear quota was to be in the range of 140,000 to 155,000 fish.

Table 1-2. Summary of the 1993-1996 total chinook catches (including terminal area exclusions and hatchery add-ons) in fisheries relevant to the U.S./Canada Pacific Salmon Treaty (thousands of fish). Shaded areas indicate ceiling fisheries.

Area	Troll				Net				Sport				Indian Food				Total			
	96	95	94	93	96	95	94	93	96	95	94	93	96	95	94	93	96	95	94	93
SEAK [1]	**141**	**138**	**186**	**227**	**37**	**48**	**36**	**28**	**38**	**49**	**42**	**49**					216	235	264	304
BRITISH COLUMBIA [2]																				
Transboundary					2	3	3	2	1	1	<1	<1	1	1	1	1	4	5	4	3
North/Cent Coast	**0**	**62**	**182**	**182**	**36**	**30**	**36**	**44**	**11**	**31**	**39**	**38**	16	17	18	**25**	63	140	275	289
Outer WCVI [3]	**0**	**81**	**145**	**274**	0	1	1	6	3	20	32	55					3	102	178	335
Terminal WCVI	0	0	0	0	<1	1	1	22	0	2	14	10	0	3	16	33	0	6	31	65
Georgia St/Fraser [4]	**0**	**0**	**13**	**33**	10	6	14	16	**71**	**47**	**56**	**106**	18	22	20	20	99	75	103	175
Johnstone St [6]	0	0	2	4	<1	1	9	15				12					0	1	11	31
Juan de Fuca Strait	0	0	0	0	1	1	9	2	**19**	**14**	**14**	**14**	1	1			21	16	23	16
Other Freshwater [6]					1	1			12	12	7	NA					13	13	7	0
Subtotal	*0*	*143*	*342*	*493*	*49*	*45*	*73*	*107*	*128*	*135*	*162*	*235*	*36*	*44*	*55*	*79*	*203*	*358*	*632*	*914*
WASHINGTON Inside [7]																				
Juan de Fuca Strait (marine) [8]	12	7	3	10	1	5	6	1		6	2	32					13	18	11	48
San Juans (marine) [9]	0	0	0	0	4	5	14	14		8	6	7					4	13	20	21
Other Puget Sound (mar + fw) [10]	0	0	0	0	60	60	59	55		58	44	47					60	118	103	106
Coastal (mar + fw) 10	0	0	0	0	56	47	46	62		10	7	10					56	57	53	56
Subtotal	*12*	*7*	*3*	*10*	*121*	*117*	*125*	*132*	*0*	*82*	*59*	*96*	*0*	*0*	*0*	*0*	*133*	*206*	*187*	*231*
COLUMBIA RIVER [11,12]					59	32	63	51	126	37	31	83	25	13	7	10	210	82	101	144
WA/OR N OF FALCON [13]	12	10	4	55					0	0	0	14					12	10	4	69
OREGON (Inside) [14]			1	1						48	37	52					0	48	38	53
GRAND TOTAL	**165**	**298**	**536**	**786**	**267**	**241**	**297**	**318**	**281**	**343**	**331**	**529**	**61**	**57**	**62**	**89**	**771**	**939**	**1226**	**1715**

1/ Southeast Alaska troll chinook catches shown for October 1-September 30 catch accounting year.
2/ British Columbia net catches include only fish over 5 lb. round weight.
3/ Outer WCVI sport catch from Area 23B (Barkley Sound)/Area 24 creel survey, July 15 - September 30, logbook catches.
4/ GS sport catches from areas 13-19, 28, 29 outside the Fraser River. Juan de Fuca Strait sport catches reported separately.
5/ No creel survey was conducted in Johnstone Strait from 1994 to 1996.
6/ Includes catches from Fraser and North Coast non-tidal fisheries.
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, 6C, and catch in area 4B outside of the PFMC management period (January-May and October-December).
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, Treaty and ceremonial and bank sale catches.
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-September), 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 1995).

Table 1-3. Annual catches, add on, and terminal exclusion for Pacific Salmon Treaty ceiling fisheries. The catches do not include the add-on or exclusions.

	SEAK (T,N,S)			NCBC (T,N,S)			WCVI (T)		GS (T,S)	
Year	**Ceiling**	**Catch**	**Add-on**	**Ceiling**	**Catch**	**Terminal Exclusion Add-on in ( )**	**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	253.0	6.1 (15.8)	360	346.8	275	153.9
1993	NA[1]	268.2	35.9	NA[1]	257.0	7.7	NA[1]	273.7	NA[1]	152.3 [2]
1994	NA[1]	232.5	31.8	NA[1]	250.4	7.2	NA[1]	145.9	NA[1]	83.8
1995	NA[1]	178.7	57.0	NA[1]	120.3	1.7	NA[1]	81.0	NA[1]	61.5
1996	NA[1]	149.0	68.2	NA[1]	30.4	16.1	NA[1]	0	NA[1]	74.9

1 There were no PSC ceilings agreed to in 1993, 1994, 1995, or 1996. Management regimes for 1995 and 1996 ceiling fisheries are discussed in the text.

2 Due to budget restraints in each year 1993 through 1996, the catch in the Strait of Georgia recreational fishery was only estimated through September (based on past averages, this period accounts for approximately 92% of the annual catch).

In addition, the SEAK fisheries were managed each year for:

1) An Alaska hatchery add-on calculated on the basis of coded-wire-tag (CWT) sampling. A 1 in 20 chance of risk was used in 1995 while a 1 in 10 chance of error was used in 1996.
2) To comply with provisions established by the National Marine Fisheries Service in accordance with the United States (U.S.) Endangered Species Act (ESA).
3) To be consistent with the provisions of the PST as required by the Salmon Fishery Management Plan of the North Pacific Fishery Management Council which was established by the U.S. Magnuson Act.

1.3.1.1. Troll Fisheries

The troll fishery harvested a total of 138,100 and 141,400 chinook salmon in 1995 and 1996 respectively (Table 1-4). Of these, 19.7% and 26.7% were of Alaska hatchery origin in 1995 and 1996 respectively. The 1995 and 1996 chinook salmon catches in the SEAK troll fisheries are as follows:

Table 1-4. Catches in the SEAK troll fisheries.

Troll Fishery	Year	Total Catch	Ak Hatchery Catch	Ak Hatchery Percent
Winter	1995	17,900	2,100	11.7%
	1996	9,400	1,700	18.1%
Spring	1995	23,100	15,300	66.2%
	1996	47,400	31,300	66.0%
Summer	1995	97,200	9,700	10.0%
	1996	84,600	4,800	5.7%
Total	1995	138,100	27,200	19.7%
	1996	141,400	37,800	26.7%

The winter troll fishery began each year on October 11 and continued through April 14. The total winter harvests were 17,900 and 9,400 in 1995 and 1996 respectively.

The spring fisheries consist of terminal and experimental area fisheries and are conducted between early May and June 30. They are intended to harvest primarily Alaska hatchery chinook salmon. The fisheries harvested 23,100 and 47,400 chinook salmon in 1995 and 1996 respectively. The Alaska hatchery composition was 66.2% and 66.0% in 1995 and 1996 respectively.

The general summer fishery opened each year on July 1. In both 1995 and 1996, the initial opening lasted through July 10. In both years, the fishery remained open for retention of other salmon species but with areas of high abundance closed. In 1995, the chinook fishery reopened for six days beginning July 31. The total summer catch was 97,200 with 10.0% coming from Alaska hatcheries. In 1996, the fishery reopened for two days beginning August 19. The total summer catch was 84,600 with 5.7% from Alaska hatcheries. In 1995, there were 7,707 days of effort during chinook retention and 24,002 days of effort during chinook non retention (CNR). In 1996, there were 5,161 days of effort during chinook retention and 23,262 days of effort during CNR.

1.3.1.2. Net Fisheries

The SEAK net fisheries have a guideline harvest of 20,000 non-Alaska hatchery chinook. The total net catches were 48,000 and 37,300 in 1995 and 1996 respectively. The number of Alaska hatchery chinook in 1995 and 1996 were 22,300 and 28,900 respectively. The total non-Alaska hatchery catches were 25,700 in 1995 and 8,400 in 1996. Net harvest of chinook salmon in the purse seine fishery is limited to 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. Some chinook in the Stikine and Taku drift gillnet fisheries are excluded.

1.3.1.3. Recreational Fisheries

The recreational fishery harvested a total of 49,700 and 38,500 in 1995 and 1996 respectively. A total of 17,400 and 8,600 were Alaska hatchery chinook in 1995 and 1996 respectively. The fishery has a 28" total length size limit. In 1995, the fishery had a two-fish bag limit through August 16. A one-fish bag limit was in effect until October 3. In 1996, the fishery had a two-fish bag limit through June 14. A one-fish bag limit was in effect from June 15 through December 31. In addition, charter boat operators were not allowed to retain chinook while clients were on board.

1.3.2. North/Central British Columbia

The 1995 North Central British Columbia (NCBC) fishery was managed under the following provisions:

1) A troll fishery ceiling of 60,000 was implemented. Management actions included area and time closures.
2) A catch target of 21,000 chinook was instituted in the Area 1, 2W sport fishery. Management actions included a reduction in the daily bag and trip possession limits.
3) A target 50% reduction in the bycatch in the net fisheries. Management actions included area and time closures, beach boundaries, and voluntary non-retention of live chinook.

In 1996, Canada adopted a management regime to reduce the total mortality of WCVI chinook in Canadian fisheries by 95%. The 1996 NCBC fishery was managed under the following provisions:

1) Non-retention/non possession of chinook was in-effect all season for the troll fleet and in any commercial intercepting net opportunities. Chinook sensitive areas around the QCI were closed to minimize shakers.
2) Non-retention/non-possession of chinook was implemented in the Area 1, 2W sport fishery after June 1 to October 31.
3) A monitoring program was in place all season to record the encounter rate of chinook in a coho directed fishery.

The estimated all-gear catch in 1995 was 119,132 excluding a terminal catch of 1,702 in the Bella Coola gillnet area (Area 8). In 1996 the all-gear catch was 26,928 excluding the terminal catch of 15,061 in the Skeena (Area 4) and 1,088 in the Bella Coola gillnet area.

Terminal exclusions (Table 1–5), as allowed in the Letter of Transmittal, are calculated as follows:

Table 1-5. Terminal exclusions.

Area	Base	1995 Catch	1995 Exclusion	1996 Catch	1996 Exclusion
Skeena	2,900	4,611	[1]	17,961	15,061
Bella Coola	2,950	4,652	1,702	3,948	998
Kitimat	2,400	NA	NA	1,500-2,000	—

[1] No Skeena terminal exclusion was taken in 1995, because the Skeena escapement goal was not met.

1.3.2.1. Troll Fisheries

In 1995, the ceiling for the troll fishery was reduced by 60% to meet the overall harvest rate reduction needed to meet the minimum spawning escapements established by Canada for the west coast of Vancouver Island chinook populations. The troll fishery opened for all species on July 1 but was closed and re-opened a couple of times while catches were assessed. Dates of fishing were: July 1 through midnight July 15; July 27 through mid-night August 4, and August 20 through midnight September 1. The total catch was 61,500 chinook and there were 35 days of chinook non-retention fishing.

For the 1996 NCBC troll season, there was mandatory non-retention/non-possession of chinook. This was implemented for conservation of west coast Vancouver Island chinook. Chinook sensitive areas were closed. A chinook encounter rate monitoring program was implemented to ensure conservation objectives were met and in-season adjustments to some closed areas were made where required. This provided opportunities for fishers to harvest fall coho and chum surpluses. The troll season for non-chinook species started July 8 and ended September 23.

1.3.2.2. Net Fisheries

In 1995, measures to ensure that harvest rates would be reduced included closure of Area 2W, partial closure of Area 3, beach boundaries in Area 1, and a 50% reduction in the bycatch limit in Area 1. The total catch of chinook in NCBC area was 29,500. Catch in the Queen Charlotte Islands (Areas 1, 2E, 2W) was 364 chinook, compared to 4,562 in 1994. Catch in the Skeena/Nass (Areas 3, 4, 5) was 18,100 chinook, and 9,400 in central British Columbia (Areas 6-11). These catches are the preliminary catches of chinook greater than 5 pounds, excluding the catch eligible for terminal exclusion of 1,702 in Area 8.

In 1996, mandatory release of chinook for Area 1, 2W, 2E was implemented. The total catch of chinook in NCBC area was 35,770. Catch in the Skeena/Nass (Areas 3, 4, 5) was 14,185 chinook, and 5,521 in Central British Columbia (Areas 6-11). These catches are the preliminary catches of chinook greater than 5 pounds, excluding the catch eligible for terminal exclusion of 16,060, in areas 4 and 8.

1.3.2.3. Recreational Fisheries

The 1995 tidal water sport fishery catch of chinook was estimated at about 31,000. Reported catches by fishery were 22,531 for the Queen Charlotte Islands (Areas 1,2E,2W), 1,987 for the surveyed areas and times in the Skeena/Nass (Areas 3,4,5), and 2,185 for surveys in the central areas (Areas 6-11). The sport fishery in Area 6 Kitimat Arm was not surveyed in 1995. Catches in that area during the 1990s have averaged about 5,000 large chinook. However, for 1995, the North Coast sport fishery coordinator estimated the total sport catch in NCBC to be 31,000 chinook.

In 1996, the NCBC sport catch was much smaller due to chinook non-retention implemented on the Queen Charlotte Islands between June 1 and October 31, 1996. Catch before June 1 for QCI was estimated to be 670 chinook. Chinook retention was permitted in the remainder of north and central B.C. Catch in the Skeena/Nass region was estimated to be 3,380 and in the central region 2,940, but which again exclude Area 6 catches. The North Coast sport fishery coordinator estimated the total NCBC sport catch to be 10,670 chinook. Throughout the NCBC sport fishery, effort was estimated to be reduced by about one-third relative to recent years.

1.3.3. West Coast Vancouver Island Troll

In 1995, the West Coast Vancouver Island (WCVI) troll fishery was managed to minimize the impact on WCVI chinook stocks.

The 1995 troll season started on July 1 and closed for the year on September 4. The conservation areas S, G, H, and F1 were closed at the start of the season (Fig. 1-1). Time area closures were put in place shortly after the start of the season. On July 17, WCVI areas north of Estevan Pt. were closed to the retention and possession of chinook. On July 27, all WCVI troll areas were closed, and opened again on August 5 for salmon species other than chinook. Chinook retention and possession were prohibited for the remainder of the season.

When trolling closed on September 4, it was estimated that 21,440 boat days had been expended during the troll season. This compares to 50,500 boat days for the 1985-1987 average. Chinook catch in 1995 for the WCVI troll fishery was 81,300.

In 1996, there was mandatory non-retention/non-possession of chinook all season, including non-retention in the July period to conserve southern B.C. and U.S. stocks, and non-retention in the late July period to achieve minimum escapement targets for WCVI chinook.

The 1996 troll season for salmon species other than chinook started on July 8 and closed for the year on October 7. The troll conservation areas A-E, F1, G-L, and S were closed at the start of the season (Figure 1-2). In addition, fishing was restricted along the WCVI following the 40 to 60 fathom depth contour. To monitor encounter rates of chinook and coho and minimize chinook encounters DFO implemented a monitoring program. This included test boats and a logbook program with industry. This program allowed opportunities to open closed areas when chinook encounters were minimal in order to maximize fishing opportunities on other species.

1.3.4. Strait of Georgia

1.3.4.1. Troll Fisheries

No chinook or coho troll fishery operated in the Strait of Georgia (GS) in 1995 and 1996.

1.3.4.2. Recreational Fisheries

The 1995 and 1996 management objective for the GS recreational fishery was to maintain a 20% harvest rate reduction, relative to 1987 levels, on lower GS chinook. Consequently, the management plan implemented in 1989 was continued through 1996. This plan consists of the following management actions:

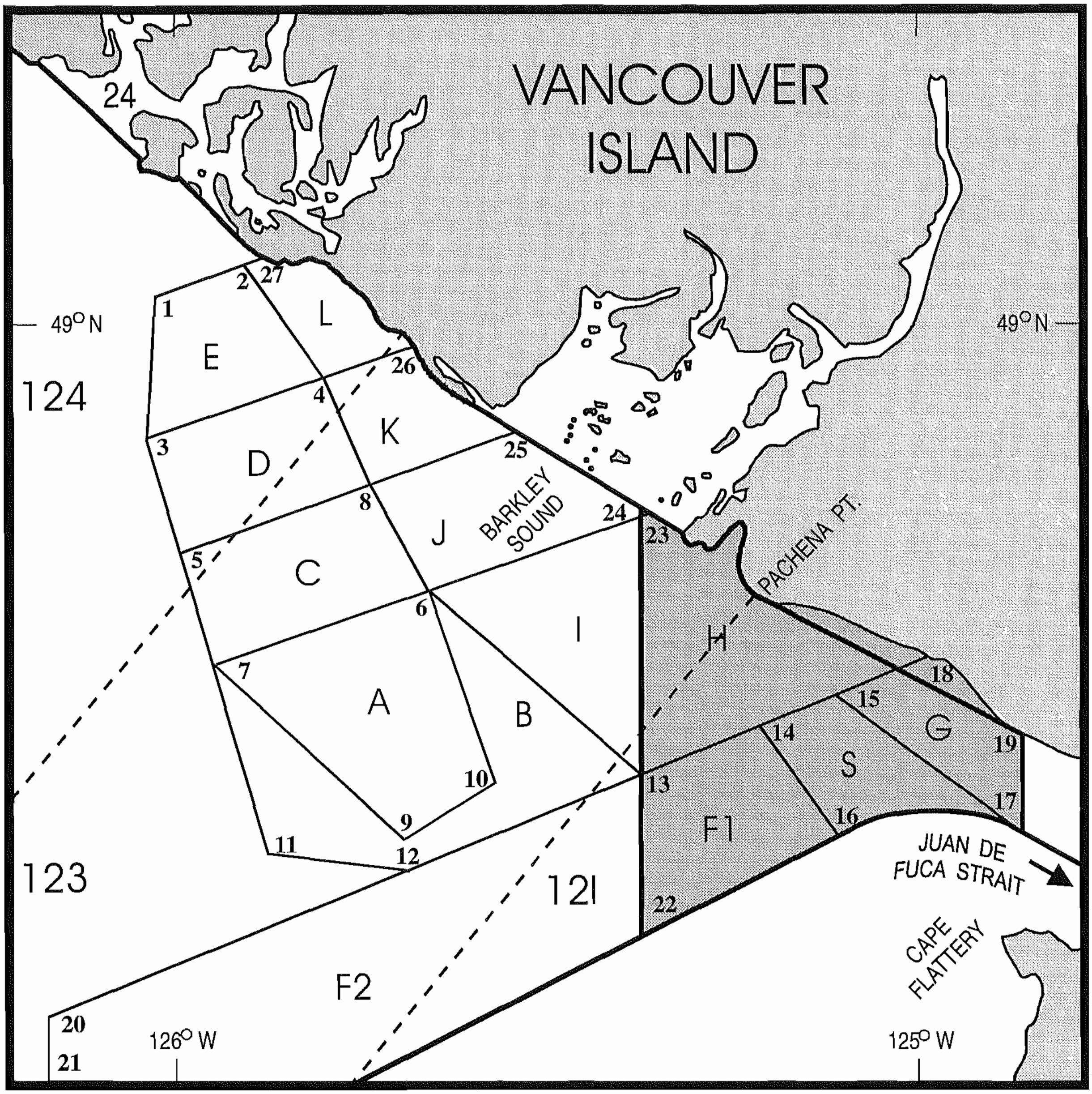
Table 1-6. Recreational daily bag, annual bag, and size limits.

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

The 1995 and 1996 catch in the Strait of Georgia creel survey area (east of Sheringham Point in the Strait of Juan de Fuca and north to Quadra and Sonora islands in southern Johnstone Strait) were 62,170 (for the survey period March through October) and 89,590 (for the survey period April through September), respectively. Full coverage of the year was not possible due to budget limitations but based on recent periods, 1990-1994, this sample coverage would be expected to account for 93% and 88% of the total annual chinook catch. However, the expected portion of the annual catch differs by area in the survey region. For the actual Strait of Georgia (excludes statistical areas 19B and Juan de Fuca Strait around Victoria, B.C.), the survey periods would be expected to account for 95 to 98% of the annual catch. In the Juan de Fuca area, however, the period covered in 1995 would be expected to account for 71% of the annual catch and the period in 1996 only 56% of the catch.

In 1995, the chinook catch in the Strait of Georgia was only 47,770 and effort was reduced to 242,650 boat trips (62% of the 1990-1994 average effort). In the Juan de Fuca Strait region, the catch was estimated to be 14,400 chinook during the surveyed period and effort was very similar to the 1990-1994 average (80,992 in 1995 versus the 81,702 boat trip average for the survey period).

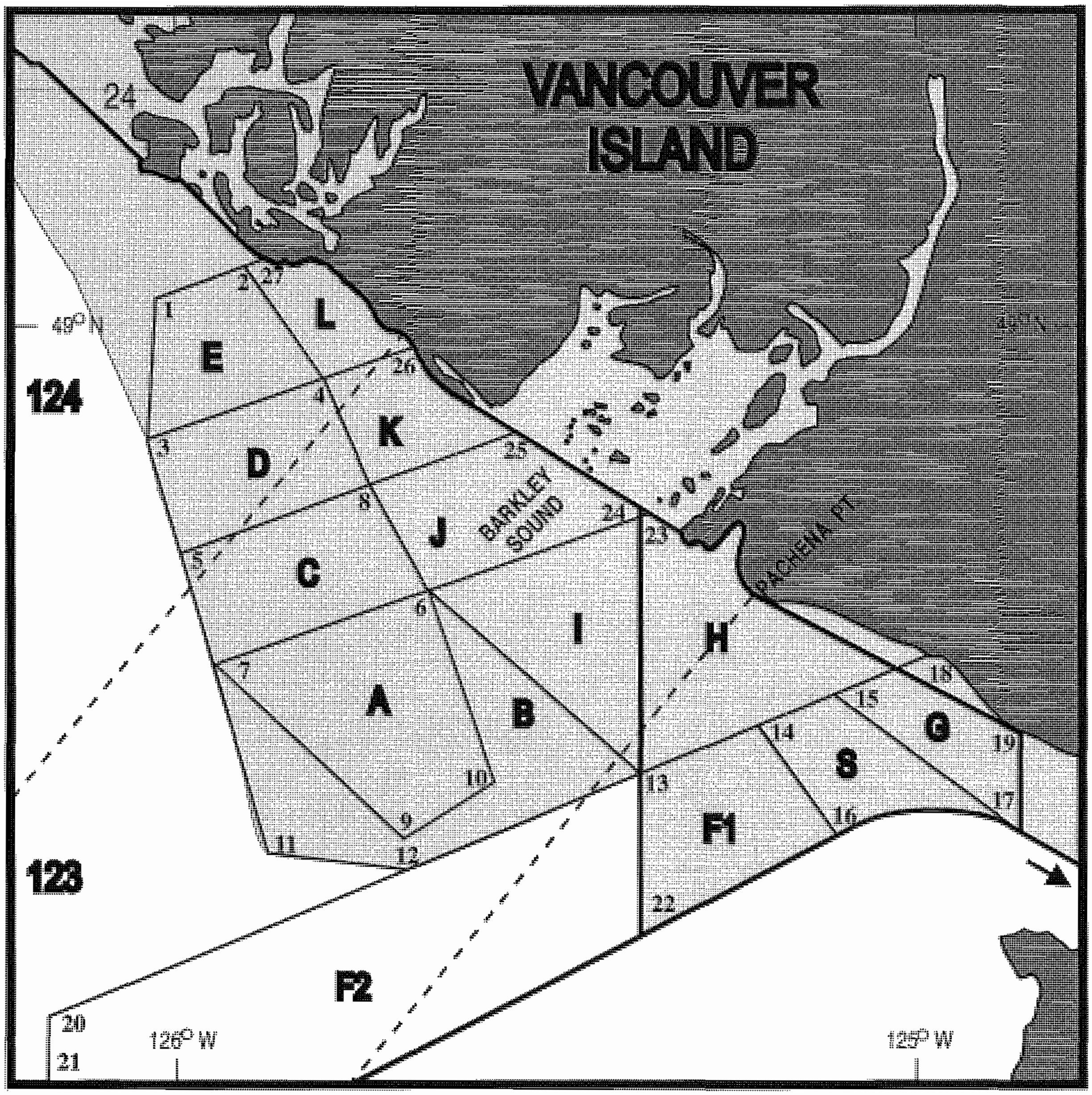
In 1996, the chinook catch in the Strait of Georgia was 70,580 and effort remained reduced at only 221,062 boat trips (59% of the 1990-1994 average effort). In the Juan de Fuca Strait region, the catch was estimated to be 19,010 chinook during the surveyed period and effort remained similar to the 1990-1994 average (68,360 in 1996 versus the 71,232 boat trip average for the survey period).



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 Island 1995 conservation areas for chinook and coho salmon.



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 1-2. West Coast of Vancouver Island 1996 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 for 1995 were: Taku River 1,577 chinook adults and 298 jacks, and Stikine River, 1,646 chinook adults and 860 jacks. For 1996 chinook catches were: Taku River 416 chinook adults and 28 jacks, and Stikine River, 1,941 chinook adults and 98 jacks. The catch of chinook in these rivers for 1995-96 is limited to incidental catch during fisheries targeting on sockeye salmon.

Catches in the Indian food fisheries in 1995 were 580, 70, and 570 in the Alsek, Taku, and Stikine respectively. In 1996, the catches were 448, 63, and 722 respectively.

The recreational catch in the Alsek river was 1,044 and 650 in 1995 and 1996 respectively.

1.4.1.2. Southern Commercial Net Fishery Management Objectives

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 and Juan de Fuca straits, 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, a maximum number of juvenile chinook caught per set is used as a means to limit total chinook mortalities. If encounters exceed this value, then the fishery is moved or closed. Chinook fishing 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.

1.4.1.3. Outer West Coast Vancouver Island

In 1995 and 1996, the WCVI recreational fishery was managed through time and area closures.

For 1995, outside of Alberni Inlet (Area 23B) additional regulations changes were as follows. At the start of the season the daily/possession limit was set at 4/8; in June it was reduced to 2/4. A further reduction to 1/3 was put in place for July 15 to September 30 above Estevan Point, and 1/3 for August 1 to September 30 below Estevan Point.

For 1996, initially the daily/possession limit was set at 2/4 with an annual limit of 30 chinook. Non-retention/non-possession of chinook was implemented from July 15 to October 31 above Estevan Point (DFO Statistical Areas 25-27, and 125-127), and from July 29 to October 31 below Estevan Point to Sheringham Point in the Strait of Juan de Fuca (DFO Statistical Areas 20(1,2,3,4),21-24, and 121-124).

In 1995 and 1996, the outer WCVI sport fishery occurred primarily in the Barkley Sound, outer Clayoquot Sound, and in Nootka Sound areas. 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.

For 1995, the estimated catch in Barkley Sound area was 14,973 chinook and outer Clayoquot Sound was 5,248. In 1996, the estimated catch from July 15 to July 29 was 2,871 chinook in the Barkley Sound area; and 376 in outer Clayoquot Sound.

1.4.1.4. WCVI Terminal

In 1995, inside of Alberni Inlet (Area 23A), at the start of the season the daily/possession limit was set at 4/8; in June it was reduced to 2/4 with a further reduction to 1/3 from August 1 to November 30. Area finfish closures were also implemented within all inlets and sounds on the WCVI. In Area 23, the area inside the surfline was closed to chinook fishing September 13. The 1995 catch was 1,684.

For WCVI chinook conservation during 1996, in areas north of Estevan Point, non-retention was implemented between July 15-October 31; and in areas south of the point, between July 29 and October 31. Bag/possession limits were 2/4 for the entire year. The terminal catch in 1996 was only 37 chinook.

An Indian food fishery also occurs in the Terminal area. In 1995, the catch was 3,400. There was no catch in 1996.

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 fishery in Alberni Inlet (Area 23). This fishery is a terminal gillnet fishery for returns to the Robertson Creek Hatchery. Small numbers of chinook may also be harvested incidentally during gillnet and seine fisheries on sockeye salmon in Barkley Sound in July. There were no catches in 1995 and 1996.

1.4.1.5. Georgia Strait/Fraser

The commercial net fisheries harvested 6,225 in 1995 and 9,553 in 1996.

The Fraser River Indian food fishery harvested 21,585 and 17,833 in 1995 and 1996 respectively. There were 533 and 810 harvested in the Cowichan River in 1995 and 1996 respectively.

1.4.1.6. Johnstone Strait

Net fisheries harvested approximately 1,000 in both 1995 and 1996. The Area 12 troll fishery was a non-retention fishery for chinook in 1995 and 1996. However, four chinook were reported in 1995.

No creel survey was conducted in Johnstone Strait in 1995 or 1996.

1.4.1.7. Juan de Fuca Strait

The commercial net catch was 621 and 606 in 1995 and 1996 respectively.

1.4.1.8. Other Freshwater

Freshwater 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 public access to salmon fishing. In recent years, fisheries have occurred in the lower Fraser mainstem as well as in terminal areas on stocks that responded well to the chinook rebuilding program. These fisheries are limited by catch ceilings. Sport fisheries also occur in the Vedder-Chilliwack, Chehalis, and Harrison River systems, but were not assessed.

The north and central coast freshwater recreational fishery harvest was 4,683 and 5,236 in 1995 and 1996 respectively. However, Area 6 is believed to be underestimated in 1995. In 1996, no estimate of Area 3 is available.

Recreational fisheries in the lower Fraser harvested 5,501 and 3,061 in 1995 and 1996 respectively. The catch in the upper Fraser was 1,477 and 3,474 in 1995 and 1996 respectively.

Indian food fisheries occur in the Transboundary, North/Central Coast, Terminal WCVI , Georgia Strait, and Juan de Fuca Strait rivers. The total catches were 44,000 and 36,000 in 1995 and 1996 respectively.

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 open in either 1995 or 1996 during the spring chinook management period (April 16-June 15). The recreational fishery was restricted each year 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, 1994, but was reopened in 1995 and 1996.

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, 1994. Non-treaty purse seine and reef net fisheries were restricted by a 28-inch chinook minimum size limit. Non-treaty 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 estimate of the 1995 incidental chinook catch in the Strait of Juan de Fuca net fishery is 4,900 chinook, compared to 5,700 in 1994. In the San Juan Island fisheries, the incidental harvest of chinook was 5,300 in 1995 compared to 13,700 in 1994.

The preliminary estimate of the 1996 incidental chinook catch in the Strait of Juan de Fuca net fishery is 600. In the 1996 San Juan Island fisheries, the incidental harvest of chinook is estimated to be 3,800.

The Strait of Juan de Fuca tribal troll fishery harvested an estimated 6,800 chinook in 1995, and 11,900 in 1996, compared to 2,800 chinook caught in 1994. This is a chinook-directed fishery that has been greatly reduced in recent years. The 5-year average (1988-92) 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 1995 and 1996, the Area 4B state waters fishery, which occurs after the PFMC fishery, was open in some areas. The total 1995 recreational catch estimate for Areas 5 and 6 is 6,300 chinook. The catch in 1995 was higher than the low 1994 catch of 1,600 chinook that was caused by a fishery closure extending from May 1 to October 31, 1994. The estimated recreational chinook catch in the San Juan Island fishery was 7,900 in 1995, compared to 5,800 in 1994. Estimates for the 1996 recreational catch are not yet available.

1.4.2.2. Puget Sound

Puget Sound recreational and commercial fisheries in 1994 were regulated by unprecedented time and area closures to protect depressed spring and fall chinook and coho stocks. These regulations were continued in 1995 and 1996. 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 with the exception of the Tulalip Bay fishery which targeted hatchery-origin chinook. 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, non-treaty purse seine fisheries were restricted by a 28-inch chinook minimum size limit. Non-treaty purse seines were required to release all chinook in Area 8 (Skagit) and in Hood Canal. In seine fisheries, 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 1995 and 1996, the net catch of chinook continued to be low, although the total marine and freshwater catch was somewhat higher than the extremely low 1994 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 net catch in Puget Sound marine areas total 37,900 chinook in 1995 and 42,000 in 1996, compared to 42,100 in 1994. Preliminary estimates of net catch in Puget Sound freshwater areas total 22,400 chinook in 1995 and 17,800 in 1996, compared to 17,000 in 1994. Commercial marine catches in 1996, 1995, and 1994 represent only 37%, 41%, and 41% of the previous 5-year average (1988-1992) of 102,359. Commercial freshwater catches represent 99%, 79%, and 75% 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 1995, excluding areas 5,6, and 7, is 53,500 chinook, compared to 40,800 in 1994. The freshwater recreational catch estimate is 4,500, compared to 4,100 in 1994. Estimates for the 1996 recreational catch are not yet available.

1.4.2.3. Washington Coast

Estimates of Grays Harbor and Willapa Bay net catch in 1995 total 38,800 chinook, compared to 34,300 in 1994. Preliminary estimates of 1996 net catch for these areas total 45,900 chinook.

The 1995 commercial net fisheries in north coastal rivers have harvested an estimated 8,000 chinook, compared to 11,300 in 1994. The 1996 estimate for these areas is 9,600. Catches for the Humptulips and Chehalis rivers are included in the Grays Harbor marine net totals.

The 1995 recreational Willapa Bay and north coastal river catch estimate is 10,000 chinook, compared to 7,000 in 1994. The 1996 estimate for these areas is not yet available.

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 both 1995 and 1996, preseason forecasts indicated that many of Washington's critical chinook and coho stocks were again expected to return in low numbers. Many critical stocks were projected to return below spawning escapement goal levels, even in the absence of any 1995 or 1996 fishing. In response, 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 remained closed for chinook in 1995 and 1996. The treaty Indian chinook fishery was the only ocean salmon fishery north of Cape Falcon authorized by the PFMC to land chinook in 1995 and 1996. Ocean harvest north of Cape Falcon was limited in 1995 to a tribal troll fishery during the period from May 1-3 (chinook only) and the period August 1-24 (all species) which had a combined quota of 12,000 chinook salmon. Ocean harvest north of Cape falcon was limited in 1996 to a tribal all-salmon-except-coho troll fishery during the period May 1-September 11, which had a quota of 11,000 chinook. These quotas were 27 and 33 percent lower than the already-reduced 1994 quota of 16,400. Effort and catch rates in this fishery were higher in both 1995 and 1996 than in 1994. A total of 9,700 chinook (81% of the quota) was landed in 1995, and 12,400 (113% of the quota) was landed in 1996, compared to 4,400 (27% of the quota) chinook landed in 1994.

1.4.2.5. Columbia River

The total in-river harvest by all sectors and areas including Bouy-10 was approximately 82,700 in 1995 and 210,700 in 1996. This catch was split between recreational anglers, non-treaty commercial harvesters, and treaty Indian harvesters.

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 ocean fisheries, while the catch distribution of MOC stocks in Oregon ocean 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. The troll catch in the late season preterminal Elk River Fishery was estimated to be 206 and 997 chinook salmon in 1995 and 1996 respectively.

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. The 1995 estuary and freshwater recreational catch was 35,807 and 12,583 for the NOC and MOC groups respectively. The 1996 estimated recreational catch is unavailable at this time.

2. ESCAPEMENT ASSESSMENT OF REBUILDING THROUGH 1996

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 primary objective is to use escapement data and the knowledge of local agency staff to evaluate the rebuilding status of naturally spawning chinook stocks with respect to the above PST objectives. The agencies of the Parties have identified 44 escapement indicator stocks representative of naturally spawning chinook stocks coastwide. It should be recognized that while coastwide chinook stocks were generally depressed before PST implementation, not all indicator stocks were depressed.

Because it was hoped that the decline in escapements would be quickly halted, most previous CTC analyses focused on evaluating whether the 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 will not achieve their escapement goals by 1998. For these stocks, it is appropriate to ask, "Has the decline in spawning escapements 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.

Spawning escapements were assessed as one measure of rebuilding progress since implementation of management actions under the PST. Reported spawning escapements were, however, a product of brood-year adult abundance, freshwater and marine survival rates, fishery impacts, and survey methods and conditions. Consequently, 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.

While assessment of progress toward attaining interim chinook escapement goals is the specific task of this chapter, some members of the CTC do not believe that application of the current algorithm results in an accurate assessment of rebuilding. The specific concerns of these members include: inconsistency in survey methodologies results in data sets of very different quality being treated equally; the numerous interim escapement goals may have no relevance to maximum sustained yield escapement goals; apparent erroneous conclusions may be reached if the algorithm is strictly applied; the current summarization of rebuilding progress does not distinguish between very small and very large stocks; and, the precision of the various escapement estimates has not been incorporated in the analysis. Some of these concerns were identified in Section 2.6 of the last annual report (TCCHINOOK 96-1). The results of this analysis must be viewed within the context of these concerns.

In spite of these concerns, the CTC decided to use the available data and the escapement goals brought forth by the agencies to meet its charge to evaluate rebuilding progress. However, in response to these concerns, the CTC has also presented information provided by the management agencies for the different stocks in addition to results from application of the assessment algorithm. The information appears under the escapement graph for each of the 44 chinook stocks. These narratives provide information such as historical factors associated with stock assessment, the basis for agency revision of escapement goals, or other specifics which are helpful in assessing the stock. The information is included to assist the reader in understanding the relative quality of data and resultant assessment as well as to present the management agency's assessment of stock status as well as comments which may be useful in the assessment. In several instances this information was used by the CTC to adjust the rebuilding status derived from the CTC assessment algorithm.

2.2. FRAMEWORK

2.2.1. Escapement Indicator Stocks

This year's initial assessment includes 44 naturally spawning escapement indicator stocks. These 44 stocks represent distinct populations or management groups. 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. The final assessment was done on the basis of 42 stocks (Section 2.4.2)

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. Sources of escapement data

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. Table 2-2 lists the sources of mortality included in estimates of terminal run size for the 28 stocks with terminal harvest or broodstock removal.

2.2.2.2. Agency procedures for estimating escapement

Methods of estimating escapement varied depending on river characteristics and agency resources. Some 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. Where appropriate, influence of hatchery fish have been removed from these escapement estimates so that they represent only the natural stock. Estimation methods are discussed in the specific stock descriptions (Section 2.4.1).

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 without enhancement. The Canadian Department of Fisheries and Oceans (CDFO) has employed two procedures to account for this enhanced production during assessment of chinook rebuilding:
    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, fish collected as broodstock are excluded from the count of natural spawners, although fish produced by enhancement projects that return as adults and 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 were reduced by the number of hatchery fish in the count in order to estimate the natural stock return; also estimated upriver harvests were subtracted.
3) For the Columbia upriver summer stock, mainstem dam counts were reduced by the number of hatchery fish in the count in order to estimate the natural stock return (TAC 1997); also estimated upriver harvests were subtracted.
4) For the North Oregon Coast (NOC) and Mid-Oregon Coast (MOC) aggregates, spawning surveys are not included if they were conducted within 10 miles of hatchery smolt releases.

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	NI			
Lower Georgia Strait	✓		✓	NI
Fraser[3]	NI	✓	✓	✓
Harrison	NI	✓	✓	✓
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[6]		✓	✓	✓
Col. Upriver summer[6]		✓	✓	✓
Col. Upriver bright[6]		✓	✓	✓
Deschutes fall[6]		✓	✓	✓
Lewis[6]		✓	✓	✓

✓: 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 River/Gap/Slough gillnet fishery.
3/ Terminal runs are determined for the aggregate spring/summer Fraser stocks (Appendix A), but terminal run for each stock is not plotted.
4/ Puget Sound estimates include reconstructed, stock-specific catches from Areas 8, 8a, 10, and 10a.
5/ Escapement estimates include fish taken for broodstock.
6/ Includes interdam loss.

2.2.3. Escapement Goals

2.2.3.1. Origin of Goals

The escapement goals provided by each management agency are meant to define long-term stock rebuilding objectives. Most of these goals were established by the managing agencies for each stock. In 1991 the Transboundary Technical Committee (TBTC) agreed to goals for the three major transboundary rivers, the Taku, Stikine, and Alsek (TBTC 1991), based on an index system; these goals are not expanded to estimate the river-wide escapements.

For many stocks, interim escapement goals were developed prior to 1984. At the time these goals were developed, 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 escapement goals are interim targets based on a doubling of base period average escapements, while initial SEAK goals were based on the highest escapement observed prior to 1981. Some escapement goals have changed since 1984 and others may change as new information is acquired. The CTC has adopted guidelines for both the acceptance of new indicator stocks and the revision of existing escapement goals for use in the CTC rebuilding assessment (CTC Technical Note 9403). To date the CTC has reviewed only 6 of the 36 stocks with escapement goals, five SEAK stocks (Situk, Unuk Chickamin, Blossom, and Keta) and the Lewis River stock.

Eight of the indicator stocks are not assessed against fixed escapement goals although there is a management objective for each stock: 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. Escapement goal ranges for all Oregon coastal stocks in aggregate are 60 to 90 peak-count fish per mile (a spawner density index). However, no specific escapement goals have been adapted for each of the smaller regional stock aggregates, NOC and MOC. The Deschutes fall stock does not have an established escapement goal that can be used for rebuilding assessment. The Washington coastal stocks, Quillayute fall, Hoh spring/summer, Hoh fall, Queets spring/summer, and Queets fall, are managed for inriver harvest rates when escapements are expected to exceed minimum threshold levels (floors).

2.2.3.2. Changes Relative to the 1994 Annual Report

Six stocks with escapement goals that had previously been assessed by CTC rebuilding criteria were assessed differently in this report because their escapement goals were changed or base period average escapements were very close to goal during the base period. These stocks are listed with their changes or base relative to goal in Table 2-3. The Snohomish and Green were placed in this group because base period average escapements for these two stocks were very close to goal.

Table 2-3. Escapement indicator stocks with base period escapements close to or above the current escapement goal.

Stock	Current Goal (year of change)	Base Escapement As % of Goal
Situk	600 (1991)	201%
Unuk	875 (1994)	105%
Lewis	5,700 (1991)	228%
Quillayute summer	1,200 (1989)	104%
Snohomish	5,250	96%
Green	5,800	99%

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 was 1995. For these stocks, the base period includes the years 1975-1980 and the rebuilding assessment period includes the years 1981-1995.

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 1985-1996.

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 1984-1996.

2.3. METHODS

2.3.1. Stocks Without Escapement Goals

While it is not possible to assess rebuilding progress for stocks without rebuilding 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.

2.3.1.1. Evaluating Escapement Declines

To determine if escapements have changed since the base period, 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 1975-1996 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 escapement averages more than one standard error below the base period average, it was concluded that escapements have declined. For stocks with recent escapement averages more than one standard error above the base period average, it was concluded that escapements have increased. For stocks with recent escapement averages 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 a change has occurred. 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: (1) base period average escapements; (2) recent 5-year-average escapements; (3) 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

This year's assessment separates stocks near or above goal during the base period from those that were noticeably depressed during the base period.

2.3.2.1. Stocks Not Depressed During Base Period

For stocks near or above goal during the base period (Table 2-3), we evaluated the stock's 1992-1996 (1991-1995 for SEAK and TBR) average escapement using the standard error criteria as explained for stocks without goals (section 2.3.1.1). If the stock's 1992-1996 (1991-1995 for SEAK and TBR) average escapement has not declined at least one standard error below the goal, the stock is classified as "Stable at Goal." If the stock's average escapement has declined at least one standard error below the goal then the stock is considered to have "Declined Below Goal."

2.3.2.2. Stocks Depressed During Base Period

This assessment used three levels of evaluation. First, stocks that are above goal were identified. Second, stocks that are meeting their rebuilding schedule were identified. 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 (TCCHINOOK 94-1).

This three-level assessment system was implemented as follows:

1) *Stocks above goal were identified.* These were stocks with at least four of the last five years' 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, rebuilding status was assessed.* This determination was made using the following criteria based on annual escapements from the last five years.

a) *Mean Criterion.* The recent 5-year average of reported escapements for a stock was compared to a test value derived from the stock's base to goal line. The test value was the average of the 1992-1996 (1991-1995 for SEAK and TBR) projected escapements from the base to goal line, and is equivalent to the mid-point value of the five-year series. This test value was then compared to the average reported escapement for the last five years. If the reported 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.* Reported escapements were compared with the base to goal line. If, in three or more of the last five years, the estimated 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. In this report, rebuilding classifications were assigned as depicted in the following table. In TCCHINOOK (96-1), the committee omitted some possible scores in the classification table.

Total Score	Classification
+2, +3	Rebuilding
0, +1	Indeterminate
-1, -2, -3	Not Rebuilding

In addition to the scores from the three criteria above, information supplied by local management agency staff was considered relative to final classifications. In some instances this information was weighted more heavily than the results of the analysis. Initially, stocks were classified into four categories: "Above Goal," "Rebuilding," "Indeterminate," and "Not Rebuilding" using the assessment algorithm described in steps a through c, above. In past reports, the CTC reviewed additional information that may not have been considered in the assessment algorithm for stocks in the Indeterminate category. In this report, the CTC expanded this review to include all stocks, regardless of rebuilding category, prior to assigning a final classification.

3) *Those stocks that were classified as "Indeterminate" or "Not Rebuilding" were further characterized.* The third-level assessment evaluates whether or not escapements have changed since the base period. Escapement declines were evaluated in the same manner as for stocks without escapement goals (see Section 2.3.1).

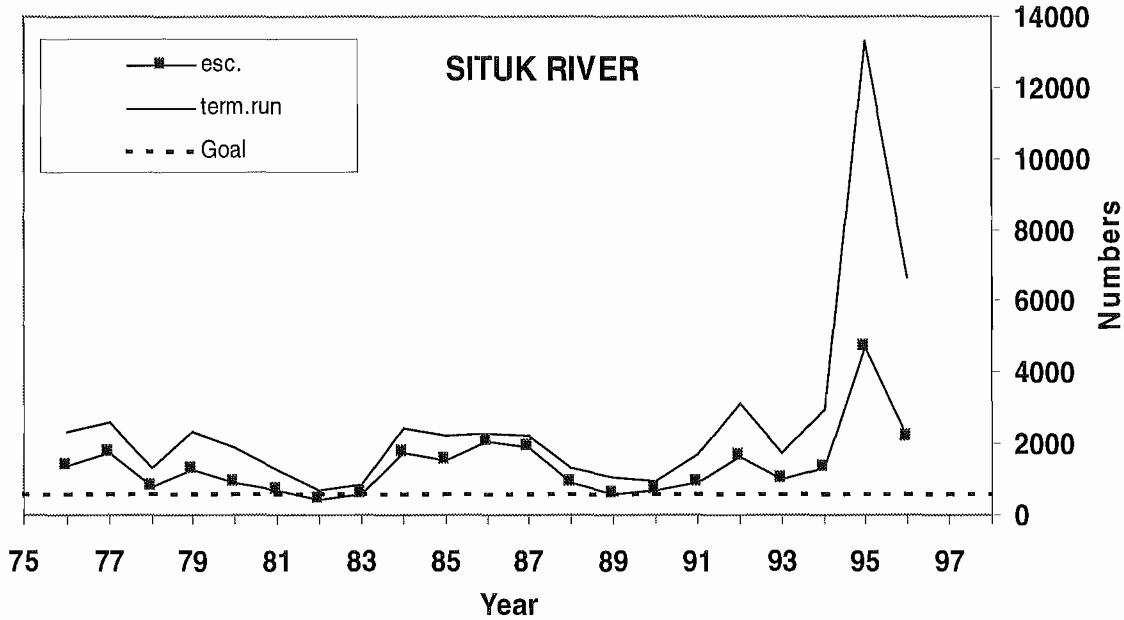
2.4. RESULTS

2.4.1. Stock Specific Graphs and Descriptions

2.4.1.1. SEAK/TBR Stocks

Of the 10 SEAK/TBR stocks included in the escapement assessment, three (Situk, King Salmon, and Andrew Creek) include estimates of total escapement of large fish. Large fish refers to three-ocean-age and older chinook salmon. Escapement estimates for the other seven systems are all index counts, and represent a fraction of total escapement in a single river. Index counts include either fish counts taken at weirs on a single tributary of a larger river or helicopter/foot survey peak counts. The peak counts are the highest count on a single day within a year. Survey methods have been standardized for all systems since 1975 (since 1971 for some) and historic counts on all ten systems are available prior to 1975, but not all are comparable to the database discussed below because of changes in methods. The SEAK/TBR stocks can be classified into two broad categories, inside-rearing and outside-rearing, based on ocean migrations. Outside-rearing stocks have limited marine rearing in SEAK and are caught primarily during their spring spawning migrations; these stocks include the Situk, Alsek, Taku, and Stikine Rivers. Inside-rearing stocks are vulnerable to SEAK/NCBC fisheries as immature fish as well as during their spawning migrations and include the other six SEAK/TBR indicator stocks.

All SEAK/TBR indicator stocks produce primarily yearling smolt except the Situk River, which produces a mixture of, but primarily, subyearling smolt. ADF&G established a 15-year rebuilding program in 1981 (ADF&G 1981). ADF&G established the interim point escapement goals in 1981 for all 10 systems, based on the highest observed escapement count prior to 1981. ADF&G has revised point goals for five stocks (Situk, Unuk, Chickamin, Blossom, and Keta), which have been accepted and used by the CTC. In 1997 ADF&G again revised the point goals to goal ranges for these five stocks to conform with the 1997 ADF&G Salmon Escapement Goal Policy (ADF&G 1997). Goal ranges are currently being formulated for the remainder of the SEAK/TBR stocks and it is anticipated all will be addressed in 1998. The Taku, Stikine, and Alsek goals will also be reviewed by CDFO. ADF&G, CDFO, Tribal organizations, and NMFS have all spent the last 10 years improving the SEAK/TBR chinook stock assessment program. Currently, 70% of the SEAK/TBR stocks meet the assessment criteria detailed in the U.S. CTC Stock Assessment Review (USCTC 1997). In the SEAK/TBR section, the term maximum sustained yield (MSY) range refers to a range of escapements that with predicted production (and subsequent harvest) at or very near production from the point estimate of escapement predicted to produce maximum sustained yield. The term "healthy" refers to a stock whose escapements are within, above, or very near to the defined escapement goal or escapement goal range.

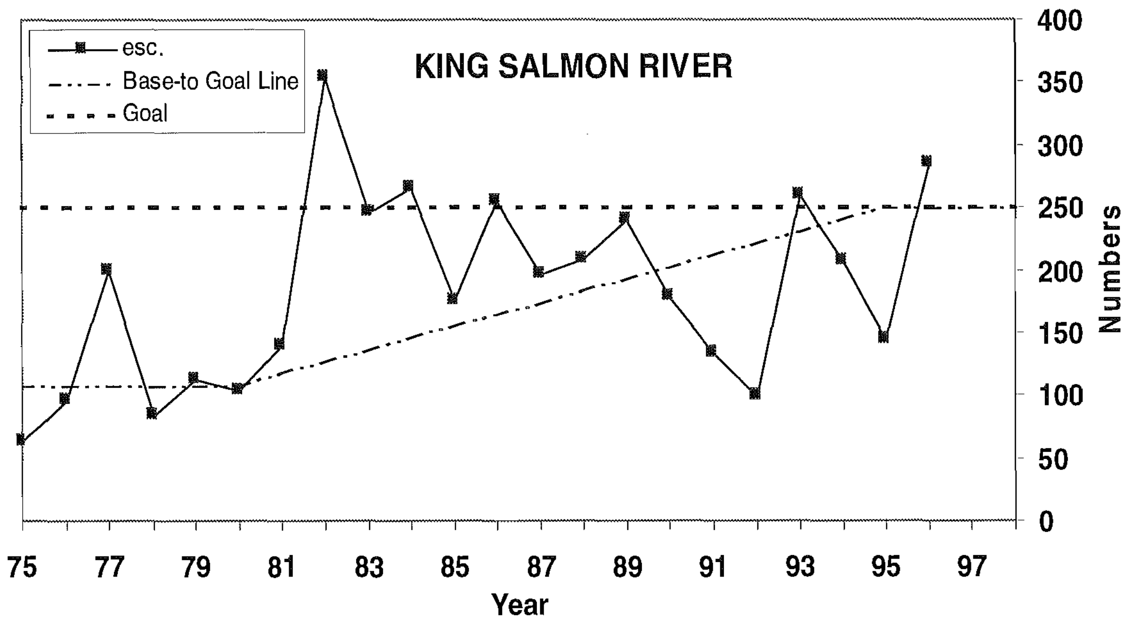


CTC Algorithm and CTC Final Assessment: **Above Goal**

Escapement Methodology: The Situk River is a nonglacial system located near Yakutat, Alaska that supports a moderate-sized, outside-rearing stock. Escapements are weir counts minus upstream sport fishery harvests. The weir, located just upstream from the mouth, has been operated each year since 1976, and was also operated from 1928-1955. Counts of large chinook are reported as the spawning stock. Jacks (1- and 2-ocean-age fish) are also counted and, since 1989, jack counts (not included in the graph above) have ranged between 1,200 and 4,000 fish.

Escapement Goal Basis: The 1981 escapement goal was set at 5,100 fish. In 1982, the goal was revised to 2,000 large fish. In 1991, ADF&G revised the Situk River chinook salmon escapement goal to 600 large spawners based upon a spawner-recruit analysis (McPherson 1991), which was reviewed and is presently used by the CTC. The Alaska Board of Fisheries directed ADF&G to manage the stock for a range of 600 to 750 large spawners in 1991. In 1997, ADF&G revised the Situk River escapement goal range to 500-1,000 large spawners to conform to the 1997 ADF&G escapement goal policy and to provide a more realistic maximum sustained yield management range.

Agency Comments: The agency comments interpreted data with respect to the 1997 goal range. During the 21-year period of 1976-1996, the Situk River chinook salmon escapements have been below the goal range once (1982). Directed U. S. sport, commercial, and subsistence-personal use fisheries located both inside the river and lagoon and in near-by surf waters target this stock under a management plan directed at achieving maximum sustainable yield escapement levels. Total annual terminal harvest rates from all gear groups have averaged about 60% during the 1990s. A strong density-dependent effect was noted in the stock (McPherson 1991) and the 1994-1996 escapements may result in much smaller runs as these fish mature and return.

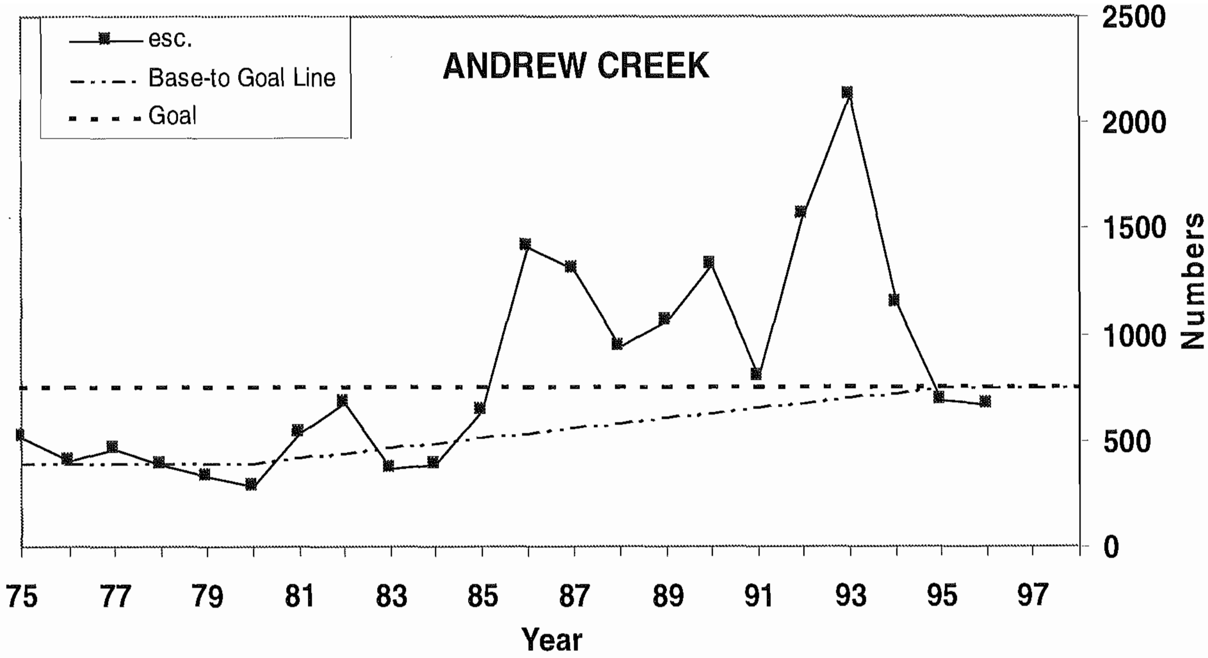


CTC Algorithm: **Not Rebuilding**; CTC Final Assessment: **Indeterminate**

Escapement Methodology: The King Salmon River is a small nonglacial system located on Admiralty Island southeast of Juneau that supports a small, inside-rearing stock. Escapements are total estimated escapements of large chinook based upon weir counts (1983-1992) or expansions of index counts (1971-1982, 1993-1996). A weir was operated for 10 years (1983-1992) along with the surveys and, on average, 67.5% of the total escapement was counted in the surveys (McPherson and Clark *In prep.*). Jacks (2-ocean-age fish) represented an average of 22% of the weir counts from 1983-1992 and are not included in the graph above.

Escapement Goal Basis: In 1981, ADF&G set the index goal at 200 large fish based upon prior highest survey counts of 200 spawners in 1957 and 211 spawners in 1973. In the mid-1980s, ADF&G revised the King Salmon River chinook escapement goal to 250 large spawners counted through the weir (total escapement), which is the present CTC goal. In 1997, ADF&G revised the goal to 120-240 total large fish based upon a spawner-recruit analysis for the 1971-1991 brood years (McPherson and Clark *In prep.*). This range is ADF&G's most current estimate of maximum sustained yield escapement.

Agency Comments: There is no terminal fishery targeting this stock, harvests of immature and mature fish occur in SEAK. During the 22 years of 1975-1996, 12 of the annual escapements have been within the 1997 management range, five have been below the range, and five have exceeded the range. Since 1990, one escapement was below the 1997 range by 17% and the remaining five have been within or exceeded the range. The 1995 survey was conducted during conditions of poor visibility. Nevertheless, the 1991-1995 average escapement exceeded the base period average by 150%. The CTC assessment was not applied to the 1997 range. The McPherson and Clark (*In prep.*) analysis will be submitted for review to the CTC by 1998. For the reasons stated above, this stock is judged by ADF&G to be healthy.

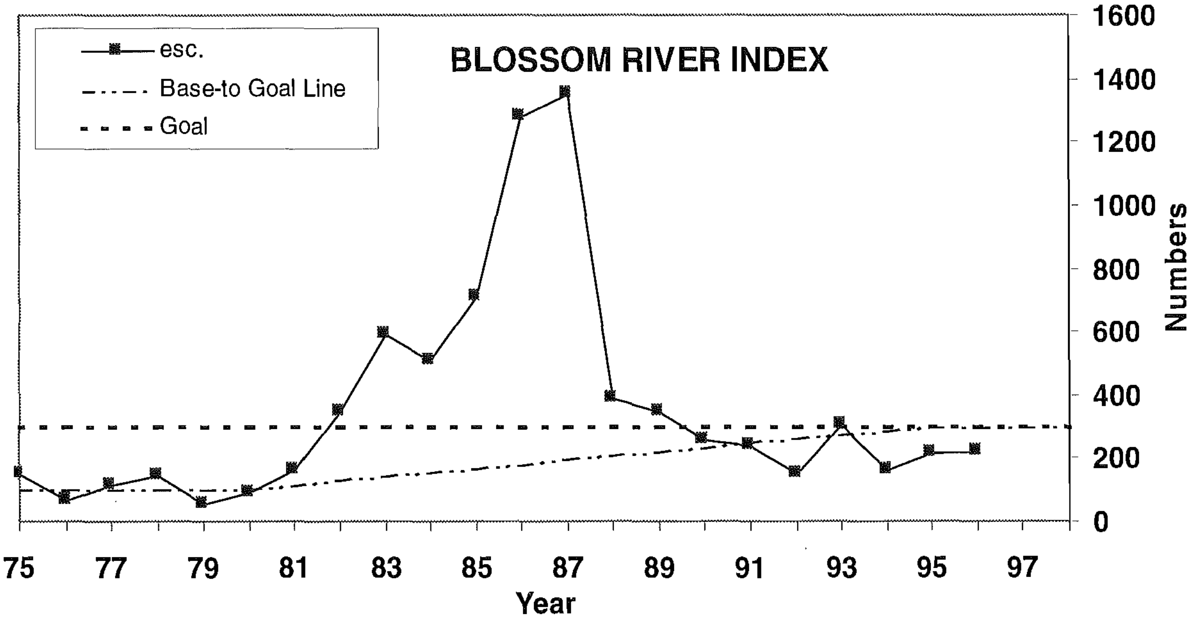


CTC Algorithm and CTC Final Assessment: **Rebuilding**

Escapement Methodology: Andrew Creek, near Petersburg, Alaska, is a nonglacial U.S. tributary of the lower Stikine River that supports a moderate-sized, inside-rearing stock. Escapements are total estimated escapements of large chinook based upon weir counts (1976-1984) or expansions of index counts. During nine years of weir operations (1976-1984), standardized surveys were also conducted in four years and, on average, 53% of the total escapement was counted in surveys (Pahlke 1997a). This expansion factor was used to expand the survey counts for 1975 and 1985-1996 to estimates of total escapement. Jacks represented an average of 19% of the weir counts and are not included in the graph above.

Escapement Goal Basis: In the early 1980s, ADF&G set the Andrew Creek chinook escapement goal at 750 large fish total escapement, which is the present goal used by ADF&G and the CTC. Evaluation of the Andrew Creek chinook salmon goal began in 1997 and will likely be completed in the spring of 1998.

Agency Comments: Historically, a significant terminal marine gillnet fishery occurred in the spring, targeting Stikine River and other nearby chinook salmon stocks. Currently, there is no terminal fishery targeting this stock. Harvests of immature and mature fish occur primarily in SEAK and to a small extent in NCBC fisheries, based on CWT recoveries of hatcheries using this brood stock. Escapements since 1986 have all been above the current goal of 750, except in 1995 and 1996, which were below the current goal by about 10%. ADF&G judges this stock to be healthy.

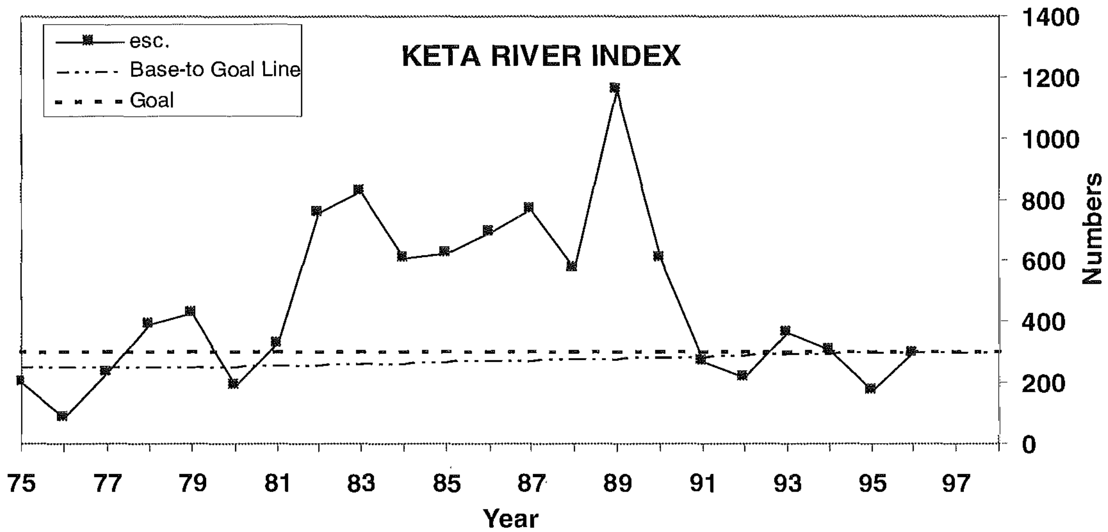


CTC Algorithm and CTC Final Assessment: **Not Rebuilding**

Escapement Methodology: The Blossom River empties into Behm Canal near Ketchikan and is a nonglacial system which supports a small, inside-rearing stock. Escapements are indices (peak counts) of large fish made by helicopter survey conducted using standardized methodology since 1975 (Pahlke 1997a).

Escapement Goal Basis: In 1981, ADF&G set an index escapement goal, as a combined count of 800 large fish from the Blossom and Wilson rivers, based upon a 1963 count of 825 fish, 450 in the Blossom and 375 in the Wilson. In 1985 the Wilson surveys were dropped for budgetary reasons, but the goal of 800 continued to be applied to the Blossom. In 1994, ADF&G revised the Blossom goal to 300 large index spawners based upon a spawner-recruit analysis (McPherson and Carlile 1997), which the CTC reviewed and has used since 1994. In 1997, ADF&G revised the goal to a range of 250-500 large index spawners in conformance with the McPherson and Carlile (1997) report and in compliance with the ADF&G Escapement Goal Policy (ADF&G 1997). This range is ADF&G's most current estimate of maximum sustained yield escapement.

Agency Comments: There is no terminal fishery targeting this stock; harvests of immature and mature fish occur in SEAK and NCBC fisheries. Between 1975 and 1981, escapements were below the 1997 ADF&G goal range of 250-500 averaging 110 large fish. These smaller escapements subsequently seeded large runs with resultant large escapements during the six-year period of 1982-1987, averaging 796. This six-year period of mostly over-escapements has been followed by a nine-year period (1988-1996) of reduced, but relatively stable, run abundance. Escapements since 1988 averaged 254 large fish with most of these annual escapements coming in at or near the lower end of the escapement goal range; these escapements are expected to provide returns within 85% of the estimated maximum yield. Because these recent nine annual escapements are all within or only slightly below the 1997 range, ADF&G judges this stock to be reasonably healthy with a moderate degree of concern for this stock.



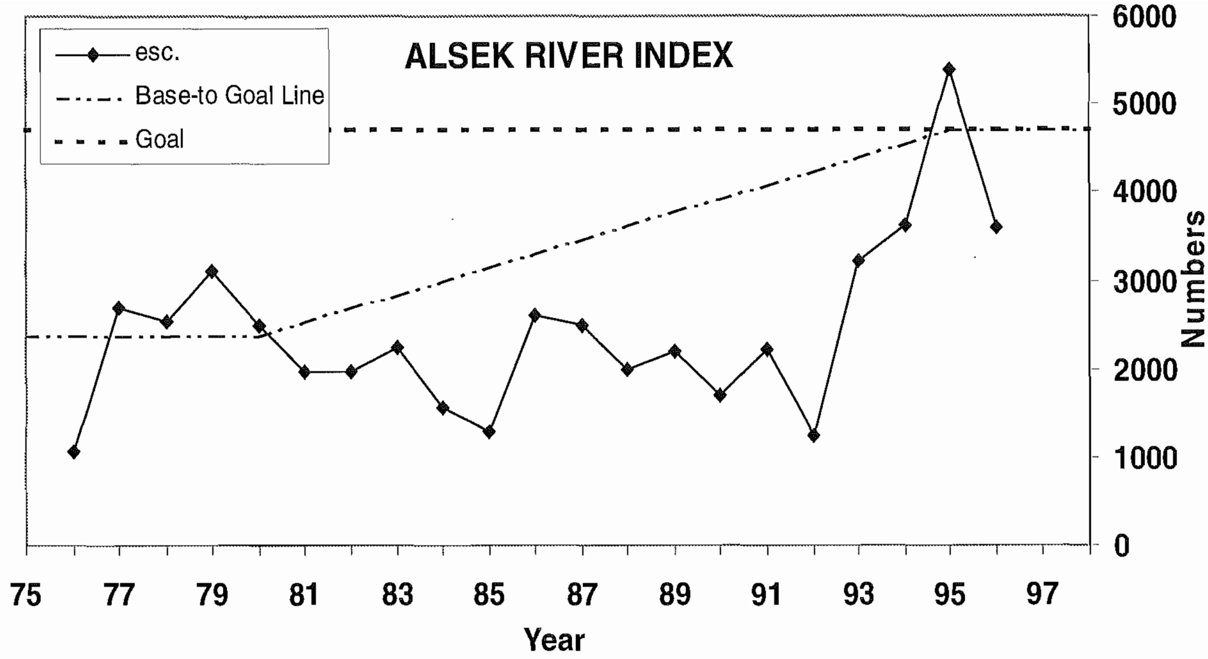
CTC Algorithm: **Not Rebuilding**; CTC Final Assessment: **Stable at Goal**

The CTC judged this stock as Stable About Goal because the difference between the base period average, the escapement goal, and the recent escapements is likely less than the precision of the annual survey counts.

Escapement Methodology: The Keta River is located near Ketchikan and is a nonglacial system which supports a small, inside-rearing stock. The escapements are indices (peak counts) of large fish made by helicopter survey that have been conducted using standardized methodology since 1975 (Pahlke 1997a).

Escapement Goal Basis: In 1981, ADF&G set the index goal at 500 large fish, based upon counts of 500 spawners in 1948 and 462 spawners in 1952 (ADF&G 1981). In 1994, ADF&G revised the escapement goal to 300 large index spawners based upon a spawner-recruit analysis (McPherson and Carlile 1997), which the CTC reviewed and has used since 1994. In 1997, ADF&G revised the escapement goal to a range of 250-500 large index spawners in conformance with the McPherson and Carlile (1997) report and in compliance with the ADF&G Escapement Goal Policy (ADF&G 1997). This range is ADF&G's most current estimate of maximum sustained yield escapement.

Agency Comments: There is no terminal fishery targeting this stock; harvests of immature and mature fish occur in SEAK and NCBC fisheries. Between 1975 and 1981, annual escapements were within or slightly below the goal of 250-500 with the average being 265 large fish. The returns from the 1975-1981 escapements were large and this trend continued through 1990 with escapements averaging 734 large fish. These over-escapements were followed with a six-year period (1991-1996) of reduced run abundance with resultant smaller escapements, averaging 271 large fish. ADF&G believes the reduction was because of reduced marine survival coupled with density dependent mortality (McPherson and Carlile 1997). Yields from the 1991-1996 escapements are expected to be average, about 91% of estimated maximum yield. Accordingly, ADF&G judges this stock to be healthy.



CTC Algorithm: **Not Rebuilding**; CTC Final Assessment: **Indeterminate**

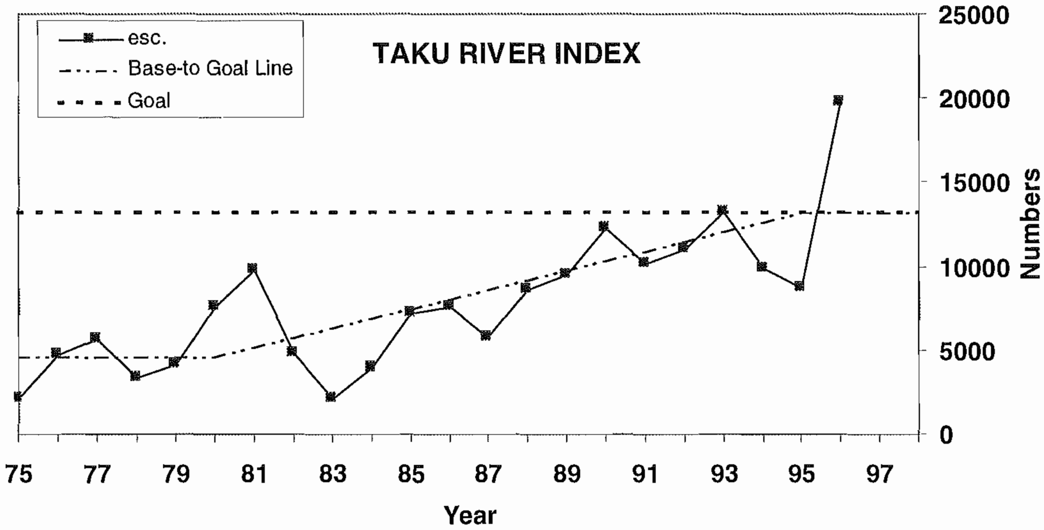
Escapement Methodology: The Alsek River is a large glacial transboundary river which originates in the Yukon Territory of Canada and flows into the Gulf of Alaska, southeast of Yakutat, Alaska. It supports a moderate-sized, outside-rearing stock. Escapements of chinook in the Alsek drainage are principally monitored by weir in the Klukshu River, one of 51 tributaries of the Tatshenshini River, the principle salmon-producing branch of the Alsek. These data are augmented by helicopter surveys of spawning chinook in three other tributaries. The weir counts from Klukshu are reported to the CTC and represent an index of escapement for the Alsek River; the Klukshu weir has been operated annually since 1976.

Escapement Goal Basis: In 1981, ADF&G set the Alsek River goal at 5,000 fish based on the 1979 Klukshu River weir count of 3,200 and an expansion factor of 1.56 for the remainder of the drainage. Later, ADF&G revised the Alsek goal to an index count of 4,400 escapement past Klukshu River weir. Meanwhile, CDFO set the Klukshu goal at 5,000 fish. In 1991, the TBR Committee of the PSC set the Klukshu River goal at 4,700 fish, mid-way between the CDFO and ADF&G goals; this is the goal that has been used by the CTC. In 1995, a joint draft report by ADF&G and CDFO staff provided spawner-recruit analysis, indicating that the Klukshu River MSY escapement level was about 950 fish and that carrying capacity was about 2,500 fish. One recommendation was to reduce the Klukshu goal from 4,700 spawners to a range of 500 to 1,400, which was rejected by internal CDFO review in the Pacific Stock Assessment Review Committee (PSARC) process, but was accepted with slight revision in the internal ADF&G review process. In 1997, a revised stock-recruitment analysis by ADF&G and CDFO staff (McPherson, Etherton, and Clark *In prep.*), using additional data and improved methods, estimated that the MSY escapement level for the Klukshu stock of chinook was about 900 spawners and that carrying capacity of the Klukshu system was about 2,500 spawners. The 1997 report recommends that ADF&G and CDFO revise the Klukshu goal from 4,700 fish to a range of 1,100 to 2,300 spawners; this report is currently undergoing review by ADF&G and CDFO.

Agency Comments:

ADF&G: Directed Canadian sport and aboriginal fisheries take place inriver. Directed U. S. commercial and subsistence-personal use fisheries located both inside the river and lagoon and in near-by surf waters also occur. Total annual harvest rates have averaged 20% to 25% since 1981 (McPherson, Etherton and Clark *In prep.*). Limited coded-wire tagging of Tatshenshini chinook salmon has occurred for most brood years since 1983. Escapements in the Klukshu River have averaged about 2,400 fish over the 21-year period of 1976-1996. The fact that the escapement average is close to estimated carrying capacity is not surprising in that exploitation of the stock in Canadian and U. S. fisheries is low. Nor is it surprising that the escapements commonly fail to reach the 1991 goal of 4,700 fish currently used for stock assessment. All escapements since 1977 exceed the lower ends of the estimated ranges expected to provide for maximum sustained yield. ADF&G judges the Alsek River system stock of chinook to be healthy, but under-utilized. The McPherson et al. paper will be submitted to the CTC for review by 1998.

CDFO: The PSARC of CDFO is currently reviewing the McPherson et al. (1997) analysis. This review agreed that the 4,700 escapement goal is likely too high given the data collected from 1976 through 1996, and the stock could be managed to a minimum escapement within the recommended range. PSARC did not, however, recommend an escapement value pending consideration of in-season management capabilities by ADF&G and CDFO.

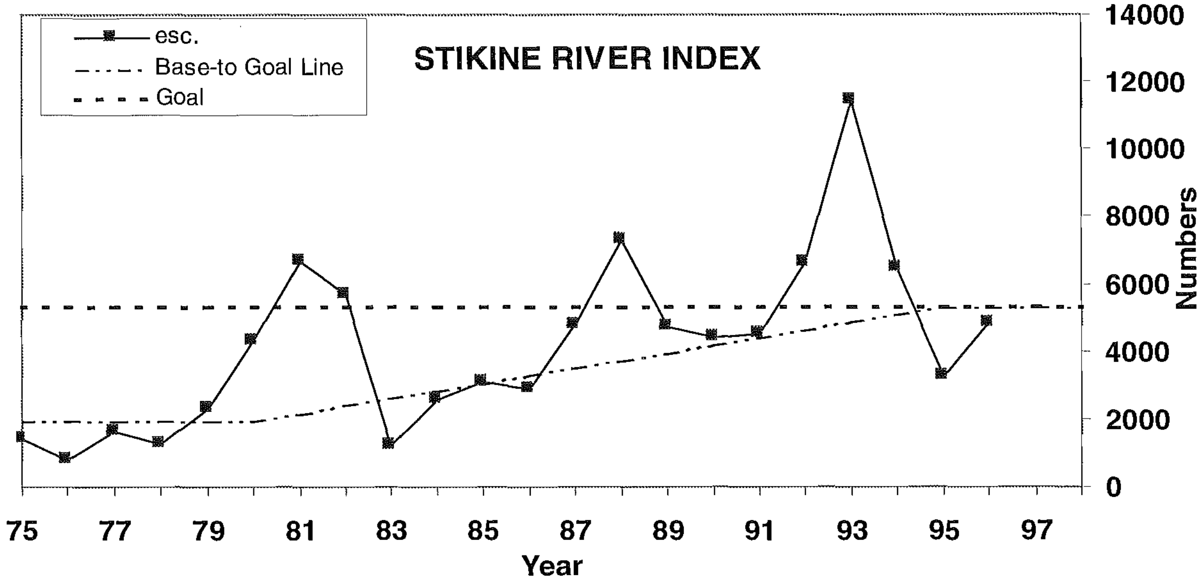


CTC Algorithm: **Not Rebuilding**; CTC Final Assessment: **Indeterminate**

Escapement Methodology: The Taku River is a large, glacial transboundary river originating in northern British Columbia and flowing into Taku Inlet east of Juneau, Alaska. It supports a large, outside-rearing stock. Escapements above are indices (peak counts) of large fish made by helicopter in six tributaries (Nakina, Nahlin, Tseta, Kowatua, Dudidontu, and Tatsamenie rivers), standardized since 1971 (Pahlke 1997a). Mark-recapture experiments conducted in 1989, 1990, 1995, and 1996 indicate these surveys account for about 25% of the total Taku River chinook escapement (McPherson et al. 1997).

Escapement Goal Basis: In 1981, ADF&G set the index goal at 9,000 fish in the Nakina River (largest producing tributary), based upon the 1952 count, the highest historical survey count in the Nakina. The Taku River total goal was set at 30,000 based upon a guess of the fraction of total escapement spawning in the Nakina River. In 1991, the TBR committee of the PSC set the Taku River chinook escapement goal at 13,200 large index spawners; this is the current goal. ADF&G and CDFO staff are currently developing the stock-recruitment database and plan to start review of this goal by May 1998.

Agency Comments: Historically, a significant terminal marine gillnet fishery occurred in the spring in Taku Inlet along with a spring SEAK troll fishery. Currently, there is no commercial fishery targeting this stock, incidental harvests occur in U.S. and Canadian fisheries. In addition, U.S. and Canadian sport fisheries target this stock. Total harvest rates range from 10% to 15% under the current management regime. Coded-wire tagging of Taku River chinook was done for the 1976-1981 and 1991-present broods. Index counts of chinook spawners in the Taku River from 1992-1996 have averaged 95% of the present escapement goal and are 273% of the base period average. The 1996 count of 19,777 large fish is the highest on record and was due to exceptional survival from the 1991 brood. The Taku River stock appears to be rebuilding, based upon the current goal, however, definitive analysis of stock health will have to await the ongoing stock-recruitment analysis discussed above.

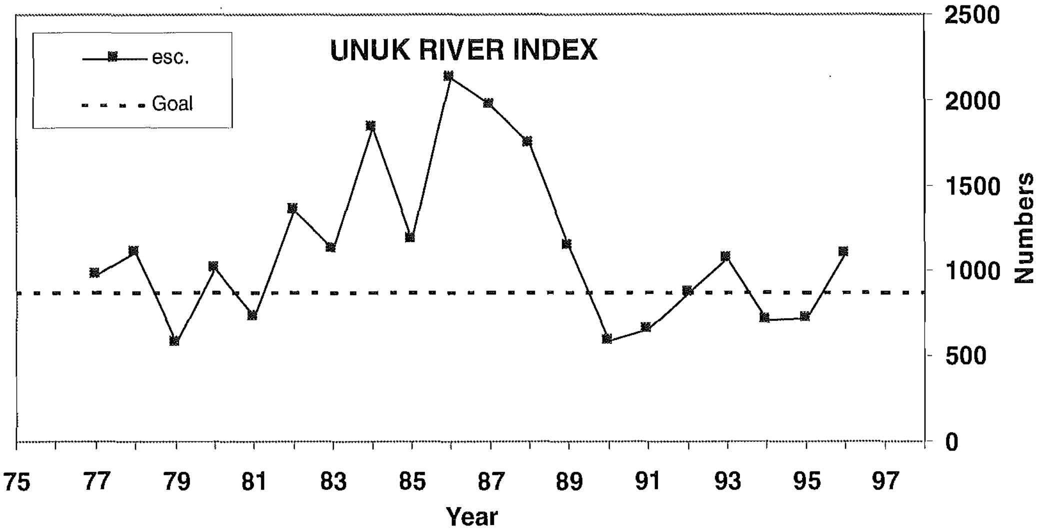


CTC Algorithm and CTC Final Assessment: **Rebuilding**

Escapement Methodology: The Stikine River is a large, glacial transboundary river which supports a large, outside-rearing stock. Escapements are index counts past the Little Tahltan River (one of a multitude of Stikine tributaries) weir, which has been operated since 1985. This index is similar to that for the Alsek/Klukshu. Helicopter surveys of chinook spawners in the Little Tahltan River have been made since 1975 and were expanded to total escapement, based on coupled surveys and weir counts since 1985 in Little Tahltan. Mark-recapture experiments in 1996 and 1997 and a radio-telemetry study in 1997 indicate that Little Tahltan River weir counts represent 17% to 20% of the total Stikine chinook escapement (Pahlke and Etherton 1997; Pahlke and Etherton *In prep.*). These were cooperative studies by ADF&G, CDFO, the Tahltan, and Iskut Bands, and NMFS.

Escapement Goal Basis: In 1981, ADF&G set the index escapement goal at 3,360 fish in the Little Tahltan River based upon an aerial count of 2,137 fish in 1980 expanded by a factor of 1.6. The overall Stikine River goal was set at 13,700 based upon a guess of the fraction spawning in the Little Tahltan River. In 1991, the TBR committee of the PSC set the Little Tahltan River goal at 5,300 spawners, an average of the U. S. (4,300) and Canada (6,250) goals; this is the current goal. ADF&G and CDFO staff are compiling data for review of the current goal and plan completion in 1998.

Agency Comments: Historically, a significant terminal marine gillnet fishery near the river mouth harvested this stock. Currently, there are no directed commercial fisheries targeting this stock, but incidental harvests occur in U.S. and Canadian gillnet and SEAK troll fisheries. A relatively small U. S. marine sport fishery harvests Stikine River chinook. Total harvest rates are believed to range from 10% to 20% under the current management regime. Little Tahltan River escapements from 1992-1996 have averaged 123% of the present goal and are 335% of the PSC base period average. The 1995 and 1996 weir counts were 61% and 91% of the current goal. The Stikine River stock is judged by ADF&G to be rebuilding, based upon the current goal; however, definitive analysis of stock health will have to await the goal analysis discussed above.

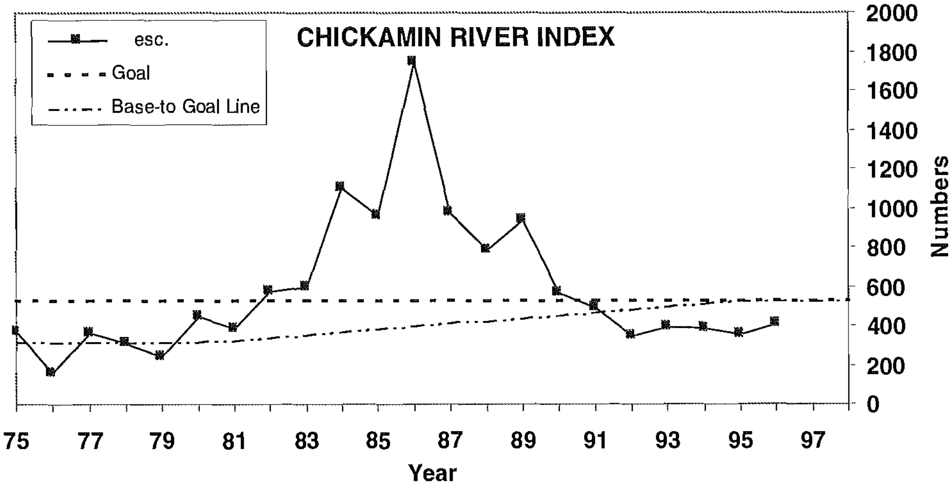


CTC Algorithm and CTC Final Assessment: **Stable at Goal**

Escapement Methodology: The Unuk River empties into Behm Canal near Ketchikan and is a glacial system with nonglacial spawning tributaries which support a moderate-sized, inside-rearing stock. Reported escapements are indices (peak counts) of large fish from six tributaries using standardized methodology since 1977 (Pahlke 1997a). Mark-recapture studies in 1994 and 1997 found that between 15% and 20% of the total escapement is counted during peak surveys (Pahlke et al. 1996; Jones and McPherson *In prep.*). A radio telemetry study in 1994 found that the surveys are conducted in stream reaches where 80% of the spawning occurs.

Escapement Goal Basis: The 1981 ADF&G goal was 1,800 large index spawners. This goal was mistakenly based upon a 1978 count thought to be 1,765 fish, which was revised downward in 1985 to 1,106 fish upon discovery that some tributary counts were entered twice. The corrected count was still the largest pre-1981 index count. In 1994, ADF&G revised the goal to 875 large index spawners based upon a spawner-recruit analysis (McPherson and Carlile 1997), which the CTC reviewed and has used since 1994. Prior to 1994, the CTC used 2,880 total spawners as the rebuilding goal; the index goal of 875 represents between 4,375 and 5,833 total large spawners when expanded. In 1997, ADF&G revised the goal to a range of 650-1,400 large index spawners in conformance with a spawner recruit analysis (McPherson and Carlile 1997) report and in compliance with the ADF&G Escapement Goal Policy (ADF&G 1997). This range is ADF&G's most current estimate of maximum sustained yield escapement.

Agency Comments: There is no terminal fishery targeting this stock; harvests of immature and mature fish occur in SEAK and NCBC fisheries. Estimated total exploitation rates average about 20% under current management (McPherson and Carlile 1997). Coded-wire tagging of this stock was conducted for the 1982-1986 (Pahlke 1995) and the 1992-present broods; Unuk wild and hatchery stock tagging both indicate that marine survival has decreased since the mid-1980s. Since 1977, the index counts have been within the 1997 range, except for four years above and two slightly below and ADF&G judges this stock to be healthy.



CTC Algorithm and CTC Final Assessment: **Not Rebuilding**

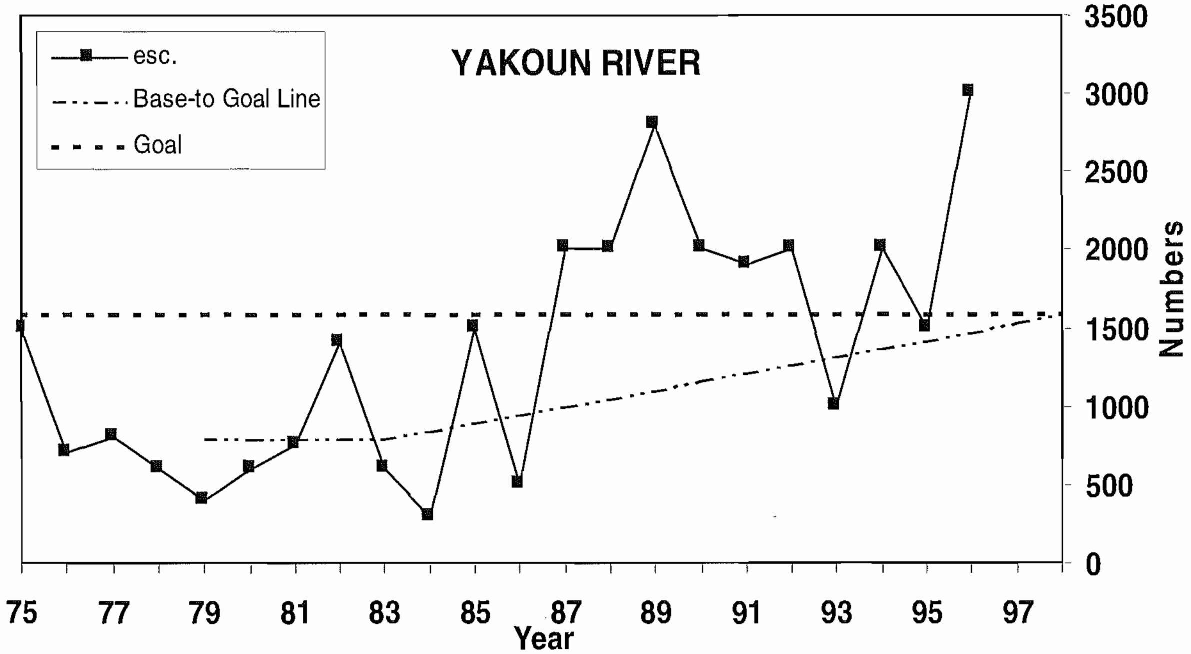
Escapement Methodology: The Chickamin River drains into Behm Canal, near Ketchikan and is a glacial system with nonglacial spawning tributaries which support a moderate-sized, inside-rearing stock. Reported escapements are index counts of large fish in eight tributaries using standardized methodology (Pahlke 1997a). Mark-recapture studies in 1995 and 1996 found that between 15% and 25% of the total escapement is counted during peak surveys (Pahlke 1996; Pahlke 1997b). A radio telemetry study in 1996 indicated that annual surveys are conducted in stream reaches where over 80% of all spawning occurs.

Escapement Goal Basis: In 1981, ADF&G set the index goal at 900 large-index fish based upon a count of 860 in 1972. In 1994, ADF&G revised the goal to 525 large index spawners based upon a spawner-recruit analysis (McPherson and Carlile 1997), which the CTC reviewed and has used since 1994. In 1997, ADF&G revised the goal to 450-900 large index spawners (McPherson and Carlile 1997) to comply with the ADF&G Escapement Goal Policy (ADF&G 1997). This range is ADF&G's most current estimate of maximum sustained yield escapement.

Agency Comments: There is no terminal fishery targeting this stock; harvests of immature and mature fish occur in SEAK and NCBC fisheries. Coded-wire tagging was conducted for the 1982-1986 broods (Pahlke 1995). Estimated total exploitation rates range from 35% to 40% under the current management regime (McPherson and Carlile 1997). Between 1975 and 1981, index counts were all below 450 large fish by an average of 30%. From 1982 to 1991, index counts were all above 450 large fish and exceeded the upper goal range of 900 in five years. The 1992-1996 index counts have all been below 450 by an average of 13%. ADF&G staff believe the recent declines are a combination of poor marine survival coupled with some density dependent mortality effects from large escapements (McPherson and Carlile 1997). The 1990-1996 escapements, averaging 420 large fish, are expected to provide yields within 78% of MSY. ADF&G judges this stock to be reasonably healthy with a moderate degree of concern for this stock.

2.4.1.2. Canadian Stocks

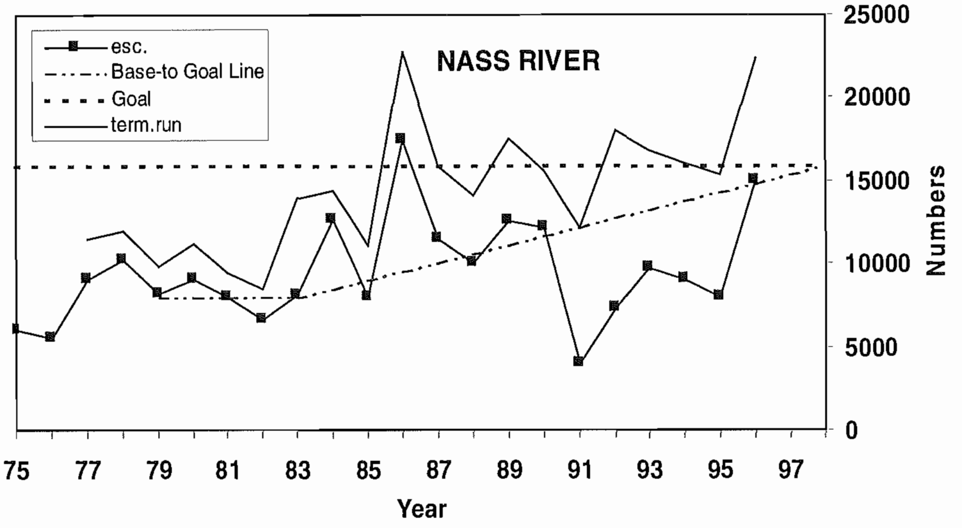
In general, escapement goals for Canadian chinook stocks were based on doubling the average escapements observed between 1979-1982. The doubling was based on the premise that Canadian chinook stocks were over fished and that doubling the escapement would still be less than the optimal escapement estimated for the aggregate of all Canadian chinook populations (see stock-recruitment curve in "Technical Basis of PSC Catch Ceilings," Figure 1, Attachment 4, PSC file # 72006). Doubling was also felt to be a large enough change in escapements to allow detection of the change in numbers of spawners and subsequent production. This process was used to determine interim escapement targets to be used as management goals for chinook rebuilding, and will be re-evaluated at the completion of the PSC "rebuilding" program.



CTC Algorithm and CTC Final Assessment: **Rebuilding**

Escapement Methodology: Visual estimates of escapement are made by local hatchery staff and DFO fishery officers during foot surveys of the system. These estimates are then expanded for a total estimate of spawning escapement in the system. The escapement surveys have been consistent between years but their accuracy (i.e. total escapement) is unknown.

Agency Comments: The Yakoun River is a large system and the only significant chinook producing stream on the Queen Charlotte Islands. Chinook spawn primarily at the outlet of Yakoun Lake and are a summer run stock. The increase in the Yakoun chinook escapements in 1996 was attributed to the closure of NBC chinook fisheries in that year.



CTC Algorithm: **Not Rebuilding**; CTC Final Assessment: **Indeterminate.**

Escapement Methodology: The Area-3 indicator stock represents a large stock grouping of approximately 25 streams in the Nass area covering a diverse range of habitats and large geographical area. Both coastal and inland streams are represented for both the Nass River and tributaries and Portland Inlet. Portland Inlet chinook streams show only very small returns. CDFO observations of escapement, based on visual counts, vary considerably between streams and have been inconsistent. The escapements used in the escapement analysis represent local fishery managers estimates based on stream walks and aerial surveys, the frequency being dependent on resource and staff availability and weather.

Since 1992, the Nisga'a Tribal Council has conducted mark recapture programs, capturing chinook with a fish wheel in the mainstem of the Nass River and recovering tags on the spawning grounds. Independent of this, and through 1994 only, local guardians continued to conduct escapement surveys on individual Area-3 rivers. The guardian's visual estimates of escapement are used in this analysis through 1994. After 1994, only the Nisga'a mark-recapture estimates, which provide more accurate and much larger estimates of escapement for the Nass system only, not the entire Area 3, are available.

Because of these major changes in escapement methodology, CDFO began investigating the possibility of using the Nisga'a data to standardize the escapement time series used in the CTC analysis. The consulting firm LGL Ltd. (Sidney, B.C.) and in conjunction with the Nisga'a Tribal Council, has developed an escapement data set using the two overlapping years (1992-1993) of the CDFO field estimates and the individual stream work by LGL on six Nass indicator streams to develop a "multiplier" for the CDFO estimates back to 1977. The new data set and new goal will be reviewed by the full CTC in 1998.

The 1991 data point is extremely low due to limited surveys in that year: The Tseax estimate dropped from 1,000 in 1990 to 200 in 1991; and most significantly, the Cranberry River dropped from 4500 in 1990 to 500 in 1991. These decreases are thought to be related to reduced surveys rather than stock declines in that year. While LGL adjusted for years with missing data, data was not adjusted for years when escapements were thought to be underestimated.

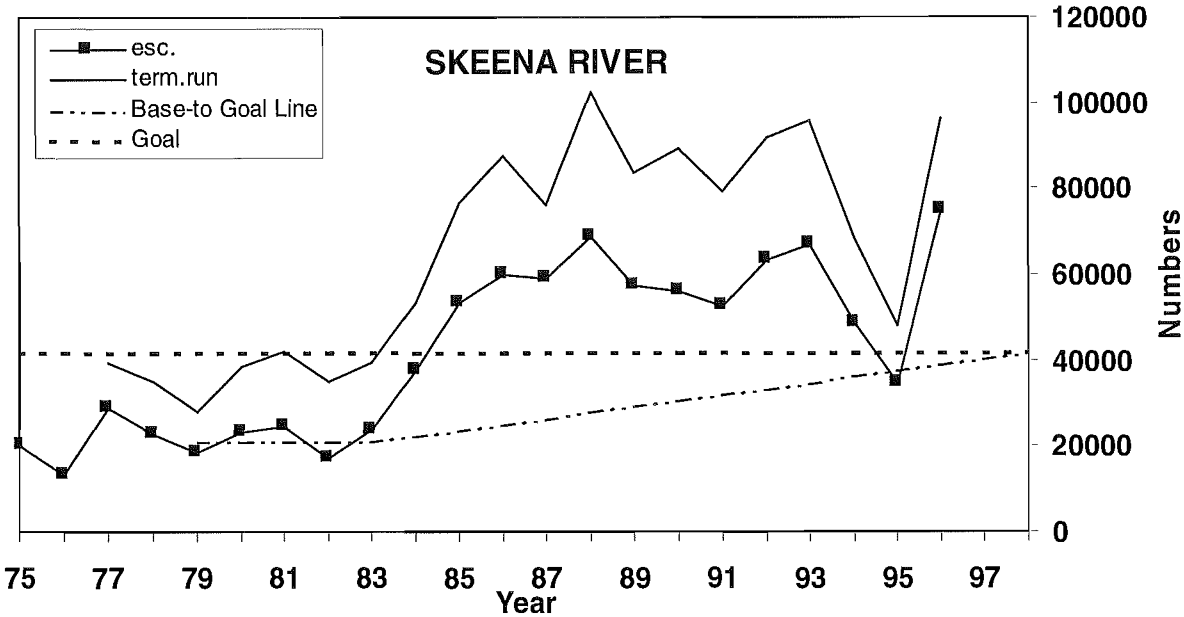
While there is no CDFO field estimate of escapement in 1995 and in 1996, the LGL escapement estimate in 1995 showed low chinook returns to the Nass, as was observed also in the Skeena systems. In 1996, the LGL data showed a very good return to the Nass.

Escapement Goal Basis: The Area-3 escapement goal is based on doubling the 1979-1982 base year average, resulting in a goal of 15,890.

Agency Comments: Due to the inconsistencies of this escapement data, it is necessary to reconcile current escapement estimates with historical data. In 1998, the CTC will review the escapement data obtained from LGL. These estimates, collected since 1992, provide more accurate estimates of escapement. They are described briefly below.

For the years 1992-1993, LGL conducted rigorous escapement surveys, including radio telemetry, on six significant chinook producing streams in the Nass system. These six streams were chosen based on their large contribution to escapement in the watershed, and because they had been surveyed relatively consistently. (See also: *Regional Fisheries Resource Manuals 3: Nass; prepared for CDFO by ESSA Technologies Ltd. and LGL Ltd. 1995).* Field estimates from the Cranberry, Damdochax, Kwinageese, Meziadin, Seaskinnish, and Tseax Rivers were examined for data gaps. Data was interpolated to fill any gaps. Next, this "observed" escapement was expanded to represent the Nass watershed by dividing the observations for the index streams by the percent that the indices contribute to the mean annual escapement to the watershed for 10-year periods. Finally, the two years (1992-1993) of radio telemetry data were compared to counts from field staff in those years resulting in an index of 178% expansion. This expansion was applied to previous years (1977-1991) of field estimates.

If the Nisga'a/LGL Nass escapement data was to be adopted as the Nass indicator stock, the new escapement goal would again be based on the doubling of the average Nass escapement data for 1979-1982 base period, resulting in a goal of 24,000. The Nass terminal-run data for sport and IFF would remain the same as in previous CTC analyses.

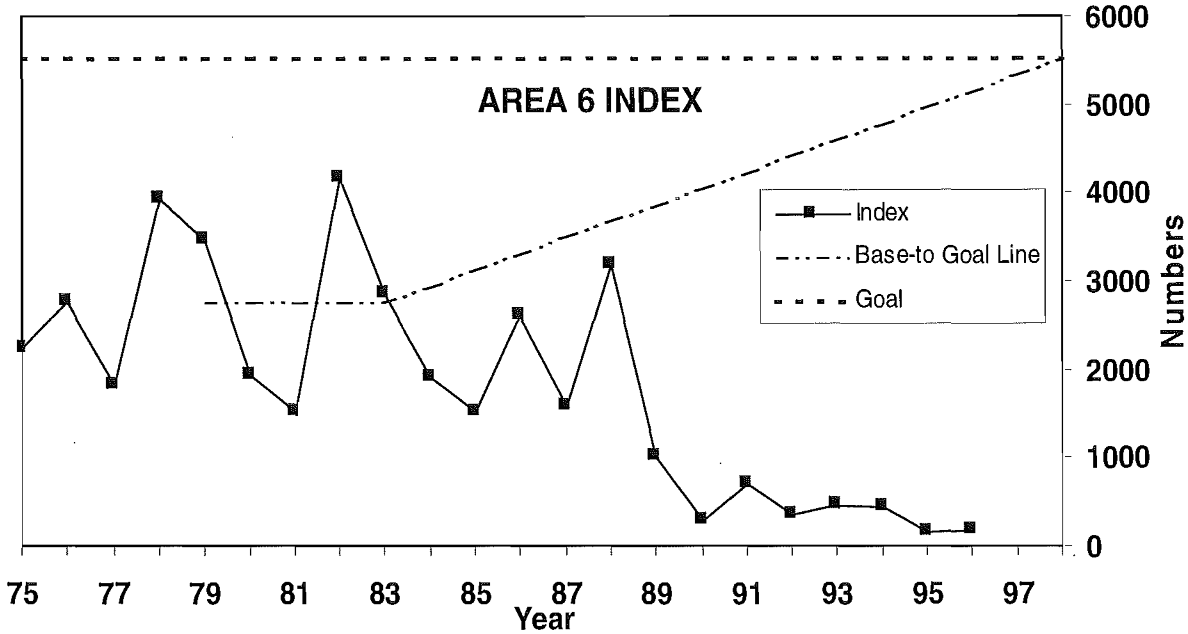


CTC Algorithm and CTC Final Assessment: **Above Goal**

Escapement Methodology: The Skeena chinook stock index represents approximately 40 streams which are consistently surveyed. As a system, the Skeena supports over 75 separate chinook spawning populations, but only three spawning populations (Kitsumkalum, Morice, and Bear Rivers), represent 73% of the total Skeena chinook spawning stock. A second group of populations (Ecstall, Kispiox, and Babine Rivers) have annual returns ranging from 1,000 to 5,000 spawners, and comprise about 13% of the Skeena stock. Escapement estimates are generally based on visual observations from helicopter, fixed wing aircraft, and/or from stream walking surveys. The Kitsumkalum River is an escapement indicator stock and has had a mark-recapture program conducted on the main population since 1984.

Agency Comments: The Skeena test fishery has provided an index of escapement since 1956. A regression analysis of Skeena escapements and the test fishery index for the years 1956-1988 was significant (r squared = .36, F ratio (1,31) = 17.1;P>0.0003; see PSARC document S89-18, *Stock Assessment of Skeena River Chinook Salmon,* B. Riddell and B. Snyder), indicating covariation between test fishery indices and the aggregate chinook escapements.

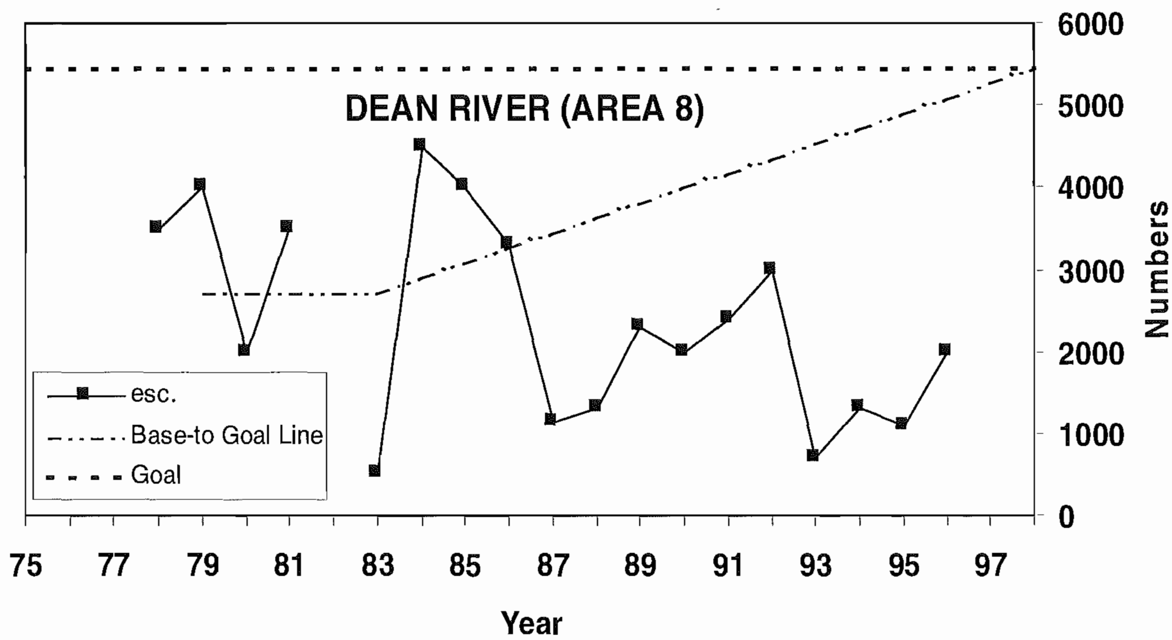
The 1995 Skeena escapement surveys were covered by a contractual arrangement with a former Fishery Officer who is very experienced in escapement enumeration. Limited resources allowed only two, and for some systems only one observation. In 1995, chinook escapements to the three main chinook producing systems (the Bear, Morice, and Kitsumkalum) were down from the last few years but remained fairly strong. However, escapements to most other systems in Area 4 and in the Nass (Area 3) were down considerably. The Skeena test fishery index was only 114.9 in 1995, the lowest since 1985, and much lower than the 1980-1994 average of 184.0. The 1996 escapements to the Bear, Morice, Kitwanga, and Nanika were well above recent averages. This coincides with the 1996 Skeena test fishery index of 243.9, the highest since 1985. Escapements to smaller, more coastal streams in the lower river (except for the lower Kistumkalum River) were poor.



CTC Algorithm and CTC Final Assessment: **Drop from CTC Assessment**

Escapement Methodology: Chinook returns have been recorded in 13 non-enhanced systems in Area 6, but the primary chinook systems have been the Kemano, Wahoo, and Kitlope rivers. Unfortunately, both the Kitlope and the Kemano are glacially fed and visibility is often very poor. Counts of escapement have been done by helicopter, fixed wing aircraft, and some walking surveys, but funding for aerial surveys has been limited, local staff have often chosen to survey other streams in the Central Coast where visibility is better. Consequently, the number of stream surveys has been extremely variable year to year, dependent on weather as well as staff availability and budget. Current budget restrictions have reduced staff and boat availability even further. Due to the inconsistencies in data collection, methods and effort, comparison of escapement enumeration from year to year, and assessment of "trends" in Kitimat natural chinook stocks is suspect. The very low escapements reported since 1990 largely reflect poor survey conditions or effort. Further, in 1995, staff available for stream surveys were seriously reduced, and no stream surveys were conducted. In 1996, the estimate for escapements to the Kemano River, normally a large contributor to escapements, was only 25 fish. High water at the end of August resulted in flood conditions making estimates of escapement extremely difficult.

Agency Comments: Due to the inconsistencies in the historical data and extreme problems in 1995 and 1996, the accuracy of a trendline of recorded escapements as a representation of natural chinook returns is unknown. For these reasons, the CDFO recommends that the Area 6 chinook stock be omitted from the CTC's escapement rebuilding assessment. This recommendation was also suggested in TCCHINOOK (94)-1, (page 18), "It is the opinion of the local CDFO staff that escapement enumeration for this stock is too inconsistent for use in the escapement estimate. Future inclusion of this stock is currently under review."; and also in TCCHINOOK (96)-1, (page 19), "Future inclusion of this stock is currently under review due to inconsistent escapement enumeration."



CTC Algorithm and CTC Final Assessment: **Not Rebuilding**

Escapement Methodology: The Area 8 chinook stock index has been comprised of seven non-enhanced systems, but the Dean River is the main spawning population. Of all chinook-producing streams in the Central Coast, the Dean is probably the best indicator in terms of consistent survey coverage and methodology. The Kwatna and Kimsquit Rivers support small chinook runs, but assessment of these streams has never been as thorough as for the Dean. In the 1990s assessment of streams other than the Dean has been further reduced. Since 1993, no escapement surveys were conducted on the Kimsquit, Noieck, Taleomey, and Kwatna rivers.

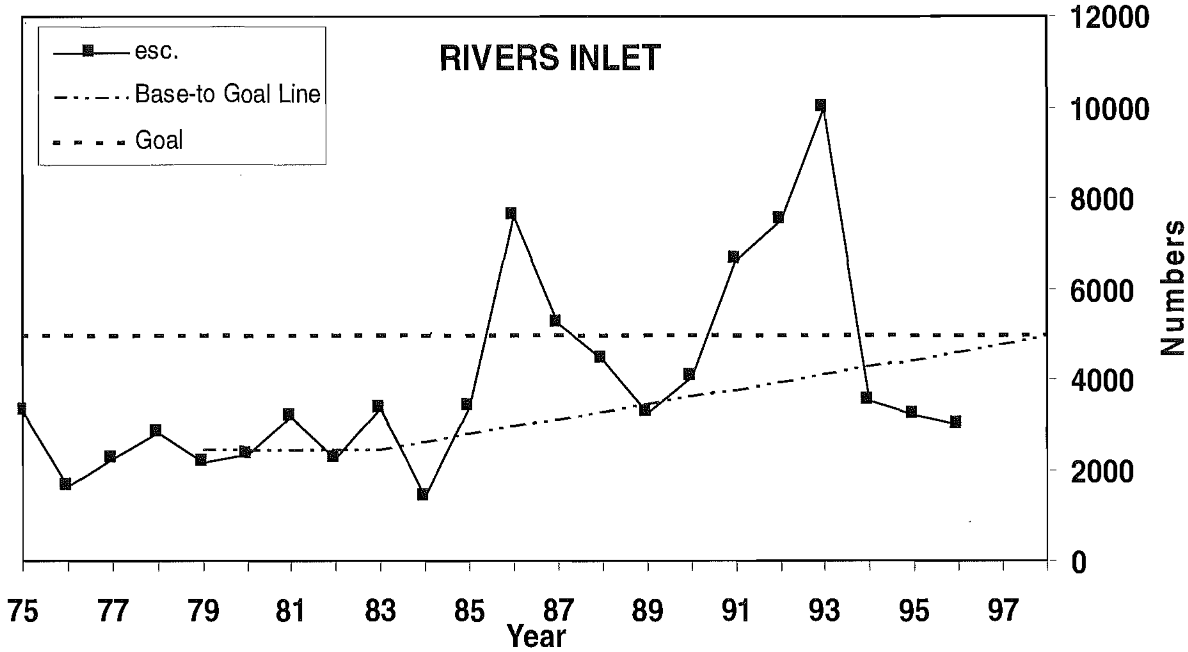
Escapement enumeration in the Dean River has been quite consistent over the past several years and surveys have shown fish distributed relatively evenly throughout the system.

Two guardians on the upper Dean monitor the number of chinook on the redds. When the spawners appear to be at peak numbers, the helicopter survey is conducted. In 1984 and 1986, only riverboat surveys were conducted; these results may not be as reliable as the helicopter estimates. Visual estimates of escapement are made by 2-3 helicopter surveys of the streams each year, combined with estimates from stream walks.

Escapement Goal Basis: Based on the large contribution of the Dean River to Area 8 escapements and due to gaps in escapement data for other streams in Area 8, the Dean River alone will now be used to represent stock strength in Area 8. When the Area 8 goal was originally calculated, it was based on the doubling of the 1979-1982 average escapements, but the 1982 data point for the Dean River was missing. This produced the current goal of 5,450. In calculating the goal for the Dean alone, CDFO applied a rounding of the doubling of the average of escapements from 1979-1981 producing an average escapement of 3,200 and a goal of 6,400. The revised goal will be documented and submitted for review by the CTC during 1998.

In 1996, the Dean River chinook escapement was only 2,000; however, this was an improvement over the 1995 escapement of 1,100.

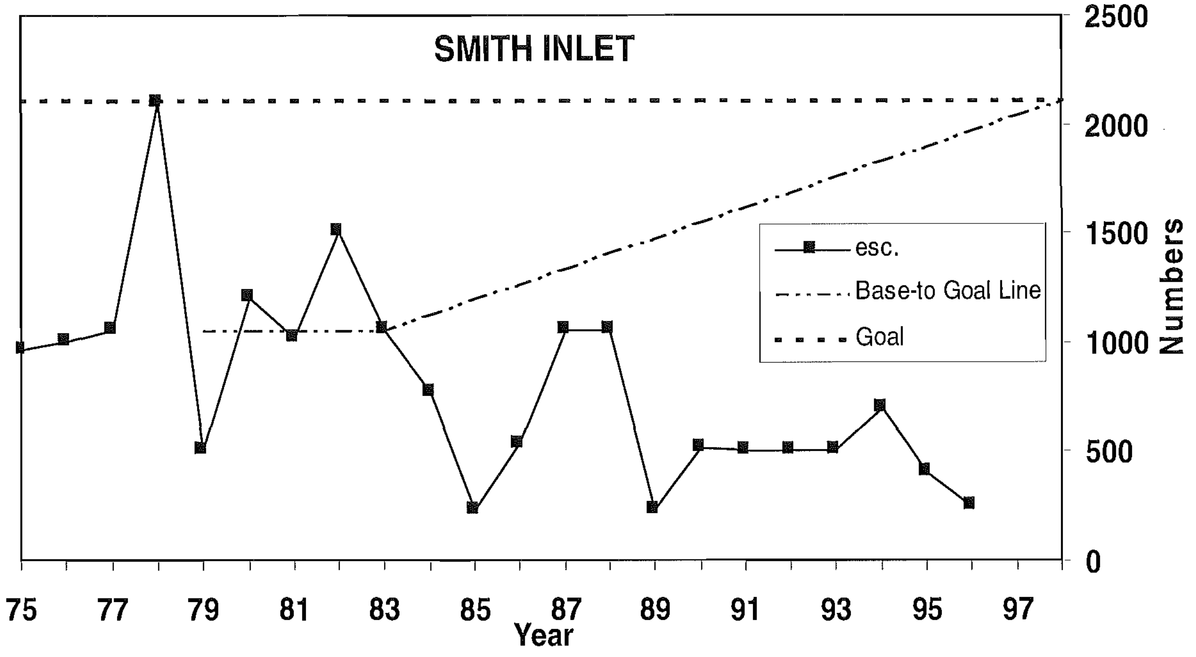
Agency Comments: Changing the Area-8 escapement indicator stock to the Dean River does not appreciably affect the escapement curve, nor the rebuilding status. Although recent escapements are still below the CDFO escapement goal, Area-8 management staff feel the Dean River chinook stock strength has remained fairly constant over the last six years, and the stock is "holding its own." A local sport fishery catch provides information on relative stock strength and has remained fairly similar in procedure and coverage each year for the last six years. In the future, these data will be assessed to determine whether they can also provide an index of abundance.



CTC Algorithm and CTC Final Assessment: **Indeterminate**

Escapement Methodology: The Wannock, Chuckwalla, and Kilbella Rivers are three primary chinook producing streams and represent the Area-9 stock index (Rivers Inlet area). Of these, the Wannock is the primary chinook producing stream, averaging 5,200 chinook in the 1990s, while the Chuckwalla and Kilbella together, average around 300. The timing of these stocks also differs: while the Wannock is late summer run timing, the other two are summer run chinook stocks. Escapement enumeration effort in the Chuckwalla and Kilbella rivers consists of stream walks and visual estimates, whereas methodology in the Wannock is more rigorous, involving a dead pitch. The same Fishery Officer has been on site for several years, conducting the Wannock escapement surveys using the same dead pitch technique. Although a mark recapture program was conducted on the Wannock from 1992-1994, the estimation from the dead pitch was used for the CTC escapement time trend to maintain consistency with past years. However, for the years that mark/recapture programs were in place on the river, it is possible that the greater effort and increased financial support for escapement survey in those years may have influenced the estimation of escapement produced from the dead pitch, yielding a larger number.

Agency Comments: The 1995 escapements to the Wannock, the Kilbella, and the Chuckwalla were similar to 1994. In 1996, water levels were good and clear, providing very good visibility for enumeration of the Chuckwalla/Kilbella Rivers. Local managers feel escapements to these two systems were much better than in 1995.

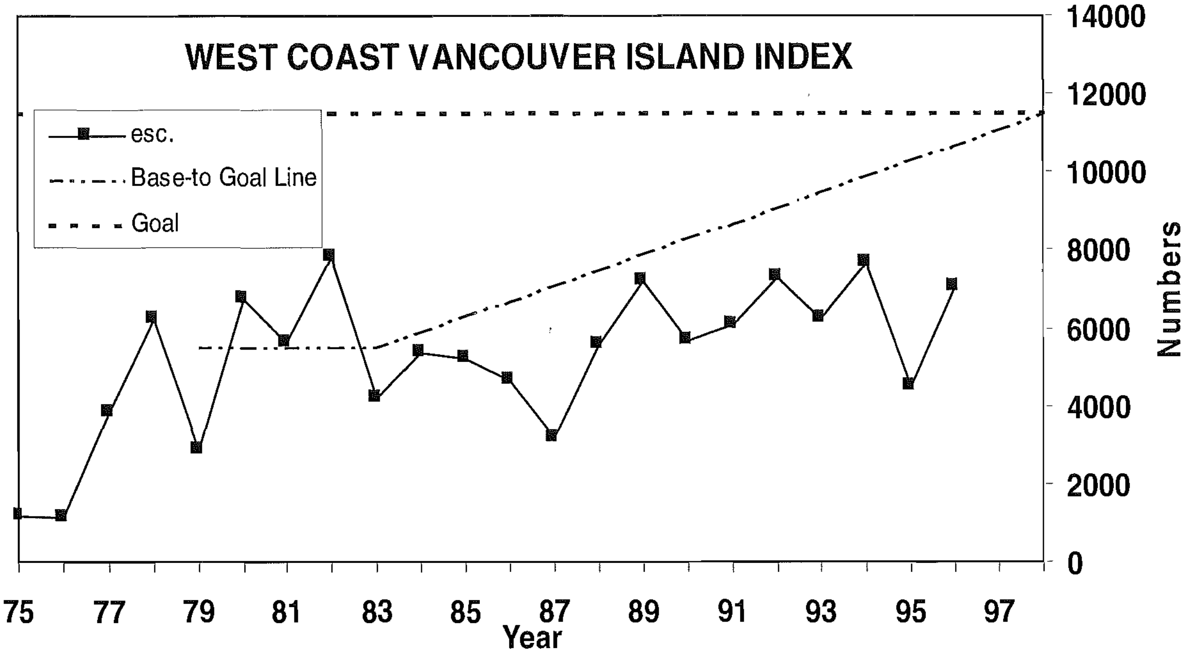


CTC Algorithm and CTC Final Assessment: **Drop from CTC Assessment**

Escapement Methodology: The Docee River is the indicator stock for Area 10 (Smith Inlet) chinook. This river is difficult to survey due to remote access and poor inriver visibility. Chinook spawn in a short reach of the river, approximately a half kilometer in length, primarily at the outlet of the lake. Spawning gravel is not prime, being rough and bouldery in composition. Estimates of spawning are not made on a consistent basis. Occasional stream walks are conducted, or very rough estimates are made from helicopter or fixed-wing airplane flights over the river.

A sockeye salmon counting fence is located on the river, but chinook run timing extends past the period of sockeye counts. Chinook move into the river during the beginning of August. Monitoring the fence beyond the sockeye timing in order to get a better estimate of chinook is generally not thought to be useful because chinook spawning grounds extend above and below the fence. It is also believed that the fence would be an obstruction to chinook movement and would provide a site for seal predation.

Agency Comments: Due to inconsistencies in the timing and frequency of escapement surveys and estimation, time trend analysis of escapements on this river is suspect. CDFO has been unable to standardize the available data. For this reason, Area 10 will no longer be included as an indicator stock in the CTC analysis.

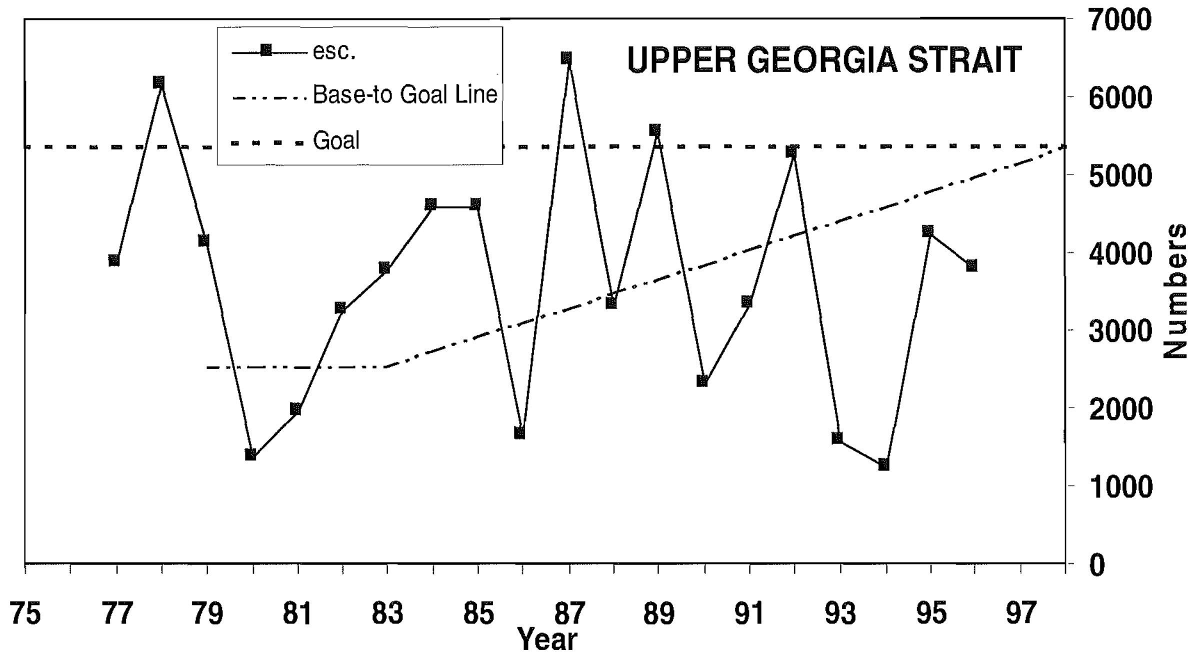


CTC Algorithm: **Not Applicable**; CTC Final Assessment: **Not Rebuilding**

Escapement Methodology: The WCVI escapement indicator stocks were chosen by assessing historic data for consistency of survey effort. This assessment also showed a time trend in the reliability of the escapement estimates with reliability increasing through time (a combination of more visits, better timing of counts, and better methods) and that the most reliable estimates are for those systems associated with enhancement (Marble, Tahsis, Gold, Burman), the latter due to increased activity on the river. However, there was still considerable variation in frequency of visits and methodology for the seven indicator rivers (4 above plus Artlish, Kaouk, and Tahsish). Methodologies used consisted mainly of walks in lower reaches (greater frequency of use in early years), helicopter over-flights at key spawning periods, and more recently an emphasis on snorkel surveys. As well, escapement estimates include broodstock. More intensive and systematic surveys and reporting, based mainly on snorkel swims, were introduced in 1995. Estimates since 1995 have been based on more frequent surveys by trained crews and Area Under the Curve estimation of total escapement. These estimates are more reliable than previous estimates and are likely to account for a higher portion of the actual escapements.

Agency Comments: Variation in escapement may also be due to changes in terminal fisheries. For the WCVI indicator stock group, the terminal fisheries include the terminal sport fisheries and native fisheries. In Nootka Sound, the sport fishery has grown substantially in recent years in response to increased returns to Conuma River Hatchery. This fishery may impact escapements to the Gold, Burman, and Tahsis river systems. However, as this terminal fishery has grown, management actions like finfish closures have increased in Muchalat Inlet (Gold and Burman) and in Tahsis Inlet (Tahsis River). The net effect of increased sport fishing in the outer terminal area and increased closures inside may be no change in the sport exploitation of the PSC indicator stocks. Recent changes in native fishing practices may actually have resulted in lowering exploitation rates. These changes consist of relocating fishing effort to stronger Conuma River chinook runs and away from Gold River and Burman River stocks. Efforts are underway to expand the number of rivers in the escapement indicator stock group. In Area 24 (Clayoquot Sound) intensive snorkel surveys have been conducted on three natural systems since 1993. In 1995, this program of intensive swim surveys was expanded to approximately 27 systems distributed throughout the WCVI.

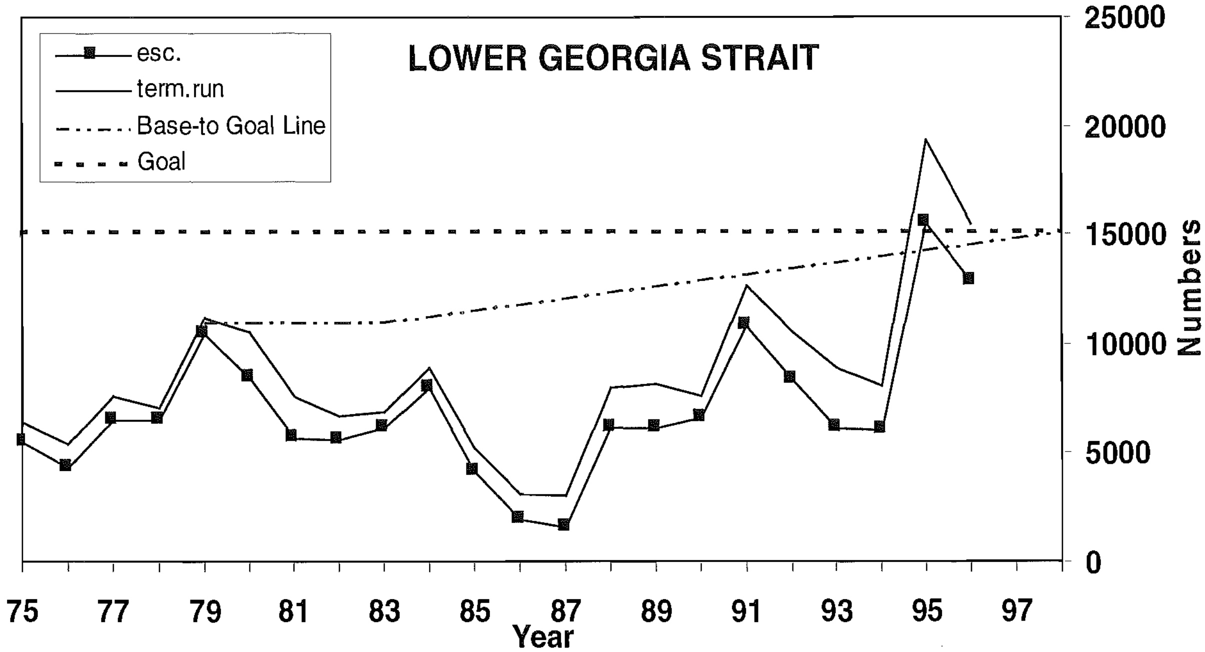
CTC Comments: Due to the 1995 change in escapement estimation procedure, the CTC did not apply the rebuilding assessment algorithm or the quantitative evaluation of changes in escapements relative to the base period to the WCVI stock. However, the CTC felt that, in spite of the change in estimation procedure, escapement trends for the WCVI stock warranted a classification of Not Rebuilding.



CTC Algorithm and CTC Final Assessment: **Not Rebuilding**

Escapement Methodology: The Upper Georgia Strait chinook stock index consists of counts in four river systems (Klinaklini, Kakweiken, Wakeman, and Kingcome Rivers) in Johnstone Strait mainland inlets and the Nimpkish River on northern Vancouver Island. The accuracy of escapement estimates in the mainland inlet systems is likely poor due to their glacial nature and remoteness for access. Escapement estimates have primarily been based on visual counts (over-flight information) although occasional swim surveys and stream walks have been conducted on the Nimpkish. The number of over-flights conducted in recent years has declined due to reduced budgets, so the reliability of these estimates has likely declined.

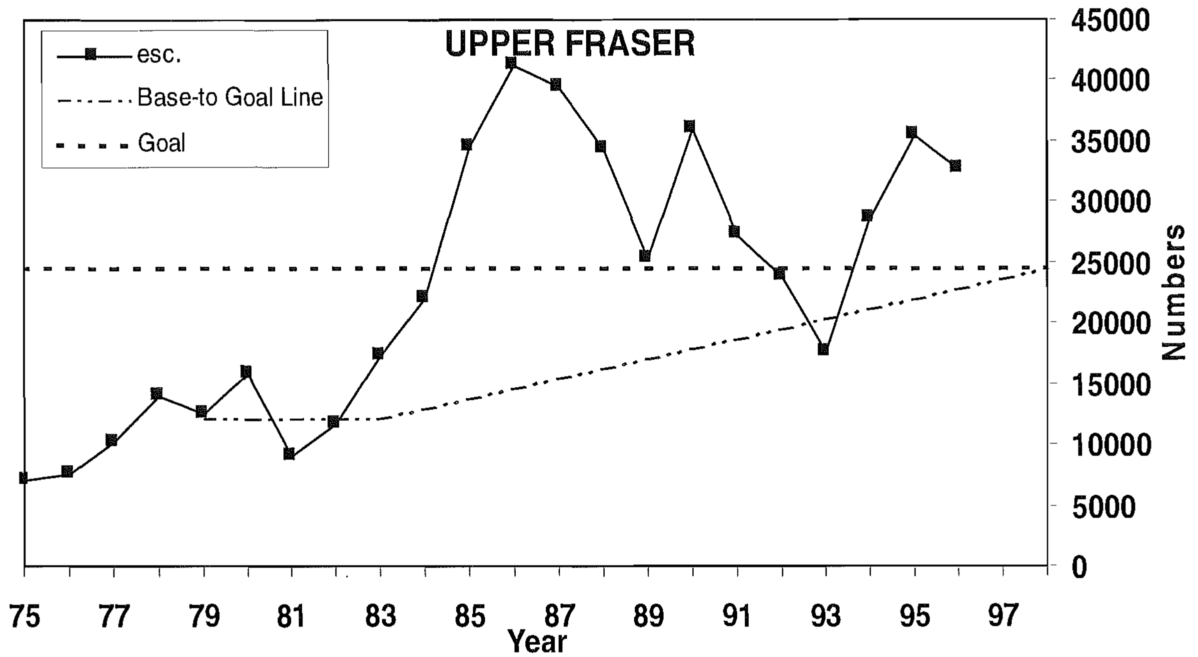
Agency Comments: Assessment of stock status is tentative due to uncertainty in escapement information, but indications are that these stocks remain below goals. Escapement for the Klinaklini system had increased in 1995 and 1996, but this may in part be due to a dramatic increase in effort to monitor this stock. From the limited information available, it is believed that these summer chinook migrate through NBC and SEAK. Recently, new escapement programs have been implemented to improve monitoring of these systems.



CTC Algorithm and CTC Final Assessment: **Not Rebuilding**

Escapement Methodology: Lower Georgia Strait river systems monitored for naturally spawning chinook escapements consist of the Cowichan and Nanaimo rivers. Prior to 1989, escapement estimates from the Cowichan River, were derived from swim surveys and over-flights by Fishery Officers and hatchery staff. This methodology was applied also to the Nanaimo River prior to 1995. Since 1989 and 1995 in respective streams, counting fence and carcass mark-recapture surveys have been established in each river. While the accuracy of these estimation procedures will vary, total chinook returns to the Cowichan and Nanaimo rivers have been estimated since 1975.

Agency Comments: The Cowichan chinook stock showed considerable increase in 1995 and 1996. One explanation for these returns can be attributed to substantial increases in enhanced contribution since 1992; however, the wild component of the run has also increased. Hatchery and wild chinook are differentiated by patterns of daily growth rings on otoliths. In the Nanaimo River, the chinook escapement estimates seem to have improved in both 1995 and 1996 compared to previous years, although it is difficult to compare with the less quantified surveys previous to 1995. Further, the Nanaimo chinook returns consist of spring-run and fall-run populations. Passage of the spring population into the upper river is highly dependent upon water levels, but returns have improved recently. Recovery of the Nanaimo fall population has not been as successful as in the Cowichan. There is also a smaller hatchery on the Nanaimo River, but survival of this hatchery stock has usually been lower than for the Cowichan chinook. In the Cowichan River, the Indian Food Fishery (IFF) catch has remained constant and no changes in fishing effort occurred. Effort and catch are inversely related to water levels and accessibility to fishing locations in the fall. There has been very little to no IFF activity in the Nanaimo River during this period.

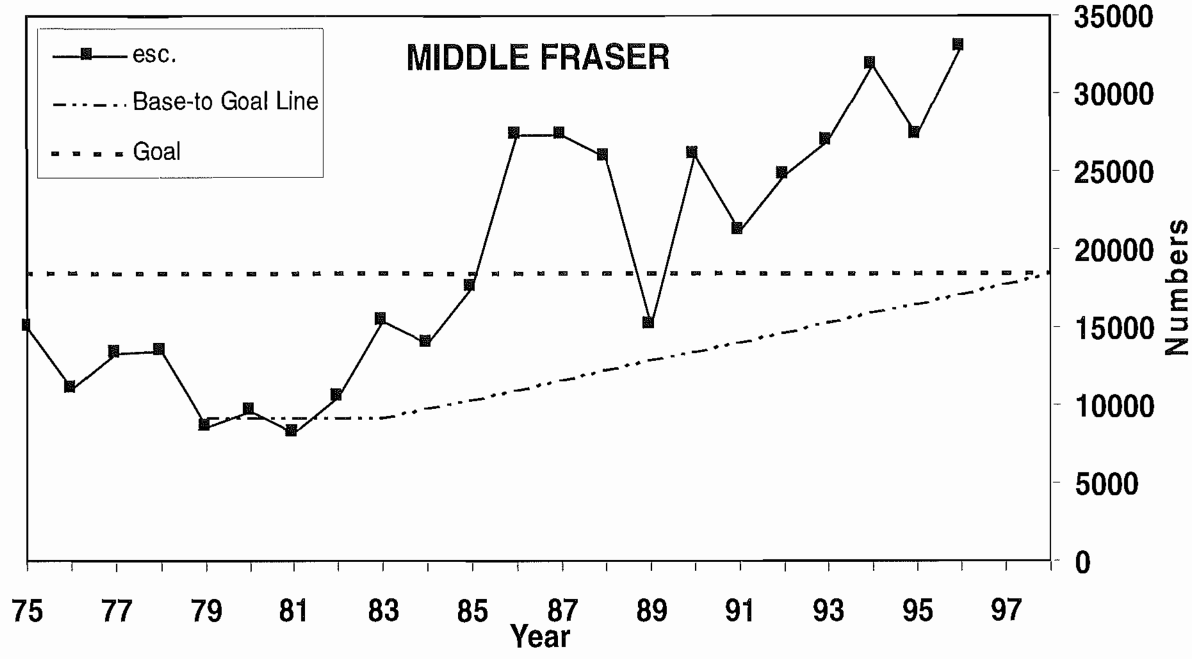


CTC Algorithm and CTC Final Assessment: **Rebuilding**

Escapement Methodology: This stock includes 16 populations that spawn in the Fraser River and its tributaries upstream of Prince George, including chinook from the McGregor, Nechako, Stuart, and Torpy River systems. Escapements were estimated for all major systems in 1995 and 1996. Most estimates were generated from aerial over-flight data by dividing the peak count by 0.65. This expansion factor has been developed by field staff on the basis of several studies but has not been documented (J. Irvine, Pacific Biology Station, Nanaimo, B.C., personal communication). In recent years, mark recapture estimates were produced for the Stuart River, area-under-the-curve estimates for the Nechako, and fence counts for the Salmon River (Prince George).

Chinook in the upper Fraser are predominantly stream-type, spending one year in freshwater before migrating to the sea. On their return, most populations return through the lower Fraser River during late April to mid-July.

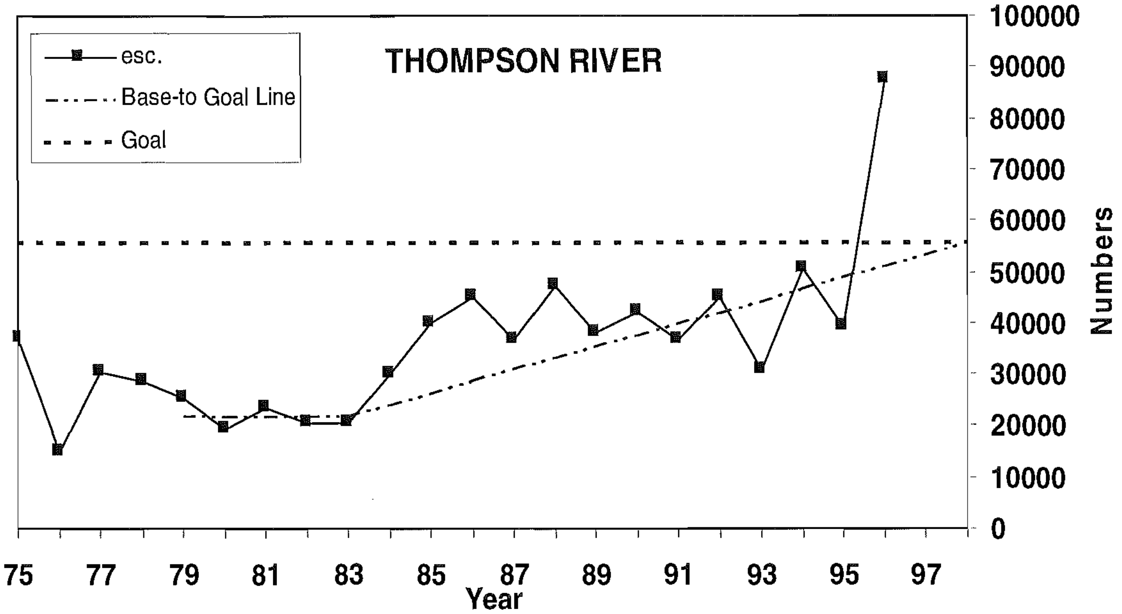
Agency Comments: Chinook escapements to the upper Fraser have been above the CTC rebuilding goal in 10 of the last 12 years.



CTC Algorithm and CTC Final Assessment: **Above Goal**

Escapement Methodology: Included in this stock are 12 populations downstream of Prince George including fish from the Chilko, Chilcotin, and Quesnel River systems. Escapements to five of the smaller systems were not estimated in 1995 and 1996, but these systems comprise, on average, 3.8% of the total index escapement (based on 1984-1993 escapement data). Estimates are primarily generated from aerial over-flight data by dividing the peak count by 0.65. This expansion factor has been developed by field staff on the basis of several studies but has not been documented (J. Irvine, Pacific Biology Station, Nanaimo, B.C., personal communication)

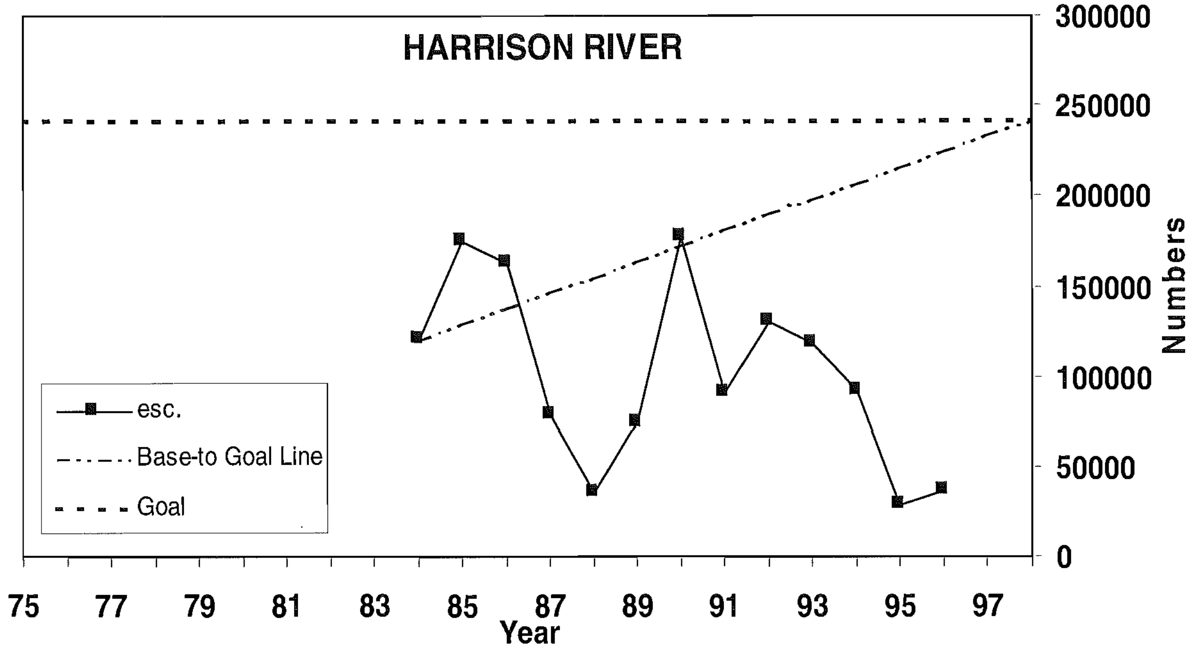
Agency Comments: The middle Fraser River chinook stock aggregate continues to be above the CTC rebuilding goal. Chinook in the middle Fraser are generally stream-type and include stocks that return during late spring and through the summer period.



CTC Algorithm and CTC Final Assessment: **Rebuilding**

Escapement Methodology: Included in the Thompson River stock aggregate are fish spawning in tributaries to the lower Thompson River downstream of Kamloops (Deadman River and Nicola River systems), six tributaries to the North Thompson plus the North Thompson itself, and seven tributaries to the South Thompson including the lower and middle Shuswap, and the South Thompson. An escapement estimate was not recorded for the North Thompson in 1995 but all other systems were enumerated during 1995 and 1996. The North Thompson comprised 5.2% of the total index escapement for the aggregate Thompson stock, based on data for 1984-1994. Most escapement estimates are produced by expanding peak visual survey estimates (as in previous two Fraser stocks), but counting fences are utilized in the Eagle, Salmon, and Deadman Rivers.

Agency Comments: Stocks associated with Shuswap Lake are mostly ocean-type (enter ocean during their first fall) while most other stocks are stream-type chinook. Return timing within this stock aggregate occurs throughout the summer (through August). The large increase in the 1996 escapement occurred in both the spring and summer components of this stock.

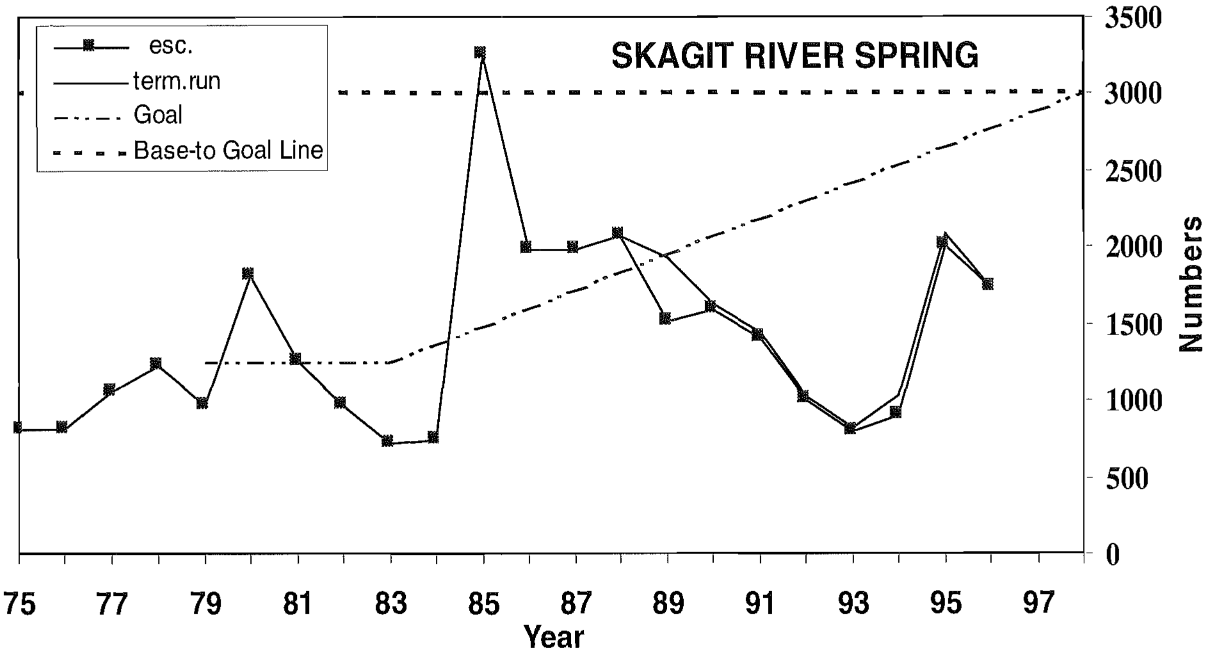


CTC Algorithm and CTC Final Assessment: **Not Rebuilding**

Escapement Methodology: The Harrison River stock is one large spawning population located in the lower Fraser River. Potentially, it is one of the largest naturally spawning chinook populations in the world. In 1984, the Harrison River stock was selected as an escapement indicator stock for assessment of chinook rebuilding. Since 1984, detailed mark recapture studies have been conducted to obtain reliable estimates of spawning escapements. Previous to 1984, escapements to the Harrison had been estimated through a variety of visual counting and estimation methods.

Escapement Goal Basis: Comparison of visual based estimates with mark-recapture estimates of spawning escapements, indicate that quantitative estimates were 5-8 times larger than the visual estimates. Consequently, to determine an interim goal for the Harrison chinook stock, the Canadian policy of doubling a base period escapement was applied to the 1984 escapement determined from the mark-recapture program. The resulting escapement goal was 242,000 chinook. The average adult escapement during 1984-1996 has been approximately 114,000 chinook but the CTC assessment of the stock continues to be that it is not rebuilding. However, the escapement goal for this stock is to be reviewed in 1997/98.

Agency Comments: Harrison River chinook are a white fleshed, fall migrating stock. They are unusual in that fry migrate into the lower Fraser River and estuary shortly after emergence. This stock spends 2-4 years in the coastal marine environment before returning to spawn.

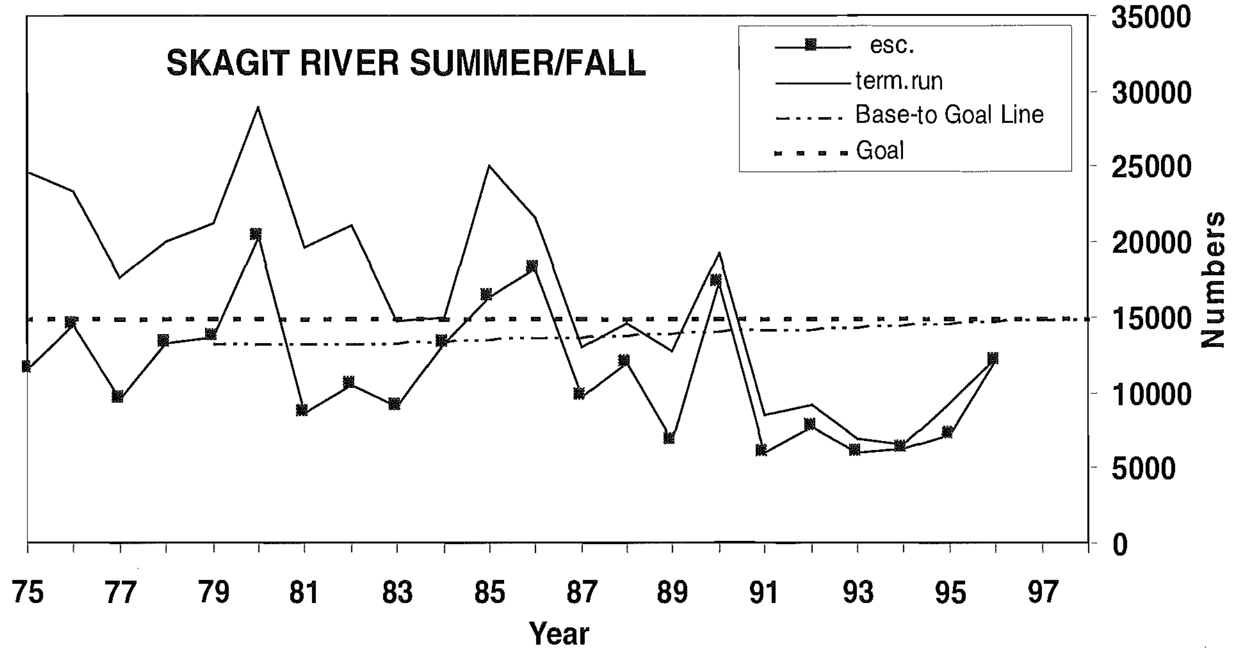


CTC Algorithm and CTC Final Assessment: **Not Rebuilding**

Escapement Methodology: The Skagit River, located in northern Puget Sound near the city of Mount Vernon, Washington, is the largest drainage in Puget Sound. It supports three stocks of spring chinook, which utilize the upper Sauk River, Suiattle River, and upper Cascade River. The Skagit River spring chinook total escapements are estimated annually from redd counts made during aerial and raft surveys. The counts are expanded by the area-under-the-curve method (Smith and Castle 1994). This method assumes a 21-day redd life and 2.5 adult spawners for each estimated redd. Redds counted by air are reduced by 5% to account for "false" redds counted during the surveys. Escapements in stream areas that are not included in redd counts are estimated by using peak-live and dead-fish counts from foot surveys.

Escapement Goal Basis: The Skagit River Spring chinook salmon escapement goal is 3,000 adults per year. This is the average of the estimated escapements from 1959-1968 (PFMC 1997a). The escapement goal has not been changed since it was developed.

Agency Comments: There is no directed fishery targeting this stock; most of the catch of this stock occurs in Georgia Strait and Puget Sound net and sport fisheries on an incidental basis. There is no supplementation program for Skagit River spring chinook.

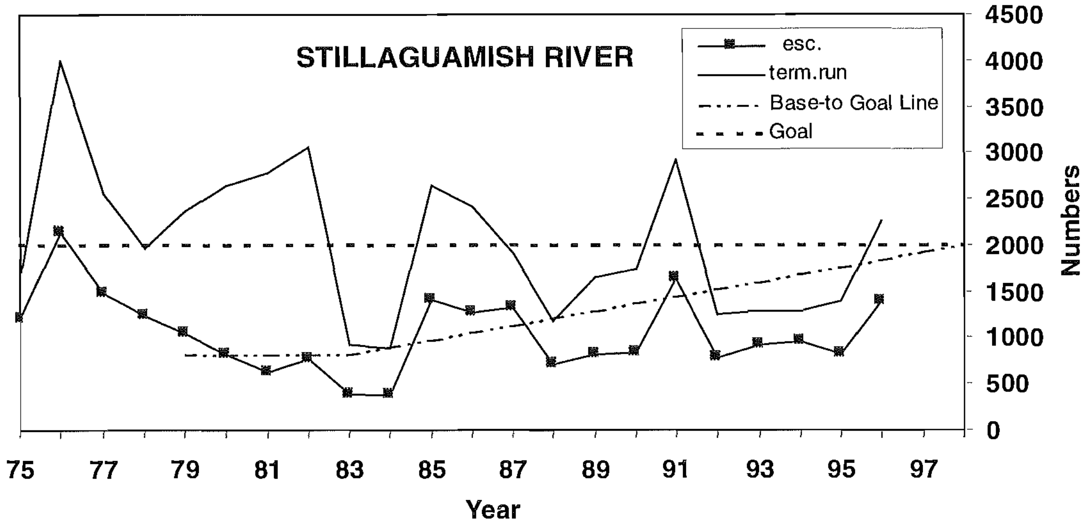


CTC Algorithm and CTC Final Assessment: **Not Rebuilding**

Escapement Methodology: The Skagit River, located in northern Puget Sound near the city of Mount Vernon, Washington, is the largest drainage in Puget Sound. It supports two stocks of summer chinook and one stock of fall chinook, which utilize the Skagit River mainstem, its associated tributaries, and lower Sauk River. The Skagit River summer/fall chinook total escapements are estimated annually from redd counts made during aerial surveys. The counts are expanded by the area-under-the-curve method (Smith and Castle 1994). This method assumes a 21-day redd life and 2.5 adult spawners for each estimated redd. The estimate is then reduced by 5% to account for "false" redds counted during aerial surveys. Escapements in stream areas that are not included in aerial counts are estimated using cumulative redd counts.

Escapement Goal Basis: In 1977, WDFW set the Skagit River summer/fall chinook salmon escapement goal as 14,900, which is the average of the 1965-1976 average escapement (Ames and Phinney 1977). This escapement goal has not changed since it was set.

Agency Comments: There is no terminal fishery targeting this wild stock; harvest is incidental to fisheries targeting pink, coho, and other stocks of chinook salmon. A CWT indicator program was founded in 1994 with naturally spawning Skagit River summer chinook. The progeny are released into the mainstem Skagit near the broodstock collecting area.

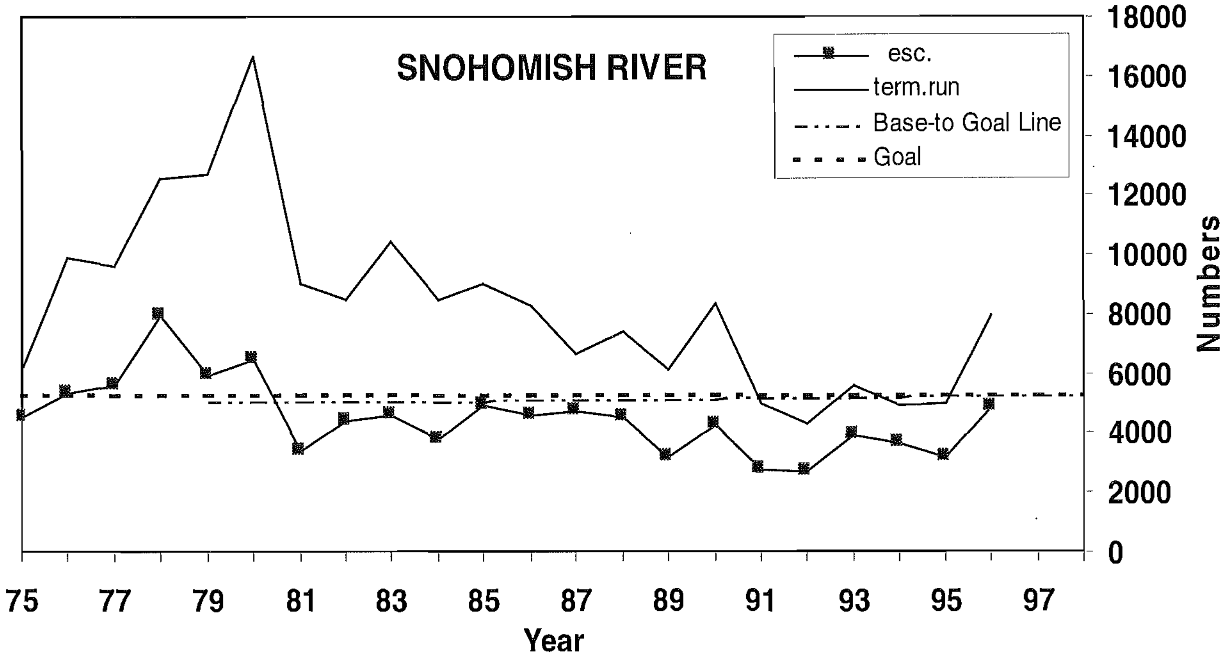


CTC Algorithm and CTC Final Assessment: **Not Rebuilding**

Escapement Methodology: The Stillaguamish River is located in northern Puget Sound with its mouth near Stanwood, Washington. A stock of summer chinook utilizes the North Fork, while a stock of fall chinook spawn in the South Fork, the mainstem, and several tributaries. Total escapements are estimated annually from redd counts made during aerial surveys. The counts are expanded by the area-under-the-curve method (Smith and Castle 1994). This method assumes a 21-day redd life and 2.5 adult spawners for each estimated redd. The estimate is then reduced by 5% to account for "false" redds counted during aerial surveys. Escapements in the tributaries are estimated by using cumulative redd counts from foot or boat surveys. Since 1992, the Stillaguamish tribe has estimated chinook escapement in the North Fork of the Stillaguamish River, between river miles 14.0 and 30.0, using a mark-and-recapture procedure (Conrad 1997). The estimates from this procedure include variance estimates and have been lower, to varying degrees, than estimates from WDFW's area-under-the-curve procedure. WDFW is proposing a project to obtain variance estimates from redd counts and to examine the differences in the redd-count and mark-recapture estimates.

Escapement Goal Basis: In 1977, WDFW set the Stillaguamish River summer/fall chinook salmon escapement goal at 2,000 fish, which was the average of the 1973-1976 escapements (Ames and Phinney 1977). The escapement goal has not changed since it was set.

Agency Comments: There are small ceremonial and subsistence fisheries on this stock, with an average harvest rate for the years 1992-1996 of 1-2%. Management actions taken in the terminal area to protect the Stillaguamish stock have been in effect since 1985, but run reconstruction estimates of terminal run size do not reflect these management changes. As such, reported Stillaguamish terminal run sizes (and thus terminal catches) for 1985-1996 are likely overestimated (TCCHINOOK (96)-1). A natural stock supplementation project exists on the Stillaguamish River. Each year, broodstock are collected in the river, spawned, and the resulting progeny reared and tagged at the Stillaguamish Hatchery. Broodstock removed for the project are included in the estimate of natural escapement (USTCCHINOOK (97)-1).

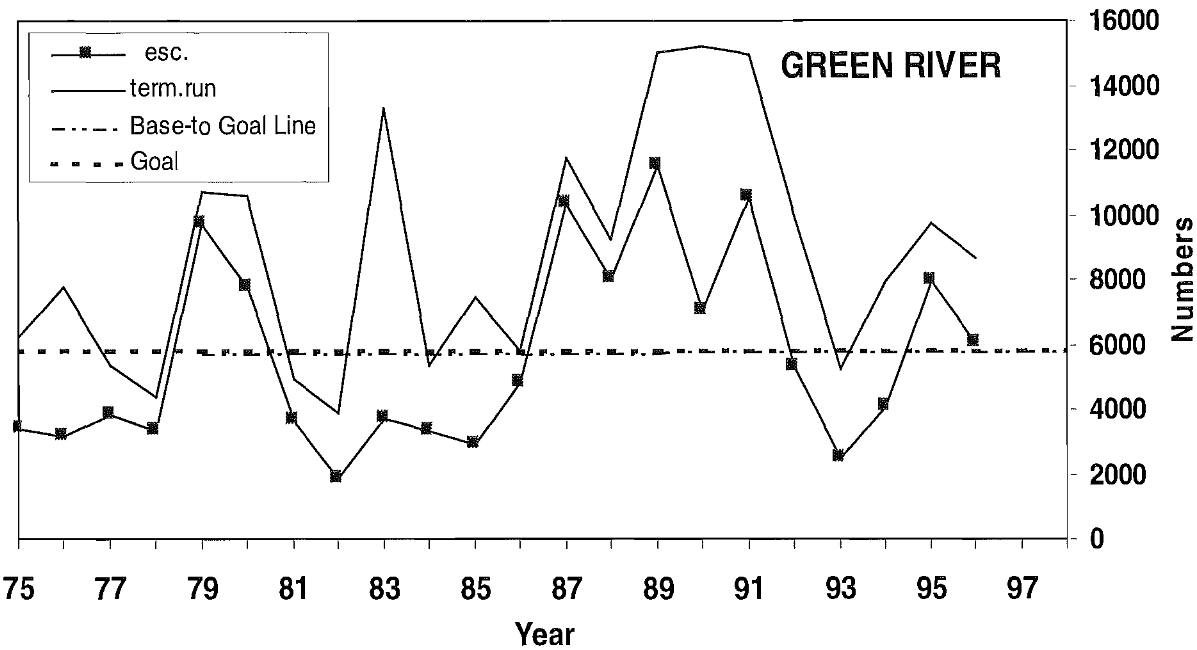


CTC Algorithm and CTC Final Assessment: **Declined Below Goal**

Escapement Methodology: The Snohomish River is located in northern Puget Sound, near Everett, Washington. It supports at least three stocks of summer and fall chinook, which utilize the mainstem, the two main forks (Skykomish and Snoqualmie Rivers), and associated tributaries. In most areas of the Snohomish River, summer/fall chinook total escapements are estimated annually from redd counts made during aerial surveys. The counts are expanded by the area-under-the-curve method (Smith and Castle 1994). This method assumes a 21-day redd life and 2.5 adult spawners for each estimated redd. The estimate is then reduced by 5% to account for "false" redds counted during the surveys. Cumulative carcass counts, live counts, cumulative redd counts, or peak redd ratio comparisons are used to estimate escapements in stream areas that are not included in aerial counts, i.e. tributaries (USTCCHINOOK (97)-1).

Escapement Goal Basis: In 1977, WDFW set the Snohomish River summer/fall chinook salmon escapement goal at 5,250 fish, which was the average of the 1965-1976 escapements (Ames and Phinney 1977). The escapement goal has not changed since it was set.

Agency Comments: Some harvest occurs in the terminal area (Area 8) incidental to net/sport fisheries targeting Tulalip chinook salmon. Management actions taken in the terminal area to protect the Stillaguamish stock have been in effect since 1985, but run reconstruction estimates of terminal run size do not reflect these management changes. As such, reported Snohomish terminal run sizes (and thus terminal catches) for 1985-1996 may be biased.

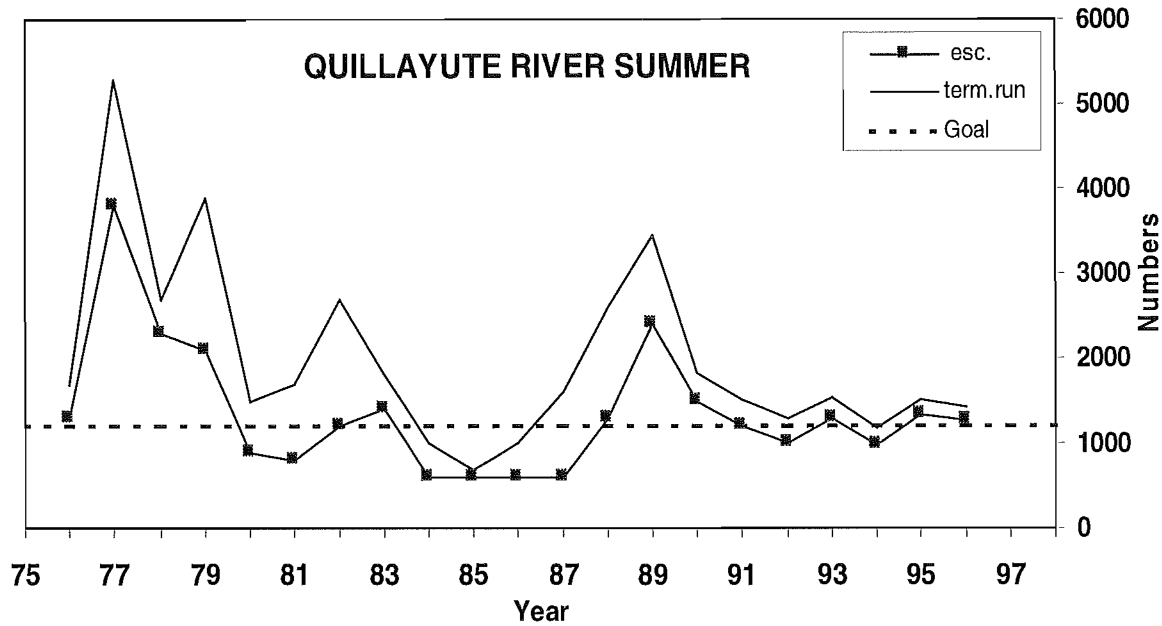


CTC Algorithm: **Declined below Goal**; CTC Final Assessment: **Stable at Goal**

Escapement Methodology: The Green River empties into central Puget Sound in Seattle, Washington. The basin has few tributaries available to anadromous fish, with significant natural chinook use occurring only in Newaukem Creek. Total escapement to the Green River system was estimated in sections from a combination of aerial and float counts in index and supplemental areas in the mainstem, combined with foot surveys in Newaukem Creek to estimate cumulative redds. Natural spawning of hatchery origin chinook in Soos Creek is estimated by carcass counts. Estimation using cumulative redd counts assumes a 21-day redd life and 2.5 adult spawners for each estimated redd (Ames and Phinney 1977). Another expansion factor is used to account for unsurveyed spawning areas in the mainstem.

Escapement Goal Basis: In 1977, WDFW set the escapement goal at 5,800, which is the average of the 1965-1976 escapements (Ames and Phinney 1977). The escapement goal has not changed since it was set.

Agency Comments: Substantial variation in numbers of hatchery chinook released each year into the Green River may cause substantial increases or decreases in terminal run and escapement. Tagging studies were conducted in 1975 and 1976 to estimate numbers of returning adults; results were in close agreement with estimates made from aerial surveys. No attempt is made to adjust the estimate of natural escapement for the presence of hatchery origin fish.

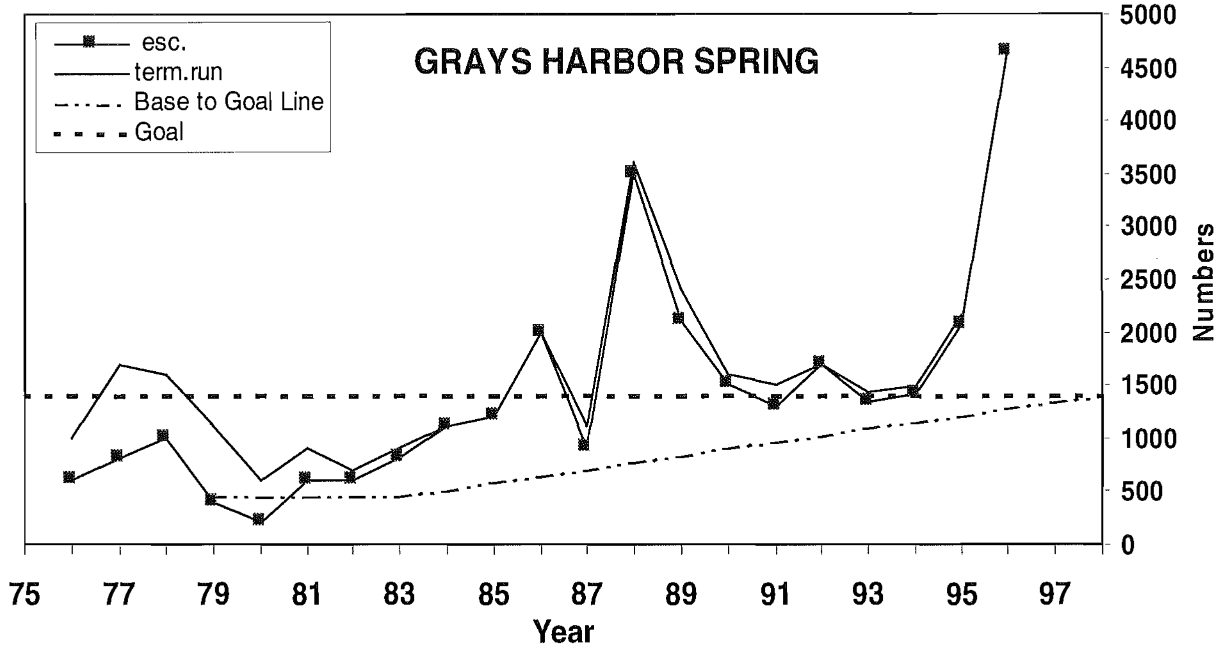


CTC Algorithm and CTC Final Assessment: **Stable at Goal**

Escapement Methodology: The Quillayute River is located on the northwestern Washington coast. It is a short stretch of river formed when the Bogachiel and Sol Duc rivers meet near the town of La Push before emptying directly into the Pacific Ocean. The river supports a stock of naturally spawning summer chinook whose total natural escapement estimates include hatchery strays and fish captured for a hatchery broodstock program. Since the early 1980s, total annual escapement has been estimated by redd count surveys conducted by foot, boat, and helicopter. Weekly surveys are made in index areas and adjusted by standardized factors to account for spawning timing, season total redds, redd life, and number of fish per redd. One-time surveys are conducted in areas outside index areas during peak spawning times and expanded by data from index areas. Redd counts in non-surveyed streams are approximated by assigning a redd per mile value from an index area (Mike Gross, WDFW, personal communication).

Escapement Goal Basis: The summer chinook stock is managed for a fixed escapement goal of 1,200 (Mike Gross, WDFW, personal communication). The 1979-1982 base period average was 1,250. The recent 5-year average was 1,155.

Agency Comments: An unusually strong return from the 1984 brood year of all coastal stocks is evident in the trend line of run sizes and escapements for returns in 1988-1990. Total natural escapement estimates include hatchery strays and fish taken for hatchery broodstock programs. The naturally spawning summer chinook stock has been supplemented by a broodstock program since 1987. A summer chinook hatchery program using native stock operated from the mid-1970s to the mid-1980s. Spring chinook of non-native origin were introduced in a hatchery program in the early 1970s. CWT analyses have demonstrated significant straying of these spring chinook into the summer chinook spawning population. Estimates for 1991-1995 averaged 47% hatchery origin strays in the naturally spawning population. In 1996, fry plants were eliminated and the smolt plants were reduced (Mike Gross, WDFW, personal communication).

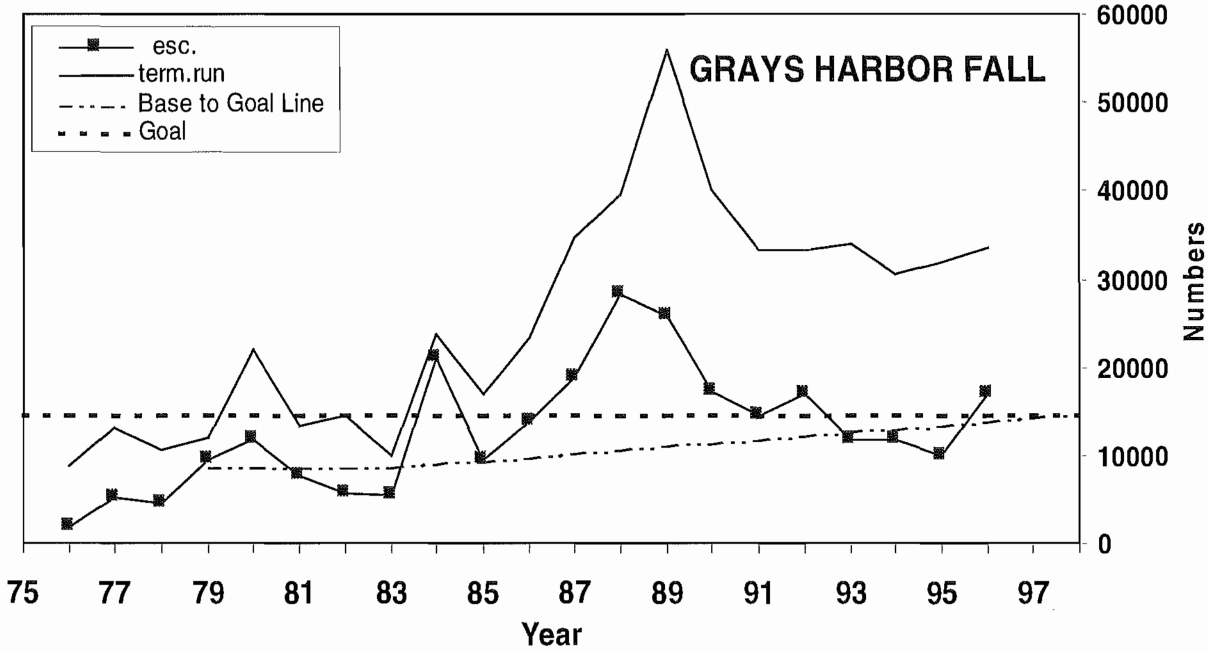


CTC Algorithm and CTC Final Assessment: **Above Goal**

Escapement Methodology: Within Grays Harbor, located on the Washington Coast, the two major tributary systems, the Humptulips River and the Chehalis River, are managed separately (PFMC 1997b). The Chehalis River supports a stock of natural-origin spring chinook. Since the early 1980s, annual escapement has been estimated by redd count surveys conducted by foot, boat, and helicopter. Weekly surveys are made in index areas and adjusted by standardized factors to account for spawning timing, season total redds, redd life, and number of fish per redd. One-time surveys are conducted in areas outside index areas during peak spawning times and expanded by data from index areas. Redd counts in non-surveyed streams are approximated by assigning a redd per-mile value from an index area.

Escapement Goal Basis: The Grays Harbor spring chinook stock is managed for a fixed natural spawning escapement goal of 1,400 fish (PFMC 1997b).

Agency Comments: There are some tribal net fisheries on fish that are surplus to the escapement goal, and a very small recreational fishery on the Chehalis River, which is typically less than 25 spring chinook (PFMC 1997b). Broodstock programs in Grays Harbor produce hatchery chinook, which return and spawn naturally because there are no adult collection facilities. These hatchery-origin chinook that spawn naturally are included in the natural escapement estimate because little or no tagging occurs to allow differentiation between the two. Terminal run data for 1996 are not yet available for this stock.

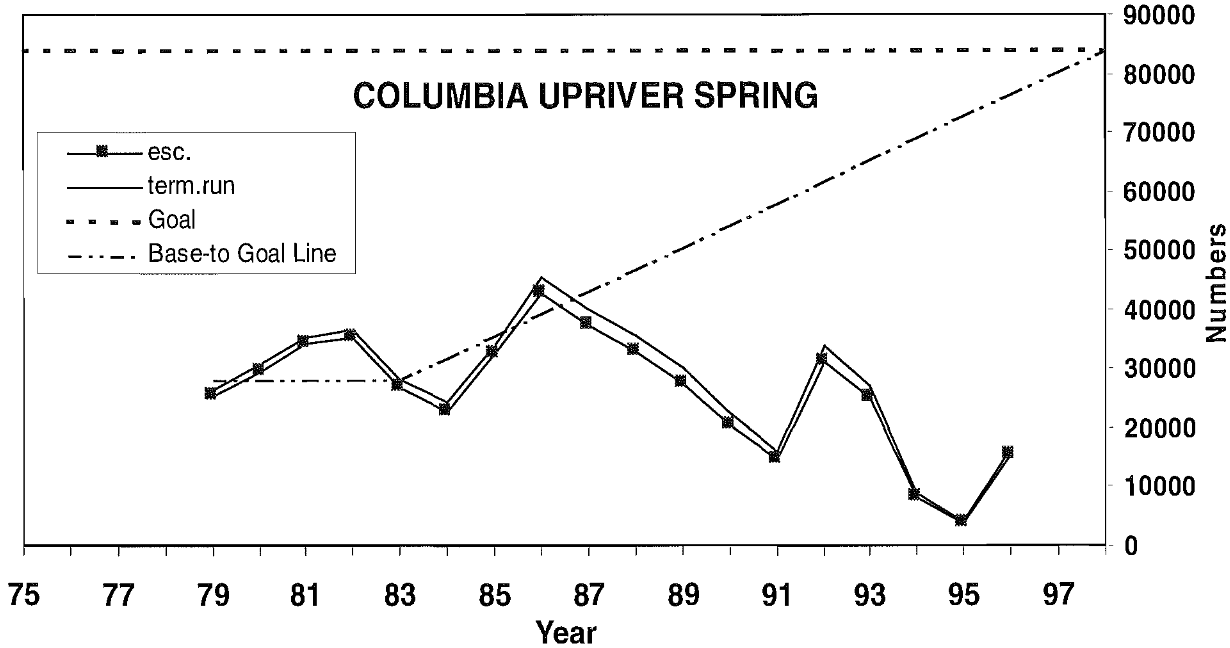


CTC Algorithm: **Indeterminate**; CTC Final Assessment: **Rebuilding**

Escapement Methodology: Within Grays Harbor, located on the Washington Coast, the two major tributary systems, the Humptulips River and the Chehalis River, are managed separately (PFMC 1997b). Both the Humptulips and Chehalis Rivers support a stock of fall chinook. Since the early 1980s, total annual escapement has been estimated by redd count surveys conducted by foot, boat, and helicopter. Weekly surveys are made in index areas and adjusted by standardized factors to account for spawning timing, season total redds, redd life, and number of fish per redd. One-time surveys are conducted in areas outside index areas during peak spawning times and expanded by data from index areas. Redd counts in non-surveyed streams are approximated by assigning a redd per-mile value from an index area.

Escapement Goal Basis: The Grays Harbor Fall chinook stock is managed for a fixed natural spawning escapement goal of 14,600 fish (PFMC 1997b).

Agency Comments: Some recreational and commercial directed harvest occurs on fish that are surplus to the escapement goal (PFMC 1997b). Broodstock programs in Grays Harbor produce hatchery chinook, which return and spawn naturally because there are no adult collection facilities. These hatchery-origin chinook that spawn naturally are included in the natural escapement estimate because little or no tagging occurs to allow differentiation.

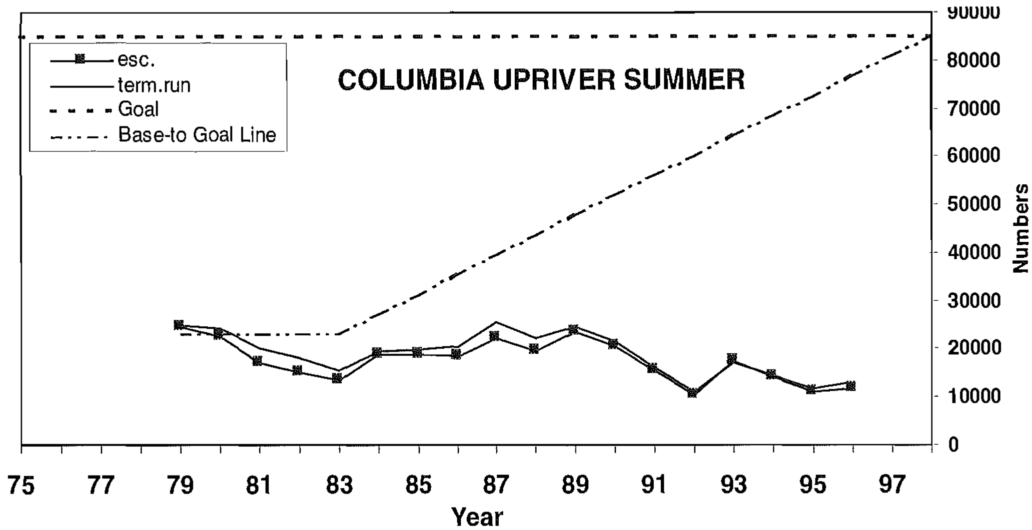


CTC Algorithm and CTC Final Assessment: **Not Rebuilding**

Escapement Methodology: Historically, the Snake River produced the majority of this stock. The Snake River spring/summer naturally spawning component of this stock was listed under the U.S. Endangered Species Act in 1992. The majority of current upriver spring chinook production above McNary Dam is now from the Columbia River, and is mostly of hatchery origin. Spring chinook escapements past Bonneville Dam are estimated from dam counts through May 31st minus harvest above Bonneville Dam, multiplied by the fraction of wild stock estimated from run reconstruction (TAC 1997).

Escapement Goal Basis: The CTC has used the goal of 84,000 natural spawners passing Bonneville Dam. This is 70% of the 120,000 fish specified in the original five-year plan under U.S. v Oregon. The interim management goal in the Columbia River Fish Management Plan (CRFMP) for Columbia River Springs is 115,000 hatchery and wild adult chinook counted at Bonneville Dam and 25,000 naturally produced plus 10,000 hatchery produced adults counted at Lower Granite Dam.

Agency Comments: There were record low returns of Columbia Upriver Springs in 1994 and 1995, but improvement in 1996. Terminal harvests have been severely constrained since 1977, with incidental harvest in lower river fisheries averaging 2.4% and total harvest in treaty Indian fisheries averaging 5.9% (TAC 1997). Washington coastal harvests have ranged from 0 to 1.3% of the terminal run size from 1986-1995 (TAC 1997). There may be some additional mortality in non-landed catches, but harvest impacts are minimal, especially if juvenile passage losses are considered (Muir et al. 1995).

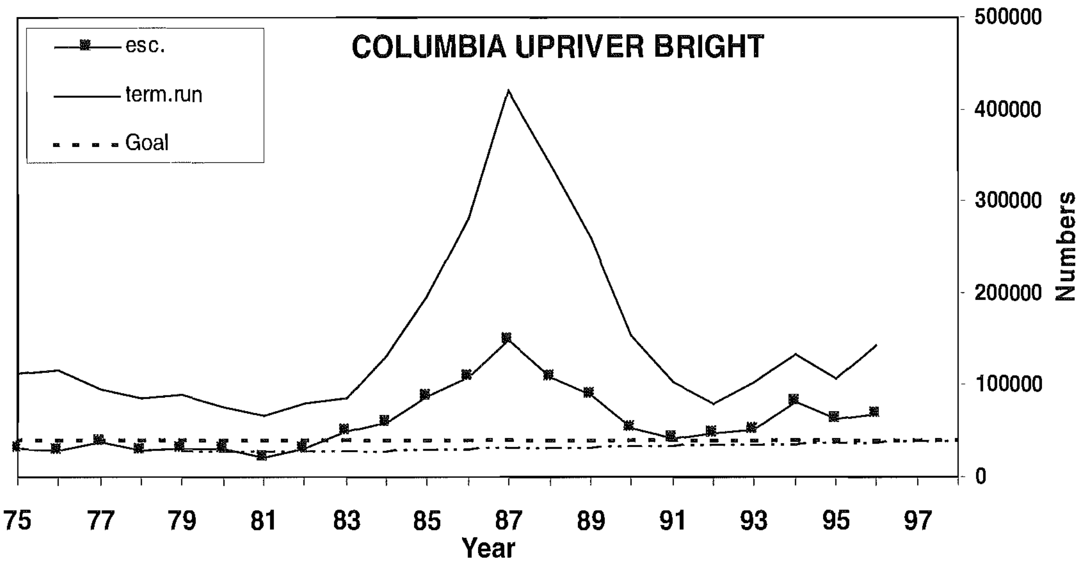


CTC Algorithm and CTC Final Assessment: **Not Rebuilding**

Escapement Methodology: In the past, the CTC assessed total summer chinook escapements past Bonneville Dam from dam counts between June 1 to July 31, minus harvest above Bonneville Dam. This year, the proportion of wild stock estimated by run reconstruction (TAC 1997) was used to obtain estimates of naturally spawned escapement. Although more consistent with the CTC's goal of tracking escapement of the naturally spawned stock, this makes the data series somewhat inconsistent with the basis of the escapement goal used for assessment.

Escapement Goal Basis: The CTC has used the rebuilding assessment goal of 85,000, which is the mid-point of the CRFMP management goal of 80,000-90,000 adult summer chinook. The CRFMP does not specify a summer chinook escapement goal, but for many years the management goal has been 80,000-90,000 total adult summer Bonneville Dam chinook (including Snake River and hatchery production). Below this goal, incidental impacts in treaty and Non-Indian fisheries are each constrained to 5% of the run. The basis of the 85,000 used by the CTC is under review under the terms of the U.S. Letter of Agreement.

Agency Comments: Columbia River Summer production is primarily from natural spawning in the Wenatchee, Methow, and Okanogan Rivers. Most migrate to sea as subyearlings and exhibit a far north migration distribution similar to Columbia Upriver Bright chinook, but some migrate in late fall or as yearlings the following spring. Productivity is limited primarily by loss of downstream migrants during passage through mainstem dams and habitat degradation related to timber harvests, lack of screens on water diversions, high water temperatures, low flows, and sediment-laden irrigation water returns (CBFWA 1990). Bosch and Parker (1995) calculated a historical rate of decline of 600 fish per year. Major improvements in survival and productivity are required to rebuild this stock. The majority of harvest impacts on this stock occur in ocean fisheries. There is little or no opportunity to rebuild this stock through further terminal fishery constraints. Escapements have exceeded 92% of the terminal run since 1974. Inriver commercial fisheries for summer chinook have been closed since the mid-1960s. Incidental harvest in non-Indian fisheries has been under 1.2% of the run since 1974. Treaty Indian ceremonial and subsistence harvest rates averaged 3% for 1986-1990 and 1.4% for 1991-1995 (TAC 1997).

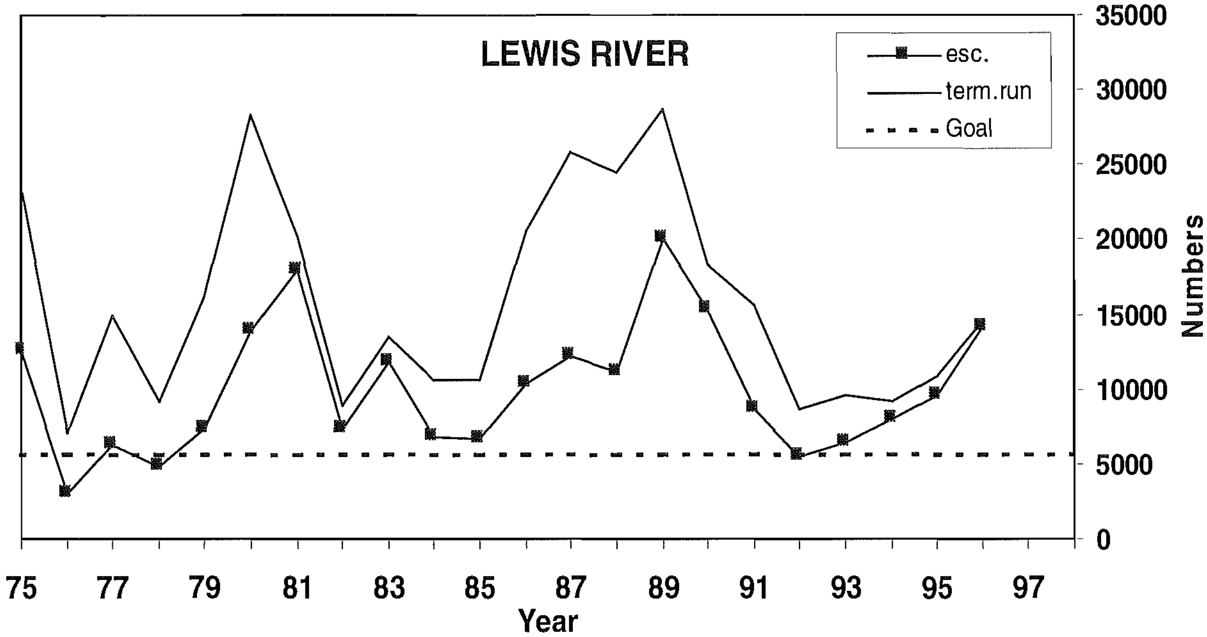


CTC Algorithm and CTC Final Assessment: **Above Goal**

Escapement Methodology: Columbia Upriver Brights are composed mainly of natural production from the Hanford Reach. Returns of adult Upriver Bright chinook to Priest Rapids, Ringold and Lyons Ferry hatcheries have ranged from 8-18% of the McNary Dam count from 1986 to 1995, averaging 13%. Hatchery production is currently included in the escapements graphed above and tabled in Appendix A, although the escapement goal of 40,000 is for natural spawners. Escapement past McNary Dam is estimated from dam counts and run reconstruction (TAC 1997). Fall chinook at McNary Dam are defined as those counted after August 9th.

Escapement Goal Basis: The CRFMP interim escapement goal for Columbia Upriver Brights is 40,000 natural spawning adults above McNary Dam. The CTC uses this goal for rebuilding escapement assessment. In 1990, a CRFMP escapement goal of 45,000 was established to provide for increased broodstock, including hatchery and wild fish. In 1994, a CRFMP management goal of 46,000 was used to provide for a Hanford Reach sport fishery. In 1995, the management goal of 46,000 was retained, but hatchery broodstock needs were re-evaluated and the CRFMP spawning escapement goal was reduced to 43,500 hatchery and natural spawners over McNary Dam.

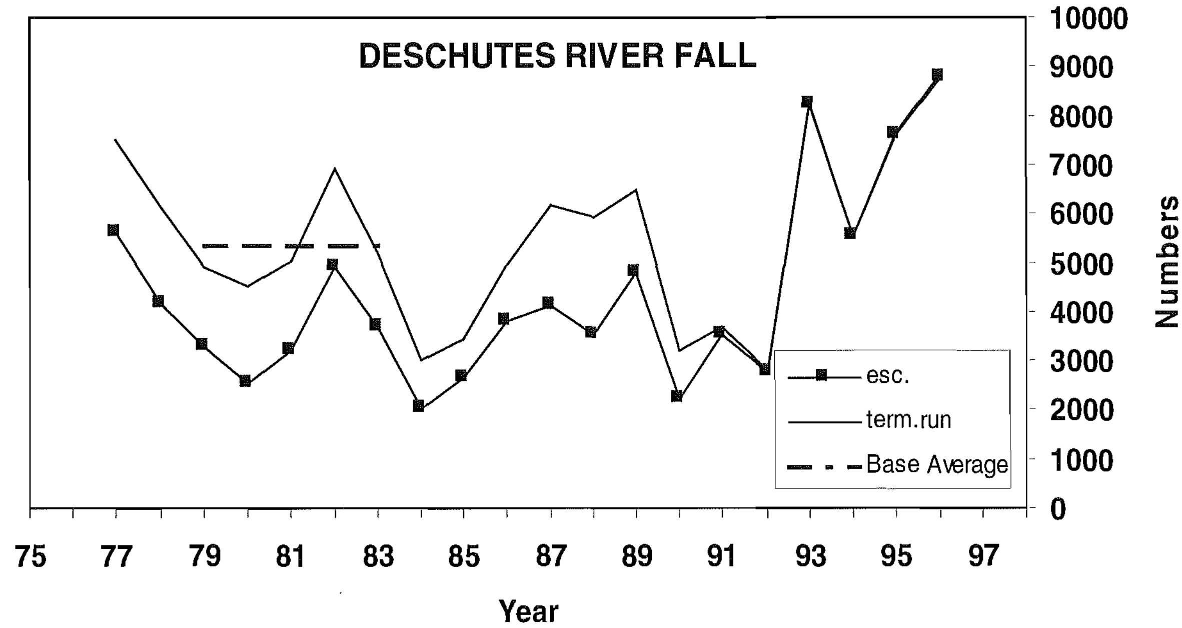
Agency Comments: Comparisons of McNary Dam escapements to the goal of 40,000 naturally produced spawners should be improved by estimating the naturally produced component of Columbia Upriver Bright escapement over McNary Dam. Improved estimation of age composition of spawners is also needed.



CTC Algorithm and CTC Final Assessment: **Stable at Goal**

Escapement Methodology: Natural fall chinook production below Bonneville Dam occurs mainly in the North Fork Lewis River. The Lewis River Wild stock is the main component of the Lower River wild management unit for fall chinook, which also includes small amounts of wild production from the Cowlitz and Sandy River basins. In the past, total escapements for the Lower River wild management unit were assessed, although the escapement goal is for Lewis River production. This year the time series of escapements for just the Lewis River was assessed to improve comparison with the Lewis River goal. Escapement estimates for natural spawners produced from the North Fork Lewis River (with strays removed) were obtained from the WDFW database (Bob Woodard, personal communication).

Escapement Goal Basis: The escapement goal of 5,700 fall chinook in the Lewis River was developed by McIsaac (1990), based on spawner-recruit analysis of the 1964-1982 broods and coded-wire tag recoveries from the 1977-1979 broods.

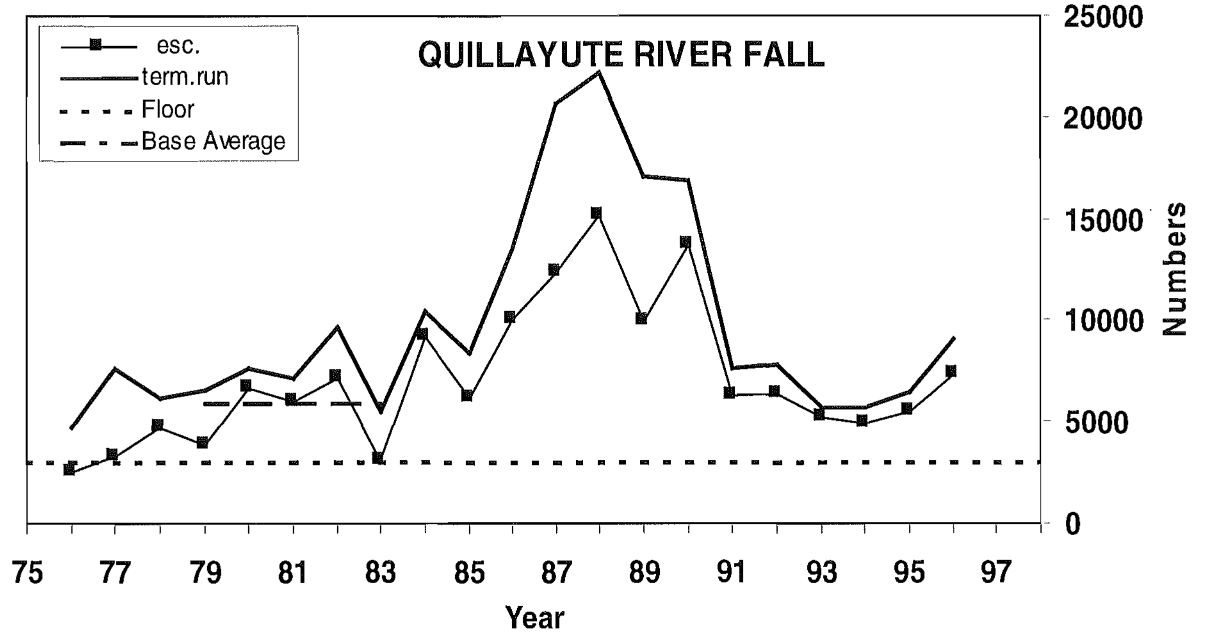


CTC Evaluation: **Increased since Base**

Escapement Methodology: Fall chinook are found throughout the mainstem Deschutes below the Pelton Reregulating Dam, 161 km upriver. Fish are captured and marked at a trap at the fish ladder of Sherars Falls. Mark-recapture is used to estimate the spawning population above Sherars Falls, and the ratio of aerial redd counts above and below the falls is used to expand to the entire river. The proportion of the population spawning above Sherars Falls has been highly variable. The variability associated with the escapement estimate increases when few fish are available for marking at the trap.

Escapement Goal Basis: There is currently no escapement goal, but there is a management goal of 4,500 adult chinook.

Agency Comments: ODFW's Lower Deschutes River Sub-Basin Fish Management Plan proposes a Deschutes escapement goal of 3,000, which includes an escapement goal for 2,000 fish above Sherars Falls. The plan proposes managing for a terminal run that would allow a harvest of 2,000-5,000 fish in excess of escapement. This proposed plan is being reviewed by the Warm Springs Tribe who are co-managers of this stock.

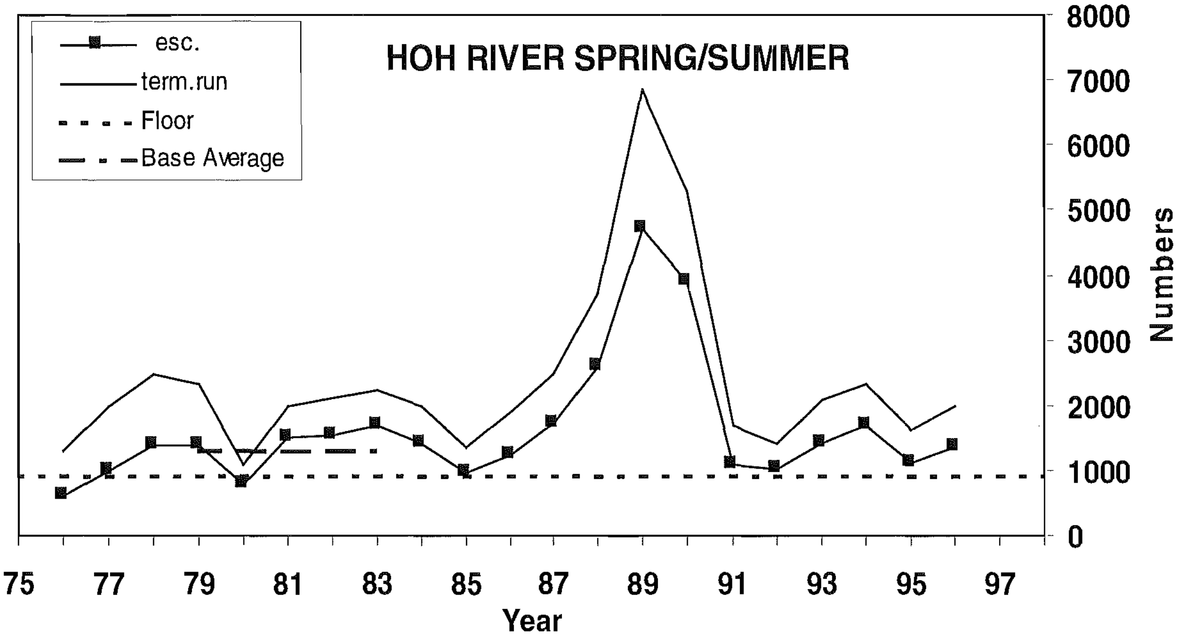


CTC Evaluation: **Indistinguishable from Base**

Escapement Methodology: The Quillayute River is located on the northwestern Washington coast near the town of La Push and empties into the Pacific Ocean. The river supports a stock of naturally spawning fall chinook. Since the early 1980s, annual escapement has been estimated by redd count surveys conducted by foot, boat, and helicopter. Weekly surveys are made in index areas and adjusted by standardized factors to account for spawning timing, season total redds, redd life, and number of fish per redd. One-time surveys are conducted in areas outside index areas during peak spawning times and expanded by data from index areas. Redd counts in non-surveyed streams are approximated by assigning a redd per mile value from an index area (Mike Gross, WDFW, personal communication).

Escapement Floor Basis: This stock is managed for an overall harvest rate of 40%, with an escapement floor of 3,000 fish (Mike Gross, WDFW, personal communication).

Agency Comments: An unusually strong return from the 1984 brood year of all coastal stocks is evident in the trend line of run sizes and escapements for returns in 1987-1990 (Mike Gross, WDFW, personal communication). No current hatchery production of fall chinook occurs in the Quillayute River basin; the program was discontinued in the late 1980s.

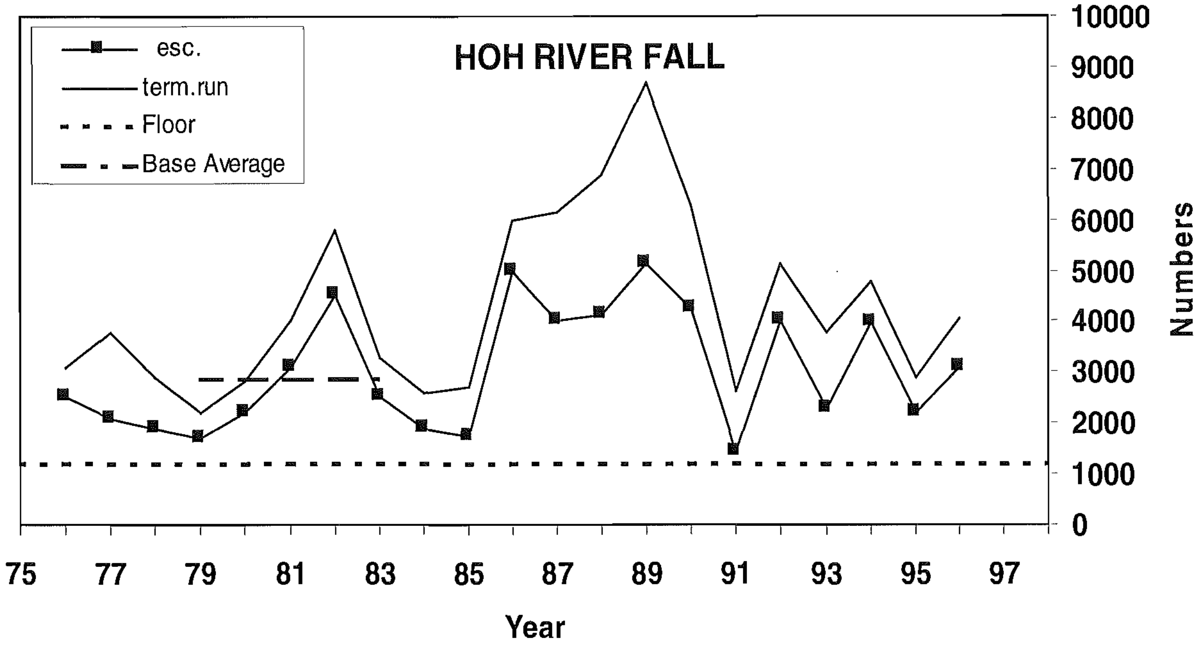


CTC Evaluation: **Indistinguishable from Base**

Escapement Methodology: The Hoh River is located on the northwestern coast of Washington north of the town of Kalaloch, and flows directly into the Pacific Ocean. The river supports a naturally-spawning stock of spring/summer chinook, and is not enhanced by hatchery supplementation, though the tribal catch from the lower river includes a significant number of "dip-in" hatchery fish from other coastal rivers. Since the early 1980s, annual escapement has been estimated by redd count surveys conducted by foot, boat, and helicopter. Weekly surveys are made in index areas and adjusted by standardized factors to account for spawning timing, season total redds, redd life, and number of fish per redd. One-time surveys are conducted in areas outside index areas during peak spawning times and expanded by data from index areas. Redd counts in non-surveyed streams are approximated by assigning a redd per mile value from an index area (Mike Gross, WDFW, personal communication).

Escapement Floor Basis: Harvest has targeted an overall rate of 31%, with an escapement floor of 900 fish (Mike Gross, WDFW, personal communication).

Agency Comments: An unusually strong return from the 1984 brood year of all coastal stocks is evident in the trend line of run sizes and escapements for returns in 1987-1990 (Mike Gross, WDFW, personal communication).

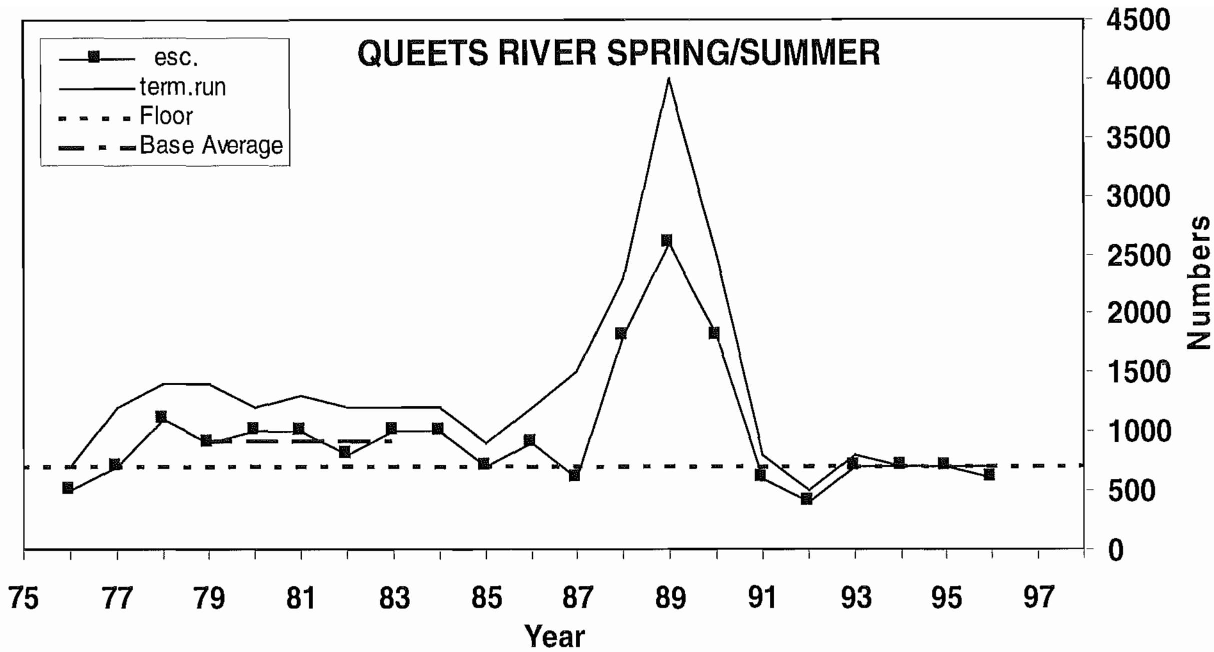


CTC Evaluation: **Increased from Base**

Escapement Methodology: The Hoh River is located on the northwestern coast of Washington north of the town of Kalaloch, and flows directly into the Pacific Ocean. The river supports a naturally-spawning stock of fall chinook, and is not enhanced by hatchery supplementation. Since the early 1980s, annual escapement has been estimated by redd count surveys conducted by foot, boat, and helicopter. Weekly surveys are made in index areas and adjusted by standardized factors to account for spawning timing, season total redds, redd life, and number of fish per redd. One-time surveys are conducted in areas outside index areas during peak spawning times and expanded by data from index areas. Redd counts in non-surveyed streams are approximated by assigning a redd per mile value from an index area (Mike Gross, WDFW, personal communication).

Escapement Floor Basis: This stock is managed at an overall harvest rate of 40%, with an escapement floor of 1,200 (Mike Gross, WDFW, personal communication). The natural escapement estimates include fish taken for broodstock in some years.

Agency Comments: An unusually strong return from the 1984 brood year of all coastal stocks is evident in the trend line of run sizes and escapements for returns in 1987-1990 (Mike Gross, WDFW, personal communication).

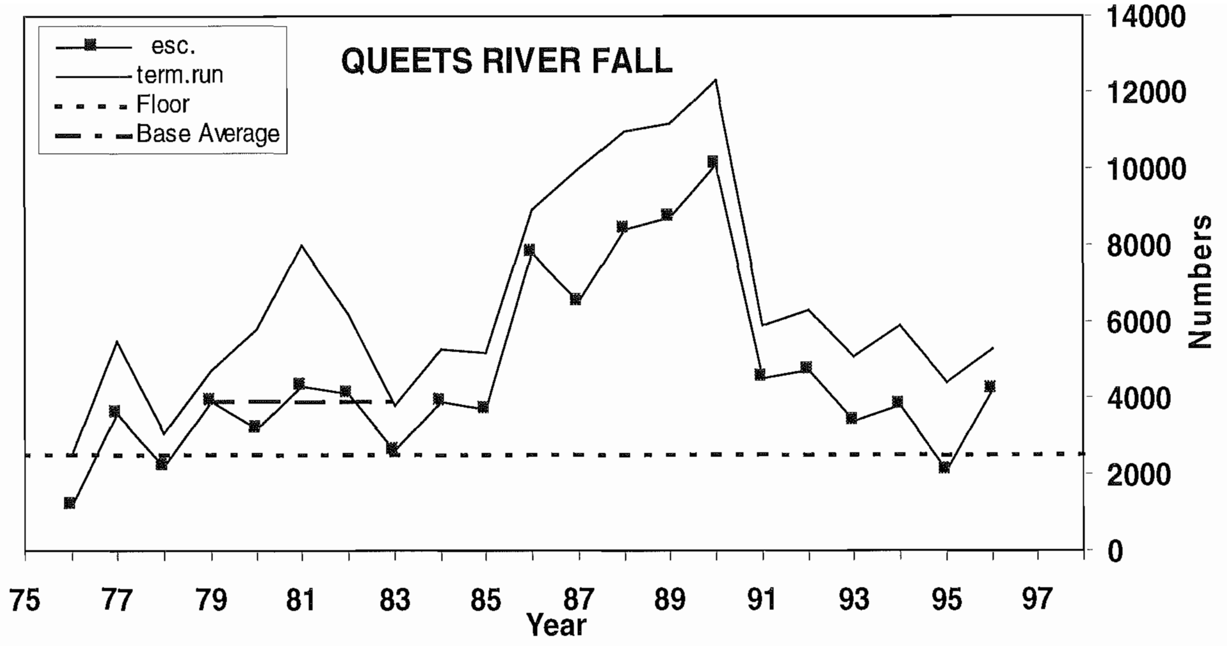


CTC Evaluation: **Decreased from Base**

Escapement Methodology: The Queets River is located on the northwestern coast of Washington near the town of Queets, and meets the Clearwater River before flowing into the Pacific Ocean. The river supports a naturally spawning stock of spring/summer chinook, and is not enhanced by hatchery supplementation. Since the early 1980s, annual escapement has been estimated by redd count surveys conducted by foot, boat, and helicopter. Weekly surveys are made in index areas and adjusted by standardized factors to account for spawning timing, season total redds, redd life, and number of fish per redd. One-time surveys are conducted in areas outside index areas during peak spawning times and expanded by data from index areas. Redd counts in non-surveyed streams are approximated by assigning a redd per mile value from an index area (Mike Gross, WDFW, personal communication).

Escapement Floor Basis: This stock is managed at an overall harvest rate of 30%, with an escapement floor of 700 (Mike Gross, WDFW, personal communication).

Agency Comments: An unusually strong return from the 1984 brood year of all coastal stocks is evident in the trend line of run sizes and escapements for returns in 1988-1990 (Mike Gross, WDFW, personal communication).

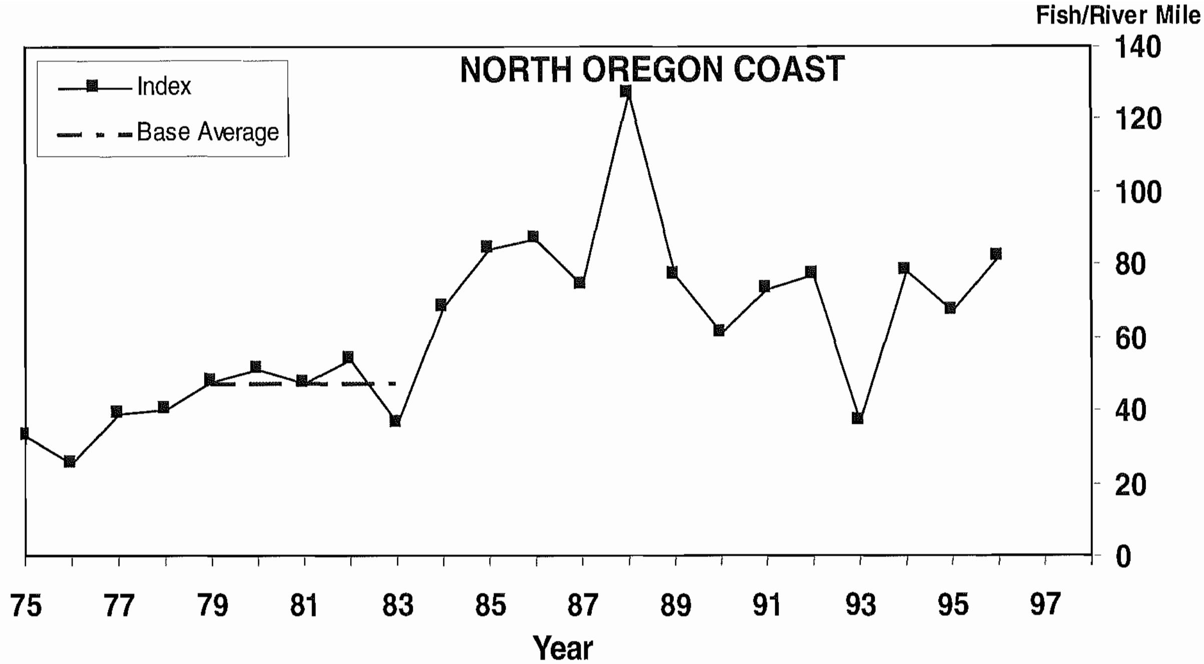


CTC Evaluation: **Indistinguishable from Base**

Escapement Methodology: The Queets River is located on the northwestern coast of Washington near the town of Queets, and meets the Clearwater River before flowing into the Pacific Ocean. The river supports a naturally spawning stock of fall chinook, and is not enhanced by hatchery supplementation. Since the early 1980s, annual escapement has been estimated by redd count surveys conducted by foot, boat, and helicopter. Weekly surveys are made in index areas and adjusted by standardized factors to account for spawning timing, season total redds, redd life, and number of fish per redd. One-time surveys are conducted in areas outside index areas during peak spawning times and expanded by data from index areas. Redd counts in non-surveyed streams are approximated by assigning a redd per mile value from an index area (Mike Gross, WDFW, personal communication).

Escapement Floor Basis: This stock is managed at an overall harvest rate of 40%, with an escapement floor of 2,500 (Mike Gross, WDFW, personal communication).

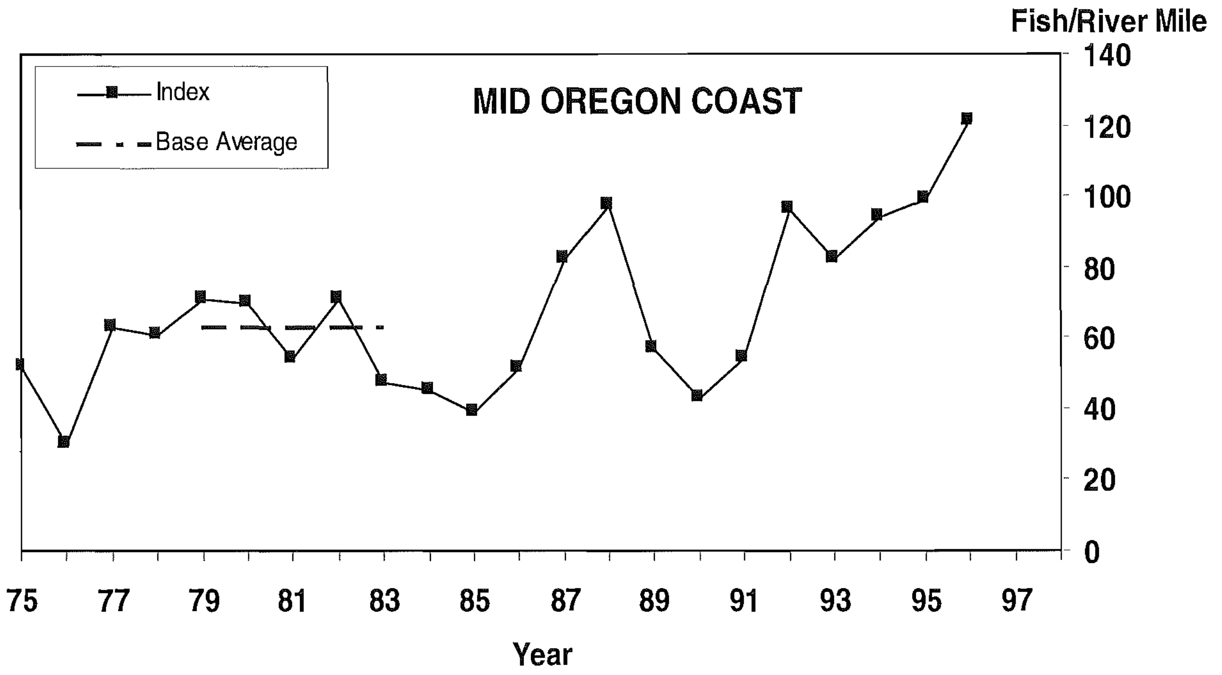
Agency Comments: An unusually strong return from the 1984 brood year of all coastal stocks is evident in the trend line of run sizes and escapements for returns in 1987-1990 (Mike Gross, WDFW, personal communication).



CTC Evaluation: **Increased from Base**

Escapement Methodology: This composite stock represents an aggregate index of spawning fish from seven of ten chinook-producing north Oregon coast rivers, the Nehalem, Tillamook, Nestucca, Siletz, Yaquina, Alsea, and Siuslaw Rivers. Foot or boat surveys are made weekly at several standard survey sites in each of these river basins throughout the survey period. Survey sites are generally 0.5 to 1.5 miles in length and are chosen to be at least 10-miles distant from where hatchery smolts were released. Counts of live and dead chinook are made for each survey section. The measurement unit used is the maximum (peak) count obtained during the season. For each river, all peak counts are added and divided by the sum of the survey miles for that river, to derive a peak spawner density index for the river. The composite stock index is a simple unweighted average of the seven river density indices and is used for this analysis.

Agency Comments: Since the base period this composite stock index has shown consistent improvements in spawner density.



CTC Evaluation: **Increased from Base**

Escapement Methodology: This composite stock represents an aggregate index of spawning fish from four of five chinook-producing central Oregon coast rivers, the Coos, Coquille, and Sixes Rivers and Floras Creek. Foot or boat surveys are made weekly at several standard survey sites in each of these river basins throughout the survey period. Survey sites are generally 0.5 to 1.5 miles in length and are chosen to be at least 10-miles distant from where hatchery smolts were released. Counts of live and dead chinook are made for each survey section. The measurement unit used is the maximum (peak) count obtained during the season. For each river, all peak counts are added and divided by the sum of the survey miles for that river, to derive a peak spawner density index for the river. The composite stock index is a simple unweighted average of the four river density indices and is used for this analysis.

Agency Comments: During the last five years the index has exceeded the base period average.

2.4.2. Stocks Excluded from Rebuilding Assessment

A total of 44 escapement indicator stocks were evaluated in 1994 and were initially considered for this report. After reviewing escapement data for Area 6 and Smith Inlet, CDFO recommended excluding these stocks from the assessment because of inconsistent or poor quality data (Section 2.4.1.2). The CTC agreed to exclude these stocks, thus reducing the total number of escapement indicator stocks evaluated to 42 (8 without escapement goals).

2.4.3. Stocks Without Escapement Goals

Recent escapements and results from the evaluation of escapement changes for stocks without escapement goals are shown in Table 2-4. Escapement has increased for 4 of the 8 stocks (50%) without escapement goals. No change from the base period can be detected for 3 (38%) of the 8 stocks. These 3 stocks are all Washington coastal stocks, and all three have remained above the escapement floor (Table 2-4). One of the 8 stocks (12%) without escapement goals, the Queets spring/summer chinook, has decreased relative to the base period. This stock is also a Washington coastal stock, and the recent escapement average is currently below its escapement floor.

2.4.3.1. Stocks With Escapement Goals

Escapement data are summarized for stocks with escapement goals in Tables 2-5 and 2-6. These data were used to assess rebuilding status and changes relative to the base period using the assessment algorithm (Table 2-7). The CTC then considered information from the management agencies (Section 2.4.1) and made a final assessment (Table 2-8). Of the 34 stocks assessed, 10 (29%) were evaluated Above Goal or Stable at Goal, 6 (18%) were evaluated as Rebuilding, 4 (12%) were evaluated as Indeterminate, and 14 (41%) were either Not Rebuilding or had Declined Below Goal.(Table 2-8). For the 18 stocks in the Indeterminate or Not Rebuilding categories, 8 showed a increase relative to the base period, 6 showed a decrease, and the recent average escapements of 3 stocks were indistinguishable in magnitude to the base period average. Because of recent changes in escapement methodology, on of the 18 stocks (WCVI) could not be tested for differences in the recent average escapements relative to the base period escapements.

Table 2-4. Summary of recent escapement data and analysis for changes relative to the base period for the 8 natural chinook indicator stocks without escapement goals. SE = standard error of the mean for 1975-1996 escapements.

Stock Name	Region	Run Type	Esc. Floor[1]	1996 Esc.	Base Period Avg. Esc.	1992-96 Avg.	1992-96 Avg. % Base	SE 1975-96 Esc.
Increased Relative To Base								
Hoh Fall	WAC	Fall	1,200	3,070	2,875	3,104	108%	215
Deschutes Fall	CR	Fall	NA	8,763	3,477	6,585	189%	415
Mid-Oregon Coast[2]	MOC	Fall	NA	121	67	98	146%	5
N. Oregon Coast[2]	NOC	Fall	NA	84	50	71	142%	5
Indistinguishable From Base								
Quillayute Fall	WAC	Fall	3,000	7,316	5,918	5,875	99%	755
Queets Fall	WAC	Fall	2,500	4,200	3,875	3,640	94%	512
Hoh Spr/sum	WAC	Spr/sum	900	1,371	1,313	1,326	101%	215
Decreased Relative To Base								
Queets Spr/sum	WAC	Spr/sum	700	600	925	620	67%	113

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 2-5. Summary of escapement data through 1995 for the 10 SEAK and TBR escapement indicator stocks. SE = standard error of the mean for 1975-1995.

Stock Name	Region	Esc. Goal	Base Per. Avg. Esc.	SE Esc. 1975 -95	1991-95 AVERAGE ESC.			MEAN CRITERION		LINE CRITERION		TREND CRITERION	
					Avg.	Avg. as % Goal	Avg. as % Base	Test Value	+/–	# Above	# Below	Than Year Before	
												>	<
Situk[1]	SEAK	600	1,209	208	1,901	317%	157%						
King Salmon	SEAK	250	110	16	169	68%	154%	239	–	1	4	1	4
Andrew Creek	SEAK	750	396	108	1,261	168%	318%	722	+	4	1	2	3
Blossom	SEAK	300	102	79	214	71%	210%	284-	–	1	4	2	3
Keta	SEAK	300	255	60	266	89%	104%	296-	–	2	3	1	4
Alsek	TBR	4,700	2,377	218	3,141	67%	132%	4,514	–	1	4	4	1
Taku	TBR	13,200	4,582	712	10,617	80%	232%	12,518	–	1	4	2	3
Stikine	TBR	5,300	1,945	568	6,458	122%	332%	5,032	+	3	2	2	3
Unuk[1]	TBR	875	918	109	806	92%	88%						
Chickamin	TBR	525	314	82	393	75%	125%	508-	–	1	4	1	4

[1] Stocks that were near or above goal during the base period, and therefore were not evaluated using the mean, line, and trend criteria.

Table 2-6. Summary of escapement data for the 24 natural chinook indicator stocks with escapement goals and a rebuilding target date of 1998. SE = standard error of the mean for 1975-1996.

Stock Name	Region	Esc. Goal	Base Per. Avg. Esc.	SE Esc. 1975-95	1991-95 AVERAGE ESC.			MEAN CRITERION		LINE CRITERION		TREND CRITERION	
					Avg.	Avg. as % Goal	Avg. as % Base	Test Value	+/–	# Above	# Below	Than Year Before >	Than Year Before <
Yakoun	NBC	1,580	788	167	1,900	120%	241%	1,369	+	4	1	3	2
Nass	NBC	15,890	7,944	666	9,808	62%	123%	13,771	–	1	4	3	2
Skeena[1]	NBC	41,770	20,883	4,241	57,694	138%	276%						
Dean (Area 8)	CBC	5,450	3,167	283	1,620	30%	51%	4,879	–	0	5	3	2
Rivers Inlet	CBC	4,950	2,475	467	5,439	110%	220%	4,290	+	2	3	2	3
WCVI[2]	WCVI	11,499	5,749										
Up. Geor. St.	GS	5,350	2,675	705	3,221	60%	120%	4,602	–	1	4	2	3
Low. Geor. St.	GS	15,075	7,538	686	9,763	65%	130%	13,980	–	1	4	1	4
Upper Fraser	FR	24,460	12,229	2,384	27,645	113%	226%	21,198	+	4	1	4	1
Mid. Fraser[1]	FR	18,430	9,216	1,706	28,713	156%	312%						
Thompson	FR	55,710	22,059	3,242	50,603	91%	229%	46,736	+	3	2	3	2
Harrison	FR	241,670	120,837	14,258	81,314	34%	67%	209,448	–	0	5	2	3
Skagit spring	PS	3,000	1,247	133	1,285	43%	103%	2,532	–	0	5	2	3
Skagit sum/fall	PS	14900	13,265	888	7,800	52%	59%	14,464	–	0	5	4	1
Stillaguamish	PS	2,000	817	89	974	49%	119%	1,685	–	0	5	3	2
Snohomish[3]	PS	5,250	5,028	265	3,645	69%	72%						
Green[3]	PS	5,800	5,723	629	5,157	89%	90%						
Quillayute sum.[3]	WAC	1,200	1,250	167	1,155	96%	92%						
Grays Hbr. Spr.[1]	WAC	1,400	450	229	2,248	161%	500%						
Grays Hbr. Fall	WAC	14,600	8,575	1,524	13,500	92%	157%	12,993	+	2	3	2	3
Col. Upr. Spring	CR	84,000	31,055	2,416	16,672	20%	54%	69,080	–	0	5	2	3
Col. Upr. Sum.	CR	85,000	19,831	913	12,986	15%	65%	68,493	–	0	5	2	3
Col. Upr. Bright[1]	CR	40,000	28,325	7,018	62,688	157%	221%						
Lewis[3]	CR	5,700	11,622	935	8,744	153%	75%						

1 Stocks with rebuilding schedules that were assessed as Above Goal, and therefore were not evaluated using the mean, line, and trend criteria.
2 Due to changes in escapement estimation methodology in 1995, this stock could not be evaluated using the assessment algorithm.
3 Stocks that were near or above goal during the base period, and therefore were not evaluated using the mean, line, and trend criteria.

Table 2-7. Status of the 34 natural chinook indicator stocks with escapement goals through 1996 (through 1995 for SEAK and TBR stocks) based on the assessment algorithm. Level 3 assessment of change in escapement level relative to base was made for those stocks in the Indeterminate or Not Rebuilding categories.

Stock	Run Type	Region	Mean	Line	Trend	Total	Rebuilding Status	Change Since Base (Level 3 Assessment)
Stocks With Rebuilding Schedules								
King Salmon	Spring	SEAK	-1	-1	0	-2	Not Rebuilding	Increase
Andrew Creek	Spring	SEAK	+1	+1	0	+2	Rebuilding	
Blossom	Spring	SEAK	-1	-1	0	-2	Not Rebuilding	Increase
Keta	Spring	SEAK	-1	-1	-1	-3	Not Rebuilding	Indistinguishable
Alsek	Spring	TBR	-1	-1	+1	-1	Not Rebuilding	Increase
Taku	Spring	TBR	-1	-1	0	-2	Not Rebuilding	Increase
Stikine	Spring	TBR	+1	+1	0	+2	Rebuilding	
Chickamin	Spring	TBR	-1	-1	-1	-3	Not Rebuilding	Indistinguishable
Yakoun	Summer	NBC	+1	+1	0	+2	Rebuilding	
Nass	Spr/Sum	NBC	-1	-1	0	-2	Not Rebuilding	Increase
Skeena	Spr/Sum	NBC					Above Goal	
Dean (Area 8)	Spring	CBC	-1	-1	0	-2	Not Rebuilding	Decrease
Rivers Inlet	Spr/sum	CBC	+1	-1	0	+2	Indeterminate	Increase
W. Coast Van.[1]	Fall	WCVI						
Up. Geor. St.	Sum/Fall	GS	-1	-1	0	-2	Not Rebuilding	Indistinguishable
Low. Geor. St.	Fall	GS	-1	-1	-1	-3	Not Rebuilding	Increase
Upper Fraser	Spring	FR	+1	+1	+1	+3	Rebuilding	
Middle Fraser	Spr/Sum	FR					Above Goal	
Thompson	Summer	FR	+1	+1	0	+2	Rebuilding	
Harrison	Fall	FR	-1	-1	0	-2	Not Rebuilding	Decrease
Skagit spring	Spring	PS	-1	-1	0	-2	Not Rebuilding	Indistinguishable
Skagit sum/fall	Sum/Fall	PS	-1	-1	+1	-1	Not Rebuilding	Decrease
Stillaguamish	Sum/Fall	PS	-1	-1	0	-2	Not Rebuilding	Increase
Grays Hbr. Spr.	Spring	WAC					Above Goal	
Grays Hbr. fall	Fall	WAC	+1	-1	0	0	Indeterminate	
Col. UpR. Spr.	Spring	CR					Not Rebuilding	Decrease
Col. UpR. Sum.	Summer	CR					Not Rebuilding	Decrease
Col. UpR bright	Fall	CR					Above Goal	
Stocks With Base Averages Near or Above Goal								
Situk	Spring	SEAK					Stable at goal	
Unuk	Spring	TBR					Stable at goal	
Snohomish	Sum/Fall	PS					Declined below goal	
Green	Fall	PS					Declined below goal	
Quillayute sum.	Summer	WAC					Stable at goal	
Lewis	Fall	CR					Stable at goal	

[1] Due to changes in escapement estimation methodology in 1995, this stock could not be evaluated using the assessment algorithm.

Table 2-8. Status and changes in escapement relative to base period for the 34 natural chinook indicator stocks with escapement goals. Status classifications are based on the assessment algorithm (Table 2-7), modified where footnoted by CTC review of additional information for the stock. Evaluation of changes relative to base is not applicable (N/A) for stocks that are Stable at Goal.

Rebuilding Status	Stock	Change Relative to Base	Region	Run Type	Stock Group
Stocks at End of Rebuilding Period (1995 Target)					
Stable at Goal	Situk	N/A	SEAK	Spring	SEAK/TBR-O
	Unuk	N/A	SEAK	Spring	SEAK/TBR-I
	Keta[1]	N/A	SEAK	Spring	SEAK/TBR-I
Rebuilding	Andrew Creek	Increase	SEAK	Spring	SEAK/TBR-I
	Stikine	Increase	SEAK	Spring	SEAK/TBR-O
Indeterminate	Alsek[1]	Increase	SEAK	Spring	SEAK/TBR-O
	Taku[1]	Increase	SEAK	Spring	SEAK/TBR-O
	King Salmon[1]	Increase	SEAK	Spring	SEAK/TBR-I
Not Rebuilding	Blossom	Increase	SEAK	Spring	SEAK/TBR-I
	Chickamin	Indistinguishable	SEAK	Spring	SEAK/TBR-I
Stocks in 13th Year of Rebuilding Period (1998 Target)					
Stable at Goal	Quillayute	N/A	WAC	Summer	WACO
	Green[1]	N/A	PS	Fall	SPS
	Lewis	N/A	CR	Fall	WACO
Above Goal	Skeena	Increase	NBC	Spring/summer	NCBC
	Middle Fraser	Increase	FR	Spring/summer	UFR
	Grays Hbr. Spring	Increase	WAC	Spring	WACO
	Col. UpR. Bright	Increase	CR	Fall	WACO
Rebuilding	Yakoun	Increase	NBC	Summer	NCBC
	Upper Fraser	Increase	FR	Spring	UFR
	Thompson	Increase	FR	Summer	UFR
	Grays Hbr. Fall[1]	Increase	WAC	Fall	WACO
Indeterminate	Rivers Inlet	Increase	CBC	Spring/summer	NCBC
Not Rebuilding	Nass	Increase	NBC	Spring/summer	NCBC
	Dean (Area 8)	Decrease	CBC	Spring	NCBC
	W. Coast Van.[2]		WCVI	Fall	WCVI
	Up. Geor. St.	Indistinguishable	GS	Summer/fall	UGS
	Low. Geor. St.	Increase	GS	Fall	LGS
	Harrison	Decrease	FR	Fall	LFR
	Skagit Spring	Indistinguishable	PS	Spring	NPS-Sp
	Skagit Sum/Fall	Decrease	PS	Summer/fall	NPS-S/F
	Stillaguamish	Increase	PS	Summer/fall	NPS-S/F
	Col. Upr. Spring	Decrease	CR	Spring	CUS
	Col. Upr. Sum	Decrease	CR	Summer	WACO
Declined Below Goal	Snohomish	Decrease	PS	Summer/fall	NPS-S/F

[1]Rebuilding status changed from Table 2-7 following CTC review of additional information for stock.
[2]Due to changes in escapement estimation methodology in 1995, recent average escapements could not be directly compared with base period assessments. CTC assignment of status took into account the methodology change.

Table 2-9. Distribution of chinook escapement indicator stocks among the rebuilding categories for the 34 stocks with escapement goals. SEAK and TBR stocks were evaluated through 1995, the end of their rebuilding program; other stocks were evaluated through 1996.

Category	SEAK and TBR		Other Stocks		Total	
Above Goal or Stable at Goal	3	30%	7	29%	10	29%
Rebuilding	2	20%	4	17%	6	18%
Indeterminate	3	30%	1	4%	4	12%
Not Rebuilding or Decline Below Goal	2	20%	12	50%	14	41%
Total	10		24		34	

2.5. SUMMARY OF REBUILDING ASSESSMENT

In 1995, the SEAK/TBR stocks completed their defined 15-year rebuilding period. Substantial progress has been made towards rebuilding these stocks. At the end of their rebuilding period, there is no evidence of escapement declines relative to the base period. Nine of the 10 stocks were Stable at Goal or had increased since the base period, and the other stock (Chickamin) had a recent escapement that was indistinguishable from base (Table 2-8). Five of the stocks (50%) were Rebuilding or Stable at Goal, while 2 (20%) were Not Rebuilding in relation to the escapement goals the CTC used for the assessment (Table 2-9). The remaining 3 stocks (30%) were Indeterminate.

The other escapement indicator stocks, located in Canada south of the SEAK/TBR rivers and in the Pacific Northwest, included 24 stocks with escapement goals and 8 without goals. These 32 indicator stocks have a target date of 1998 for completion of their 15-year rebuilding program. Thirty-one of these stocks were evaluated for changes in escapement relative to their respective base period; one stock (WCVI) was excluded from this analysis due to significant changes in escapement methodology. Of the 31 stocks evaluated through 1996, most (77%) have been stable at goal, have increased, or have remained indistinguishable in escapement magnitude relative to the base period (Tables 2-4, 2-8). However, seven (22%) of these stocks have shown escapement declines after 13 years of the rebuilding program. Of the 24 stocks with escapement goals, 11 (46%) were Stable at Goal, Above Goal, or Rebuilding, while 12 (50%) were Not Rebuilding or Declined Below Goal (Table 2-9). One stock was Indeterminate.

These results suggest a differential response of the SEAK/TBR stocks and the more southern stocks after 15 and 13 years, respectively, of the rebuilding program. A substantial proportion (22%) of the southern stocks have shown escapement declines since their base period, compared to no declining stocks among the SEAK/TBR escapement indicators. Also, while the proportions of stocks with escapement goals that were Rebuilding, Stable at Goal, or Above Goal were similar for each of the two geographic groupings, the proportion of stocks Not Rebuilding was 2.5 times higher for the southern stocks.

2.6. IMPROVEMENT OF THE REBUILDING ASSESSMENT

The basic framework for the evaluation of the PST chinook rebuilding program was developed by the CTC in 1987 (CTC 1987).

> "In assessing the status of individual stocks under the rebuilding program, three main elements must be examined: 1) spawning escapement levels; 2) fishery harvest and stock-specific exploitation rates; and 3) production responses to increases in spawning escapements. In developing the rebuilding program, the immediate objective was to stop the decline in escapements of naturally spawning chinook populations and to increase escapements subsequently. The ultimate objective, however, must be to maximize sustainable harvests."

Since this chapter of the report addresses only the first element, spawning escapements, it provides a limited perspective on the rebuilding program. The escapement assessment evaluates only escapement levels and trends relative to escapement goals provided by the agencies. Failure to achieve the goals may be caused by many factors beyond the scope of this chapter, including reductions in productivity related to habitat degradation or oceanic conditions, excessive exploitation rates in ceiling or pass-through fisheries, or goals that are inconsistent with the production potential of the stock.

In assessing spawning escapement levels, the 1987 report of the CTC noted that there were many complexities even in the seemingly simple task of evaluating progress toward rebuilding.

Complexities inherent in the assessment included:

1) all stocks were not expected to rebuild at the same rate, nor were individual stocks expected to rebuild at a constant rate over time;
2) the quality and availability of historical data bases on escapements were poor for some stocks, and this problem was aggravated by differences in escapement estimation procedures employed for individual stocks over time;
3) even escapement data collected during the rebuilding period may have substantial error and bias;
4) modification of spawning escapement goals was anticipated as additional information on stock productivity became available.

These complexities have remained, and have even become accentuated, during the rebuilding program. As agency stock assessment procedures have improved, evaluating temporal trends in escapement have become even more difficult. The West Coast Vancouver Island stock is the most obvious example, but there are few escapement indicator stocks for which changes in the assessment methodology have not occurred in the last 20 years.

The CTC has endeavored to provide assessments that recognize these complexities while still fulfilling our primary task, to "evaluate annually the status of chinook stocks in relation to objectives set out in this Chapter and...make recommendations for adjustments to the management measures" (PST, Chinook Annex).

The CTC believes that efforts to substantively improve our assessments should now be initiated in three areas: 1) the escapement assessment methodology; 2) the stock-recruit productivity relationship and escapement goals of the indicator stocks; and 3) identification of factors contributing to the status of stocks identified as Not Rebuilding.

Escapement Assessment Methodology. The methodology for the escapement assessment was developed in 1988 (CTC 1988) and has been used since that time with minor modifications. An improved method is needed that: 1) incorporates the measures of uncertainty included in the data standards developed bilaterally (CTC 1992) and within the U.S. section (U.S. CTC 1997) of the CTC; 2) facilitates the inclusion of escapement data of improved quality; and 3) reflects current management objectives of the PSC and management agencies. When the PST was negotiated, the management policies were typically expressed in terms of a fixed-point escapement goal. Subsequent evolution in management strategies has led to the adoption of many alternative policies, including escapement ranges, escapement floors, and the maintenance of stock diversity. The escapement assessment methodology must account for these alternatives while providing a useful assessment framework within the context of the PST.

Stock-Recruit Productivity Relationships. The 1987 report of the CTC identified the stock production response as one of the three elements that must be considered in the evaluation of stock status. Estimates of stock productivity are essential for many analyses, including the CTC escapement assessment and the evaluation of the effects of alternative fishing regimes. Progress of the CTC in evaluating stock productivity has been limited. Stock-recruit productivity relationships have been evaluated by the CTC with the exception of reviews of five SEAK/TBR stocks and the Lewis River. To assist the CTC in completing this task, a workshop should be held to foster understanding of recent developments and generate collaboration and consensus on how to estimate the parameters of stock-recruit relations.

Evaluation of Stocks Identified as Not Rebuilding. Although the CTC has regularly assessed the escapement status of stocks, detailed analyses of the factors contributing to this status have never been completed. These analyses should be an essential component of the evaluation of the rebuilding program, particularly in 1998. For each stock identified as Not Rebuilding, the analysis should review the quality of the escapement data, evaluate the escapement goal and the effect of management actions, and recommend appropriate management measures.

Despite efforts by the CTC to improve assessment methods, the quality of the assessment can be no better than the basic resource data collected by the management agencies. As previously noted by the CTC (1992):

"Without a greater realization of the need for more accurate data and, following that, a commitment to better and consistent data collection, we will not be able to answer the increasingly complex questions that are asked about responsible utilization of chinook resources. The costs of poor data will only become more and more evident, obvious examples being: extinction of some chinook populations; loss of harvest opportunities, particularly as fisheries become regulated to conserve smaller or less productive stocks; and increased disruption to traditional fisheries. Without improved information, controversy over the utilization and conservation of the resource will increase and resource benefits to both Parties will be lost.

3. EXPLOITATION RATE ASSESSMENT
Based on CWT Recovery Data Through Calendar Year 1996

3.1. INTRODUCTION

The Exploitation Rate Assessment relies on CWT release and recovery data from a set of indicator stocks to estimate: 1) indices of annual changes in harvest rate for the ceiling fisheries and the Washington/Oregon (WA/OR) ocean sport and troll fisheries, 2) non-ceiling indices of annual changes in harvest rate on naturally spawning stocks (for those not achieving their escapement goals) killed in nonceiling fisheries, 3) brood year exploitation rates and indices, 4) trends in marine survival of the indicator stocks, and 5) catch and total mortality distributions by stock and among fisheries. In many cases, the trends in these indices are standardized relative to the pre-treaty base period 1979-1982. An index less than 1.0 represents a decrease from the base period while an index greater than 1.0 represents an increase. The relative magnitude of the change is the difference between 1.0 and the value of an index in one year or an average for a period.

The statistics reported in this chapter are largely based on cohort analysis. Cohort analysis reconstructs the production from a tagged group by starting with the escapement and catch of the oldest age class (normally age 5) and working backwards in time to estimate the pre-fishery abundance of ocean age-2 chinook. These reconstructions are based on CWT recoveries (by stock, age, and fishery), estimates of the incidental mortality associated with fishing, and assumptions about age-specific natural mortality rates. However, fishing mortality is not included in this assessment if quantitative estimates of CWT recoveries are not available and/or were not available during the base period (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 (Non-terminal)	No base period sampling, substantial expansion of fishery since the base period
Johnstone Strait Sport	No base period sampling, periodic catch monitoring
Canadian Freshwater Sport	No base period sampling, periodic catch monitoring, recovery rate varies between stocks
Canadian Freshwater Net	Native fisheries not included in recovery programs until recently, recovery rate by stock unknown

Assessment methods were similar to those in the 1994 Annual Report (TCCHINOOK(96)-1) except for: 1) incorporation of new CTC recommended incidental mortality rates, 2) development of new methods to calculate chinook non-retention mortality in 1996 Canadian fisheries, and 3) calculation of survival rate indices in adult equivalents instead of nominal terms. These changes are described in Section 3.2.1.

3.1.1. Definitions

Adult Equivalent Factors (AEQ): AEQ is the probability of a chinook of a given stock, age, and cohort reaching the spawning ground in the absence of any subsequent fishing on that cohort. An AEQ is multiplied by an age and stock-specific catch to express that catch as the number of fish that would be expected to reach the spawning grounds in the absence of fishing. For example, the AEQ for age-3 chinook is frequently computed to be 0.75. At this level, the AEQ would indicate that three of every four age-3 chinook caught would be expected to return to the spawning ground (potentially as an age-3 spawner or as an older spawner). AEQ is calculated as:

AEQ in age i = maturation rate + (1- maturation rate)(survival rate)(AEQ in age (i+1)).

Reported Catch vs. 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.

3.1.2. Ceiling Fishery Indices

The Pacific Salmon Treaty implemented fixed catch limitations in mixed-stock ocean fisheries in SEAK and British Columbia that impact chinook salmon. These ceilings were set to immediately reduce the harvest rate on chinook in these fisheries and to maintain this catch limit for 15 years (through 1998 fisheries). The premise of this plan was that spawning escapements would increase following the initial reduction in harvest rates, and assuming the fish conserved would "pass-through" to the spawning grounds, and chinook production would increase due to the increased escapements. By maintaining the catch ceilings over time, the harvest rates in these ocean fisheries would decline further as chinook production increased. However, this rebuilding plan also assumed that the marine survival of chinook salmon would be equal to or greater than the survival rates observed before the Treaty (i.e., before about 1984). If marine survival declined then the abundance of chinook in the ceiling fisheries could be less than assumed when determining the fixed catch limits and the harvest rates in these fisheries could increase (if the fisheries were allowed or capable of achieving the catch ceiling).

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. Fishery indices are presented for both reported catch and total mortality (reported catch plus estimated incidental mortality) for all fisheries except SEAK troll. For the SEAK troll fishery, the stratified proportional harvest rate index adjusted for untagged stocks (SPFI) is presented for reported catch and total mortality. The SPFI is described in TCCHINOOK (96)-1. The graphs presented in this section also include the time trend of harvest rate indices projected by the 1984 version of the CTC chinook model.

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.

3.1.3. 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 naturally spawning 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.

Table 3-2. Fisheries included in the nonceiling fishery 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	

3.1.4. 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 naturally spawning 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 non-terminal net fisheries. By partitioning the fisheries in this way, the most appropriate measure of brood exploitation rates on naturally spawning stocks could be selected. The method selected for each exploitation rate indicator stock is given in Table 3-5.

3.1.5. Survival Indices

Two types of survival measures, an ocean age 2-3 survival rate and a cohort survival rate, are included in the Exploitation Rate Assessment. The ocean age 2-3 survival rate index, based on AEQ catch of age-2 and age-3 fish, provides an estimate of survival for incomplete broods. However, the cohort survival rate provides the best estimate of the overall survival for a brood. It includes the estimated CWT recoveries in catch and escapement, the assumed incidental mortality, and the estimated natural mortality of the ocean age 2 and older age classes. Although it provides the best estimate, it has little direct use in predicting future contributions, since all ages must be accounted for before the cohort survival rate can be computed.

The following assumptions are made in calculating survival rate indices: 1) variations in natural mortality occur primarily before ocean age 2, and 2) variations in marine survival are large in comparison to variations in fishery exploitation rates and maturity rates. Because of the large reductions in Canadian fisheries in 1995 and 1996, the second assumption may no longer hold. Changes to the calculation of survival rate indices to compensate for Canadian reductions are described in Section 3.2.1.3.

3.1.6. Stock Catch Distribution

The distributions of reported catch and total mortalities for each indicator stock are presented for nine fishery categories: one for each set of fisheries operating under a PSC ceiling and one for each gear type of Canadian and U.S. fisheries that do not operate under PSC ceilings. The PSC ceiling fisheries for NCBC and Alaska include sport, net, and troll fisheries. Distributions are presented as percentages of both the reported catch and the total fishing mortality (expressed in AEQ). Distributions were computed only for calendar years in which CWT recovery data were present for at least three brood years for a given exploitation rate indicator stock.

Distributions were averaged across years for 1979-1984 (pre-Treaty), 1985-1990 (post-Treaty period of consistent fisheries), and 1991-1996 (post-Treaty period of variable fishing patterns). The latter period was identified separately since the closure of fisheries will change the percentage distribution observed in the fisheries that remain open. In these cases, biological distribution of the indicator stocks should not be inferred from catch distributions in those years. For example, the closure of Canadian fisheries in 1996 does not mean that the stock was not present in northern BC fishing areas, only that there was not any catch. Distributions of CWT recoveries previous to 1991 are more typical of the biological distribution of the indicator stocks and their typical exploitation pattern but since 1991 many changes have occurred in the coastal fisheries. For example, closure of the WA/OR troll fishery in 1994, closure of the Strait of Georgia troll fishery since 1995, and the major reductions in Canadian ocean fisheries in 1995 and 1996. The catch distributions can be found in Appendix B.

3.2. ESTIMATION OF EXPLOITATION RATES

Of the 39 exploitation rate indicator stocks, 18 had sufficient data to calculate fishery indices, nonceiling indices, and/or brood exploitation rates. Five Canadian exploitation rate indicator stocks were not used in this year's limited analysis (in past years these stocks were only used for catch distribution tables). 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.

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 migrate to terminal areas during fall (Table 3-3) dominate the indicator stocks.

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

Origin	Stock Name	Location	Run Type	Smolt Age
S.E. Alaska	Alaska Spring	Southeast Alaska	Spring	Age 1
British Columbia	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
Puget Sound	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 Wash. 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
Washington Coast	Sooes Fall Fingerling	North Wash. Coast	Fall	Age 0
	Queets Fall Fingerling	North Wash. Coast	Fall	Age 0
Columbia River	Cowlitz Tule	Columbia Rvr. (WA)	Fall Tule	Age 0
	Spring Creek Tule	Columbia Rvr. (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 Rvr.	Fall Bright	Age 0
	Hanford Wild	Upper Columbia Rvr.	Fall Bright	Age 0
	Leavenworth Spring [1]	Upper Columbia Rvr.	Spring	Age 1
	Lewis River Wild	Lower Columbia Rvr.	Fall Bright	Age 0
	Lyons Ferry	Snake River	Fall Bright	Age 0
	Willamette Spring	Lower Columbia Rvr.	Spring	Age 1
Oregon Coast	Salmon River	North Oregon Coast	Fall	Age 0
Idaho	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 3-4. 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	NC Index	Brood	Survival	Distn	Esc	Base
Alaska Spring	SEAK/TBR-I	yes	—	Total	yes	yes	yes	yes
Kitsumkalum[3]	NCBC	—	—	—	—	—	—	yes
Snootli Creek[3]	NCBC	—	—	—	—	—	—	—
Kitimat River[3]	NCBC	—	—	—	—	—	—	—
Robertson Creek	WCVI	yes	—	Ocean	yes	yes	yes[2]	yes
Quinsam	UGS	yes	yes	Total	yes	yes	yes	yes
Puntledge	LGS	yes	—	Total	yes	yes	yes	yes
Big Qualicum	LGS	yes	yes	Total	yes	yes	yes	yes
Chehalis [3]	LFR	—	—	—	—	—	—	—
Chilliwack[3, 5]	LFR	—	—	—	—	—	—	—
South Puget Sound Fall Yearling		yes	[6]	[6]	yes	yes	yes[4]	yes
Squaxin Pens Fall Yearling		—	[6]	[6]	yes	yes	yes[4]	—
Univ of Washington Accelerated		yes	[6]	[6]	—	yes	yes[4]	yes
Samish Fall Fingerling	NPS-S/F	yes	yes	Ocean	yes	yes	yes[4]	yes
Stillaguamish Fall Fingerling	NPS-S/F	—	—	—	—	yes	—	—
George Adams Fall Fingerling		yes	[6]	[6]	yes	yes	yes[4]	yes
South Puget Sound Fall Fingerling	SPS-S/F	yes	—	Ocean	yes	yes	yes[4]	yes
Kalama Creek Fall Fingerling	SPS-S/F	—	—	—	—	yes	—	yes
Elwha Fall Fingerling		—	—	—	—	yes	—	—
Hoko Fall Fingerling		—	—	—	yes	yes	yes	—
Skagit Spring Yearling	NPS-Sp	—	—	—	yes	yes	yes[4]	—
Nooksack Spring Yearling	NPS-Sp	—	—	—	yes	yes	yes[4]	—
White River Spring Yearling		—	—	—	yes	yes	yes[4]	yes
Sooes Fall Fingerling	WACO	—	—	—	yes	yes	yes	—
Queets Fall Fingerling	WACO	—	—	—	—	yes	—	yes
Cowlitz Tule	CRT	yes	[6]	[6]	yes	yes	yes	yes
Spring Creek Tule	CRT	yes	[6]	[6]	yes	yes	yes	
Bonneville Tule	CRT	yes	[6]	[6]	—	yes	yes	yes
Stayton Pond Tule	CRT	yes	[6]	[6]	yes	yes	yes	yes
Upriver Bright	WACO	yes	yes	Ocean	yes	yes	yes	yes
Hanford Wild	WACO	—	—	—	yes	yes	yes	—
Lewis River Wild	WACO	yes	yes	Ocean	yes	yes	yes	yes
Lyons Ferry	WACO	—	—	—	yes	yes	yes	—
Willamette Spring		yes	—	[6]	yes	yes	yes	yes
Salmon River	WACO	yes	yes	Ocean	yes	yes	yes	yes

NC Index = index for nonceiling fisheries; Brood Exp = brood ERs; Distn = Stock Catch Distribution, Esc = quantitative estimates of escapement.

1 Acronyms and descriptions for stock groups:

SEAK-TBR/I:	SEAK and Transboundary rivers, inside migrating	LFR:	Lower Fraser fall
NCBC:	NCBC spring/summer	NPS-S/F:	North Puget Sound summer/fall
WCVI:	WCVI fall	SPS-S/F:	South Puget Sound summer/fall
UGS:	UGS summer/fall	NPS-Sp:	North Puget Souud spring
LGS:	LGS fall	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 Lists the appropriate statistic to consult when using the indicator stock to represent the regional stock group.

3 Not used in this year's analyses.

4 Only hatchery rack recoveries are included in escapement.

5 Harrison stock only.

6 Hatchery stock not used to represent naturally spawning stock.

3.2.1. Theory and Procedures

3.2.1.1. Modifications of Incidental Mortality Rates

Based on the CTC recommendations in "Incidental Fishing Mortality of Chinook Salmon: Mortality Rates Applicable to Pacific Salmon Commission Fisheries" (TCCHINOOK (97)-1), new incidental mortality rates for PSC fisheries were implemented in the cohort analysis (Table 3-6). The capability now exists for fishery and year specific rates. For troll fisheries, there are separate rates for barbed and barbless hook and 'drop-off' mortality. The recommended incidental mortality rates for net fisheries were not implemented in this analysis. The recommendations are net gear, size, and area specific. The gear specific data required *(for example net gear- specific encounter rates)* is not commonly available and would require considerable effort to develop for all net fisheries. The CTC anticipates using gear specific incidental mortality rates for net fisheries when the necessary data becomes available. In net and sport fisheries, there are different rates for above and below 33 cm lengths and drop-off/drop-out mortality. Rates are currently the same among years for all fisheries except Washington/Oregon Troll and Georgia Strait Sport.

Table 3-5 Incidental mortality rates implemented for the 1996 Cohort Analysis (TCCHINOOK(97)-1).

Fishery #	Fishery	Sub-Legal	Legal	Drop-off
1	Alaska Winter/Spring Troll	0.255	0.211	0.008
2	Alaska June Inside Troll	0.255	0.211	0.008
3	Alaska June Outside Troll	0.255	0.211	0.008
4	Alaska July Inside Troll	0.255	0.211	0.008
5	Alaska July Outside Troll	0.255	0.211	0.008
6	Alaska Fall Troll	0.255	0.211	0.008
7	North B.C. Troll	0.255	0.211	0.017
8	Central B.C. Troll	0.255	0.211	0.017
9	W. Coast Vancouver Island Troll	0.255	0.211	0.017
10	Wash./Oregon Troll 1973-1984	0.255	0.211	0.017
	Wash./Oregon Troll 1985-1996	0.220	0.185	0.025
11	Georgia Strait Troll	0.255	0.211	0.017
12	Alaska Net	0.900	0.900	N/A
13	North B.C. Net	0.900	0.900	N/A
14	Central B.C. Net	0.900	0.900	N/A
15	W. Coast Vancouver Island Net	0.900	0.900	N/A
16	Juan De Fuca Net	0.900	0.900	N/A
17	Puget Sound North Net	0.900	0.900	N/A
18	Puget Sound Other Net	0.900	0.900	N/A
19	Washington Coast Net	0.900	0.900	N/A
20	Columbia River Net	0.900	0.900	N/A
21	Johnstone Strait Net	0.900	0.900	N/A
22	Fraser Net	0.900	0.900	N/A
23	Alaska Sport	0.123	0.123	0.036
24	North/Central Sport	0.123	0.123	0.069
25	W. Coast Vancouver Is. Sport	0.123	0.123	0.069
26	Washington Coast Sport	0.123	0.123	0.069
27	Puget Sound North Sport	0.123	0.123	0.145
28	Puget Sound Other Sport	0.123	0.123	0.145
29	Georgia St. Sport 1973-1982	0.322	0.322	0.069
	Georgia Strait Sport 1983-1988	0.123	0.123	0.069
	Georgia Strait Sport 1989-1996	0.0306	0.123	0.069
30	Columbia River Sport	0.322	0.322	0.069

3.2.1.2. Modifications of Chinook Non-Retention Estimates

During the 1996 fishing season, there were several Canadian fisheries with CNR imposed all season. In the past, incidental mortalities during CNR fisheries were calculated using information from the chinook retention portion of the fishery. Since several fisheries had no retention period in 1996, new algorithms had to be developed to estimate the CNR mortality. These algorithms are described in detail in Appendix G.

The CTC evaluated this new method for estimating CNR by comparing CNR estimated using the previous method (with chinook retention) with the new non-retention method. An example of the results from this comparison are summarized in Appendix G. It is important to note that no direct comparison of CNR mortalitites estimated using the two methods is possible. Previous to 1996, there were no instances where CNR was imposed all season (i.e. no existing method). In addition, there is little external data available to evaluate model estimates of CNR during a non-retention fishery. For our evaluation, we applied the new CNR method to a previous year where there was reported catch, essentially ignored the CWT recoveries, and estimated CNR using a base period average catchability. We then compared these estimates of CNR when catch was ignored to those previously computed when the reported catch was used to estimate CNR. Estimates of the CNR mortalities in 1996 fisheries are not tabulated in this text since this estimation procedure is in incorporated in the stock-specific cohort analyses. Incidental mortalities (the difference between total mortality and reported catch) presented by each stock includes the results of the new method.

3.2.1.3. Modifications of Survival Rate Indices

Since a substantial portion of the age-2 and age-3 chinook are usually recovered in the catch, closure of fisheries or major reductions in harvest rates has the potential to bias the age 2-3 survival index. Chinook that are not caught in one year may return to spawn or remain in the ocean cohort. The latter is likely for the younger age chinook used in the age 2-3 index and would result in an under-estimation of the cohort survival. To compensate for this problem, the age 2-3 index has been converted to express all recoveries as spawner equivalents (AEQ). The recent reductions in fisheries to increase spawning escapements are therefore compensated for by only comparing survivals in terms of the expected number of spawners, both for the present and past year's data. Cohort survivals were not translated into adult equivalents since they are only determined for completed brood years. Expressing these cohorts as AEQ survival indices would not appreciably change the correlations between the Age 2-3 and cohort survival estimates. Further, leaving the cohort survival rate as the actual value allows comparison with past reports. The survival rate results are presented in Section 3.6.

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).

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 equal to those in Table 3.6. The incidental mortality rates are equal in retention and non-retention periods.

6) In the absence of an independent estimate of incidental mortality during non-retention periods, the procedure for estimating the mortality of CWT fish of legal size assumes 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 non-retention 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, personal communication). 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 non-retention 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.

8) For fishery indices, the temporal and spatial distributions of stocks in and between fisheries are stable from year to year and equal to the base period.

3.3. FISHERY INDICES

3.3.1. Ceiling Fisheries (and U.S. South Ocean Sport/Troll)

Fishery indices provide a means to assess the effectiveness of the PSC management 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.

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 1979-1984 and 1985-1996 averages.

Since the CTC is frequently asked questions about the U.S. South ocean sport and troll fisheries, the indices for these fisheries are presented separately in Figures 3-5 and 3-6. 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. However, the fishery index for this component of the U.S. nonceiling fisheries is calculated using the same criteria and computation as the ceiling fisheries. 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.

Estimates of the indices presented in this report may differ from previous estimates, particularly for more recent years, due to a number of factors including: 1) changes in stock/age combinations that meet index criteria, 2) revised estimates of non-retention mortality (see Table 3-5), 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 1985-1996 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	4%	1%	-4%	-3%	0%	0%	-11%	-12%	-4%	-5%	-34%	-33%
1980	15%	8%	9%	9%	1%	0%	5%	6%	-2%	-2%	3%	3%
1981	3%	4%	20%	20%	-14%	-14%	33%	34%	-6%	-5%	11%	10%
1982	-23%	-12%	-25%	-25%	13%	13%	-27%	-28%	12%	12%	20%	20%
1983	-4%	10%	-9%	-9%	22%	22%	-26%	-25%	-39%	-40%	8%	9%
1984	-31%	-32%	1%	0%	59%	58%	7%	9%	-76%	-76%	-40%	-38%
1979-84 Average	-6%	-4%	-1%	-1%	14%	13%	-3%	-3%	-19%	-19%	-5%	-5%
1985	-27%	-10%	-7%	-8%	-6%	-5%	-40%	-38%	-44%	-41%	-50%	-51%
1986	-45%	-38%	-30%	-29%	7%	5%	0%	5%	-47%	-50%	17%	15%
1987	-48%	-38%	-1%	3%	-30%	-22%	-30%	-28%	-43%	-42%	138%	135%
1988	-36%	-33%	-46%	-43%	-6%	1%	-42%	-41%	-28%	-29%	226%	223%
1989	-46%	-41%	-33%	-32%	-53%	-50%	-36%	-25%	-7%	-6%	217%	224%
1990	-18%	10%	-33%	-30%	-10%	-4%	-38%	-32%	-28%	-27%	298%	306%
1991	-31%	-27%	-28%	-25%	-36%	-33%	-16%	-4%	-49%	-50%	321%	326%
1992	-50%	-42%	-32%	-29%	-8%	-4%	-2%	13%	-26%	-22%	369%	359%
1993	-42%	-32%	-32%	-28%	-9%	-2%	18%	34%	14%	14%	227%	224%
1994	-47%	-34%	-33%	-30%	-42%	-39%	-15%	-5%	-92%	-92%	-38%	-39%
1995	-43%	-28%	-69%	-68%	-66%	-62%	-42%	-34%	-96%	-96%	-26%	-26%
1996	-61%	-52%	-101%	-98%	-99%	-95%	-32%	-17%	-65%	-67%	53%	47%
1985-96 Average	-41%	-30%	-37%	-35%	-30%	-26%	-23%	-14%	-42%	-42%	146%	145%

3.3.2. Southeast Alaska

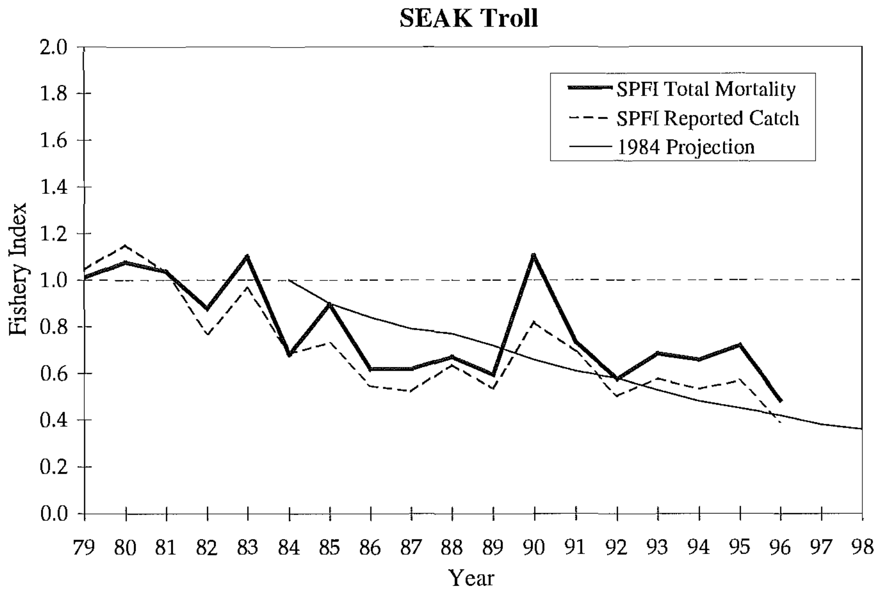


Figure 3-1. Estimated stratified proportional fishery indices for reported catch and total mortality in the SEAK troll fishery, and projected indices from the 1984 CTC chinook model.

3.3.3. North/Central B.C.

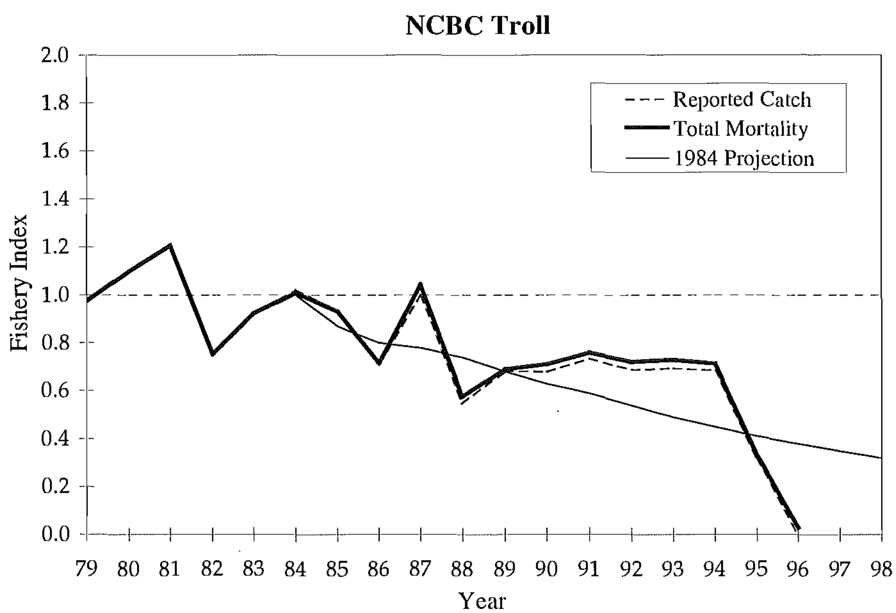


Figure 3-2. Estimated fishery indices for reported catch and total mortality in the NCBC troll fishery, and the projected indices from the 1984 CTC chinook model.

3.3.4. West Coast Vancouver Island

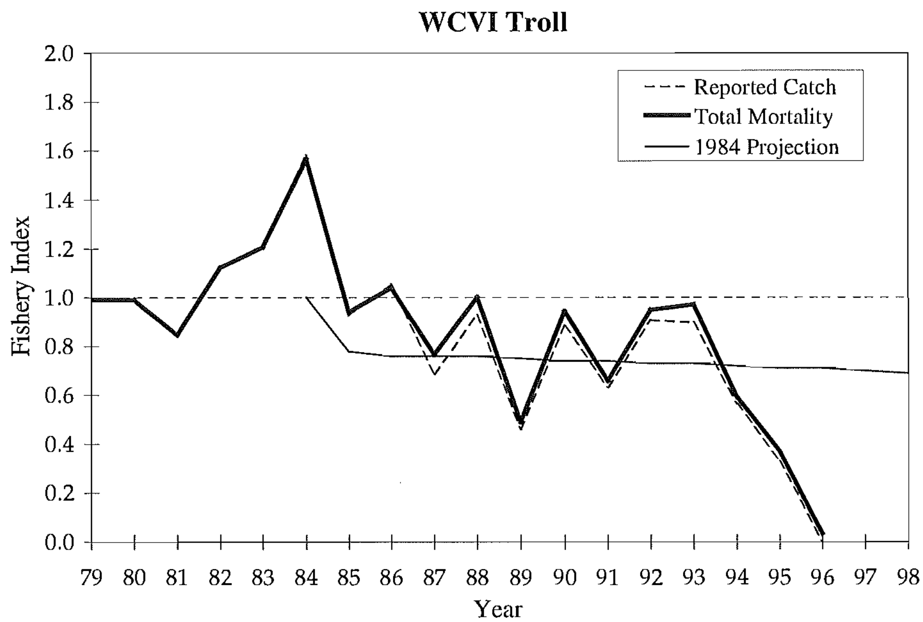


Figure 3-3. Estimated fishery indices for reported catch and total mortality for the WCVI troll fishery, and the projected indices from the 1984 CTC chinook model.

3.3.5. Strait of Georgia

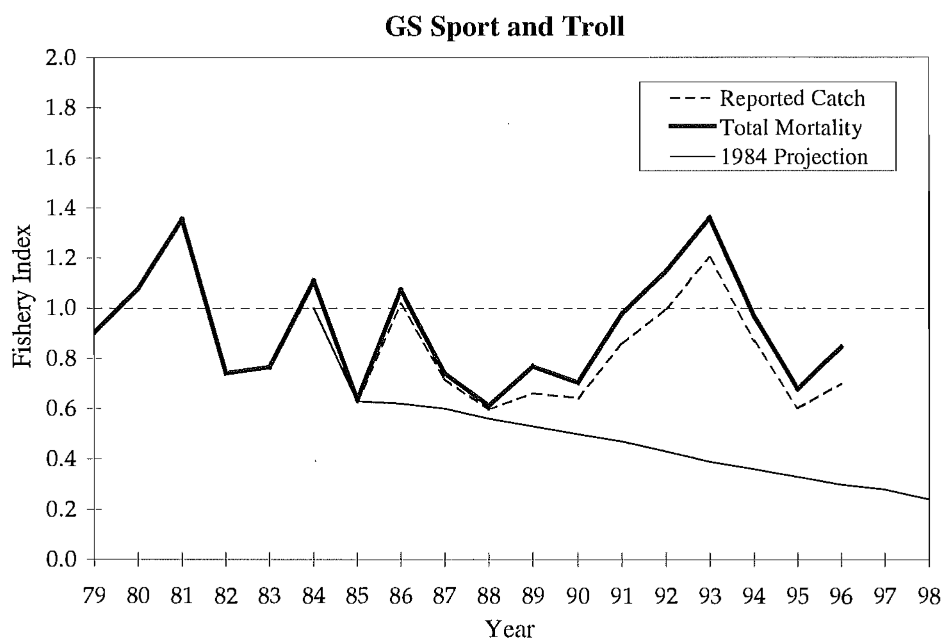


Figure 3-4. Estimated fishery indices for reported catch and total mortality for the GS sport and troll fishery, and the projected indices from the 1984 CTC chinook model.

3.3.6. U.S. South, Columbia River

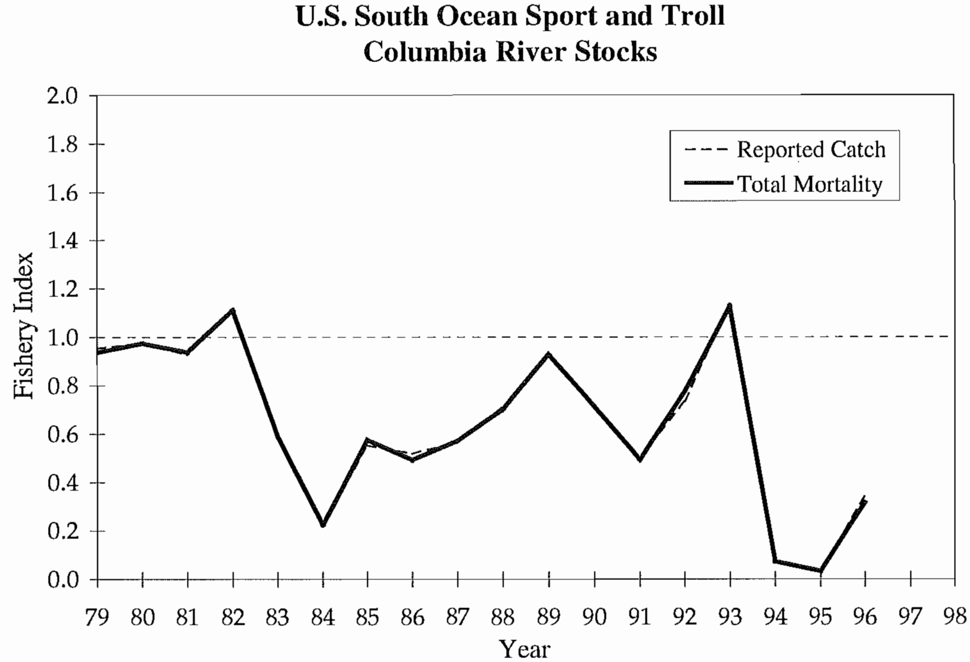


Figure 3-5 Estimated fishery indices for reported catch and total fishing mortality for the U.S. South ocean sport and troll fishery for Columbia River stocks.

3.3.7. U.S. South, Puget Sound

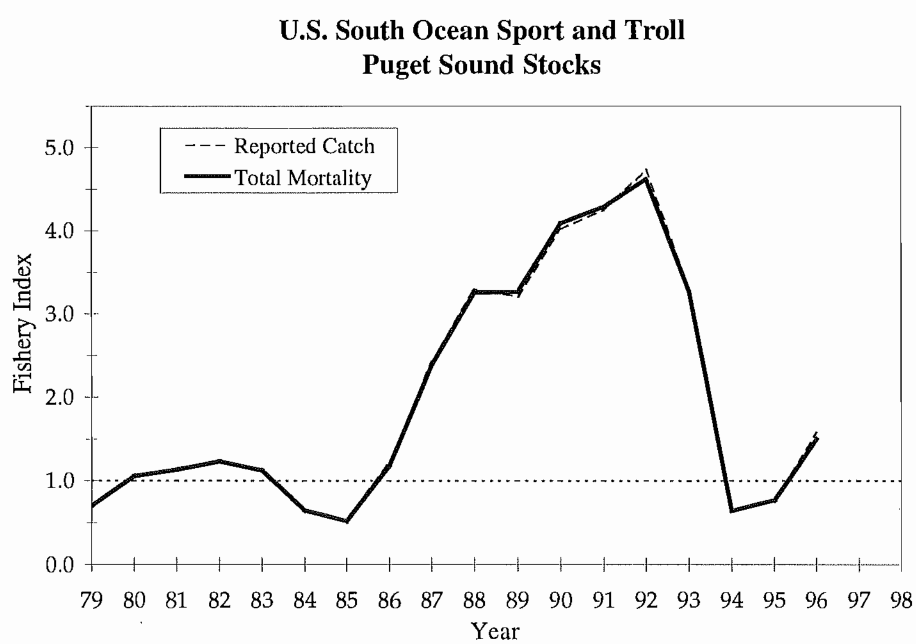


Figure 3-6. Estimated fishery indices for reported catch and total fishing mortality for the U.S. South ocean sport and troll fishery for Puget Sound stocks.

3.3.8. 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 naturally spawning stocks represented by an exploitation rate indicator stock. For example, two exploitation rate indicator stocks (Puntledge and Big Qualicum; Table 3-3) represent the LGS stock. Although the passthrough provision applies to all depressed naturally spawning 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.

For Canadian stocks, the passthrough provision was met and the target reduction achieved except in 1985 for the Upper Georgia Strait stock (Figure 3-7) and in 1986 for the Lower Georgia Strait stock (Figure 3-8).

The Passthrough provision was met in US fisheries for the Skagit Summer/Fall stock except in 1991 and 1992, when the index was just above 1.0 (Figure 3-9). The provision was also not met in 1990-1992 for the Snohomish Summer/Fall stock (Figure 3-10), and in 1990 and 1992 for the Stillaguamish Summer/Fall stock (Figure 3-11). Passthrough obligations were met in all years for both the Grays Harbor Fall and Columbia River Summer stocks (Figures 3-12 and 3-13). The passthrough provision was met in U.S. fisheries for the Quillayute Summer stock in all years except during the years 1987 – 1989 (Figure 3-14).

3.3.9. Upper Georgia Strait

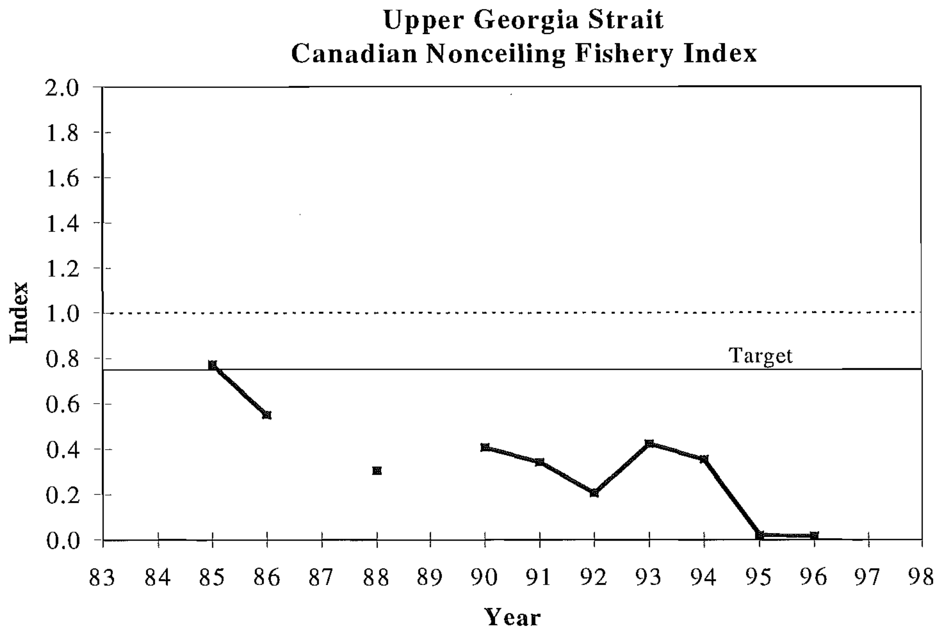


Figure 3-7. Estimated nonceiling fishery indices for the UGS stock in Canadian fisheries. Indices were not computed for 1987 and 1989 because escapement exceeded goal.

3.3.10. Lower Georgia Strait

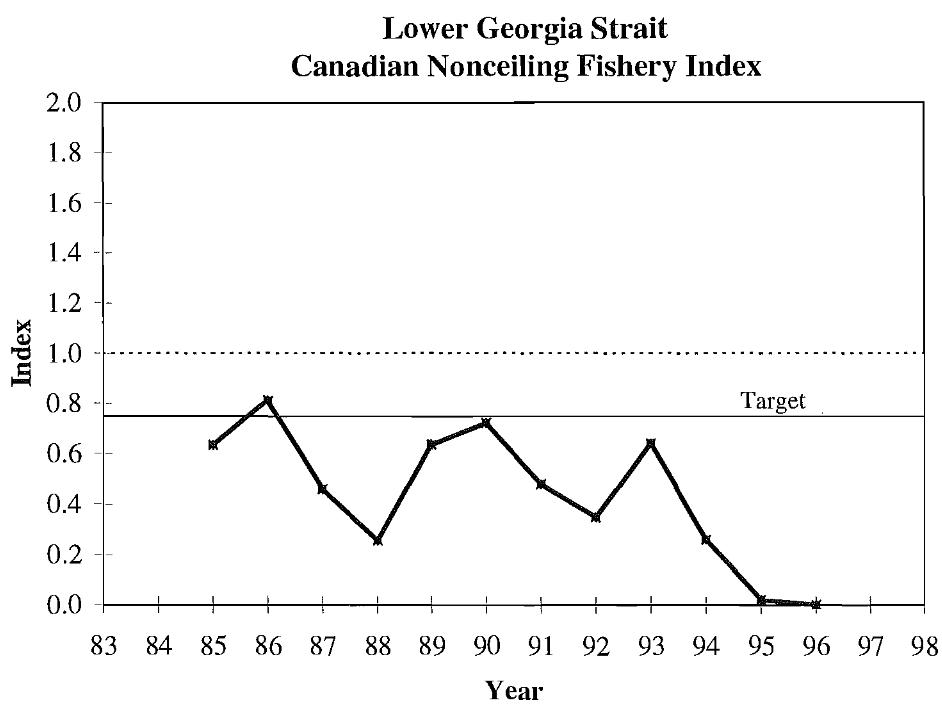


Figure 3-8. Estimated nonceiling fishery indices for the LGS stock in Canadian fisheries. Indices were not computed for 1987 and 1989 because escapement exceeded goal.

3.3.11. Skagit

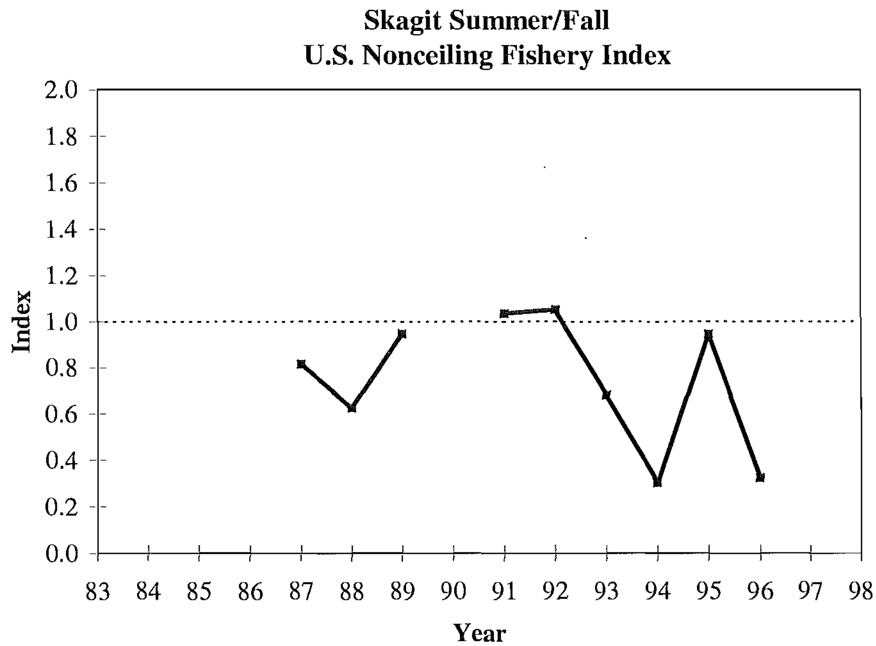


Figure 3-9. Estimated nonceiling fishery indices for the Skagit summer/fall stock in U.S. fisheries. An index was not computed for 1990 because escapement exceeded goal.

3.3.12. Snohomish

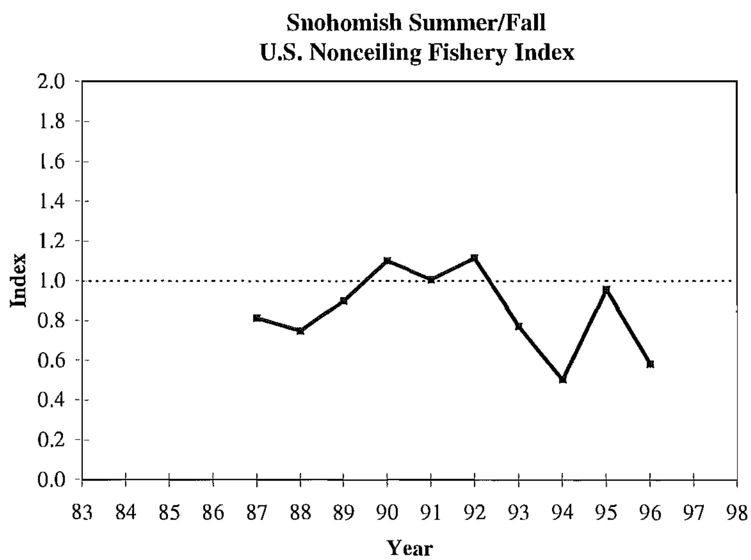


Figure 3-10 Estimated nonceiling fishery indices for the Snohomish summer/fall stock in U.S. fisheries.

3.3.13. Stillaguamish

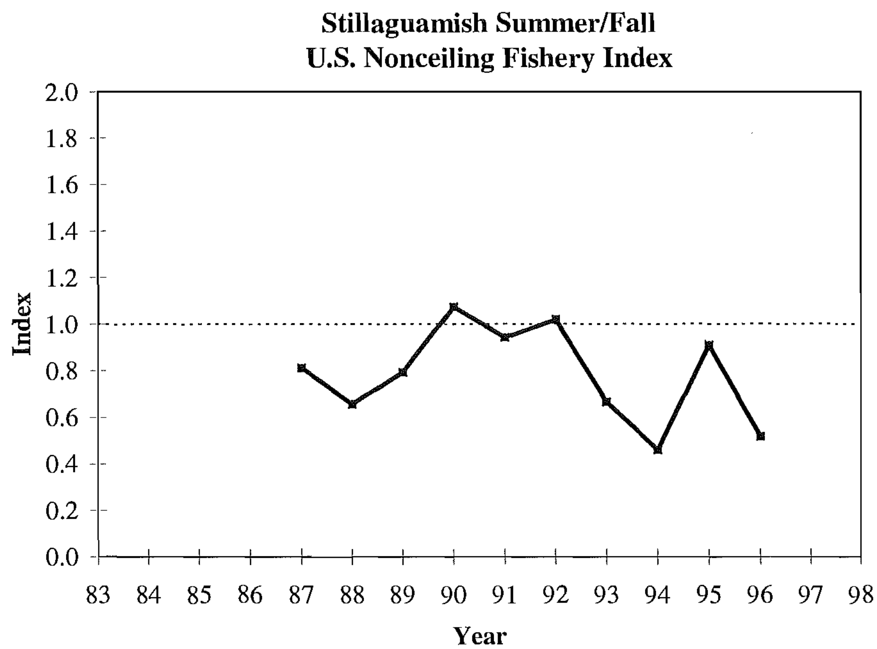


Figure 3-11. Estimated nonceiling fishery indices for the Stillaguamish summer/fall stock in U.S. fisheries.

3.3.14. Columbia River

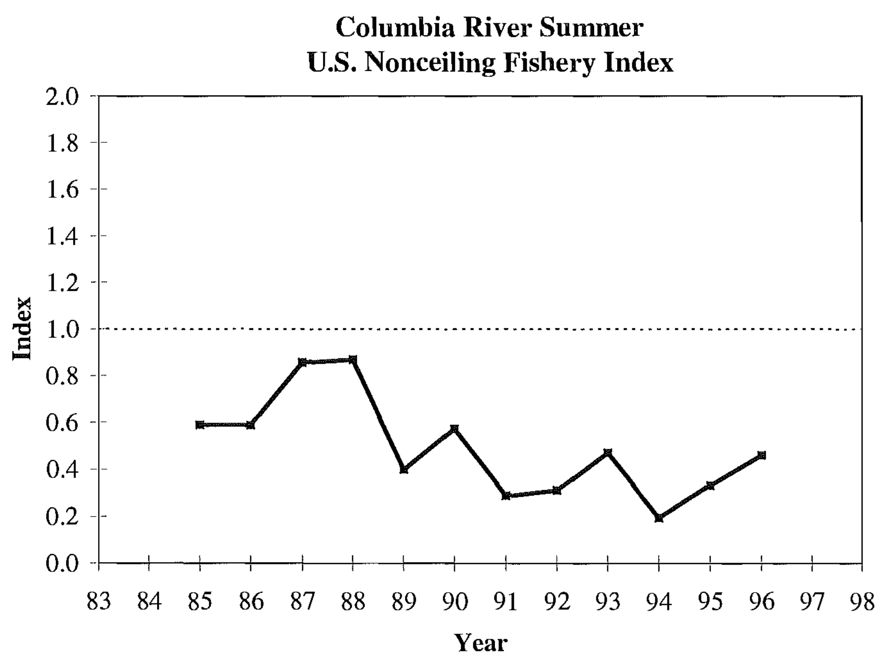


Figure 3-12. Estimated nonceiling fishery indices for the Columbia River summer stock in U.S. fisheries.

3.3.15. Grays Harbor

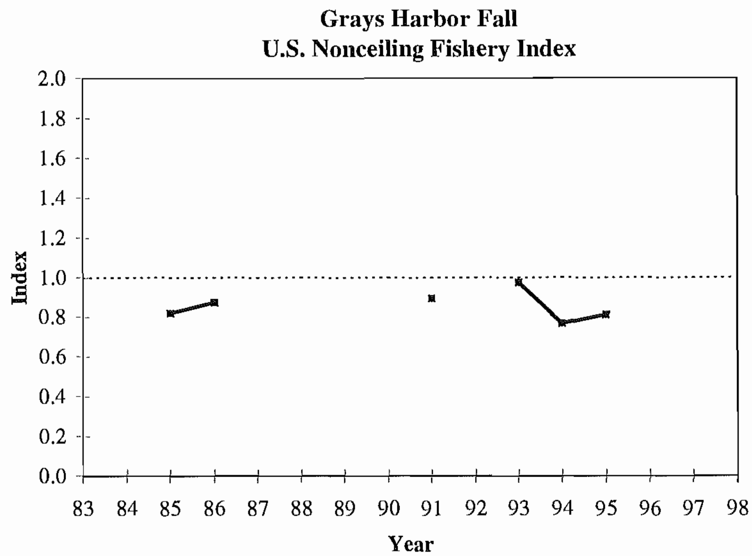


Figure 3-13. Estimated nonceiling fishery indices for Grays Harbor fall stock in U.S. fisheries. Indices were not computed for 1987-1990 and 1992 because escapement exceeded goal.

3.3.16. Quillayute

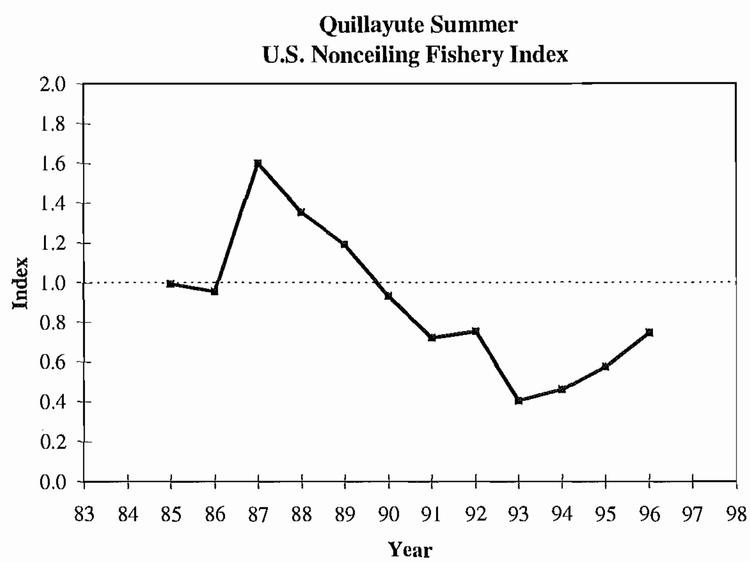


Figure 3-14. Estimated nonceiling fishery indices for Quillayute stock in U.S. fisheries.

3.4. BROOD EXPLOITATION RATES

Figures 3-15 – 3-21 provide estimates of the brood exploitation indices for each of the seven stock groups with an exploitation rate indicator stock. The brood year exploitation rates are calculated through 1992 for five-year-old stocks, and through 1991 for six-year-old stocks.

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 1991 and 1992 brood exploitation rates declined for all of the stock groups examined except UGS and SEAK/TBR-I. Changes in brood exploitation rate indices relative to the base period varied widely between the seven stock groups examined. In all groups except SEAK/TBR-I, exploitation rates based on total fishing mortalities indicate a reduction (9-66%) in ocean exploitation rates relative to the base period. For SEAK/TBR-I, the 1991 brood year total exploitation rate is 30% above the base period.

For three stock groups, there are brood year exploitation rate projections from the 1984 CTC chinook model. The 1992 brood year exploitation rate for LGS is higher than the 1984 projections. The 1992 brood year exploitation rates for WACO and WCVI are lower than the 1984 projections.

3.4.1. SEAK

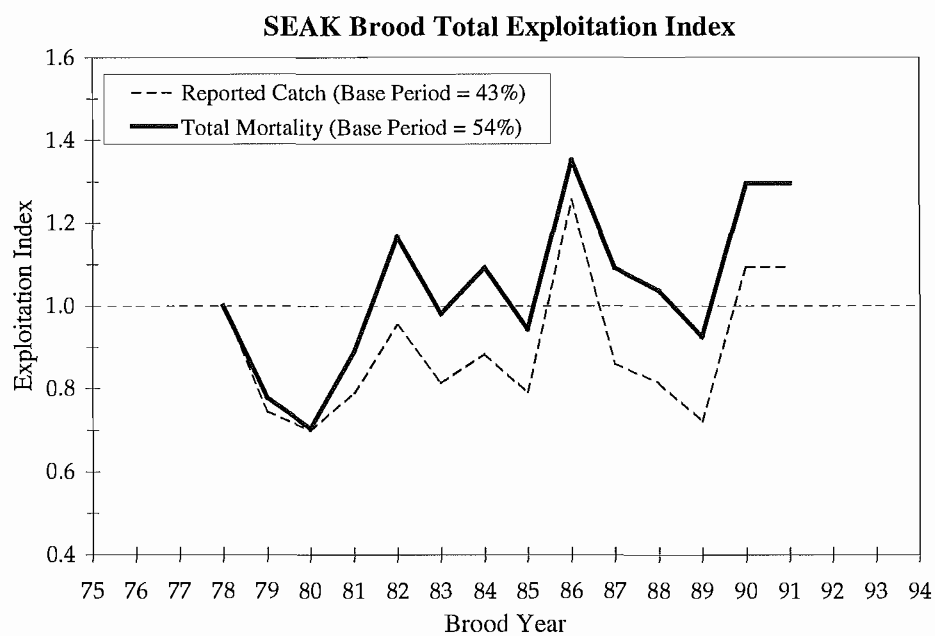


Figure 3-15. Estimated brood total exploitation indices for the SEAK/TBR-I stock group.

Figure 3-16. Estimated brood total exploitation rates for Alaska Spring stock.

Brood Year	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Reported Catch	0.43	0.32	0.30	0.34	0.41	0.35	0.38	0.34	0.54	0.37	0.35	0.31	0.47	0.47
Total Mortality	0.54	0.42	0.38	0.48	0.63	0.53	0.59	0.51	0.73	0.59	0.56	0.50	0.70	0.70

3.4.2. West Coast Vancouver Island

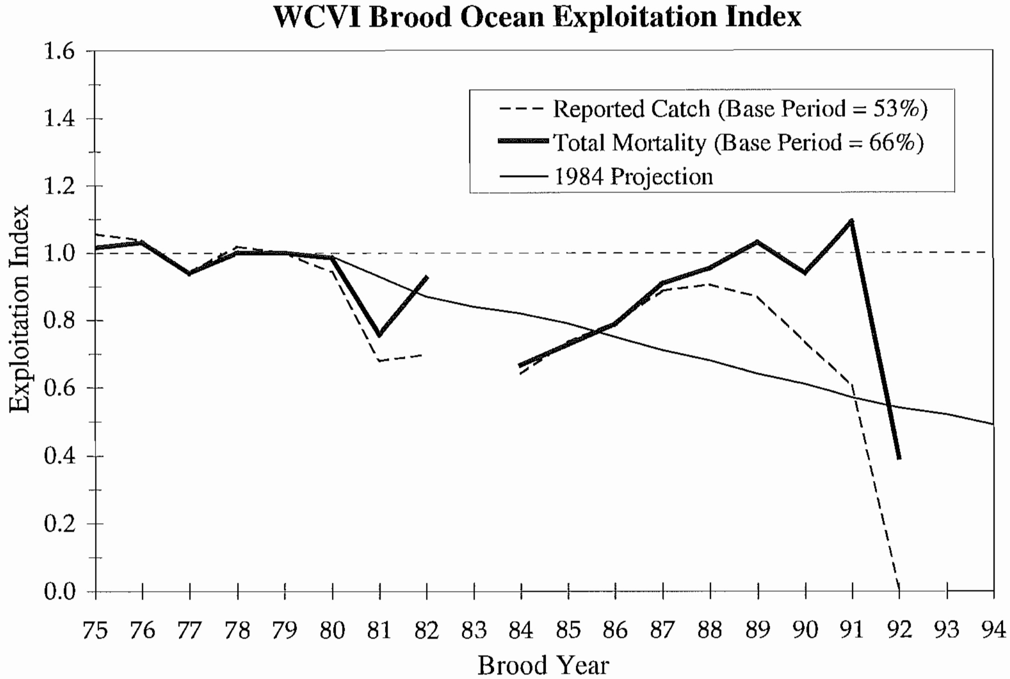


Figure 3-17. Estimated brood ocean exploitation indices for the WCVI stock group and the projected indices from the 1984 CTC chinook model.

Figure 3-18. Estimated brood ocean exploitation rates for Robertson Creek stock.

Brood Year	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Reported Catch	0.53	0.50	0.36	0.37	0.27	0.34	0.39	0.42	0.47	0.48	0.46	0.39	0.32	0.00
Total Mortality	0.66	0.65	0.50	0.61	0.78	0.44	0.48	0.52	0.60	0.63	0.68	0.62	0.72	0.26

The 1983 broods were not included in Fig. 3-16 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.

3.4.3. Upper Georgia Strait

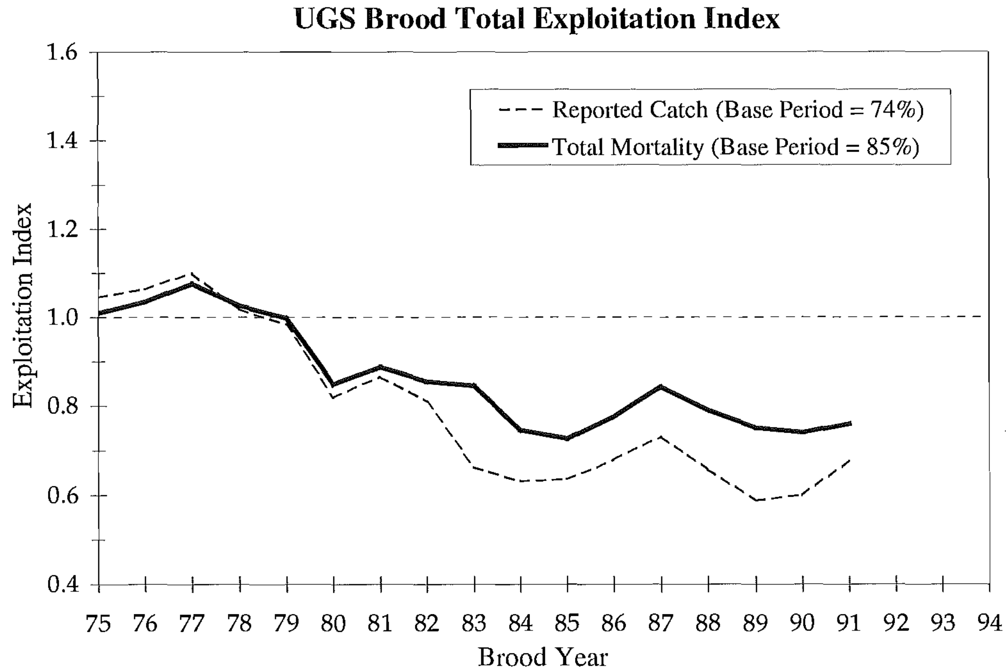


Figure 3-19. Estimated brood total exploitation indices for the UGS stock group.

Figure 3-20. Estimated brood total exploitation rates for Quinsam stock.

Brood Year	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Reported Catch	0.73	0.61	0.64	0.60	0.49	0.47	0.47	0.50	0.54	0.49	0.43	0.44	0.50
Total Mortality	0.85	0.72	0.75	0.73	0.72	0.63	0.62	0.66	0.72	0.67	0.64	0.63	0.65

3.4.4. Lower Strait of Georgia Fall Stock Group (LGS)

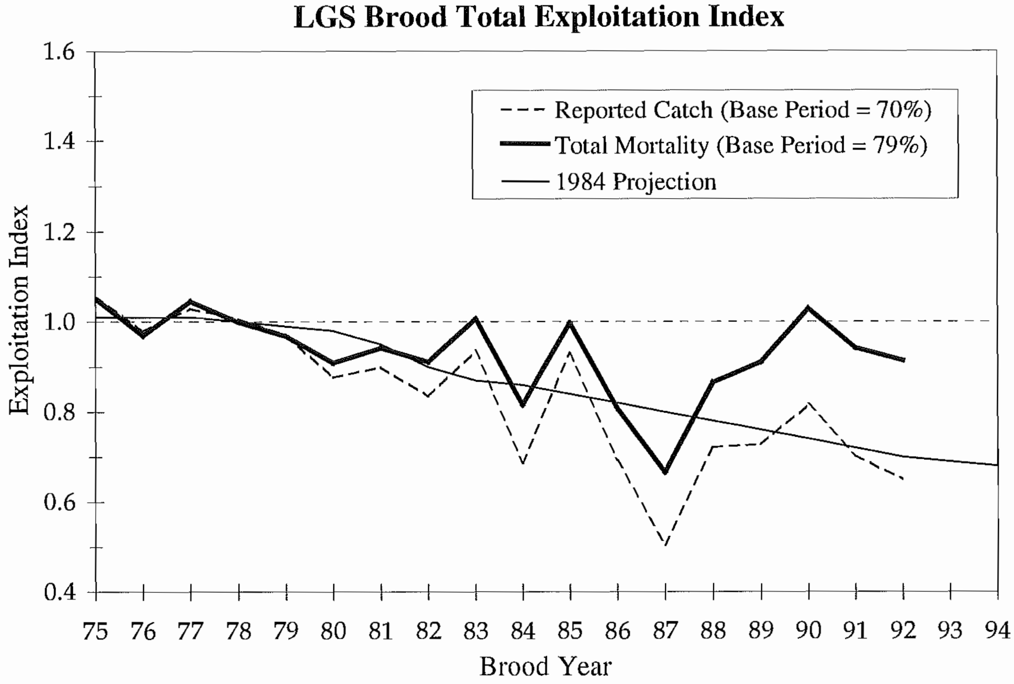


Figure 3-21. Estimated brood total exploitation indices for the LGS stock group and the projected indices from the 1984 CTC chinook model.

Figure 3-22. Estimated brood total exploitation rates for Big Qualicum stock.

Brood Year	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Reported Catch	0.71	0.69	0.68	0.60	0.66	0.51	0.56	0.54	0.50	0.53	0.56	0.48	0.39	0.46
Total Mortality	0.80	0.80	0.80	0.74	0.80	0.68	0.70	0.71	0.72	0.74	0.79	0.75	0.61	0.65

Figure 3-23. Estimated brood total exploitation rates for Puntledge stock.

Brood Year	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Reported Catch	0.65	0.54	0.58	0.57	0.65	0.45	0.74	0.43	0.21	0.48	0.46	0.66	0.59	0.45
Total Mortality	0.73	0.64	0.69	0.70	0.79	0.61	0.87	0.57	0.34	0.63	0.65	0.87	0.87	0.79

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

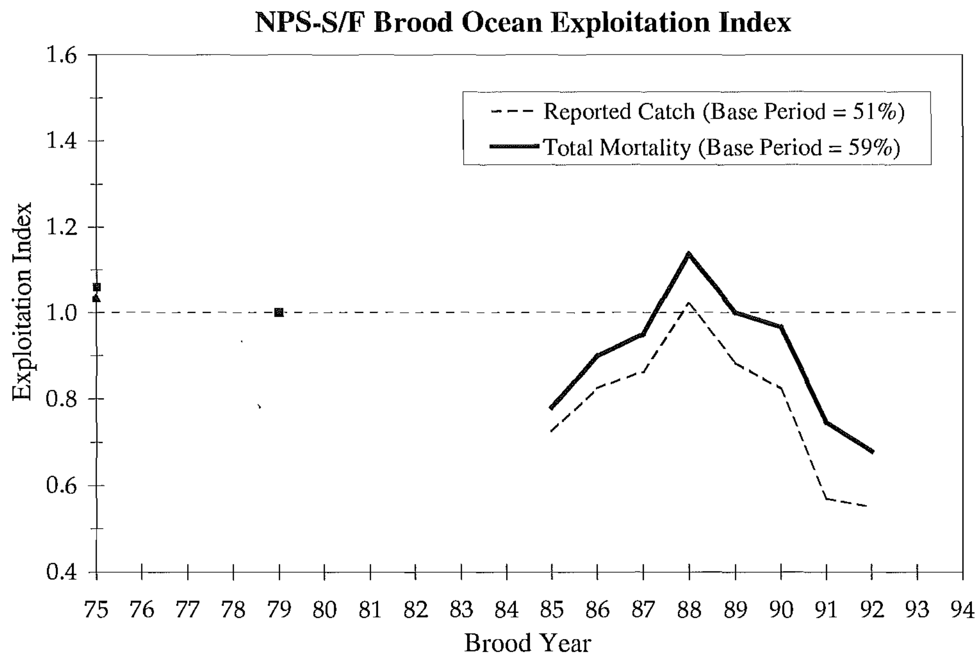


Figure 3-24. Estimated brood ocean exploitation indices for the NPS-S/F stock group.

Figure 3-25. Estimated brood ocean exploitation rates for Samish Fall Fingerling stock.

Brood Year	1985	1986	1987	1988	1989	1990	1991	1992
Reported Catch	0.37	0.42	0.44	0.52	0.45	0.42	0.29	0.28
Total Mortality	0.46	0.53	0.56	0.67	0.59	0.57	0.44	0.40

3.4.6. South Puget Sound Summer/Fall Stock Group (SPS)

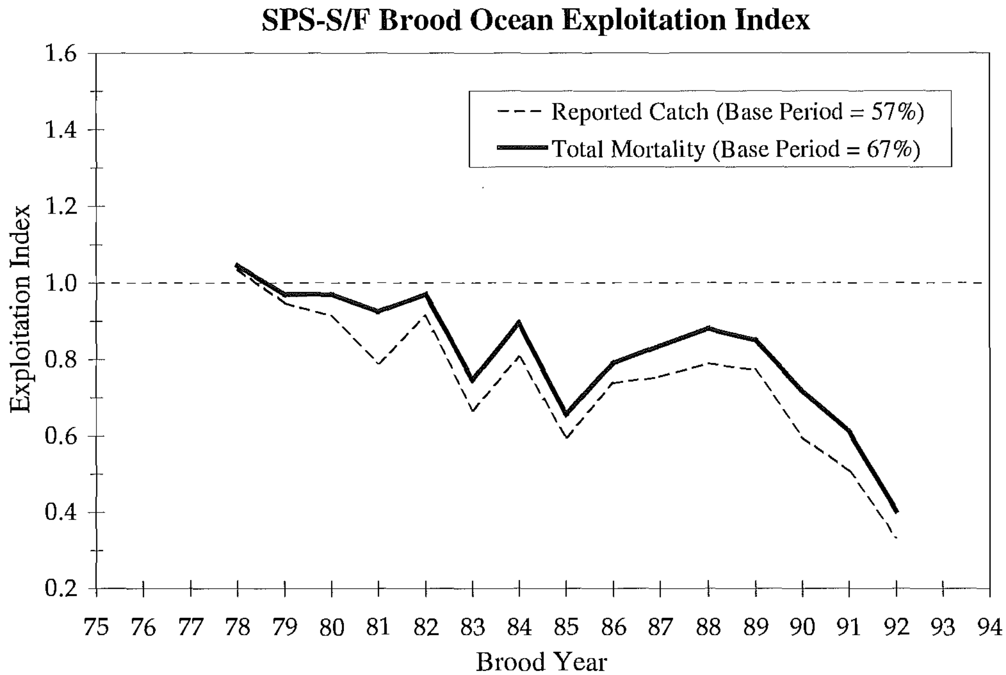


Figure 3-26. Estimated brood ocean exploitation indices for the SPS-S/F stock group.

Figure 3-27. 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	1991	1992
Reported Catch	0.54	0.52	0.45	0.52	0.38	0.46	0.34	0.42	0.43	0.45	0.44	0.34	0.29	0.19
Total Mortality	0.65	0.65	0.62	0.65	0.50	0.60	0.44	0.53	0.56	0.59	0.57	0.48	0.41	0.27

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

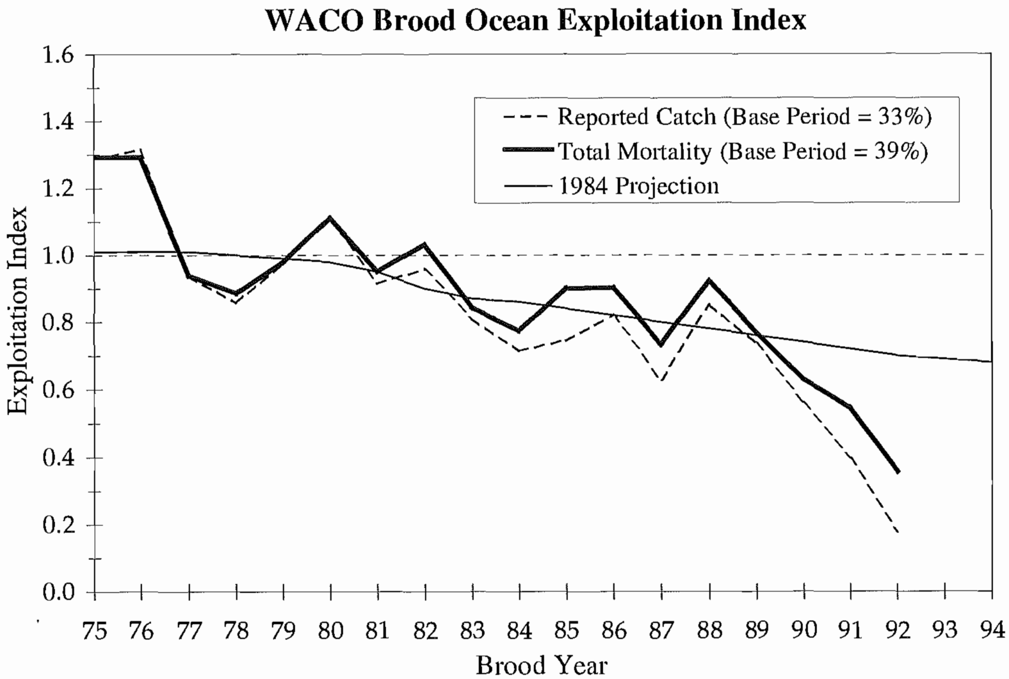


Figure 3-28. Estimated brood ocean exploitation indices for the WACO stock group in ocean fisheries and the projected indices from the 1984 CTC chinook model p.

Figure 3-29. 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	1991	1992
Reported Catch	0.29	0.45	0.32	0.29	0.34	0.29	0.23	0.26	0.18	0.32	0.30	0.23	0.07	0.08
Total Mortality	0.35	0.51	0.39	0.36	0.42	0.39	0.38	0.39	0.29	0.40	0.35	0.30	0.18	0.16

Figure 3-30. Estimated brood ocean exploitation rates for Lewis River Wild stock.

Brood Year	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Reported Catch	0.27	n/a	n/a	0.23	0.27	0.18	0.20	0.20	0.18	0.20	0.11	0.12	0.15	0.05
Total Mortality	0.33	n/a	n/a	0.27	0.33	0.22	0.27	0.24	0.23	0.26	0.15	0.16	0.20	0.10

Figure 3-31. Estimated brood ocean exploitation rates for Salmon River stock.

Brood Year	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Reported Catch	0.42	0.34	n/a	0.45	0.19	0.25	0.32	0.37	0.27	0.34	0.35	0.22	0.17	0.06
Total Mortality	0.49	0.42	n/a	0.62	0.24	0.32	0.43	0.46	0.36	0.45	0.44	0.30	0.27	0.17

3.5. SURVIVAL RATE INDICES

Graphs of the age 2-3 (age 3-4 for Alaska Spring and Willamette Spring) and cohort survival rate indices are presented in Appendix F. The correlations between the two indices for 20 out of the 24 stocks were between 0.90 and 1.00, Alaska Spring had a correlation of 0.87, Salmon River had a correlation of 0.75, and Hanford Wild Brights had a correlation of 0.36. However, there were only five years of data on which to compute the correlation for Hanford. These correlations indicate that the age 2-3 indices are generally a good predictor of cohort survival.

In general, the age 2-3 survival indices for the indicator stocks are either declining or holding steady with minor fluctuations. The one exception appears to be the Columbia River Upriver Brights which has been on an increasing trend since the 1991 brood (however, the 1994 index based solely on age-2 fish could not be computed due to a lack of recoveries).

3.6. DISCUSSION

The closure of several Canadian fisheries (CNR imposed all season) during the 1996 season required that the CTC make several changes to the exploitation analysis methods. Prior to 1996, incidental mortalities during CNR fisheries were calculated using information from the chinook retention portion of the fishery. For the 1996 analysis, a new method was developed to estimate CNR mortality based on encounter rates during a base period (*see Section 3.2.1.2*). In addition, the age 2-3 survival index for 1996 was converted to express all recoveries as spawner equivalents (AEQ). This conversion was implemented to compensate for the under-estimation of cohort survival resulting from the closure of these Canadian fisheries (a substantial portion of the age-2 and age-3 chinook recoveries are usually catch recoveries). The cohort analysis was further modified in 1996 to incorporate the incidental mortality rates for troll and sport fisheries recommended by the CTC (TCCHINOOK (97)-1, *see Section 3.2.1.1*).

Examination of coded-wire tag data for 18 of the 39 exploitation rate indicator stocks (identified in Table 3-3) indicated that:

e) In 1996, fishery indices for both reported catch and total mortality were below base levels in all PSC ceiling fisheries (Table 3-3). Total mortality fishery indices for 1996 were reduced from base period levels by 52% in SEAK troll, 98% in NCBC troll, 95% in WCVI troll, and 17% in the Strait of Georgia troll and sport fisheries. The 1995 and 1996 total mortality fishery indices for NCBC and WCVI trolls were below the projected indices from the 1984 chinook model. The SEAK troll and Strait of Georgia total mortality indices were above the 1984 projected index in both 1995 and 1996 (*see Figures 3-1 through 3-4*). The total mortality fishery indices for U.S. South ocean troll and sport were reduced 67% from the base period levels in the Columbia River stock group and increased 47% from base in the Puget Sound stock group.

f) In 1995 and 1996 nonceiling fisheries, harvest rates on wild stocks subject to the passthrough provision were below base period levels and therefore met the CTC's interpretation of passthrough obligations.

g) Brood year 1992 exploitation rates declined from brood year 1991 rates for both Total mortality and reported catch for all five of the ocean type (age 0 migrant) stock groups. The 1991 brood year exploitation rates for the UGS and SEAK/TBR-I (stream type stocks) increased or remained the same compared to 1990 for total mortality and reported catch. In all stock groups except SEAK/TBR-I, exploitation rates based on total fishing mortalites indicate a 9 to 66% reduction in ocean exploitation rates relative to the base period. For SEAK/TBR, the 1991 brood year total exploitation rate is 30% above the base period. Brood year exploitation rates indices for three of the stock groups can be compared to projections from the 1984 CTC chinook model. The 1992 brood total mortality exploitation rate index for LGS is higher than the 1984 projection. The 1992 brood total mortality exploitation rate indices for the WACO and WCVI stock groups are lower than the 1984 projections.

h) The age 2-3 survival indices are either declining or holding steady with minor fluctuations (*see Appendix F*). The one exception is the Columbia River Bright index, which has been increasing since the 1991 brood. However, it must be remembered that the brood year 1994 age-2 index for this stock was not computed because there were no fishery or escapement recoveries reported in 1996. While it is true that major Canadian ocean troll fisheries were closed to chinook retention in 1996, the CTC is concerned that a complete lack of CWT recoveries, including escapement recoveries, may signal poor survival of the 1992 brood. Other major stocks with no age-2 recoveries in 1996 include Robertson Creek, Cowlitz Fall, and Stayton Pond.

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APPENDIX A: ESCAPEMENTS AND TERMINAL RUNS

Escapements and terminal runs of PSC Chinook Technical Committee natural chinook escapement indicator stocks, 1975-1996.

Year	Southeast Alaska					
	Situk		King Salmon	Andrew	Blossom Index	Keta Index
	esc.	t.run	esc.	esc.	esc.	esc.
1975			62	520	146	203
1976	1,365	2,318	96	404	68	84
1977	1,732	2,595	199	456	112	230
1978	776	1,298	84	388	143	392
1979	1,266	2,308	113	327	54	426
1980	905	1,879	104	282	89	192
1981	702	1,270	139	536	159	329
1982	434	672	354	672	345	754
1983	592	866	245	366	589	822
1984	1,726	2,427	265	389	508	610
1985	1,521	2,233	175	640	709	624
1986	2,067	2,290	255	1,414	1,278	690
1987	1,884	2,215	196	1,302	1,349	768
1988	885	1,337	208	940	384	575
1989	563	1,073	240	1,060	344	1,155
1990	676	969	179	1,328	257	606
1991	897	1,679	134	800	239	272
1992	1,618	3,103	99	1,556	150	217
1993	980	1,717	259	2,120	303	362
1994	1,311	2,974	207	1,144	161	306
1995	4,700	13,335	144	686	217	175
1996	2,175	6,633	284	670	220	297
Goal	600		250	750	300	300

Year	Transboundary Rivers					
	Alsek (Klukshu)	Taku (6 stocks)	Stikine (L.Tahltan)	Unuk Index	Chickamin Index	Chilkat
	esc.	esc.	esc.	esc.	esc.	esc.
1975		2,089	1,400		370	
1976	1,064	4,726	800		157	
1977	2,698	5,671	1,600	974	363	
1978	2,530	3,305	1,264	1,106	308	
1979	3,104	4,156	2,332	576	239	
1980	2,487	7,544	4,274	1,016	445	
1981	1,963	9,786	6,668	731	384	
1982	1,969	4,813	5,660	1,351	571	
1983	2,237	2,062	1,188	1,125	599	
1984	1,572	3,909	2,588	1,837	1,102	
1985	1,283	7,208	3,114	1,184	956	
1986	2,607	7,520	2,891	2,126	1,745	
1987	2,491	5,743	4,783	1,973	975	
1988	1,994	8,626	7,292	1,746	786	
1989	2,202	9,480	4,715	1,149	934	
1990	1,698	12,249	4,392	591	564	
1991	2,223	10,153	4,506	655	487	5,897
1992	1,243	11,058	6,627	874	346	5,284
1993	3,221	13,204	11,449	1,068	389	4,472
1994	3,620	9,913	6,450	711	388	6,795
1995	5,397	8,757	3,259	722	356	3,790
1996	3,599	19,777	4,840	1,100	410	4,997
Goal	4,700	13,200	5,300	875	525	

Escapements and terminal runs of PSC Chinook Technical Committee natural chinook escapement indicator stocks, 1975-1996 (continued).

Year	Northern B.C.								
	AREA 1 Yakoun	AREA 3 Nass		AREA 4 Skeena		AREA 6	AREA 8 Dean	AREA 9 Rivers	AREA 10 Smith
	esc.	esc.	t.run	esc.	t.run	Index	Index	Inlet	Inlet
1975	1,500	6,025		20,319		2,225		3,280	960
1976	700	5,590		13,078		2,765		1,640	1,000
1977	800	9,060	11,460	29,018	39,606	1,820		2,225	1,050
1978	600	10,190	11,975	22,661	35,055	3,912	3,500	2,800	2,100
1979	400	8,180	9,788	18,488	28,166	3,455	4,000	2,150	500
1980	600	9,072	11,186	23,429	38,626	1,935	2,000	2,325	1,200
1981	750	7,950	9,443	24,523	42,018	1,502	3,500	3,175	1,020
1982	1,400	6,575	8,426	17,092	35,185	4,150		2,250	1,500
1983	600	8,055	13,949	23,562	39,510	2,845	500	3,320	1,050
1984	300	12,620	14,380	37,598	53,516	1,914	4,500	1,400	770
1985	1,500	8,002	11,121	53,599	76,544	1,509	4,000	3,371	230
1986	500	17,390	22,775	59,968	87,566	2,615	3,300	7,623	532
1987	2,000	11,431	15,849	59,120	76,349	1,566	1,144	5,239	1,050
1988	2,000	10,000	14,140	68,705	102,563	3,165	1,300	4,429	1,050
1989	2,800	12,525	17,526	57,202	83,439	998	2,300	3,265	225
1990	2,000	12,123	15,607	55,976	89,447	281	2,000	4,039	510
1991	1,900	4,017	12,162	52,753	79,343	709	2,400	6,635	500
1992	2,000	7,312	18,003	63,392	92,184	340	3,000	7,500	500
1993	1,000	9,715	16,850	66,977	96,018	462	700	10,000	500
1994	2,000	9,061	16,044	48,712	68,127	438	1,300	3,500	700
1995	1,500	7,950	15,363	34,390	48,351	162	1,100	3,196	400
1996	3,000	15,000	22,350	75,000	96,453	177	2,000	3,000	250
Goal	1,580	15,890		41,770		5,520	5,450	4,950	2,110

Year	Southern B.C.				Fraser River					
	W. Coast Vancouver I.	Lower Georgia 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	1,200	5,475	6,390	11,800	7,028	15,050	37,035	119,081		
1976	1,100	4,340	5,390	15,150	7,612	10,975	14,875	98,691		
1977	3,835	6,530	7,590	3,880	10,135	13,320	30,321	132,553		
1978	6,250	6,495	7,035	6,150	14,015	13,450	28,465	109,119		
1979	2,848	10,450	11,209	4,127	12,495	8,595	25,145	104,568		
1980	6,724	8,400	10,519	1,367	15,796	9,625	19,330	68,973		
1981	5,610	5,710	7,607	1,945	9,021	8,175	23,375	65,677		
1982	7,813	5,590	6,657	3,260	11,603	10,470	20,385	82,820		
1983	4,200	6,100	6,862	3,770	17,185	15,404	20,381	72,999		
1984	5,362	8,000	8,861	4,600	21,938	13,957	29,972	95,878	120,837	131,757
1985	5,200	4,150	5,242	4,600	34,527	17,595	39,997	124,380	174,778	179,255
1986	4,660	1,900	3,144	1,630	41,207	27,349	45,130	145,652	162,596	176,740
1987	3,170	1,600	3,044	6,450	39,420	27,330	36,730	127,582	79,038	82,025
1988	5,560	6,150	7,937	3,300	34,400	25,924	47,103	128,654	35,116	39,487
1989	7,220	6,150	8,123	5,550	25,310	15,095	37,975	107,136	74,685	75,090
1990	5,660	6,575	7,620	2,320	35,902	26,060	41,995	134,022	177,375	180,758
1991	6,060	10,800	12,613	3,340	27,317	21,150	36,483	112,527	90,638	93,472
1992	7,330	8,293	10,500	5,268	23,853	24,779	45,008	111,740	130,411	132,411
1993	6,230	6,150	8,872	1,574	17,569	26,876	30,860	106,829	118,998	120,681
1994	7,680	6,086	8,074	1,237	28,627	31,732	50,656	142,694	91,698	93,140
1995	4,515	15,434	19,282	4,227	35,435	27,279	39,052	125,793	28,600	32,552
1996	7,026	12,850	15,470	3,800	32,743	32,900	87,441	178,253	36,865	39,057
Goal	11,499	15,075		5,350	24,460	18,430	55,710		241,670	

Escapements and terminal runs of PSC Chinook Technical Committee natural chinook escapement indicator stocks, 1975-1996 (continued).

Year	Puget Sound									
	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	11,555	24,625	1,198	1,635	4,485	6,123	3,394	6,238
1976	812	812	14,479	23,306	2,140	4,002	5,315	9,889	3,140	7,732
1977	1,049	1,049	9,497	17,693	1,475	2,549	5,565	9,618	3,804	5,366
1978	1,220	1,220	13,209	20,030	1,232	1,959	7,931	12,591	3,304	4,349
1979	968	968	13,605	21,243	1,042	2,366	5,903	12,706	9,704	10,730
1980	1,803	1,803	20,345	28,938	821	2,647	6,460	16,688	7,743	10,608
1981	1,250	1,250	8,670	19,675	630	2,783	3,368	8,968	3,606	4,912
1982	965	965	10,439	21,022	773	3,058	4,379	8,470	1,840	3,850
1983	710	710	9,080	14,671	387	925	4,549	10,386	3,679	13,290
1984	747	747	13,239	15,005	374	883	3,762	8,480	3,353	5,381
1985	3,249	3,249	16,298	25,075	1,409	2,641	4,873	9,005	2,908	7,444
1986	1,978	1,978	18,127	21,585	1,277	2,416	4,534	8,267	4,792	5,784
1987	1,979	1,979	9,647	13,037	1,321	1,906	4,689	6,670	10,338	11,724
1988	2,064	2,064	11,954	14,647	717	1,176	4,513	7,389	7,994	9,207
1989	1,515	1,924	6,776	12,787	811	1,642	3,138	6,142	11,512	15,000
1990	1,592	1,627	17,206	19,172	842	1,739	4,209	8,345	7,035	15,200
1991	1,411	1,448	6,014	8,425	1,632	2,913	2,783	4,964	10,548	14,967
1992	1,001	1,025	7,671	9,201	780	1,254	2,708	4,319	5,267	9,941
1993	788	818	5,916	6,879	928	1,294	3,866	5,602	2,476	5,202
1994	899	1,027	6,231	6,479	954	1,285	3,626	4,885	4,078	7,963
1995	2,010	2,079	7,155	9,301	822	1,398	3,176	5,000	7,939	9,743
1996	1,728	1,728	12,025	12,193	1,384	2,260	4,851	7,921	6,026	8,668
Goal	3,000		14,900		2,000		5,250		5,800	

Year	Washington Coast															
	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	1,300	1,700	2,500	4,700	600	1,300	2,500	3,100	500	700	1,200	2,500	600	1,000	1,800	8,900
1977	3,800	5,300	3,300	7,600	1,000	2,000	2,100	3,800	700	1,200	3,600	5,500	800	1,700	5,200	13,200
1978	2,300	2,700	4,700	6,200	1,400	2,472	1,900	2,900	1,100	1,400	2,200	3,100	1,000	1,600	4,600	10,600
1979	2,100	3,900	3,900	6,600	1,400	2,326	1,700	2,200	900	1,400	3,900	4,700	400	1,100	9,400	12,100
1980	900	1,500	6,700	7,600	800	1,079	2,200	2,800	1,000	1,200	3,200	5,800	200	600	11,700	22,000
1981	800	1,700	5,963	7,102	1,498	2,005	3,100	4,000	1,000	1,300	4,300	8,000	600	900	7,600	13,400
1982	1,200	2,700	7,107	9,651	1,553	2,125	4,500	5,800	800	1,200	4,100	6,200	600	700	5,600	14,600
1983	1,400	1,800	3,069	5,530	1,696	2,233	2,500	3,300	1,000	1,200	2,600	3,800	800	900	5,500	9,900
1984	600	1,000	9,128	10,447	1,430	2,005	1,900	2,600	1,000	1,200	3,900	5,300	1,100	1,100	21,000	23,700
1985	600	700	6,145	8,367	978	1,353	1,725	2,720	700	900	3,700	5,200	1,200	1,200	9,500	16,900
1986	600	1,000	10,006	13,529	1,248	1,912	4,981	6,000	900	1,200	7,800	8,900	2,000	2,000	13,700	23,300
1987	600	1,600	12,352	20,663	1,710	2,480	4,006	6,147	600	1,500	6,500	10,000	900	1,100	18,800	34,600
1988	1,300	2,600	15,168	22,166	2,605	3,712	4,128	6,873	1,800	2,300	8,400	11,000	3,500	3,600	28,200	39,600
1989	2,407	3,445	9,951	17,102	4,697	6,863	5,148	8,682	2,600	4,000	8,700	11,200	2,100	2,400	25,700	56,000
1990	1,483	1,826	13,711	16,937	3,886	5,294	4,236	6,298	1,800	2,500	10,100	12,300	1,500	1,600	17,200	40,100
1991	1,190	1,507	6,292	7,655	1,078	1,693	1,420	2,611	600	800	4,500	5,900	1,300	1,500	14,400	33,200
1992	1,008	1,291	6,342	7,850	1,018	1,406	4,003	5,136	400	500	4,700	6,300	1,700	1,700	16,900	33,200
1993	1,292	1,531	5,254	5,735	1,411	2,077	2,280	3,766	700	800	3,400	5,100	1,335	1,433	11,844	33,874
1994	974	1,187	4,932	5,692	1,699	2,325	3,967	4,806	700	700	3,800	5,900	1,402	1,478	11,816	30,568
1995	1,333	1,501	5,532	6,512	1,132	1,637	2,202	2,898	700	700	2,100	4,400	2,070	2,156	9,952	31,926
1996	1,269	1,414	7,316	9,043	1,371	1,978	3,070	4,067	600	700	4,200	5,300	4,647	NA	16,988	33,569
Goal	1,200												1,400		14,600	
Floor			3,000		900		1,200		700		2,500					

Escapements and terminal runs of PSC Chinook Technical Committee natural chinook escapement indicator stocks, 1975-1996 (continued).

Year	Columbia River									
	Col. Upriver spring		Mid-Columbia summer		Snake summer		Col. Upriver summer [1]		Col. Upriver bright [2]	
	esc.	t.run	esc.	t.run	esc.	t.run	esc.	t.run	esc.	t.run
1975									29,600	112,500
1976									28,800	115,100
1977									37,600	95,100
1978									27,900	85,300
1979	25,322	26,230	21,670	22,706	2,712	2,164	24,382	24,870	31,200	89,200
1980	29,521	30,662	19,771	20,701	2,688	3,426	22,459	24,127	29,900	76,800
1981	34,074	35,183	13,962	14,881	3,326	5,235	17,288	20,116	21,114	66,600
1982	35,302	36,442	11,665	12,613	3,529	5,518	15,194	18,131	31,103	79,000
1983	26,783	28,218	10,166	10,442	3,233	5,113	13,399	15,555	48,735	86,100
1984	22,611	24,503	14,726	15,062	4,200	4,583	18,926	19,645	59,352	131,400
1985	32,502	33,798	15,728	16,754	3,196	3,124	18,924	19,878	86,725	196,400
1986	42,588	45,445	14,699	15,486	3,934	5,100	18,633	20,586	108,193	281,500
1987	37,315	40,090	19,855	21,112	2,414	4,350	22,269	25,462	147,957	420,600
1988	32,774	35,598	17,217	18,182	2,263	4,116	19,480	22,298	108,585	340,000
1989	27,399	30,196	21,306	21,421	2,350	3,196	23,656	24,617	90,285	261,100
1990	20,396	22,326	16,970	17,076	3,378	4,407	20,348	21,483	53,421	153,600
1991	14,571	15,941	12,551	12,690	2,814	3,369	15,365	16,059	42,387	102,100
1992	31,223	33,748	9,281	9,364	1,148	1,840	10,429	11,204	48,428	80,600
1993	24,924	26,947	13,528	13,866	3,959	3,410	17,487	17,276	51,678	102,900
1994	8,221	8,757	13,893	14,109	305	411	14,198	14,520	81,158	132,800
1995	3,745	4,034	10,763	11,091	371	534	11,134	11,625	63,500	106,500
1996	15,248	16,389	9,553	9,901	2,129	3,046	11,682	12,947	68,677	143,200
Goal	84,000						85,000[1]		40,000	

[1] Columbia Upriver summers are a single indicator stock with an escapement goal of 85,000. Mid-Columbia summers and Snake River summers exhibit different life histories, and only the Mid-Columbia component is included in the Columbia River Summer model stock. For reference, data are given for each stock, based on the run reconstruction (TAC 1997).

[2] The CRFMP stated an interim escapement goal of 40,000 natural spawning Upriver Brights at McNary Dam, including 38,700 for Hanford Reach and 1,100 in the Snake River. In 1990, the escapement goal was increased to 45,000 for increased hatchery production. In 1994, a management goal of 46,000 was established, and in 1995, the management goal was retained while the escapement goal was reduced to 43,500.

Escapements and terminal runs of PSC Chinook Technical Committee natural chinook escapement indicator stocks, 1975-1996 (continued).

Year	Columbia River				Oregon	
	Lewis fall		Deschutes fall [3]		North Oregon Coast	Mid-Oregon Coast
	esc.	t.run	esc.	t.run	Density Index	Density Index
1975	12,533	23,606			33	52
1976	3,064	7,117			25	30
1977	6,321	15,001	5,631	7,492	39	63
1978	4,877	9,144	4,154	6,125	40	61
1979	7,307	16,176	3,291	4,883	48	71
1980	13,882	28,302	2,542	4,493	51	70
1981	17,946	20,174	3,183	5,020	47	54
1982	7,353	8,922	4,890	6,906	54	71
1983	11,756	13,492	3,669	5,165	36	47
1984	6,847	10,554	2,025	2,995	68	45
1985	6,629	10,580	2,645	3,452	84	39
1986	10,300	20,560	3,801	4,954	89	51
1987	12,200	25,821	4,097	6,154	75	82
1988	11,172	24,566	3,520	5,911	130	97
1989	20,058	28,754	4,770	6,500	79	57
1990	15,378	18,359	2,224	3,194	63	43
1991	8,667	15,556	3,532	3,686	75	54
1992	5,502	8,650	2,776	2,813	79	96
1993	6,429	9,607	8,239	8,250	38	82
1994	8,059	9,130	5,524	5,524	79	94
1995	9,563	10,834	7,588	7,624	74	99
1996	14,166	14,600	8,763	8,841	84	121
1997						
Goal	5,700		NA		NA	NA

[3] The time series data in previous CTC reports was for the Lower River wild composite, and included some natural production from the Cowlitz and Sandy Rivers. This year, the time series was replaced with data from the Lewis River only.

APPENDIX B: STOCK CATCH DISTRIBUTIONS

Alaska Spring

Distribution of Reported Catch in Adult Equivalents

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	94.6%	5.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
84	96.1%	3.8%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
85	97.1%	2.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
86	98.3%	1.7%	0.0%	0.0%	0.0%	0.0%	0.0%	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%	0.0%	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	97.6%	2.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
95	98.8%	1.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
96	99.3%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
(83-96)	97.7%	2.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
(83-84)	95.4%	4.6%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
(85-90)	97.6%	2.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
(91-96)	98.6%	1.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Distribution of Total Mortalities in Adult Equivalents

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%	4.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
84	96.6%	3.3%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
85	97.9%	2.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
86	98.7%	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	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	96.9%	3.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
91	98.4%	1.6%	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	99.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
94	98.5%	1.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
95	98.8%	1.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
96	99.3%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
(83-96)	98.1%	1.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
(83-84)	96.2%	3.7%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
(85-90)	98.0%	2.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
(91-96)	98.8%	1.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Robertson Creek

Distribution of Reported Catch in Adult Equivalents

	Fisheries with ceilings				Other fisheries				
Catch Year	All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
79	32.2%	43.2%	11.4%	2.4%	3.2%	7.4%	0.0%	0.2%	0.0%
80	45.3%	26.3%	9.4%	0.3%	14.5%	4.1%	0.1%	0.0%	0.0%
81	39.3%	30.6%	6.3%	1.2%	16.3%	6.4%	0.0%	0.0%	0.0%
82	36.1%	30.9%	6.8%	1.0%	17.7%	7.6%	0.0%	0.0%	0.0%
83	46.4%	22.6%	5.7%	0.3%	19.6%	5.0%	0.0%	0.3%	0.0%
84	35.5%	21.3%	7.0%	0.8%	18.6%	16.6%	0.0%	0.2%	0.0%
85	30.6%	32.3%	2.8%	1.1%	5.1%	25.2%	0.0%	2.8%	0.0%
86	30.1%	19.6%	6.6%	0.0%	2.2%	40.1%	0.0%	0.0%	1.4%
87	17.9%	26.6%	5.1%	1.1%	2.1%	46.4%	0.0%	0.6%	0.3%
88	23.3%	19.3%	7.3%	1.1%	14.5%	33.5%	0.0%	0.6%	0.3%
89	17.7%	16.9%	2.6%	1.2%	32.2%	29.2%	0.0%	0.1%	0.1%
90	31.7%	20.5%	10.8%	0.5%	17.8%	18.5%	0.0%	0.0%	0.2%
91	30.2%	19.9%	6.6%	0.4%	22.2%	20.4%	0.0%	0.0%	0.1%
92	31.7%	21.4%	31.7%	0.2%	1.2%	13.7%	0.0%	0.1%	0.1%
93	27.1%	16.4%	20.2%	0.7%	12.1%	23.2%	0.1%	0.0%	0.1%
94	33.5%	19.5%	8.1%	0.6%	5.2%	32.9%	0.0%	0.0%	0.1%
95	40.7%	10.0%	3.3%	3.0%	15.7%	27.0%	0.0%	0.4%	0.0%
96	59.4%	26.1%	0.0%	14.5%	0.0%	0.0%	0.0%	0.0%	0.0%
(79-96)	33.8%	23.5%	8.4%	1.7%	12.2%	19.9%	0.0%	0.3%	0.2%
(79-84)	39.1%	29.2%	7.8%	1.0%	15.0%	7.9%	0.0%	0.1%	0.0%
(85-90)	25.2%	22.5%	5.9%	0.8%	12.3%	32.1%	0.0%	0.7%	0.4%
(91-96)	37.1%	18.9%	11.7%	3.2%	9.4%	19.5%	0.0%	0.1%	0.1%

Distribution of Total Mortalities in Adult Equivalents

	Fisheries with ceilings				Other fisheries				
Catch Year	All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
79	35.6%	40.8%	11.0%	2.1%	2.8%	7.5%	0.0%	0.2%	0.0%
80	45.9%	26.6%	9.6%	0.3%	13.4%	4.2%	0.0%	0.0%	0.0%
81	42.9%	29.5%	6.2%	1.1%	13.8%	6.5%	0.0%	0.0%	0.0%
82	39.9%	29.7%	6.6%	1.0%	15.3%	7.5%	0.0%	0.0%	0.0%
83	50.7%	21.3%	5.4%	0.3%	17.2%	4.8%	0.0%	0.3%	0.0%
84	36.5%	21.2%	7.2%	0.8%	17.3%	16.8%	0.0%	0.2%	0.0%
85	42.4%	26.6%	2.3%	0.9%	4.0%	21.3%	0.0%	2.5%	0.0%
86	42.2%	19.0%	5.9%	0.0%	1.7%	30.2%	0.0%	0.0%	1.1%
87	23.4%	24.0%	4.6%	1.0%	1.5%	44.8%	0.0%	0.5%	0.2%
88	28.0%	19.0%	7.5%	1.1%	12.1%	31.5%	0.0%	0.6%	0.2%
89	25.9%	17.3%	2.8%	1.4%	25.6%	26.8%	0.0%	0.1%	0.1%
90	38.1%	20.8%	10.2%	0.5%	13.8%	16.5%	0.0%	0.0%	0.1%
91	34.2%	20.1%	6.7%	0.5%	18.9%	19.4%	0.0%	0.0%	0.1%
92	39.9%	19.4%	28.2%	0.2%	0.9%	11.3%	0.0%	0.1%	0.1%
93	30.8%	16.2%	20.0%	0.7%	10.4%	21.8%	0.1%	0.0%	0.1%
94	38.4%	18.1%	7.7%	0.6%	4.5%	30.6%	0.0%	0.0%	0.1%
95	42.1%	10.4%	3.5%	3.0%	14.4%	26.3%	0.0%	0.3%	0.0%
96	65.3%	18.8%	0.0%	11.9%	0.0%	4.0%	0.0%	0.0%	0.0%
(79-96)	39.0%	22.2%	8.1%	1.5%	10.4%	18.4%	0.0%	0.3%	0.1%
(79-84)	41.9%	28.2%	7.7%	0.9%	13.3%	7.9%	0.0%	0.1%	0.0%
(85-90)	33.3%	21.1%	5.5%	0.8%	9.8%	28.5%	0.0%	0.6%	0.3%
(91-96)	41.8%	17.2%	11.0%	2.8%	8.2%	18.9%	0.0%	0.1%	0.1%

Quinsam

Distribution of Reported Catch in Adult Equivalents

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%	66.6%	0.0%	12.2%	7.5%	0.0%	0.0%	0.0%	0.0%
80	31.5%	51.2%	0.0%	7.5%	9.8%	0.0%	0.0%	0.0%	0.0%
81	21.3%	54.3%	0.7%	15.3%	8.4%	0.0%	0.0%	0.0%	0.0%
82	38.7%	46.1%	0.5%	5.0%	9.8%	0.0%	0.0%	0.0%	0.0%
83	31.4%	52.9%	0.8%	5.4%	9.5%	0.0%	0.0%	0.0%	0.0%
84	36.5%	42.1%	1.1%	11.0%	9.2%	0.0%	0.0%	0.0%	0.0%
85	53.7%	28.6%	0.2%	6.1%	11.4%	0.0%	0.0%	0.0%	0.0%
86	31.8%	51.1%	0.0%	8.6%	8.5%	0.0%	0.0%	0.0%	0.0%
87	26.6%	55.5%	0.6%	6.1%	10.6%	0.6%	0.0%	0.0%	0.0%
88	45.6%	35.1%	1.5%	7.6%	8.1%	1.9%	0.0%	0.0%	0.3%
89	33.8%	26.6%	0.6%	13.9%	24.8%	0.0%	0.0%	0.2%	0.0%
90	33.4%	51.3%	2.3%	5.7%	7.4%	0.0%	0.0%	0.0%	0.0%
91	25.2%	60.3%	0.8%	7.2%	5.3%	1.2%	0.0%	0.0%	0.0%
92	28.3%	60.4%	0.6%	6.4%	4.3%	0.0%	0.0%	0.0%	0.0%
93	19.1%	58.2%	1.8%	15.6%	5.3%	0.0%	0.0%	0.0%	0.0%
94	22.4%	57.3%	0.0%	12.6%	7.7%	0.0%	0.0%	0.0%	0.0%
95	26.5%	59.8%	0.0%	12.8%	0.9%	0.0%	0.0%	0.0%	0.0%
96	20.7%	60.9%	0.0%	17.2%	1.1%	0.0%	0.0%	0.0%	0.0%
(79-96)	30.0%	51.0%	0.6%	9.8%	8.3%	0.2%	0.0%	0.0%	0.0%
(79-84)	28.8%	52.2%	0.5%	9.4%	9.0%	0.0%	0.0%	0.0%	0.0%
(85-90)	37.5%	41.4%	0.8%	8.0%	11.8%	0.4%	0.0%	0.0%	0.0%
(91-96)	23.7%	59.5%	0.5%	12.0%	4.1%	0.2%	0.0%	0.0%	0.0%

Distribution of Total Mortalities in Adult Equivalents

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	17.3%	64.5%	0.1%	11.0%	7.1%	0.0%	0.0%	0.0%	0.0%
80	31.9%	51.4%	0.0%	7.3%	9.4%	0.0%	0.0%	0.0%	0.0%
81	21.9%	54.5%	0.7%	14.9%	7.9%	0.0%	0.0%	0.0%	0.0%
82	42.2%	43.9%	0.4%	4.8%	8.7%	0.0%	0.0%	0.0%	0.0%
83	35.3%	50.2%	0.7%	5.4%	8.4%	0.0%	0.0%	0.0%	0.0%
84	37.8%	41.5%	1.2%	11.0%	8.6%	0.0%	0.0%	0.0%	0.0%
85	60.8%	24.5%	0.1%	5.3%	9.3%	0.0%	0.0%	0.0%	0.0%
86	39.6%	45.4%	0.0%	8.0%	7.0%	0.0%	0.0%	0.0%	0.0%
87	40.6%	45.8%	0.6%	4.8%	7.9%	0.4%	0.0%	0.0%	0.0%
88	48.1%	33.8%	1.6%	7.2%	7.2%	1.8%	0.0%	0.0%	0.3%
89	41.6%	23.6%	0.5%	13.6%	20.4%	0.0%	0.0%	0.2%	0.0%
90	38.5%	47.5%	2.2%	5.7%	6.2%	0.0%	0.0%	0.0%	0.0%
91	31.6%	55.0%	0.8%	7.0%	4.5%	1.0%	0.0%	0.0%	0.0%
92	33.2%	56.3%	0.5%	6.3%	3.7%	0.0%	0.0%	0.0%	0.0%
93	26.0%	51.9%	1.7%	16.3%	4.2%	0.0%	0.0%	0.0%	0.0%
94	27.0%	52.9%	0.0%	13.2%	6.9%	0.0%	0.0%	0.0%	0.0%
95	22.6%	57.5%	0.0%	19.4%	0.5%	0.0%	0.0%	0.0%	0.0%
96	16.4%	62.3%	0.7%	19.9%	0.7%	0.0%	0.0%	0.0%	0.0%
(79-96)	34.0%	47.9%	0.7%	10.1%	7.1%	0.2%	0.0%	0.0%	0.0%
(79-84)	31.1%	51.0%	0.5%	9.0%	8.4%	0.0%	0.0%	0.0%	0.0%
(85-90)	44.9%	36.8%	0.8%	7.4%	9.7%	0.4%	0.0%	0.0%	0.1%
(91-96)	26.1%	56.0%	0.6%	13.7%	3.4%	0.2%	0.0%	0.0%	0.0%

Puntledge

Distribution of Reported Catch in Adult Equivalents

Catch Year	All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
	------Fisheries with ceilings------				------------Other fisheries------------				
79	2.5%	27.5%	1.4%	59.1%	9.5%	0.0%	0.0%	0.0%	0.0%
80	4.5%	20.6%	7.5%	58.5%	8.9%	0.0%	0.0%	0.0%	0.0%
81	1.2%	23.3%	0.0%	69.3%	6.2%	0.0%	0.0%	0.0%	0.0%
82	2.7%	37.0%	2.7%	32.8%	24.9%	0.0%	0.0%	0.0%	0.0%
83	1.9%	49.8%	3.8%	40.4%	4.1%	0.0%	0.0%	0.0%	0.0%
84	2.6%	28.2%	5.1%	58.1%	6.0%	0.0%	0.0%	0.0%	0.0%
85	19.4%	29.6%	0.0%	43.9%	7.1%	0.0%	0.0%	0.0%	0.0%
86	12.2%	22.9%	3.8%	58.8%	2.3%	0.0%	0.0%	0.0%	0.0%
87	10.5%	52.3%	0.0%	29.1%	0.0%	8.1%	0.0%	0.0%	0.0%
88	26.1%	37.0%	0.0%	34.8%	2.2%	0.0%	0.0%	0.0%	0.0%
89	6.3%	0.0%	0.0%	93.8%	0.0%	0.0%	0.0%	0.0%	0.0%
90	22.2%	44.4%	0.0%	22.2%	11.1%	0.0%	0.0%	0.0%	0.0%
91	15.5%	25.9%	0.0%	46.6%	12.1%	0.0%	0.0%	0.0%	0.0%
92	0.0%	17.3%	0.0%	61.5%	21.2%	0.0%	0.0%	0.0%	0.0%
93	0.0%	26.5%	0.0%	73.5%	0.0%	0.0%	0.0%	0.0%	0.0%
94	10.5%	10.5%	0.0%	73.7%	5.3%	0.0%	0.0%	0.0%	0.0%
95	16.7%	22.2%	0.0%	61.1%	0.0%	0.0%	0.0%	0.0%	0.0%
96	0.0%	21.1%	0.0%	73.7%	5.3%	0.0%	0.0%	0.0%	0.0%
(79-96)	8.6%	27.6%	1.3%	55.0%	7.0%	0.5%	0.0%	0.0%	0.0%
(79-84)	2.5%	31.1%	3.4%	53.0%	9.9%	0.0%	0.0%	0.0%	0.0%
(85-90)	16.1%	31.0%	0.6%	47.1%	3.8%	1.4%	0.0%	0.0%	0.0%
(91-96)	7.1%	20.6%	0.0%	65.0%	7.3%	0.0%	0.0%	0.0%	0.0%

Distribution of Total Mortalities in Adult Equivalents

Catch Year	All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
	------Fisheries with ceilings------				------------Other fisheries------------				
79	3.0%	28.9%	1.6%	57.4%	9.1%	0.0%	0.0%	0.0%	0.0%
80	5.1%	21.7%	8.0%	56.6%	8.6%	0.0%	0.0%	0.0%	0.0%
81	1.3%	24.7%	0.0%	68.1%	6.0%	0.0%	0.0%	0.0%	0.0%
82	2.7%	36.9%	3.0%	34.5%	22.9%	0.0%	0.0%	0.0%	0.0%
83	3.3%	50.6%	3.9%	38.4%	3.9%	0.0%	0.0%	0.0%	0.0%
84	2.1%	29.3%	5.0%	57.9%	5.7%	0.0%	0.0%	0.0%	0.0%
85	23.4%	28.2%	0.0%	41.9%	6.5%	0.0%	0.0%	0.0%	0.0%
86	12.7%	22.3%	3.8%	59.2%	1.9%	0.0%	0.0%	0.0%	0.0%
87	15.6%	52.3%	0.0%	25.7%	0.0%	6.4%	0.0%	0.0%	0.0%
88	22.8%	38.6%	0.0%	36.8%	1.8%	0.0%	0.0%	0.0%	0.0%
89	4.3%	0.0%	0.0%	95.7%	0.0%	0.0%	0.0%	0.0%	0.0%
90	22.2%	42.2%	0.0%	24.4%	11.1%	0.0%	0.0%	0.0%	0.0%
91	17.0%	20.5%	0.0%	53.4%	9.1%	0.0%	0.0%	0.0%	0.0%
92	0.0%	14.9%	0.0%	67.2%	17.9%	0.0%	0.0%	0.0%	0.0%
93	0.0%	24.2%	0.0%	75.8%	0.0%	0.0%	0.0%	0.0%	0.0%
94	11.1%	7.4%	0.0%	77.8%	3.7%	0.0%	0.0%	0.0%	0.0%
95	8.3%	13.9%	0.0%	77.8%	0.0%	0.0%	0.0%	0.0%	0.0%
96	0.0%	15.4%	0.0%	80.8%	3.8%	0.0%	0.0%	0.0%	0.0%
(79-96)	8.6%	26.2%	1.4%	57.2%	6.2%	0.4%	0.0%	0.0%	0.0%
(79-84)	2.9%	32.0%	3.6%	52.1%	9.4%	0.0%	0.0%	0.0%	0.0%
(85-90)	16.8%	30.6%	0.6%	47.3%	3.5%	1.1%	0.0%	0.0%	0.0%
(91-96)	6.1%	16.0%	0.0%	72.1%	5.8%	0.0%	0.0%	0.0%	0.0%

Big Qualicum

Distribution of Reported Catch in Adult Equivalents

	Fisheries with ceilings				Other fisheries				
Catch Year	All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
79	6.9%	22.3%	3.2%	55.8%	11.3%	0.1%	0.0%	0.4%	0.1%
80	4.8%	22.0%	5.8%	54.6%	12.9%	0.0%	0.0%	0.0%	0.0%
81	2.9%	21.2%	1.8%	62.5%	11.2%	0.3%	0.0%	0.0%	0.0%
82	8.5%	28.9%	6.5%	38.0%	18.1%	0.0%	0.0%	0.0%	0.0%
83	9.0%	22.6%	1.5%	47.1%	19.0%	0.0%	0.0%	0.0%	0.8%
84	2.6%	22.5%	1.8%	65.3%	7.8%	0.0%	0.0%	0.0%	0.0%
85	7.7%	20.5%	2.1%	48.4%	17.5%	0.0%	0.0%	3.8%	0.0%
86	3.5%	30.4%	1.8%	55.3%	9.0%	0.0%	0.0%	0.0%	0.0%
87	16.4%	18.3%	6.6%	49.0%	7.2%	0.0%	1.3%	1.1%	0.0%
88	5.1%	24.3%	4.7%	53.2%	7.7%	3.4%	0.0%	1.7%	0.0%
89	11.7%	10.2%	7.2%	56.8%	12.3%	0.0%	0.3%	0.0%	1.5%
90	14.1%	26.6%	4.7%	35.5%	15.9%	0.0%	0.2%	0.0%	3.0%
91	4.4%	12.9%	2.9%	69.1%	8.3%	0.0%	0.7%	0.7%	1.0%
92	4.9%	29.2%	4.7%	55.8%	4.9%	0.0%	0.0%	0.5%	0.0%
93	4.0%	16.9%	2.6%	66.2%	8.8%	0.0%	0.0%	0.0%	1.5%
94	8.3%	15.9%	5.3%	62.1%	3.8%	0.0%	0.0%	4.5%	0.0%
95	18.6%	25.7%	0.0%	54.3%	1.4%	0.0%	0.0%	0.0%	0.0%
96	4.5%	3.7%	0.0%	90.3%	0.0%	0.0%	0.0%	0.0%	1.5%
(79-96)	7.7%	20.8%	3.5%	56.6%	9.8%	0.2%	0.1%	0.7%	0.5%
(79-84)	5.8%	23.2%	3.4%	53.9%	13.4%	0.1%	0.0%	0.1%	0.2%
(85-90)	9.8%	21.7%	4.5%	49.7%	11.6%	0.6%	0.3%	1.1%	0.7%
(91-96)	7.5%	17.4%	2.6%	66.3%	4.5%	0.0%	0.1%	1.0%	0.7%

Distribution of Total Mortalities in Adult Equivalents

	Fisheries with ceilings				Other fisheries				
Catch Year	All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
79	8.5%	23.3%	3.4%	53.5%	10.6%	0.1%	0.0%	0.5%	0.1%
80	5.1%	22.8%	6.2%	53.2%	12.6%	0.0%	0.0%	0.0%	0.0%
81	3.5%	22.4%	1.9%	61.0%	10.9%	0.4%	0.0%	0.0%	0.0%
82	10.3%	28.4%	6.6%	37.6%	17.1%	0.0%	0.0%	0.0%	0.0%
83	9.3%	22.4%	1.4%	48.1%	17.5%	0.0%	0.0%	0.0%	1.3%
84	3.5%	22.3%	1.9%	65.5%	6.8%	0.0%	0.0%	0.0%	0.0%
85	11.9%	19.2%	2.0%	47.9%	14.7%	0.0%	0.0%	4.2%	0.0%
86	5.7%	29.8%	1.7%	54.7%	8.1%	0.0%	0.0%	0.0%	0.0%
87	18.3%	18.3%	7.0%	47.5%	6.5%	0.0%	1.3%	1.1%	0.0%
88	6.0%	23.2%	5.0%	54.0%	6.6%	3.0%	0.0%	2.3%	0.0%
89	17.7%	8.9%	6.5%	56.1%	9.1%	0.0%	0.4%	0.0%	1.3%
90	19.7%	23.6%	4.2%	37.7%	12.2%	0.0%	0.2%	0.0%	2.4%
91	6.5%	11.4%	2.8%	71.0%	6.1%	0.0%	0.7%	0.5%	1.0%
92	6.0%	26.2%	4.3%	59.2%	3.7%	0.0%	0.0%	0.5%	0.0%
93	5.9%	15.0%	2.3%	68.7%	6.7%	0.0%	0.0%	0.0%	1.3%
94	8.6%	14.7%	4.9%	63.2%	3.7%	0.0%	0.0%	4.9%	0.0%
95	13.4%	22.8%	0.0%	63.0%	0.8%	0.0%	0.0%	0.0%	0.0%
96	3.8%	3.8%	0.5%	90.4%	0.0%	0.0%	0.0%	0.0%	1.4%
(79-96)	9.1%	19.9%	3.5%	57.3%	8.5%	0.2%	0.1%	0.8%	0.5%
(79-84)	6.7%	23.6%	3.6%	53.2%	12.6%	0.1%	0.0%	0.1%	0.2%
(85-90)	13.2%	20.5%	4.4%	49.6%	9.5%	0.5%	0.3%	1.3%	0.6%
(91-96)	7.4%	15.7%	2.5%	69.3%	3.5%	0.0%	0.1%	1.0%	0.6%

South Puget Sound Fall Yearling

Distribution of Reported Catch in Adult Equivalents

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%	3.9%	0.0%	0.0%	1.2%	15.8%	73.4%
83	0.0%	1.9%	6.2%	0.5%	0.0%	0.0%	0.0%	10.5%	80.9%
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%	61.0%
91	0.0%	0.0%	6.9%	1.1%	0.0%	0.0%	4.6%	15.9%	71.5%
92	0.0%	0.0%	5.0%	0.9%	0.0%	0.9%	5.0%	31.1%	57.2%
93	0.0%	0.0%	1.9%	2.9%	0.0%	0.0%	1.9%	14.1%	79.1%
94	0.0%	0.0%	0.9%	0.9%	2.6%	0.5%	0.0%	18.7%	76.3%
95	0.0%	0.0%	7.1%	2.8%	0.0%	1.6%	0.4%	11.8%	76.2%
96	0.0%	0.0%	0.0%	1.9%	0.0%	1.6%	0.5%	2.8%	93.1%
(82-96)	0.0%	0.5%	4.0%	1.7%	0.3%	0.5%	1.5%	19.6%	72.0%
(82-84)	0.0%	1.5%	5.9%	2.1%	0.0%	0.0%	0.4%	21.7%	68.4%
(90-90)	0.0%	0.3%	0.3%	0.0%	0.5%	0.0%	1.5%	36.3%	61.0%
(91-96)	0.0%	0.0%	3.7%	1.8%	0.4%	0.8%	2.1%	15.7%	75.6%

Distribution of Total Mortalities in Adult Equivalents

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%	2.3%	3.5%	3.2%	0.0%	0.0%	0.9%	13.6%	76.5%
83	0.0%	1.9%	5.8%	0.4%	0.0%	0.0%	0.0%	9.2%	82.7%
84	0.0%	0.0%	8.0%	2.1%	0.0%	0.0%	0.0%	36.1%	53.8%
90	0.0%	0.2%	0.9%	0.1%	0.5%	0.0%	1.7%	33.9%	62.8%
91	0.0%	0.0%	6.5%	1.1%	0.0%	0.0%	4.1%	13.6%	74.7%
92	0.0%	0.0%	5.3%	0.9%	0.0%	0.7%	5.1%	28.9%	59.0%
93	0.0%	0.0%	1.3%	3.9%	0.0%	0.0%	1.3%	7.6%	85.9%
94	0.0%	0.0%	1.1%	1.4%	2.1%	0.4%	0.0%	16.5%	78.5%
95	0.0%	0.0%	6.9%	2.7%	0.0%	1.3%	0.3%	9.1%	79.6%
96	0.0%	0.0%	0.1%	1.9%	0.0%	1.5%	0.5%	2.5%	93.5%
(82-96)	0.0%	0.4%	3.9%	1.8%	0.3%	0.4%	1.4%	17.1%	74.7%
(82-84)	0.0%	1.4%	5.7%	1.9%	0.0%	0.0%	0.3%	19.6%	71.0%
(90-90)	0.0%	0.2%	0.9%	0.1%	0.5%	0.0%	1.7%	33.9%	62.8%
(91-96)	0.0%	0.0%	3.5%	2.0%	0.4%	0.6%	1.9%	13.0%	78.5%

Squaxin Pens Fall Yearling

Distribution of Reported Catch in Adult Equivalents

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%	33.7%	56.3%
91	0.0%	0.0%	4.4%	1.6%	0.6%	0.0%	9.5%	33.8%	50.1%
92	0.0%	0.9%	2.5%	3.9%	1.3%	0.6%	7.5%	23.6%	59.8%
93	0.0%	1.0%	11.0%	9.4%	1.6%	1.0%	15.9%	3.9%	56.2%
94	0.0%	0.0%	32.6%	7.8%	4.7%	3.1%	8.5%	29.5%	14.0%
95	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	58.3%	41.7%
96	0.0%	0.0%	0.0%	1.9%	0.0%	0.0%	1.0%	4.1%	93.1%
(90-96)	0.0%	0.3%	7.7%	3.6%	1.3%	0.7%	6.6%	26.7%	53.0%
(90-90)	0.0%	0.1%	3.4%	0.8%	1.3%	0.4%	4.1%	33.7%	56.3%
(91-96)	0.0%	0.3%	8.4%	4.1%	1.4%	0.8%	7.1%	25.5%	52.5%

Distribution of Total Mortalities in Adult Equivalents

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%	3.3%	1.1%	1.0%	0.4%	4.1%	32.3%	57.7%
91	0.0%	0.0%	4.5%	1.7%	0.5%	0.0%	9.4%	31.6%	52.3%
92	0.0%	0.6%	2.0%	3.9%	1.0%	0.4%	6.2%	22.8%	63.0%
93	0.0%	0.8%	11.8%	10.1%	1.4%	1.1%	15.1%	3.9%	55.7%
94	0.0%	0.0%	29.9%	7.5%	4.1%	2.7%	8.2%	26.5%	21.1%
95	0.0%	0.0%	0.0%	1.7%	0.0%	0.0%	0.0%	15.9%	82.3%
96	0.0%	0.0%	0.2%	2.0%	0.0%	0.0%	0.8%	4.0%	92.9%
(90-96)	0.0%	0.2%	7.4%	4.0%	1.1%	0.7%	6.3%	19.6%	60.7%
(90-90)	0.0%	0.1%	3.3%	1.1%	1.0%	0.4%	4.1%	32.3%	57.7%
(91-96)	0.0%	0.2%	8.1%	4.5%	1.2%	0.7%	6.6%	17.5%	61.2%

University of Washington Accelerated

Distribution of Reported Catch in Adult Equivalents

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%	9.4%	53.9%
80	0.0%	0.4%	8.6%	7.0%	1.8%	0.1%	1.4%	16.4%	64.2%
81	0.0%	0.7%	12.7%	6.8%	5.0%	0.0%	2.7%	14.8%	57.3%
82	0.2%	0.5%	24.5%	6.1%	1.3%	0.4%	3.4%	20.2%	43.6%
83	0.0%	1.6%	13.3%	6.6%	2.1%	0.1%	1.7%	32.6%	41.9%
84	0.0%	0.8%	25.1%	7.0%	1.3%	0.3%	2.5%	31.0%	32.0%
85	0.0%	0.5%	21.3%	6.9%	6.7%	1.8%	2.9%	21.1%	38.7%
86	0.0%	0.6%	22.4%	5.4%	9.4%	1.1%	1.8%	31.9%	27.3%
87	0.4%	0.4%	12.7%	7.5%	0.4%	1.3%	4.9%	56.7%	15.7%
(79-87)	0.1%	0.7%	17.9%	6.9%	3.7%	0.6%	2.6%	26.0%	41.6%
(79-84)	0.0%	0.7%	17.4%	7.0%	2.8%	0.2%	2.3%	20.7%	48.8%
(85-87)	0.1%	0.5%	18.8%	6.6%	5.5%	1.4%	3.2%	36.6%	27.2%

Distribution of Total Mortalities in Adult Equivalents

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%	18.8%	7.5%	4.9%	0.1%	2.0%	9.5%	56.6%
80	0.0%	0.4%	8.8%	5.3%	1.5%	0.1%	1.5%	15.4%	67.0%
81	0.0%	0.7%	12.0%	5.6%	4.2%	0.0%	2.6%	13.6%	61.3%
82	0.1%	0.4%	24.3%	5.7%	1.1%	0.3%	3.6%	19.6%	44.8%
83	0.0%	1.3%	11.1%	5.6%	1.5%	0.1%	1.5%	30.1%	48.8%
84	0.0%	0.7%	22.3%	6.2%	1.2%	0.2%	2.2%	28.7%	38.5%
85	0.0%	0.6%	19.1%	6.5%	5.8%	1.7%	2.7%	18.7%	45.0%
86	0.0%	0.6%	21.4%	5.2%	7.9%	1.1%	1.8%	29.1%	33.0%
87	0.6%	0.6%	14.4%	7.3%	0.3%	1.3%	5.2%	53.8%	16.6%
(79-87)	0.1%	0.6%	16.9%	6.1%	3.2%	0.6%	2.6%	24.3%	45.7%
(79-84)	0.0%	0.6%	16.2%	6.0%	2.4%	0.2%	2.2%	19.5%	52.8%
(85-87)	0.2%	0.6%	18.3%	6.3%	4.7%	1.4%	3.2%	33.9%	31.5%

Samish Fall Fingerling

Distribution of Reported Catch in Adult Equivalents

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%	1.1%	8.3%	21.0%	4.0%	0.7%	9.1%	43.9%	11.9%
90	0.2%	0.9%	22.7%	16.6%	1.6%	0.9%	11.0%	37.3%	8.9%
91	0.0%	0.6%	18.4%	15.7%	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%	1.7%	17.0%	28.8%	2.9%	4.1%	5.4%	22.8%	17.2%
94	0.3%	1.1%	14.8%	19.8%	2.4%	5.1%	2.8%	48.9%	4.9%
95	0.5%	1.3%	10.1%	10.3%	0.5%	4.8%	5.5%	45.6%	21.4%
96	0.2%	0.5%	0.0%	18.6%	0.2%	1.3%	3.3%	59.9%	16.1%
(89-96)	0.1%	1.0%	13.3%	19.1%	2.2%	2.6%	7.9%	38.9%	14.8%
(89-90)	0.1%	1.0%	15.5%	18.8%	2.8%	0.8%	10.0%	40.6%	10.4%
(91-96)	0.2%	1.0%	12.6%	19.2%	2.0%	3.2%	7.2%	38.3%	16.2%

Distribution of Total Mortalities in Adult Equivalents

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%	1.1%	10.7%	22.5%	3.5%	0.6%	9.5%	39.0%	13.0%
90	0.1%	1.0%	23.9%	17.3%	1.5%	0.9%	11.2%	34.4%	9.6%
91	0.0%	0.6%	19.2%	17.3%	3.2%	3.2%	12.6%	28.4%	15.6%
92	0.0%	0.8%	13.3%	27.9%	2.1%	0.6%	11.4%	16.3%	27.5%
93	0.0%	1.6%	17.8%	32.9%	2.4%	3.6%	5.2%	19.5%	17.1%
94	0.6%	1.1%	15.8%	22.2%	2.2%	5.1%	2.8%	44.7%	5.5%
95	0.3%	1.1%	9.9%	13.0%	0.3%	3.9%	4.6%	32.5%	34.3%
96	0.1%	0.5%	3.3%	27.6%	0.1%	0.9%	2.5%	41.8%	23.2%
(89-96)	0.1%	1.0%	14.2%	22.6%	1.9%	2.4%	7.5%	32.1%	18.2%
(89-90)	0.1%	1.1%	17.3%	19.9%	2.5%	0.8%	10.3%	36.7%	11.3%
(91-96)	0.2%	0.9%	13.2%	23.5%	1.7%	2.9%	6.5%	30.5%	20.5%

Stillaguamish Fall Fingerling

Distribution of Reported Catch in Adult Equivalents

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	11.5%	7.7%	27.9%	9.6%	10.6%	8.7%	0.0%	8.7%	15.4%
86	5.5%	4.4%	31.9%	22.0%	0.0%	0.0%	0.0%	16.5%	19.8%
90	0.7%	18.0%	25.8%	12.4%	5.7%	2.8%	6.7%	11.3%	16.6%
91	0.8%	1.6%	17.2%	12.9%	3.1%	5.9%	15.2%	19.9%	23.4%
92	0.0%	3.8%	22.7%	7.8%	3.4%	4.0%	7.6%	15.9%	35.0%
93	0.0%	8.2%	18.1%	17.9%	2.0%	6.6%	8.6%	2.4%	36.3%
94	7.9%	6.4%	20.7%	25.7%	2.9%	10.0%	0.0%	7.9%	18.6%
95	5.9%	20.7%	5.3%	12.4%	2.4%	16.6%	1.2%	4.1%	31.4%
96	2.0%	18.3%	0.0%	15.6%	1.4%	17.6%	0.0%	1.0%	44.1%
(84-96)	3.4%	11.9%	17.7%	15.3%	5.4%	7.2%	3.9%	9.2%	26.0%
(84-84)	0.0%	29.8%	7.1%	16.7%	22.6%	0.0%	0.0%	4.8%	19.0%
(85-90)	5.9%	10.0%	28.5%	14.7%	5.4%	3.8%	2.2%	12.1%	17.3%
(91-96)	2.8%	9.8%	14.0%	15.4%	2.5%	10.1%	5.4%	8.5%	31.4%

Distribution of Total Mortalities in Adult Equivalents

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	1.8%	23.9%	9.7%	15.9%	18.6%	0.9%	0.0%	3.5%	25.7%
85	11.9%	7.1%	27.8%	8.7%	8.7%	7.9%	0.0%	7.1%	20.6%
86	6.1%	4.1%	31.6%	21.4%	0.0%	0.0%	0.0%	15.3%	21.4%
90	0.8%	16.2%	24.7%	14.2%	4.7%	2.7%	7.7%	10.1%	18.9%
91	0.6%	1.3%	16.9%	15.0%	2.8%	5.3%	15.0%	17.2%	25.9%
92	0.0%	3.0%	20.5%	10.5%	2.3%	3.3%	6.4%	12.8%	41.1%
93	0.0%	7.5%	20.1%	19.3%	1.8%	5.8%	8.7%	1.9%	35.0%
94	8.6%	5.1%	20.6%	26.9%	2.9%	9.1%	0.0%	6.3%	20.6%
95	4.4%	17.4%	6.5%	15.0%	2.0%	11.9%	0.7%	2.7%	39.2%
96	2.2%	17.4%	1.0%	16.9%	1.0%	14.6%	0.0%	0.7%	46.2%
(84-96)	3.6%	10.3%	17.9%	16.4%	4.5%	6.2%	3.8%	7.8%	29.5%
(84-84)	1.8%	23.9%	9.7%	15.9%	18.6%	0.9%	0.0%	3.5%	25.7%
(85-90)	6.3%	9.1%	28.0%	14.8%	4.5%	3.6%	2.6%	10.9%	20.3%
(91-96)	2.6%	8.6%	14.3%	17.3%	2.1%	8.4%	5.1%	7.0%	34.7%

George Adams Fall Fingerling

Distribution of Reported Catch in Adult Equivalents

	Fisheries with ceilings				Other fisheries				
Catch Year	All Alaska	All Nth/Cent	WCVI Troll	All Geo St	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%	48.8%	13.7%
83	0.0%	3.8%	18.8%	5.6%	4.8%	0.6%	0.2%	35.3%	30.9%
84	0.1%	5.7%	21.4%	7.5%	1.4%	0.0%	2.7%	36.9%	24.4%
89	0.1%	0.3%	9.8%	4.4%	5.4%	0.6%	14.9%	44.7%	19.9%
90	0.2%	1.6%	21.6%	5.6%	0.8%	1.3%	16.7%	31.6%	20.5%
91	0.4%	0.0%	21.8%	2.9%	0.5%	3.7%	10.1%	39.4%	21.3%
92	0.0%	0.6%	17.5%	2.3%	5.3%	0.0%	22.8%	10.5%	40.9%
93	0.0%	0.0%	43.8%	5.6%	0.0%	4.5%	11.2%	5.6%	29.2%
94	0.0%	0.0%	0.0%	25.0%	0.0%	0.0%	0.0%	50.0%	25.0%
95	0.0%	4.7%	18.6%	11.6%	1.2%	8.1%	2.3%	10.5%	43.0%
96	0.0%	6.3%	0.0%	35.2%	0.0%	12.5%	14.1%	0.0%	32.0%
(82-96)	0.1%	2.2%	18.2%	10.1%	1.8%	2.9%	9.0%	28.5%	27.3%
(82-84)	0.0%	3.5%	22.2%	6.3%	2.2%	0.2%	2.2%	40.3%	23.0%
(89-90)	0.2%	0.9%	15.7%	5.0%	3.1%	0.9%	15.8%	38.2%	20.2%
(91-96)	0.1%	1.9%	17.0%	13.8%	1.2%	4.8%	10.1%	19.3%	31.9%

Distribution of Total Mortalities in Adult Equivalents

	Fisheries with ceilings				Other fisheries				
Catch Year	All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
82	0.0%	1.2%	26.1%	5.9%	0.6%	0.0%	3.7%	46.2%	16.3%
83	0.0%	2.6%	13.9%	4.7%	3.3%	0.5%	0.1%	28.0%	46.9%
84	0.1%	5.6%	21.1%	7.3%	1.3%	0.0%	2.7%	35.7%	26.2%
89	0.3%	0.5%	11.6%	5.1%	4.6%	0.7%	14.7%	40.2%	22.4%
90	0.8%	1.6%	23.4%	5.9%	0.7%	1.3%	17.1%	28.5%	20.7%
91	0.3%	0.0%	22.6%	3.0%	0.4%	3.7%	10.1%	36.8%	22.9%
92	0.0%	0.5%	18.5%	2.6%	4.6%	0.0%	22.6%	9.2%	42.1%
93	0.0%	0.0%	41.1%	6.3%	0.0%	4.5%	9.8%	5.4%	33.0%
94	0.0%	0.0%	0.0%	23.5%	0.0%	0.0%	0.0%	47.1%	29.4%
95	0.0%	4.2%	17.5%	14.0%	0.7%	5.6%	1.4%	7.7%	49.0%
96	0.0%	6.3%	2.5%	36.3%	0.0%	10.6%	13.1%	0.0%	31.3%
(82-96)	0.1%	2.0%	18.0%	10.4%	1.5%	2.4%	8.7%	25.9%	30.9%
(82-84)	0.0%	3.1%	20.4%	6.0%	1.7%	0.2%	2.2%	36.6%	29.8%
(89-90)	0.5%	1.0%	17.5%	5.5%	2.7%	1.0%	15.9%	34.3%	21.6%
(91-96)	0.1%	1.8%	17.0%	14.3%	1.0%	4.1%	9.5%	17.7%	34.6%

South Puget Sound Fall Fingerling

Distribution of Reported Catch in Adult Equivalents

Catch Year	All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
	Fisheries with ceilings				Other fisheries				
82	0.3%	1.6%	25.6%	16.0%	1.8%	0.1%	3.1%	27.7%	23.8%
83	0.2%	3.7%	19.9%	6.6%	3.0%	0.3%	1.9%	31.6%	32.9%
84	0.4%	3.0%	25.0%	10.9%	1.2%	0.3%	1.8%	30.0%	27.3%
85	1.0%	1.0%	22.8%	7.7%	2.0%	0.9%	2.3%	35.8%	26.4%
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%	10.8%	38.6%	20.5%
89	0.1%	1.0%	11.2%	6.9%	6.1%	1.2%	16.7%	32.4%	24.4%
90	0.1%	1.1%	30.4%	5.2%	1.3%	1.5%	12.0%	31.8%	16.5%
91	0.6%	0.2%	21.3%	2.5%	1.4%	2.6%	16.1%	37.1%	18.4%
92	1.1%	1.8%	21.9%	5.4%	3.1%	1.6%	11.5%	30.1%	23.4%
93	0.5%	1.1%	22.9%	7.8%	2.9%	3.3%	7.9%	23.0%	30.5%
94	0.0%	1.5%	20.0%	7.2%	9.0%	2.1%	1.7%	36.6%	21.9%
95	0.7%	3.0%	14.0%	8.5%	0.6%	3.3%	5.1%	22.3%	42.6%
96	0.4%	1.4%	0.0%	13.2%	0.2%	5.8%	9.5%	21.3%	48.2%
(82-96)	0.4%	1.7%	19.4%	9.4%	3.1%	1.7%	7.9%	29.1%	27.4%
(82-84)	0.3%	2.7%	23.5%	11.2%	2.0%	0.3%	2.3%	29.8%	28.0%
(85-90)	0.2%	1.3%	20.0%	10.5%	4.0%	1.0%	9.9%	29.4%	23.7%
(91-96)	0.6%	1.5%	16.7%	7.4%	2.9%	3.1%	8.6%	28.4%	30.8%

Distribution of Total Mortalities in Adult Equivalents

Catch Year	All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
	Fisheries with ceilings				Other fisheries				
82	0.3%	1.7%	25.3%	15.1%	1.6%	0.1%	3.0%	25.9%	26.9%
83	0.1%	3.3%	18.5%	6.1%	2.5%	0.3%	1.8%	28.0%	39.3%
84	0.4%	3.0%	24.8%	10.5%	1.1%	0.3%	1.8%	28.5%	29.6%
85	1.1%	0.9%	22.1%	7.5%	1.9%	0.9%	2.3%	33.9%	29.3%
86	0.0%	1.7%	24.4%	10.6%	2.2%	0.0%	5.3%	13.0%	42.8%
87	0.0%	0.0%	28.5%	18.8%	4.6%	0.0%	12.3%	15.5%	20.2%
88	0.6%	2.8%	12.7%	13.4%	3.9%	1.8%	10.3%	29.0%	25.6%
89	0.1%	1.1%	12.7%	7.8%	5.3%	1.2%	17.5%	29.3%	25.0%
90	0.2%	1.2%	31.2%	5.4%	1.2%	1.5%	12.0%	29.3%	18.0%
91	0.7%	0.1%	22.5%	2.7%	1.3%	2.6%	16.5%	34.0%	19.6%
92	1.7%	1.7%	20.8%	6.7%	2.8%	1.5%	10.7%	25.0%	29.2%
93	1.1%	1.0%	24.7%	9.0%	2.4%	3.0%	7.8%	20.1%	30.8%
94	0.0%	1.3%	17.8%	9.8%	7.1%	1.9%	1.4%	28.6%	32.0%
95	0.6%	2.5%	12.4%	11.0%	0.4%	2.2%	3.5%	14.8%	52.6%
96	0.4%	1.5%	4.7%	13.7%	0.2%	5.0%	9.2%	18.0%	47.4%
(82-96)	0.5%	1.6%	20.2%	9.9%	2.6%	1.5%	7.7%	24.9%	31.2%
(82-84)	0.3%	2.7%	22.9%	10.6%	1.7%	0.2%	2.2%	27.4%	31.9%
(85-90)	0.3%	1.3%	21.9%	10.6%	3.2%	0.9%	9.9%	25.0%	26.8%
(91-96)	0.8%	1.4%	17.1%	8.8%	2.4%	2.7%	8.2%	23.4%	35.3%

Kalama Fall Fingerling

Distribution of Reported Catch in Adult Equivalents

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%	30.3%	0.0%	6.1%	3.0%	7.6%	31.8%	21.2%
86	0.0%	0.0%	17.9%	15.8%	2.1%	0.0%	0.0%	43.2%	21.1%
87	0.0%	3.8%	12.2%	16.0%	0.8%	0.0%	6.1%	39.7%	21.4%
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%	48.6%	20.9%
90	0.0%	0.3%	25.6%	3.9%	0.2%	1.7%	11.5%	43.1%	13.7%
91	0.0%	2.4%	9.7%	4.4%	2.9%	1.5%	19.9%	27.2%	32.0%
92	0.0%	1.8%	12.9%	4.9%	4.4%	4.4%	12.4%	30.7%	28.4%
93	0.0%	1.5%	19.0%	7.4%	3.3%	0.8%	4.6%	34.1%	29.2%
94	0.0%	0.2%	8.7%	4.8%	4.2%	0.6%	1.3%	42.4%	37.8%
95	0.0%	0.6%	7.4%	3.4%	0.1%	3.3%	3.6%	48.2%	33.4%
96	0.3%	1.4%	0.0%	4.9%	0.0%	1.7%	2.1%	59.0%	30.5%
(83-96)	0.0%	1.6%	14.5%	7.8%	3.1%	1.4%	7.4%	37.4%	26.7%
(83-84)	0.0%	1.3%	23.5%	7.8%	4.3%	0.0%	3.1%	25.6%	34.5%
(85-90)	0.0%	2.1%	16.5%	10.7%	3.3%	1.2%	8.8%	38.6%	18.8%
(91-96)	0.1%	1.3%	9.6%	5.0%	2.5%	2.0%	7.3%	40.3%	31.9%

Distribution of Total Mortalities in Adult Equivalents

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%	1.7%	14.6%	10.2%	4.8%	0.0%	3.1%	9.2%	56.5%
84	0.0%	0.0%	30.2%	1.8%	2.7%	0.0%	1.8%	36.9%	26.7%
85	0.0%	0.0%	28.6%	0.0%	4.8%	3.6%	7.1%	31.0%	25.0%
86	0.0%	0.0%	18.2%	16.4%	1.8%	0.0%	0.0%	38.2%	25.5%
87	0.0%	4.1%	15.3%	15.3%	0.6%	0.0%	6.5%	32.4%	25.9%
88	0.0%	7.7%	7.4%	26.3%	4.9%	0.0%	10.9%	21.4%	21.4%
89	0.0%	1.3%	6.0%	3.4%	3.6%	2.0%	16.6%	45.5%	21.6%
90	0.0%	0.2%	26.5%	4.1%	0.2%	1.6%	11.6%	40.5%	15.2%
91	0.0%	2.5%	10.5%	4.6%	2.5%	1.7%	20.1%	24.3%	33.9%
92	0.0%	1.4%	10.1%	7.9%	2.7%	3.3%	9.5%	25.3%	39.9%
93	0.0%	1.2%	20.5%	9.1%	2.8%	0.8%	4.7%	30.3%	30.5%
94	0.0%	0.1%	6.3%	6.9%	2.7%	0.3%	1.0%	26.6%	56.2%
95	0.0%	0.6%	10.2%	3.9%	0.1%	2.9%	3.7%	42.0%	36.4%
96	0.3%	1.6%	0.7%	5.2%	0.0%	1.6%	2.2%	54.4%	33.9%
(83-96)	0.0%	1.6%	14.6%	8.2%	2.4%	1.3%	7.0%	32.7%	32.0%
(83-84)	0.0%	0.9%	22.4%	6.0%	3.7%	0.0%	2.4%	23.0%	41.6%
(85-90)	0.0%	2.2%	17.0%	10.9%	2.6%	1.2%	8.8%	34.8%	22.4%
(91-96)	0.0%	1.2%	9.7%	6.3%	1.8%	1.8%	6.9%	33.8%	38.5%

Elwha Fall Fingerling

Distribution of Reported Catch in Adult Equivalents

	Fisheries with ceilings				Other fisheries				
Catch Year	All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
86	32.1%	9.5%	19.1%	8.0%	1.5%	1.0%	1.0%	13.4%	14.4%
87	20.5%	15.5%	16.7%	12.9%	0.6%	2.3%	3.5%	7.6%	20.5%
88	13.4%	14.3%	24.8%	0.0%	0.8%	3.8%	8.0%	21.8%	13.0%
89	17.0%	20.0%	11.9%	0.0%	0.0%	0.0%	5.9%	22.2%	23.0%
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	3.5%	5.3%	43.9%	0.0%	3.5%	3.5%	17.5%	0.0%	22.8%
93	8.4%	0.0%	20.0%	15.8%	0.0%	7.4%	4.2%	4.2%	40.0%
94	8.6%	25.7%	37.1%	17.1%	11.4%	0.0%	0.0%	0.0%	0.0%
95	4.9%	19.7%	47.5%	0.0%	0.0%	4.9%	3.3%	1.6%	18.0%
96	17.5%	10.5%	0.0%	15.8%	0.0%	19.3%	3.5%	0.0%	33.3%
(86-96)	11.5%	16.1%	25.9%	6.3%	1.6%	3.8%	4.9%	12.9%	16.8%
(86-90)	16.6%	21.9%	24.5%	4.2%	0.6%	1.4%	3.7%	13.0%	14.2%
(91-96)	7.2%	11.4%	27.1%	8.1%	2.5%	5.8%	5.9%	12.9%	19.0%

Distribution of Total Mortalities in Adult Equivalents

	Fisheries with ceilings				Other fisheries				
Catch Year	All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
86	33.0%	9.7%	18.5%	7.8%	1.3%	1.2%	1.2%	11.9%	15.4%
87	21.8%	15.3%	17.7%	12.0%	0.5%	2.2%	3.4%	6.5%	20.6%
88	14.9%	14.1%	26.4%	0.0%	0.7%	3.3%	7.8%	19.7%	13.0%
89	22.9%	18.3%	11.1%	0.0%	0.0%	0.0%	5.2%	19.6%	22.9%
90	0.0%	45.5%	54.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
91	0.0%	3.6%	25.0%	3.6%	0.0%	0.0%	7.1%	50.0%	10.7%
92	3.6%	6.0%	37.3%	4.8%	2.4%	3.6%	13.3%	0.0%	28.9%
93	12.2%	0.0%	20.3%	17.1%	0.0%	6.5%	4.1%	3.3%	36.6%
94	17.0%	21.3%	34.0%	19.1%	8.5%	0.0%	0.0%	0.0%	0.0%
95	9.1%	18.2%	47.5%	0.0%	0.0%	4.0%	2.0%	1.0%	18.2%
96	16.7%	12.1%	1.5%	16.7%	0.0%	16.7%	3.0%	0.0%	33.3%
(86-96)	13.7%	14.9%	26.7%	7.4%	1.2%	3.4%	4.3%	10.2%	18.2%
(86-90)	18.5%	20.6%	25.7%	4.0%	0.5%	1.3%	3.5%	11.5%	14.4%
(91-96)	9.8%	10.2%	27.6%	10.2%	1.8%	5.1%	4.9%	9.0%	21.3%

Hoko Fall Fingerling

Distribution of Reported Catch in Adult Equivalents

	Fisheries with ceilings				Other fisheries				
Catch Year	All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
89	7.3%	19.7%	15.2%	2.2%	22.5%	0.0%	1.1%	1.1%	30.9%
90	29.4%	16.9%	25.6%	1.3%	2.8%	0.0%	0.8%	1.5%	21.7%
91	39.3%	17.1%	17.1%	1.0%	1.6%	0.8%	0.4%	2.6%	20.2%
92	32.2%	23.9%	31.1%	1.7%	0.0%	2.2%	0.0%	1.1%	7.8%
93	20.0%	24.0%	36.0%	2.4%	5.6%	0.0%	0.0%	0.8%	11.2%
94	33.1%	31.4%	22.1%	7.6%	2.9%	2.9%	0.0%	0.0%	0.0%
95	54.5%	25.7%	10.9%	5.9%	0.5%	0.0%	0.0%	0.0%	2.5%
96	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
(89-96)	39.5%	19.8%	19.7%	2.8%	4.5%	0.7%	0.3%	0.9%	11.8%
(89-90)	18.4%	18.3%	20.4%	1.8%	12.6%	0.0%	0.9%	1.3%	26.3%
(91-96)	46.5%	20.3%	19.5%	3.1%	1.8%	1.0%	0.1%	0.7%	6.9%

Distribution of Total Mortalities in Adult Equivalents

	Fisheries with ceilings				Other fisheries				
Catch Year	All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
89	18.3%	18.3%	17.3%	2.2%	14.7%	0.0%	0.7%	0.7%	27.7%
90	34.6%	16.3%	23.9%	1.0%	2.3%	0.0%	0.8%	1.2%	20.0%
91	42.9%	15.8%	15.8%	1.0%	1.3%	0.7%	0.3%	2.2%	19.9%
92	35.2%	23.8%	28.6%	2.2%	0.0%	1.8%	0.0%	0.9%	7.5%
93	30.6%	21.2%	30.6%	2.9%	4.1%	0.0%	0.0%	0.6%	10.0%
94	41.8%	27.7%	18.9%	7.2%	2.0%	2.4%	0.0%	0.0%	0.0%
95	55.1%	25.4%	11.0%	5.3%	0.4%	0.0%	0.0%	0.0%	2.8%
96	92.1%	3.9%	3.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
(89-96)	43.8%	19.1%	18.7%	2.7%	3.1%	0.6%	0.2%	0.7%	11.0%
(89-90)	26.5%	17.3%	20.6%	1.6%	8.5%	0.0%	0.8%	1.0%	23.8%
(91-96)	49.6%	19.6%	18.1%	3.1%	1.3%	0.8%	0.1%	0.6%	6.7%

Skagit Spring Yearling

Distribution of Reported Catch in Adult Equivalents

	Fisheries with ceilings				Other fisheries				
Catch Year	All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
85	0.0%	0.0%	7.2%	31.5%	28.8%	0.0%	0.0%	10.8%	21.6%
86	2.3%	13.5%	7.6%	52.0%	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%	19.7%	10.3%	3.8%	2.3%	36.2%	17.4%
89	0.0%	1.3%	5.0%	25.4%	4.8%	0.8%	6.5%	44.2%	12.0%
90	0.0%	4.9%	6.8%	21.3%	5.5%	3.9%	4.5%	21.3%	31.8%
(85-90)	0.4%	7.1%	5.6%	27.5%	10.1%	2.6%	2.6%	24.4%	19.8%
(85-90)	0.4%	7.1%	5.6%	27.5%	10.1%	2.6%	2.6%	24.4%	19.8%

Distribution of Total Mortalities in Adult Equivalents

	Fisheries with ceilings				Other fisheries				
Catch Year	All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
85	0.0%	0.8%	7.4%	32.0%	26.2%	0.0%	0.0%	9.8%	23.8%
86	3.1%	12.4%	7.3%	52.3%	3.1%	6.7%	0.0%	3.6%	11.4%
87	0.0%	11.5%	3.6%	14.4%	5.0%	0.0%	1.4%	20.1%	43.9%
88	0.0%	7.4%	2.9%	19.9%	9.5%	3.8%	2.7%	34.3%	19.4%
89	0.0%	1.3%	5.5%	29.2%	4.5%	0.8%	6.6%	38.2%	14.0%
90	0.0%	4.4%	6.8%	22.2%	5.0%	3.7%	4.8%	19.8%	33.3%
(85-90)	0.5%	6.3%	5.6%	28.3%	8.9%	2.5%	2.6%	21.0%	24.3%
(85-90)	0.5%	6.3%	5.6%	28.3%	8.9%	2.5%	2.6%	21.0%	24.3%

Nooksack Spring Yearling

Distribution of Reported Catch in Adult Equivalents

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%	57.6%	27.3%	0.0%	0.0%	0.0%	15.2%
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%	8.9%	7.8%	3.4%	13.4%	8.4%
92	1.3%	4.2%	39.2%	29.4%	2.4%	2.9%	2.1%	0.8%	17.7%
93	0.0%	5.2%	8.9%	33.4%	10.8%	7.2%	1.6%	10.8%	22.0%
94	1.1%	0.0%	9.4%	69.6%	1.8%	0.0%	0.4%	11.6%	6.2%
95	0.0%	0.0%	0.0%	74.2%	0.0%	0.0%	0.0%	6.5%	19.4%
96	0.0%	7.1%	0.0%	61.9%	0.0%	16.7%	2.4%	0.0%	11.9%
(86-96)	0.3%	2.7%	6.8%	47.6%	7.1%	3.8%	1.5%	11.1%	19.2%
(86-90)	0.0%	2.2%	0.0%	35.6%	13.4%	0.0%	1.1%	18.8%	29.0%
(91-96)	0.4%	3.0%	10.1%	53.7%	4.0%	5.8%	1.6%	7.2%	14.2%

Distribution of Total Mortalities in Adult Equivalents

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%	4.1%	60.7%	9.0%	0.8%	0.8%	14.8%	9.0%
89	0.0%	0.0%	0.0%	32.6%	0.0%	0.0%	0.0%	39.5%	27.9%
90	0.0%	5.1%	8.9%	48.1%	7.6%	1.3%	1.3%	2.5%	25.3%
91	0.0%	0.7%	2.9%	63.2%	6.9%	5.8%	2.9%	9.4%	8.3%
92	4.2%	3.5%	35.4%	31.9%	1.8%	2.4%	1.8%	0.7%	18.2%
93	0.0%	4.5%	8.9%	38.7%	9.2%	6.4%	1.4%	9.5%	21.4%
94	1.0%	0.0%	8.9%	70.5%	1.7%	0.0%	0.3%	10.9%	6.6%
95	0.0%	0.0%	0.0%	72.2%	0.0%	0.0%	0.0%	5.1%	22.8%
96	0.0%	6.0%	2.0%	60.0%	0.0%	16.0%	2.0%	0.0%	14.0%
(86-96)	0.6%	2.3%	7.9%	53.1%	4.0%	3.6%	1.2%	10.3%	17.1%
(86-90)	0.0%	2.0%	4.3%	47.1%	5.5%	0.7%	0.7%	18.9%	20.7%
(91-96)	0.9%	2.4%	9.7%	56.1%	3.3%	5.1%	1.4%	5.9%	15.2%

White River Spring Yearling

Distribution of Reported Catch in Adult Equivalents

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%	11.1%	8.6%	9.9%	0.0%	0.0%	4.9%	17.3%	48.1%
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%	2.3%	0.0%	0.4%	21.8%	71.5%
87	0.0%	0.0%	0.0%	2.8%	0.8%	0.0%	6.0%	19.8%	70.6%
88	0.0%	0.0%	0.3%	4.1%	0.3%	0.3%	2.1%	20.9%	71.9%
89	0.0%	0.0%	1.9%	1.9%	1.6%	0.0%	9.0%	20.5%	65.0%
90	0.0%	0.0%	2.9%	0.6%	1.0%	0.0%	7.7%	22.4%	65.5%
91	0.0%	0.0%	1.4%	2.3%	0.0%	1.8%	7.3%	19.2%	68.0%
92	0.0%	0.8%	3.7%	3.6%	3.6%	0.4%	3.7%	12.0%	72.2%
93	0.0%	0.0%	0.0%	3.8%	0.0%	0.0%	7.5%	9.4%	79.2%
94	0.0%	0.0%	0.0%	3.7%	1.8%	0.0%	0.0%	2.8%	91.7%
95	0.0%	0.0%	0.0%	2.6%	0.0%	0.0%	0.0%	2.6%	94.8%
96	0.0%	0.0%	0.0%	2.0%	0.0%	0.0%	0.0%	0.7%	97.4%
(83-96)	0.0%	1.0%	1.8%	2.9%	1.0%	0.3%	3.6%	15.4%	73.9%
(83-84)	0.0%	6.6%	7.1%	4.9%	0.0%	0.0%	3.5%	15.8%	62.1%
(85-90)	0.0%	0.1%	1.0%	2.1%	1.5%	0.4%	4.2%	22.9%	67.9%
(91-96)	0.0%	0.1%	0.9%	3.0%	0.9%	0.4%	3.1%	7.8%	83.9%

Distribution of Total Mortalities in Adult Equivalents

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%	1.8%	4.7%	0.0%	0.0%	0.0%	1.8%	13.0%	78.7%
84	0.0%	6.8%	5.6%	6.2%	0.0%	0.0%	2.5%	9.9%	69.1%
85	0.0%	0.0%	0.0%	0.0%	2.5%	1.8%	0.0%	25.5%	70.2%
86	0.0%	0.5%	0.7%	2.7%	2.0%	0.0%	0.5%	19.5%	74.1%
87	0.0%	0.0%	0.0%	1.8%	0.6%	0.0%	3.6%	11.6%	82.4%
88	0.0%	0.0%	0.4%	3.8%	0.3%	0.3%	2.2%	19.4%	73.6%
89	0.0%	0.0%	1.9%	2.0%	1.5%	0.0%	8.7%	17.3%	68.7%
90	0.0%	0.0%	2.8%	0.8%	0.8%	0.0%	7.6%	18.4%	69.7%
91	0.0%	0.0%	1.3%	2.4%	0.0%	1.7%	6.4%	15.2%	73.1%
92	0.0%	0.7%	3.8%	3.8%	3.0%	0.3%	3.8%	10.6%	74.1%
93	0.0%	0.0%	0.0%	3.6%	0.0%	0.0%	6.4%	7.1%	82.9%
94	0.0%	0.0%	0.0%	3.6%	1.4%	0.0%	0.0%	2.1%	92.9%
95	0.0%	0.0%	0.0%	2.1%	0.0%	0.0%	0.0%	2.1%	95.8%
96	0.0%	0.0%	0.0%	2.6%	0.0%	0.0%	0.0%	0.5%	96.8%
(83-96)	0.0%	0.7%	1.5%	2.5%	0.9%	0.3%	3.1%	12.3%	78.7%
(83-84)	0.0%	4.3%	5.1%	3.1%	0.0%	0.0%	2.1%	11.4%	73.9%
(85-90)	0.0%	0.1%	1.0%	1.9%	1.3%	0.4%	3.8%	18.6%	73.1%
(91-96)	0.0%	0.1%	0.9%	3.0%	0.7%	0.3%	2.8%	6.3%	85.9%

Sooes Fall Fingerling

Distribution of Reported Catch in Adult Equivalents

	------Fisheries with ceilings-------				-------------Other fisheries------------				
Catch Year	All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
89	41.4%	24.1%	10.3%	0.0%	10.3%	13.8%	0.0%	0.0%	0.0%
90	23.6%	25.8%	28.1%	11.2%	3.4%	0.0%	2.2%	0.0%	5.6%
91	34.4%	32.0%	14.4%	0.0%	5.6%	0.0%	0.0%	0.0%	13.6%
92	19.4%	23.6%	40.3%	2.1%	6.9%	2.1%	0.7%	0.0%	4.9%
93	14.3%	36.9%	45.2%	0.0%	0.0%	0.0%	1.2%	0.0%	2.4%
94	50.6%	31.0%	18.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
95	36.1%	22.2%	41.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
96	94.7%	5.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
(89-96)	39.3%	25.1%	24.8%	1.7%	3.3%	2.0%	0.5%	0.0%	3.3%
(89-90)	32.5%	25.0%	19.2%	5.6%	6.9%	6.9%	1.1%	0.0%	2.8%
(91-96)	41.6%	25.2%	26.7%	0.3%	2.1%	0.3%	0.3%	0.0%	3.5%

Distribution of Total Mortalities in Adult Equivalents

	------Fisheries with ceilings-------				-------------Other fisheries------------				
Catch Year	All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
89	40.7%	22.0%	15.3%	1.7%	8.5%	6.8%	0.0%	0.0%	5.1%
90	28.8%	27.1%	25.4%	9.3%	2.5%	0.0%	2.5%	0.0%	4.2%
91	34.8%	30.3%	17.4%	0.6%	4.5%	0.0%	0.0%	0.0%	12.3%
92	22.9%	24.0%	38.3%	2.3%	5.7%	1.7%	0.6%	0.0%	4.6%
93	21.6%	32.4%	42.2%	0.0%	0.0%	0.0%	1.0%	0.0%	2.9%
94	59.8%	25.0%	15.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
95	41.3%	20.6%	38.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
96	87.5%	10.0%	2.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
(89-96)	42.2%	23.9%	24.3%	1.7%	2.7%	1.1%	0.5%	0.0%	3.6%
(89-90)	34.7%	24.6%	20.3%	5.5%	5.5%	3.4%	1.3%	0.0%	4.7%
(91-96)	44.6%	23.7%	25.6%	0.5%	1.7%	0.3%	0.3%	0.0%	3.3%

Queets Fall Fingerling

Distribution of Reported Catch in Adult Equivalents

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[1]	U.S. Sport
81	14.9%	23.0%	14.9%	0.0%	1.4%	0.0%	1.4%	40.5%	4.1%
82	20.2%	32.1%	15.5%	0.0%	0.0%	0.0%	0.0%	32.1%	0.0%
83	43.3%	10.6%	9.6%	0.0%	2.9%	0.0%	1.0%	32.7%	0.0%
84	21.8%	28.2%	10.0%	0.0%	0.0%	0.0%	2.7%	37.3%	0.0%
85	24.6%	47.3%	3.0%	0.0%	2.4%	0.0%	0.0%	21.6%	1.2%
86	38.9%	26.4%	13.9%	0.0%	2.1%	0.0%	0.0%	18.8%	0.0%
87	38.1%	22.2%	1.2%	0.0%	0.0%	0.0%	0.9%	36.6%	0.9%
88	31.5%	20.6%	7.7%	0.0%	0.0%	1.9%	0.0%	32.0%	6.3%
89	18.9%	18.3%	12.9%	0.0%	0.0%	0.0%	0.0%	47.3%	2.7%
90	31.7%	17.9%	16.3%	0.0%	0.0%	0.0%	0.0%	34.0%	0.0%
91	41.1%	20.2%	8.9%	0.0%	0.0%	0.0%	0.0%	28.9%	0.8%
92	21.2%	15.9%	29.4%	0.0%	0.0%	0.0%	0.0%	32.3%	1.3%
93	26.1%	24.9%	19.0%	0.0%	0.0%	0.0%	0.8%	24.9%	4.3%
94	26.0%	34.9%	6.1%	0.4%	0.0%	0.8%	0.0%	31.8%	0.0%
(81-94)	28.5%	24.5%	12.0%	0.0%	0.6%	0.2%	0.5%	32.2%	1.5%
(81-84)	25.0%	23.5%	12.5%	0.0%	1.1%	0.0%	1.3%	35.7%	1.0%
(85-90)	30.6%	25.5%	9.2%	0.0%	0.7%	0.3%	0.2%	31.7%	1.9%
(91-94)	28.6%	24.0%	15.9%	0.1%	0.0%	0.2%	0.2%	29.5%	1.6%

Distribution of Total Mortalities in Adult Equivalents

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[1]	U.S. Sport
81	18.9%	24.4%	14.4%	0.0%	1.1%	0.0%	2.2%	34.4%	4.4%
82	22.7%	32.2%	14.7%	0.0%	0.0%	0.0%	0.0%	30.3%	0.0%
83	60.1%	7.6%	6.3%	0.0%	2.5%	0.0%	0.6%	22.8%	0.0%
84	26.9%	28.5%	9.2%	0.0%	0.0%	0.0%	3.1%	32.3%	0.0%
85	29.5%	46.7%	2.9%	0.0%	1.9%	0.0%	0.0%	17.6%	1.4%
86	48.9%	22.1%	11.6%	0.0%	1.6%	0.0%	0.0%	15.8%	0.0%
87	45.1%	20.7%	2.2%	0.0%	0.0%	0.0%	0.7%	30.3%	1.0%
88	36.8%	21.2%	9.1%	0.0%	0.0%	1.5%	0.0%	25.6%	5.8%
89	26.5%	19.2%	13.8%	0.0%	0.0%	0.0%	0.0%	37.8%	2.6%
90	35.4%	18.6%	16.0%	0.0%	0.0%	0.0%	0.0%	30.0%	0.0%
91	45.1%	19.9%	8.7%	0.0%	0.0%	0.0%	0.0%	25.4%	0.9%
92	30.9%	15.6%	27.5%	0.0%	0.0%	0.0%	0.0%	24.8%	1.2%
93	30.8%	24.7%	18.9%	0.0%	0.0%	0.0%	0.6%	20.8%	4.2%
94	35.4%	31.9%	5.6%	0.3%	0.0%	0.7%	0.0%	26.1%	0.0%
(81-94)	35.2%	23.8%	11.5%	0.0%	0.5%	0.2%	0.5%	26.7%	1.5%
(81-84)	32.2%	23.2%	11.2%	0.0%	0.9%	0.0%	1.5%	30.0%	1.1%
(85-90)	37.1%	24.8%	9.3%	0.0%	0.6%	0.2%	0.1%	26.2%	1.8%
(91-94)	35.6%	23.0%	15.2%	0.1%	0.0%	0.2%	0.2%	24.3%	1.6%

[1] Freshwater Net recoveries not reported to PSMFC in 1995 and 1996

Cowlitz Fall Tule

Distribution of Reported Catch in Adult Equivalents

Catch Year	All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
	Fisheries with ceilings				Other fisheries				
81	9.0%	12.4%	22.6%	0.0%	3.4%	0.0%	13.5%	21.1%	18.0%
82	6.0%	6.0%	22.3%	0.0%	1.8%	1.4%	28.4%	14.9%	19.1%
83	6.1%	17.2%	27.7%	0.8%	0.8%	0.0%	10.8%	7.5%	29.1%
84	7.5%	15.8%	38.0%	0.0%	2.7%	0.0%	6.9%	23.5%	5.6%
85	8.5%	16.8%	22.6%	0.9%	2.4%	0.0%	8.8%	12.9%	27.1%
86	0.8%	2.3%	17.4%	0.5%	1.5%	0.0%	17.8%	42.5%	17.4%
87	5.4%	6.2%	11.9%	0.0%	0.9%	0.6%	13.9%	32.7%	28.3%
88	2.9%	2.8%	21.8%	0.0%	0.9%	0.0%	21.4%	33.0%	17.1%
89	7.7%	9.3%	12.7%	0.0%	2.0%	0.0%	34.3%	13.7%	20.3%
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%	8.0%	44.0%	0.0%	0.0%	0.0%	17.3%	13.3%	12.0%
93	6.5%	5.9%	11.9%	0.0%	0.0%	0.0%	30.8%	5.4%	39.5%
94	37.5%	16.7%	16.7%	0.0%	0.0%	0.0%	29.2%	0.0%	0.0%
95	16.1%	12.9%	9.7%	0.0%	0.0%	12.9%	25.8%	12.9%	9.7%
96	28.6%	0.0%	0.0%	17.1%	0.0%	0.0%	45.7%	8.6%	0.0%
(81–96)	11.0%	9.8%	19.9%	1.2%	1.1%	1.2%	21.5%	16.4%	17.9%
(81–84)	7.2%	12.9%	27.7%	0.2%	2.2%	0.4%	14.9%	16.7%	18.0%
(85–90)	5.7%	8.8%	19.3%	0.2%	1.5%	0.1%	19.3%	22.5%	22.5%
(91–96)	18.9%	8.7%	15.4%	2.9%	0.0%	2.9%	28.0%	10.1%	13.1%

Distribution of Total Mortalities in Adult Equivalents

Catch Year	All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
	Fisheries with ceilings				Other fisheries				
81	9.3%	11.6%	23.5%	0.0%	3.0%	0.0%	15.6%	19.5%	17.5%
82	6.9%	6.0%	22.9%	0.0%	1.7%	1.4%	29.1%	13.7%	18.3%
83	6.7%	17.1%	27.9%	1.0%	0.7%	0.0%	11.5%	7.0%	28.1%
84	7.3%	16.2%	38.7%	0.0%	2.7%	0.0%	7.1%	22.3%	5.8%
85	9.8%	16.4%	23.0%	1.0%	2.2%	0.0%	9.3%	11.5%	26.7%
86	1.1%	2.2%	18.2%	0.5%	1.4%	0.0%	19.0%	39.2%	18.4%
87	8.0%	6.9%	13.1%	0.0%	0.9%	0.5%	14.0%	29.1%	27.4%
88	3.7%	3.0%	23.5%	0.0%	0.8%	0.0%	21.6%	30.6%	16.8%
89	9.2%	9.2%	13.1%	0.0%	1.8%	0.0%	34.2%	12.5%	19.9%
90	8.4%	16.1%	29.7%	0.0%	1.9%	0.0%	19.4%	0.0%	24.5%
91	22.0%	8.5%	11.0%	0.0%	0.0%	4.9%	19.5%	18.3%	15.9%
92	5.4%	8.7%	44.6%	0.0%	0.0%	0.0%	17.4%	12.0%	12.0%
93	7.0%	6.6%	12.2%	0.0%	0.0%	0.0%	30.1%	4.8%	39.3%
94	37.9%	17.2%	17.2%	0.0%	0.0%	0.0%	27.6%	0.0%	0.0%
95	20.0%	15.0%	10.0%	0.0%	0.0%	12.5%	25.0%	10.0%	7.5%
96	26.8%	2.4%	4.9%	17.1%	0.0%	0.0%	41.5%	7.3%	0.0%
(81–96)	11.8%	10.2%	20.8%	1.2%	1.1%	1.2%	21.4%	14.9%	17.4%
(81–84)	7.5%	12.7%	28.2%	0.2%	2.0%	0.4%	15.8%	15.6%	17.4%
(85–90)	6.7%	9.0%	20.1%	0.2%	1.5%	0.1%	19.6%	20.5%	22.3%
(91–96)	19.9%	9.7%	16.6%	2.8%	0.0%	2.9%	26.8%	8.7%	12.4%

Spring Creek Tule

Distribution of Reported Catch in Adult Equivalents

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%	29.2%	3.2%	1.1%	0.1%	26.9%	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%	42.2%	2.2%	0.0%	0.7%	11.9%	28.5%	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%	9.7%	0.0%	0.0%	0.0%	18.3%	47.3%	24.7%
88	0.0%	1.1%	26.5%	1.1%	2.2%	0.9%	21.0%	35.5%	11.8%
89	0.0%	0.2%	17.1%	0.5%	0.5%	1.2%	29.4%	41.1%	9.9%
90	0.0%	1.1%	24.6%	0.9%	0.9%	2.0%	19.9%	32.3%	18.3%
91	0.0%	0.5%	17.1%	0.3%	0.5%	1.3%	21.9%	44.2%	14.3%
92	0.0%	0.4%	17.5%	1.0%	0.7%	2.2%	39.1%	21.5%	17.4%
93	0.0%	0.0%	25.7%	0.0%	0.4%	2.6%	25.4%	30.8%	15.2%
94	0.0%	0.0%	33.8%	0.0%	1.3%	4.4%	6.5%	52.7%	1.5%
95	0.0%	0.0%	13.4%	0.0%	0.5%	4.4%	2.5%	79.2%	0.0%
96	0.0%	0.0%	0.0%	0.0%	0.0%	5.1%	10.6%	81.4%	2.9%
(79-96)	0.0%	0.8%	23.6%	0.9%	1.0%	1.7%	18.9%	41.4%	11.7%
(79-84)	0.0%	1.2%	31.6%	1.7%	1.4%	0.3%	20.0%	31.1%	12.8%
(85-90)	0.0%	1.1%	21.4%	0.8%	1.0%	1.4%	19.1%	41.4%	13.8%
(91-96)	0.0%	0.1%	17.9%	0.2%	0.6%	3.3%	17.7%	51.6%	8.5%

Distribution of Total Mortalities in Adult Equivalents

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%	29.6%	1.6%	2.6%	0.1%	23.0%	25.5%	16.5%
80	0.1%	0.8%	29.7%	2.8%	1.0%	0.1%	28.1%	24.9%	12.4%
81	0.0%	0.5%	25.9%	1.7%	2.2%	0.2%	30.0%	23.9%	15.6%
82	0.0%	0.6%	25.5%	1.2%	0.2%	0.0%	24.9%	38.3%	9.3%
83	0.0%	0.6%	42.4%	2.3%	0.0%	0.6%	12.2%	25.5%	16.3%
84	0.0%	3.1%	36.1%	0.0%	1.6%	0.5%	8.1%	32.7%	17.8%
85	0.0%	0.2%	24.0%	0.0%	0.2%	1.0%	25.3%	42.4%	6.8%
86	0.0%	3.7%	27.7%	2.6%	2.2%	3.4%	3.4%	44.9%	12.0%
87	0.0%	0.0%	11.4%	0.0%	0.0%	0.0%	18.9%	45.5%	24.2%
88	0.0%	1.1%	29.3%	1.1%	1.7%	0.8%	21.1%	30.7%	14.3%
89	0.0%	0.2%	19.1%	0.7%	0.5%	1.1%	30.9%	36.9%	10.5%
90	0.0%	1.1%	26.3%	1.2%	0.8%	2.0%	20.5%	28.0%	20.0%
91	0.0%	0.5%	19.0%	0.4%	0.5%	1.3%	23.3%	39.8%	15.3%
92	0.0%	0.5%	19.4%	1.2%	0.6%	2.0%	39.9%	19.1%	17.3%
93	0.0%	0.0%	27.3%	0.0%	0.3%	2.5%	26.5%	27.0%	16.3%
94	0.0%	0.0%	37.4%	0.0%	1.3%	4.1%	6.7%	48.9%	1.6%
95	0.0%	0.0%	18.8%	0.0%	0.4%	4.6%	2.8%	73.4%	0.0%
96	0.0%	0.0%	2.4%	0.0%	0.0%	5.0%	11.7%	77.7%	3.1%
(79-96)	0.0%	0.8%	25.1%	0.9%	0.9%	1.6%	19.9%	38.1%	12.8%
(79-84)	0.0%	1.1%	31.5%	1.6%	1.3%	0.2%	21.1%	28.5%	14.7%
(85-90)	0.0%	1.1%	23.0%	0.9%	0.9%	1.4%	20.0%	38.1%	14.6%
(91-96)	0.0%	0.2%	20.7%	0.3%	0.5%	3.3%	18.5%	47.7%	8.9%

Bonneville Tule

Distribution of Reported Catch in Adult Equivalents

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%	36.4%	5.5%	4.3%	0.0%	37.3%	3.5%	11.9%
82	0.0%	1.7%	45.6%	0.0%	0.7%	1.0%	11.4%	31.6%	8.0%
83	0.0%	4.6%	54.6%	4.1%	0.8%	0.6%	14.1%	10.0%	11.2%
84	0.0%	7.3%	51.1%	0.0%	3.3%	0.0%	8.7%	23.6%	6.0%
85	0.0%	1.1%	53.3%	0.0%	2.7%	2.2%	23.4%	9.8%	7.6%
86	0.0%	0.0%	8.2%	4.5%	14.5%	5.8%	3.6%	39.1%	24.2%
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%	38.7%	2.0%	3.7%	1.4%	18.7%	19.7%	13.1%
(80-84)	0.3%	3.4%	42.8%	2.1%	2.3%	0.5%	20.2%	16.0%	12.5%
(85-87)	0.0%	1.3%	31.8%	1.7%	5.8%	3.0%	16.3%	25.9%	14.2%

Distribution of Total Mortalities in Adult Equivalents

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	0.9%	1.8%	30.7%	0.9%	2.4%	0.9%	31.5%	8.3%	22.6%
81	0.0%	1.1%	35.6%	5.0%	3.8%	0.0%	39.7%	3.4%	11.5%
82	0.0%	1.6%	47.4%	0.0%	0.8%	0.8%	12.8%	28.2%	8.2%
83	0.0%	4.5%	54.3%	4.2%	0.7%	0.5%	14.9%	9.2%	11.8%
84	0.0%	7.5%	51.1%	0.0%	2.9%	0.0%	9.0%	22.8%	6.8%
85	0.0%	0.9%	53.7%	0.0%	2.3%	1.9%	25.5%	8.8%	6.9%
86	0.0%	0.0%	4.8%	3.6%	7.4%	3.7%	2.1%	23.0%	55.4%
87	0.0%	2.8%	35.9%	0.6%	0.3%	1.0%	21.3%	26.9%	11.3%
(80-87)	0.1%	2.5%	39.2%	1.8%	2.6%	1.1%	19.6%	16.3%	16.8%
(80-84)	0.2%	3.3%	43.8%	2.0%	2.1%	0.4%	21.6%	14.4%	12.2%
(85-87)	0.0%	1.3%	31.4%	1.4%	3.3%	2.2%	16.3%	19.6%	24.5%

Stayton Pond Tule

Distribution of Reported Catch in Adult Equivalents

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%	70.7%	2.5%	1.6%	0.5%	7.2%	10.4%	4.4%
85	0.0%	2.8%	46.2%	2.8%	1.8%	1.0%	28.1%	5.8%	11.6%
86	0.0%	2.7%	23.5%	5.7%	13.1%	4.4%	19.8%	12.8%	18.0%
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%	21.9%	5.5%	36.1%
92	0.0%	0.9%	27.8%	0.0%	1.6%	2.2%	47.6%	1.3%	18.6%
93	0.0%	1.1%	34.5%	0.0%	0.0%	3.1%	36.8%	3.8%	20.7%
94	0.0%	0.0%	66.7%	33.3%	0.0%	0.0%	0.0%	0.0%	0.0%
95	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
(82-95)	0.0%	1.5%	37.3%	3.6%	2.4%	1.4%	23.4%	9.8%	13.4%
(82-84)	0.0%	3.3%	51.3%	2.0%	0.9%	0.6%	17.9%	13.6%	10.4%
(85-90)	0.1%	1.4%	35.8%	1.5%	3.8%	1.5%	28.0%	14.3%	13.5%
(91-95)	0.0%	0.5%	30.7%	7.0%	1.5%	1.8%	21.2%	2.1%	15.1%

Distribution of Total Mortalities in Adult Equivalents

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%	2.9%	33.4%	1.5%	0.4%	0.5%	28.7%	19.3%	13.2%
83	0.0%	3.9%	49.7%	2.1%	0.7%	0.7%	18.9%	9.5%	14.6%
84	0.0%	2.8%	70.7%	2.5%	1.4%	0.5%	7.5%	9.7%	5.0%
85	0.0%	2.5%	46.2%	2.5%	1.7%	0.8%	29.4%	5.3%	11.4%
86	0.0%	2.4%	18.6%	5.8%	9.1%	3.9%	15.5%	9.8%	35.1%
87	0.0%	2.2%	41.0%	0.7%	0.2%	1.8%	20.5%	20.6%	13.1%
88	0.7%	0.5%	44.8%	0.0%	0.0%	1.3%	18.9%	28.7%	4.9%
89	0.0%	0.0%	28.7%	0.0%	3.5%	0.0%	48.3%	9.1%	10.5%
90	0.0%	0.6%	41.3%	0.0%	2.8%	0.0%	33.0%	0.6%	21.8%
91	0.0%	0.4%	24.3%	4.7%	5.1%	3.5%	21.2%	4.7%	36.1%
92	0.0%	0.9%	30.1%	0.0%	1.3%	1.9%	47.0%	1.2%	17.7%
93	0.0%	1.3%	36.2%	0.0%	0.0%	2.6%	36.2%	3.3%	20.5%
94	0.0%	0.0%	69.2%	30.8%	0.0%	0.0%	0.0%	0.0%	0.0%
95	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
(82-95)	0.1%	1.5%	38.1%	3.6%	1.9%	1.2%	23.2%	8.7%	14.6%
(82-84)	0.0%	3.2%	51.2%	2.0%	0.8%	0.6%	18.4%	12.8%	11.0%
(85-90)	0.1%	1.4%	36.8%	1.5%	2.9%	1.3%	27.6%	12.4%	16.1%
(91-95)	0.0%	0.5%	32.0%	7.1%	1.3%	1.6%	20.9%	1.8%	14.9%

Columbia River Upriver Bright

Distribution of Reported Catch in Adult Equivalents

	Fisheries with ceilings				Other fisheries				
Catch Year	All Alaska	All Nth/Cent	WCVI Troll	All Geo St	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%	30.2%	2.4%
80	44.5%	20.0%	14.7%	2.1%	0.4%	0.0%	2.0%	12.6%	3.6%
81	47.3%	22.7%	11.1%	1.0%	1.4%	0.5%	1.8%	11.2%	2.9%
82	36.9%	23.3%	20.9%	0.0%	2.0%	0.0%	2.7%	11.3%	3.0%
83	37.0%	35.8%	7.8%	0.5%	0.3%	0.0%	0.8%	17.9%	0.0%
84	31.3%	22.1%	13.1%	0.3%	1.4%	0.4%	0.3%	28.0%	3.1%
85	16.3%	15.8%	11.3%	0.1%	1.7%	0.1%	0.6%	47.5%	6.6%
86	19.4%	15.4%	9.6%	0.2%	0.2%	0.1%	1.1%	50.4%	3.5%
87	19.9%	19.0%	9.9%	0.0%	0.1%	0.3%	1.8%	44.4%	4.7%
88	14.5%	10.2%	13.3%	0.0%	0.1%	0.0%	2.5%	56.3%	3.1%
89	15.1%	19.3%	9.4%	0.0%	0.9%	0.0%	1.5%	51.6%	2.2%
90	21.1%	15.0%	10.8%	0.0%	0.0%	0.0%	1.6%	47.8%	3.7%
91	16.7%	17.4%	17.4%	0.0%	0.0%	0.0%	1.4%	38.4%	8.7%
92	10.5%	11.2%	24.5%	0.0%	1.4%	1.4%	0.0%	36.4%	14.7%
93	18.5%	13.1%	28.4%	0.0%	0.0%	0.0%	2.9%	26.2%	10.9%
94	23.4%	22.2%	15.0%	0.0%	0.0%	0.7%	0.0%	31.0%	7.6%
95	29.0%	7.1%	16.1%	0.0%	0.0%	0.0%	2.2%	29.9%	15.6%
96	11.4%	1.6%	0.0%	0.0%	0.0%	0.0%	2.9%	71.0%	13.1%
(79-96)	24.5%	17.3%	13.8%	0.3%	0.6%	0.2%	1.5%	35.7%	6.1%
(79-84)	37.6%	24.0%	13.9%	0.8%	1.1%	0.2%	1.5%	18.5%	2.5%
(85-90)	17.7%	15.8%	10.7%	0.0%	0.5%	0.1%	1.5%	49.7%	4.0%
(91-96)	18.3%	12.1%	16.9%	0.0%	0.2%	0.4%	1.6%	38.8%	11.8%

Distribution of Total Mortalities in Adult Equivalents

	Fisheries with ceilings				Other fisheries				
Catch Year	All Alaska	All Nth/Cent	WCVI Troll	All Geo St	Canada Net	Canada Sport	U.S. Troll	U.S. Net	U.S. Sport
79	29.2%	20.1%	15.7%	0.6%	0.9%	0.0%	1.7%	29.1%	2.6%
80	45.0%	19.9%	14.8%	2.1%	0.4%	0.0%	2.1%	12.1%	3.7%
81	48.2%	22.5%	11.1%	1.0%	1.3%	0.5%	1.9%	10.5%	3.0%
82	41.9%	22.1%	19.3%	0.0%	1.8%	0.0%	2.9%	9.4%	2.6%
83	44.6%	32.8%	7.2%	0.6%	0.2%	0.0%	0.8%	14.0%	0.0%
84	34.6%	22.5%	13.4%	0.3%	1.3%	0.4%	0.3%	23.7%	3.5%
85	22.2%	15.2%	11.0%	0.1%	1.5%	0.1%	0.7%	42.5%	6.8%
86	22.4%	15.3%	10.0%	0.2%	0.2%	0.1%	1.2%	46.9%	3.7%
87	25.4%	19.3%	10.4%	0.0%	0.1%	0.3%	1.8%	38.3%	4.4%
88	17.4%	10.7%	14.2%	0.0%	0.1%	0.0%	2.6%	51.9%	3.1%
89	17.9%	19.4%	9.8%	0.0%	0.8%	0.0%	1.5%	48.4%	2.2%
90	21.9%	15.8%	11.4%	0.0%	0.0%	0.0%	1.7%	45.3%	3.9%
91	20.5%	18.1%	18.1%	0.0%	0.0%	0.0%	1.8%	33.1%	8.4%
92	12.9%	11.7%	25.7%	0.0%	1.2%	1.8%	0.0%	32.2%	14.6%
93	26.1%	12.9%	28.0%	0.0%	0.0%	0.0%	2.5%	21.1%	9.4%
94	27.3%	21.9%	15.0%	0.0%	0.0%	0.7%	0.0%	27.8%	7.4%
95	32.5%	8.1%	18.4%	0.0%	0.0%	0.0%	2.1%	24.7%	14.1%
96	13.1%	4.4%	2.9%	0.0%	0.0%	0.0%	2.5%	64.0%	13.1%
(79-96)	27.9%	17.4%	14.2%	0.3%	0.5%	0.2%	1.6%	31.9%	5.9%
(79-84)	40.6%	23.3%	13.6%	0.8%	1.0%	0.1%	1.6%	16.4%	2.6%
(85-90)	21.2%	15.9%	11.1%	0.0%	0.5%	0.1%	1.6%	45.6%	4.0%
(91-96)	22.1%	12.8%	18.0%	0.0%	0.2%	0.4%	1.5%	33.8%	11.2%

Hanford Wild Brights

Distribution of Reported Catch in Adult Equivalents

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	16.2%	9.8%	15.7%	0.0%	0.4%	1.7%	0.9%	42.1%	13.2%
91	18.9%	17.3%	7.5%	1.6%	0.0%	0.0%	2.0%	44.3%	8.5%
92	29.6%	10.2%	24.7%	0.0%	0.0%	0.0%	1.6%	29.6%	4.3%
93	26.6%	9.2%	11.5%	0.0%	3.2%	1.8%	5.5%	28.0%	14.2%
94	34.0%	14.3%	9.8%	0.0%	0.6%	0.0%	2.2%	27.9%	11.1%
95	47.1%	10.8%	5.8%	0.0%	0.0%	0.0%	0.0%	22.4%	13.9%
96	21.5%	1.1%	0.0%	0.0%	0.0%	0.0%	0.0%	66.4%	10.9%
(90-96)	27.7%	10.4%	10.7%	0.2%	0.6%	0.5%	1.7%	37.2%	10.9%
(90-90)	16.2%	9.8%	15.7%	0.0%	0.4%	1.7%	0.9%	42.1%	13.2%
(91-96)	29.6%	10.5%	9.9%	0.3%	0.6%	0.3%	1.9%	36.4%	10.5%

Distribution of Total Mortalities in Adult Equivalents

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	18.0%	10.7%	16.1%	0.0%	0.4%	1.5%	1.1%	39.1%	13.0%
91	21.6%	18.0%	7.7%	1.8%	0.0%	0.0%	2.1%	40.5%	8.3%
92	33.6%	11.7%	24.7%	0.0%	0.0%	0.0%	1.3%	25.1%	3.6%
93	35.3%	8.5%	11.4%	0.0%	2.6%	1.5%	4.8%	23.2%	12.9%
94	39.7%	13.6%	9.9%	0.0%	0.5%	0.0%	2.1%	24.0%	10.1%
95	49.5%	12.5%	6.4%	0.0%	0.0%	0.0%	0.0%	18.8%	12.8%
96	26.4%	2.3%	0.7%	0.0%	0.0%	0.0%	0.0%	59.9%	10.7%
(90-96)	32.0%	11.0%	11.0%	0.3%	0.5%	0.4%	1.6%	32.9%	10.2%
(90-90)	18.0%	10.7%	16.1%	0.0%	0.4%	1.5%	1.1%	39.1%	13.0%
(91-96)	34.4%	11.1%	10.1%	0.3%	0.5%	0.2%	1.7%	31.9%	9.7%

Lewis River Wild

Distribution of Reported Catch in Adult Equivalents

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%	15.4%	14.2%	0.0%	1.7%	0.0%	4.9%	9.9%	37.4%
82	13.4%	8.9%	18.4%	0.7%	1.3%	0.0%	7.1%	10.6%	39.5%
86	9.4%	7.6%	10.9%	0.0%	0.0%	4.1%	5.3%	42.9%	19.8%
87	6.8%	10.7%	14.9%	0.0%	0.0%	0.8%	4.9%	43.4%	18.6%
88	7.9%	4.9%	14.2%	0.0%	0.2%	0.0%	7.3%	38.6%	26.9%
89	6.1%	15.9%	14.2%	0.0%	2.2%	0.9%	13.5%	26.8%	20.5%
90	14.9%	10.4%	36.4%	0.0%	0.0%	1.6%	11.2%	9.8%	15.7%
91	15.9%	11.8%	12.1%	0.0%	1.5%	0.0%	5.9%	36.5%	16.2%
92	4.3%	13.7%	14.1%	0.0%	0.0%	0.0%	6.3%	10.9%	50.8%
93	16.0%	13.9%	22.2%	0.0%	2.8%	0.0%	2.1%	18.1%	25.0%
94	38.1%	19.0%	19.0%	0.0%	9.5%	0.0%	4.8%	9.5%	0.0%
95	16.1%	5.8%	8.5%	0.0%	0.0%	0.0%	0.0%	0.0%	69.6%
96	57.4%	0.0%	0.0%	0.0%	0.0%	0.0%	19.1%	6.4%	17.0%
(81-96)	17.1%	10.6%	15.3%	0.1%	1.5%	0.6%	7.1%	20.3%	27.5%
(81-84)	14.9%	12.2%	16.3%	0.4%	1.5%	0.0%	6.0%	10.3%	38.4%
(86-90)	9.0%	9.9%	18.1%	0.0%	0.5%	1.5%	8.4%	32.3%	20.3%
(91-96)	24.6%	10.7%	12.7%	0.0%	2.3%	0.0%	6.4%	13.6%	29.8%

Distribution of Total Mortalities in Adult Equivalents

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	17.4%	15.3%	15.1%	0.0%	1.6%	0.0%	5.3%	9.1%	36.2%
82	15.2%	9.0%	18.0%	0.7%	1.2%	0.0%	7.0%	9.8%	39.2%
86	10.9%	8.5%	12.3%	0.0%	0.0%	4.0%	5.6%	39.3%	19.4%
87	9.0%	11.3%	15.8%	0.0%	0.0%	0.7%	4.8%	39.6%	18.8%
88	8.8%	5.2%	16.0%	0.0%	0.2%	0.0%	7.6%	35.0%	27.4%
89	7.4%	16.2%	14.9%	0.0%	2.1%	0.8%	13.7%	24.6%	20.2%
90	19.0%	10.3%	35.7%	0.0%	0.0%	1.3%	10.5%	8.5%	14.7%
91	18.1%	12.0%	12.4%	0.0%	1.4%	0.0%	5.9%	33.8%	16.4%
92	4.6%	13.7%	14.4%	0.0%	0.0%	0.0%	6.3%	10.2%	50.7%
93	17.3%	14.3%	22.6%	0.0%	2.4%	0.0%	3.6%	16.1%	23.8%
94	41.4%	24.1%	17.2%	0.0%	6.9%	0.0%	3.4%	6.9%	0.0%
95	17.2%	6.4%	9.4%	0.0%	0.0%	0.0%	0.0%	0.0%	67.0%
96	57.9%	1.8%	1.8%	0.0%	0.0%	0.0%	17.5%	5.3%	15.8%
(81-96)	18.8%	11.4%	15.8%	0.1%	1.2%	0.5%	7.0%	18.3%	26.9%
(81-84)	16.3%	12.1%	16.5%	0.3%	1.4%	0.0%	6.2%	9.4%	37.7%
(86-90)	11.0%	10.3%	18.9%	0.0%	0.5%	1.4%	8.4%	29.4%	20.1%
(91-96)	26.1%	12.1%	13.0%	0.0%	1.8%	0.0%	6.1%	12.0%	29.0%

Lyons Ferry

Distribution of Reported Catch in Adult Equivalents

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%	13.9%	22.6%	0.0%	2.1%	0.0%	10.2%	32.7%	7.3%
92	5.8%	13.5%	29.0%	0.0%	2.8%	5.4%	16.1%	22.6%	4.8%
93	7.7%	14.6%	23.5%	0.0%	2.7%	0.0%	17.2%	30.9%	3.6%
94	26.0%	21.5%	21.0%	2.0%	6.4%	0.0%	0.0%	21.5%	1.5%
(88-94)	9.7%	12.1%	24.0%	0.3%	2.3%	0.9%	12.8%	32.2%	5.8%
(88-90)	5.8%	7.1%	23.9%	0.0%	0.6%	0.3%	15.4%	39.3%	7.7%
(91-94)	12.7%	15.8%	24.0%	0.5%	3.5%	1.3%	10.9%	26.9%	4.3%

Distribution of Total Mortalities in Adult Equivalents

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	5.0%	7.2%	28.5%	0.0%	0.3%	0.1%	15.9%	37.5%	5.6%
89	6.4%	9.5%	23.3%	0.0%	1.4%	0.8%	16.9%	33.1%	8.7%
90	8.3%	6.0%	24.8%	0.0%	0.0%	0.0%	14.6%	37.4%	8.9%
91	13.4%	14.4%	23.3%	0.0%	2.0%	0.0%	10.2%	29.5%	7.2%
92	8.7%	14.1%	29.9%	0.0%	2.5%	5.2%	15.7%	19.1%	4.9%
93	13.2%	15.9%	23.5%	0.3%	2.2%	0.0%	15.3%	26.5%	3.3%
94	27.1%	19.6%	19.9%	2.2%	6.0%	0.0%	2.2%	21.1%	1.9%
(88-94)	11.7%	12.4%	24.7%	0.3%	2.1%	0.9%	13.0%	29.2%	5.8%
(88-90)	6.6%	7.6%	25.5%	0.0%	0.6%	0.3%	15.8%	36.0%	7.7%
(91-94)	15.6%	16.0%	24.1%	0.6%	3.2%	1.3%	10.9%	24.0%	4.3%

Willamette Spring

Distribution of Reported Catch in Adult Equivalents

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	25.0%	27.4%	11.1%	0.7%	0.0%	0.0%	2.8%	0.2%	32.9%
81	11.6%	19.1%	3.8%	0.3%	0.0%	0.0%	1.6%	20.0%	43.6%
82	11.6%	15.0%	10.6%	0.0%	0.1%	0.0%	2.4%	9.5%	50.9%
83	19.7%	16.6%	5.8%	1.2%	0.0%	0.0%	3.8%	10.7%	42.3%
84	11.0%	7.7%	5.0%	0.2%	0.3%	0.0%	2.1%	16.4%	57.2%
85	15.7%	2.8%	1.7%	0.4%	0.0%	0.0%	0.8%	34.0%	44.7%
86	5.2%	17.3%	5.7%	0.0%	0.0%	1.2%	0.5%	30.4%	39.7%
87	19.2%	13.3%	3.0%	0.0%	0.0%	0.5%	3.9%	7.8%	52.1%
88	13.5%	8.3%	3.9%	0.0%	0.0%	0.0%	2.7%	13.9%	57.8%
89	9.1%	3.4%	3.1%	0.8%	0.2%	0.2%	2.9%	26.0%	54.3%
90	11.2%	3.2%	2.8%	0.0%	0.1%	0.2%	1.6%	27.6%	53.2%
91	7.5%	2.7%	0.4%	0.2%	0.1%	0.1%	1.0%	10.3%	77.7%
92	9.6%	1.9%	4.5%	0.0%	0.1%	0.2%	4.1%	11.0%	68.7%
93	13.6%	1.8%	2.3%	0.2%	0.0%	0.1%	3.0%	1.5%	77.4%
94	8.4%	2.0%	1.2%	0.0%	0.0%	0.0%	0.3%	8.6%	79.4%
95	5.7%	1.8%	0.6%	0.0%	0.0%	0.2%	0.2%	0.6%	90.9%
96	4.7%	0.3%	0.0%	0.0%	0.0%	0.0%	0.8%	3.0%	91.3%
(80-96)	11.9%	8.5%	3.9%	0.2%	0.0%	0.2%	2.0%	13.6%	59.7%
(80-84)	15.8%	17.2%	7.3%	0.5%	0.1%	0.0%	2.5%	11.3%	45.4%
(85-90)	12.3%	8.1%	3.4%	0.2%	0.0%	0.4%	2.1%	23.3%	50.3%
(91-96)	8.2%	1.7%	1.5%	0.1%	0.0%	0.1%	1.6%	5.8%	80.9%

Distribution of Total Mortalities in Adult Equivalents

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	24.5%	26.3%	10.5%	0.6%	0.0%	0.0%	2.8%	0.6%	34.7%
81	13.9%	19.6%	3.9%	0.3%	0.0%	0.0%	1.7%	17.1%	43.4%
82	13.4%	14.7%	10.7%	0.0%	0.1%	0.0%	2.4%	8.3%	50.4%
83	23.6%	16.1%	5.5%	1.1%	0.0%	0.0%	3.8%	9.1%	40.9%
84	11.3%	7.9%	5.1%	0.2%	0.3%	0.0%	2.2%	14.5%	58.5%
85	21.1%	2.6%	1.6%	0.3%	0.0%	0.0%	0.8%	29.4%	44.2%
86	6.9%	19.1%	6.4%	0.0%	0.0%	1.5%	0.4%	27.2%	38.5%
87	27.0%	13.1%	3.3%	0.0%	0.0%	0.4%	3.7%	5.6%	46.9%
88	16.1%	9.1%	4.1%	0.0%	0.0%	0.0%	2.5%	11.7%	56.5%
89	10.2%	3.7%	3.3%	1.1%	0.2%	0.2%	3.0%	23.4%	55.0%
90	16.2%	3.8%	3.3%	0.0%	0.1%	0.2%	1.7%	23.6%	50.9%
91	9.3%	2.9%	0.4%	0.3%	0.1%	0.1%	1.1%	9.3%	76.4%
92	13.5%	2.1%	4.9%	0.0%	0.0%	0.1%	4.3%	9.4%	65.6%
93	19.4%	1.9%	2.3%	0.2%	0.0%	0.1%	3.0%	1.2%	71.9%
94	10.4%	2.1%	1.3%	0.0%	0.0%	0.0%	0.3%	7.6%	78.2%
95	8.2%	2.2%	0.8%	0.0%	0.0%	0.1%	0.2%	0.5%	87.9%
96	5.8%	1.0%	0.2%	0.0%	0.0%	0.0%	0.8%	2.6%	89.6%
(80-96)	14.8%	8.7%	4.0%	0.2%	0.0%	0.2%	2.0%	11.8%	58.2%
(80-84)	17.4%	16.9%	7.2%	0.4%	0.1%	0.0%	2.6%	9.9%	45.6%
(85-90)	16.2%	8.6%	3.7%	0.2%	0.0%	0.4%	2.0%	20.2%	48.7%
(91-96)	11.1%	2.0%	1.7%	0.1%	0.0%	0.1%	1.6%	5.1%	78.2%

Salmon River

Distribution of Reported Catch in Adult Equivalents

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	22.7%	43.9%	5.5%	0.0%	0.0%	1.2%	2.0%	0.0%	24.7%
82	22.5%	26.6%	11.6%	0.0%	0.0%	0.0%	4.3%	0.0%	35.0%
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	34.4%	31.3%	2.0%	0.0%	0.0%	0.0%	0.0%	0.0%	32.4%
86	35.1%	27.2%	4.5%	0.0%	0.0%	0.0%	0.0%	0.0%	33.2%
87	19.1%	27.4%	3.7%	0.0%	0.0%	0.0%	4.2%	0.0%	45.7%
88	24.3%	21.1%	9.8%	0.0%	0.0%	0.0%	2.0%	0.0%	42.9%
89	15.5%	20.8%	6.5%	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	6.7%	19.6%	32.1%	0.0%	0.0%	0.0%	4.2%	0.2%	37.2%
93	12.0%	23.0%	24.1%	0.0%	0.6%	0.0%	4.0%	0.0%	36.4%
94	17.8%	32.8%	9.4%	0.0%	0.0%	0.0%	2.5%	0.0%	37.5%
95	16.2%	11.1%	1.7%	0.0%	0.0%	0.2%	0.2%	0.0%	70.5%
96	14.9%	0.0%	0.0%	0.0%	0.0%	0.0%	6.1%	0.0%	79.0%
(81-96)	21.2%	25.0%	9.4%	0.0%	0.2%	0.1%	2.5%	0.1%	41.4%
(81-84)	24.1%	35.3%	9.1%	0.0%	0.3%	0.3%	1.7%	0.2%	29.0%
(85-90)	24.8%	24.6%	6.3%	0.0%	0.3%	0.0%	2.7%	0.0%	41.3%
(91-96)	15.7%	18.6%	12.8%	0.0%	0.1%	0.0%	2.9%	0.0%	49.7%

Distribution of Total Mortalities in Adult Equivalents

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	24.0%	42.7%	5.8%	0.0%	0.0%	1.1%	1.9%	0.0%	24.5%
82	25.3%	26.0%	11.5%	0.0%	0.0%	0.0%	4.3%	0.0%	32.9%
83	38.0%	28.3%	11.9%	0.0%	0.0%	0.0%	0.0%	0.0%	21.9%
84	19.4%	38.4%	5.6%	0.0%	1.3%	0.0%	0.4%	0.6%	34.2%
85	40.9%	27.0%	2.2%	0.0%	0.0%	0.0%	0.2%	0.0%	29.8%
86	38.7%	26.2%	5.3%	0.0%	0.0%	0.0%	0.7%	0.0%	29.1%
87	25.9%	27.2%	3.7%	0.0%	0.0%	0.0%	3.7%	0.0%	39.5%
88	28.6%	22.8%	10.2%	0.0%	0.0%	0.0%	2.1%	0.0%	36.4%
89	24.3%	22.6%	6.7%	0.0%	1.1%	0.0%	4.5%	0.0%	40.7%
90	27.4%	20.4%	10.8%	0.0%	0.3%	0.0%	4.0%	0.0%	37.2%
91	30.3%	24.9%	9.7%	0.0%	0.0%	0.0%	0.4%	0.0%	34.7%
92	10.3%	20.2%	31.4%	0.0%	0.0%	0.0%	4.1%	0.1%	33.9%
93	16.0%	23.1%	23.4%	0.0%	0.4%	0.0%	3.6%	0.0%	33.4%
94	25.5%	30.4%	8.7%	0.0%	0.0%	0.0%	2.3%	0.0%	33.2%
95	19.9%	13.0%	2.0%	0.0%	0.0%	0.2%	0.2%	0.0%	64.7%
96	22.1%	6.6%	1.7%	0.0%	0.0%	0.0%	5.1%	0.0%	64.6%
(81-96)	26.0%	25.0%	9.4%	0.0%	0.2%	0.1%	2.3%	0.0%	36.9%
(81-84)	26.7%	33.8%	8.7%	0.0%	0.3%	0.3%	1.7%	0.2%	28.4%
(85-90)	30.9%	24.4%	6.5%	0.0%	0.2%	0.0%	2.5%	0.0%	35.4%
(91-96)	20.7%	19.7%	12.8%	0.0%	0.1%	0.0%	2.6%	0.0%	44.1%

APPENDIX C: CWT DATA AND METHODS USED

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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 associated 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 only been sampled 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 (rack returns and cost recovery) 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.

<u>SSRAA.</u> 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 1996 were obtained from the NWIFC and QIN;

2) Because of inconsistencies between PSMFC data and past exploitation rate analyses, recoveries for Stillaguamish Fall Fingerling, SPS Fall Fingerling (Grovers Creek), Hoko Fall Fingerling, and Kalama Fall Fingerling for previous years were obtained from NWIFC, and recoveries for Queets Fall Fingerling for past years were received from QIN.

3) Recoveries to the U.S. Fish and Wildlife Service (USFWS) Makah National Fish Hatchery in 1996 were obtained from the USFWS;

4) 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

5) 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:

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

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-10. Additional tables have been included to account for chinook incidental mortalities in northern and central B.C. net and sport fisheries. Voluntary release of chinook has become increasingly prevalent in B.C. seine fisheries during 1995 and 1996. Nonretention in the NCBC sport fishery was due to a reduced daily bag and possession limit (1 chinook/day and 2 in possession (half of the previous limit)) commencing on July 19, 1995 in the Queen Charlotte Islands (in effect through March 31, 1996). In 1996, chinook nonretention was implemented in the QCI sport fishery from June 1st through October 31. Limits were not reduced in other NCBC sport areas.

Sport limits were also reduced along the west coast of Vancouver Island. In 1995, catch limits were reduced to 1 chinook per day and 3 in possession during periods when WCVI chinook were returning to terminal areas. Given the catch rates in that fishery, however, these limits likely reduced effort and possession, but not the retention rate per boat trip. Effort in 1995 was substantially reduced (-27% for WCVI) compared to the 1990-1994 period (94,000 boat trips compared to an annual average of 129,000 boat trips, W. Luedke, personal communication). There was no direct monitoring of legal-sized chinook released, consequently mortality associated with non-retention has not been included for the 1995 WCVI sport fishery. However, in 1996, the WCVI sport fishery was also under chinook non-retention limits (from July 15th in areas 25 to 27, and from July 29th in areas 21-24) through October 31st. To account for incidental mortalities during these periods, the terminal catchability was applied to effort in Area 23 (Barkley Sound and Alberni Canal) during August and September. Sport fishing effort was estimated from the annual creel survey: for Barkley Sound and Alberni Canal, the 1996 non-retention effort was 9,171 boat trips; and in areas outside of Barkley Sound, non-retention effort was 9,104 boat trips. Overall, the 1996 sport fishing effort is estimated to have declined to only 33% of the 1990-1994 average.

Table C-1. Brood years included by stock for exploitation rate assessment.

Stock Name	Youngest Age	Oldest Age	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94
Alaska Spring	3	6	-	-	-	-	-	-	-	x	x	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	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	x	x
Puntledge	2	5	-	-	-	-	x	x	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	x	x
South Puget Sound Fall Yearling	2	5	-	-	-	-	-	-	-	x	x	x	x	-	-	-	-	x	x	x	x	x	x	x	x	x
Squaxin Pens Fall Yearling	2	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	x	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	x	x
Stillaguamish Fall Fingerling	2	5	-	-	-	-	-	-	-	-	-	x	x	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	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	x	x
Kalama Fall Fingerling	2	5	-	-	-	-	-	-	-	-	x	x	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	x	x
Hoko Fall Fingerling	2	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	x	-	x	x	x	x	x	x
Skagit Spring Yearling	2	5	-	-	-	-	-	-	-	-	-	-	x	x	x	x	x	x	x	-	-	x	-	-	x	x
Nooksack Spring Yearling	2	5	-	-	-	-	-	-	-	-	-	-	x	x	-	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	x	x
Sooes Fall Fingerling	2	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	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	x	x	x
Cowlitz Tule	2	5	-	-	-	-	-	-	x	x	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	x	x
Bonneville Tule	2	5	-	-	-	-	-	x	x	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	-	x	x
Upriver Bright	2	6	-	-	-	-	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Hanford Wild	2	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	x	x	x	x	x	x	x	x
Lewis River Wild	2	6	-	-	-	-	-	-	x	x	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	x	x	-
Salmon River	2	5	-	-	-	-	-	-	x	x	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	BY 93	BY 94
							031661	031716	031753	031761	031655	031826	031901	031957	032027	032037	030116	030218	030227	030233	030234	030130	
							031703	031717	031754	031762	031807	031827	031902	031958	032028	032038	030119	030219	030228	032233	030235	030131	
							031704	041917	041944	031763	031808	031828	031903	031959	032029	032039	030121	030220	030229	032234	030236	030132	
							031705	041943	042121	031801	031809	031829	031904	031960	032030	032040	030122	030221	030230	032235	030237	030133	
							031706	041945	042202	031802	031810	031830	031905	031961	032031	032041	030125	030222	030231	036332	030238	030134	
							031707	042039	044005	031803	031811	031831	031906	031962	032032	032042	030216	030223	030332	036335	032236	030135	
							031708	042040		031804	031812	031832	031907	031963	032033	032043	030217	030224	031618	036337	032237	032137	
							031709	042042		036303	031813	031833	031908	032001	032034	032044	031947	030225	032216	036338	032238	032242	
							031710	042043		036304	031814	031834	031909	032002	032113	032045	032138	030226	032217	036339	032239	032243	
							031711	042045		036305	031815	031835	031910	032003	032114	032131	032141	032052	032218	036340	032240	032244	
							031712			042222	031816	031836	031911	032004	032116	032132	032201	032203	032219	036341	032241	036209	
							031713			042223	031817	031837	031912	032005	032119	032135	032202	032204	032220	036342	036350	036210	
							031714			042227	031818	031838	031913	032006	032121	036226	036237	032205	032221	036343	036351	036301	
							031715			042229	031819	031839	031914	032007	032122	036228	036238	032206	032222	036344	036352	036357	
							041932			042230	036306	031843	031915	032008	036213	036231	036329	032207	032223	036345	036353	036358	
							041938			B40907	036307	031844	031916	032009	036214	036232	036330	032208	032224	036346	036354	036359	
							041939			B40908	036308	031845	031917	032010	036216	036319	036331	032209	032225	036347	036355	036360	
							041940				036309	031846	031918	032011	036219	036321	043247	032210	032226	036348	036356	036361	
											042255	031847	031919	032012	036221	036322	043249	032211	032227	036349	044049	036362	
											042354	031848	031920	032013	036222	036323	043250	032212	032228	043857	044050	036363	
											042355	031849	031921	032014	036225	036324	043252	032213	032229	043858	044142	044314	
											042356	031850	031922	032015	036310	036325	043255	032214	032230	043859	044143	044315	
											042430	031851	031923	032016	036311	036326	043303	032215	032231	043904	044148	044407	
											042431	031852	031924	032017	036312	036327	043304	043232	032232	043905	044149	044416	
												031853	031925	032018	036313	036328	043305	043449	036333	043906	044157	044417	
												031854	031926	032019	036314	042737	043306	043450	036334	043907	044223	044418	
												031855	031927	032101	036315	042738	043319	043501	042945	043933	044224	044419	
												031856	031928	032102	036316	043027	043320	043502	043701	043934	044238	044420	
												031857	031929	032103	036317	043028	043323	043504	043702	043936	044239	044421	
												031858	031930	032104	042754	043029	043324	043507	043704	043937		044430	
												031859	031931	042626	042908	043030	043406	043530	043705	043938		044431	
												031860	031932	042628	042909	043031	043407	043531	043706	043939			
												031861	031933	042631	042960	043032		043532	043707	044028			
												031862	031934	042632	043101	043058		043533	043708	044029			
												031863	031935	042633	043102	043059		043606	043745	044101			
												040321	031936	042634	043104	043141		043607	043746	044102			
												042463	031937	042713	043107	043142		043608	043747	044104			
												042503	031938	042731	043108	043144			043748				
												042511	031939	042732		043147			043749				
												042512	031940	042733		043149			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	BY 93	BY 94
													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	BY 93	BY 94
		020203	020606	020408	021629	022217	021615	021827	021661	022202	022541	022662	023131	023734	024256	024311	025014	020151	021208	180620	180259	181539	
		020406	020906	020409	021630	022218	021635	021829		022405	082225	022663	023132	023735	024257	024802	025836	020152	021209	180621	180260	181540	
		020506	021206	021305	021631							022708	023133	023736	024361	024809	025837	020153	021549	180622	180261	181541	
		020602	021406									022753	023134	023737	024362	024810	025838	020645	021550	180623	180262	181542	
												082247	023135	023738	024363	024951	025839	020646	021551	180802	180624	181543	
												082248	023136	023739	024401	024952	026055	020647	021552	180803	180625	181544	
													023142	023740		024958	026056	020648	021553	180804	180626	181545	
													023143	023741		024959	026057	020948		180805	180627	181546	
													023144			024960		020949					
													023145			024961		020950					
													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	BY 93	BY 94
			020403	020108	021916	021736	021759	021757	021657	022303	022518	022631	023322	023522	024152	024419	025814	026062	020956	180422	181150	180629	181644
						021737		021758	021943	022304	022519	022632	023323	023523	024153	024420	025815	026063	020957	180421	181151	180630	181645
						021738			021950				023324	023524	024154	024421	025816	026101	020958	180420	181152	180631	181646
													023325	023525	024155	024956	025817	026102	020959	180419	181153	181357	181647
													023326	023554	024156	025358	025818	020361	021448	180418	181154	181358	181648
													023327	023555	024157	025359	025819	020360	021449	180417	181155	181359	181649
													023328	023556	024158	025360	025820	020359	021450	180416	181156	181360	181650
													023329	023557	024159	025361	025821	020358	021451	180415	181157	181361	181651
													023330	023558	024160	025362	025822	020357	026019	021331	181158	181362	181652

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	BY 93	BY 94
			021402	020308	021816	021634	021731	021854	021947	022302	022556	022710	023357	023727	024701	023701	026034	020809	180315	180817	181403	181410	182138
											022557	022711	023358		024702			020810	180316	180816	181404	181411	182139
													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	BY 93	BY 94
		BLRD	021002	020206	021716	021726	021612	021824	021810	022223	022543	022661	023217	023742	024260	024416	026010	020660	021312	180863	180406	180636	181059
		BLRDGN				021727	021613	021825	021944	022306		022747	023320	023743	024261	024742	026047	020661	021313	180862	180407	180637	181060
		BLRDGD					021656	021826				022748	023321	023744	024262	024761	026048	020662	021314	180861	180408	180638	181061
		021102										022824	023333	023745	024263	024762	026049	020663	021315	021335	180409	180639	181062
												022825	023334	024047	024357	024957	026050	020727	180253	021334	180410	181055	182014
												022826	023335	024048	024358	024962	026051	020952	180254	021333	180411	181056	182015
													023336	024049	024359	024963	026052	020953	180255	021332	181103	181057	182121
													023337	024050	024360	025001	026053	020954	180256		181104	181058	182122
													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	BY 93	BY 94
							632004	632015	632248	632147					634959	635502	630138	633926	634257	634528	635217	635721	635856
								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	BY 93	BY 94
															634162	634202	635244	630455	633955		635218	635719	635855
																			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	BY 93	BY 94
				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-2.9. 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	BY 93	BY 94
			011305	130302				632042						633804	634122	634732	635242	630731	634025	634340	635009	635543	635758
			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	BY 93	BY 94
									050843	051063	051427	211618			212221	212555	213147	211826	212026	212205	212251	212330	212610

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	BY 93	BY 94
	150812		130303	130913			631752	632041	632146	632235				633501	634119	635208	635237	630450	630862	634023	634946	635545	635023
	151013						631915	632109	632262	632331				633502						634620	635057		635801
									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	BY 93	BY 94
150010	151010	151312	011403	130604			631935	631943	632145	051047	051346	211622	211657	211901	211961	212542	213137	211831	634024	634339	212326	212329	635826
150109	151012	151313	011404				631936	631944	632233	632256				633643	634116	635221	635238	630261	212014	212217	634953	635318	635831
150111	151202						631940		632253	632158				633644	634121	635222	635262						212634
150114							631945							633645									212636
150200														633646									212639
150203														634104									212640
150806																							212643
																							212645
																							212646
																							212648
																							212651

BY 94 (continued)

212653	212706	212717	212728	212739	212750	212761	212818
212654	212707	212718	212729	212740	212751	212762	212820
212657	212708	212719	212730	212741	212752	212763	212823
212658	212709	212720	212731	212742	212753	212803	212824
212660	212710	212721	212732	212743	212754	212805	212829
212663	212711	212722	212733	212744	212755	212806	212830
212701	212712	212723	212734	212745	212756	212809	212833
212702	212713	212724	212735	212746	212757	212810	212834
212703	212714	212725	212736	212747	212758	212812	212836
212704	212715	212726	212737	212748	212759	212815	212840
212705	212716	212727	212738	212749	212760	212817	

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

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	BY 93	BY 94
								050722	050839	051048	051344	211628	211706	211759	211962	212541	213138	211836	211833	212206	212323	212450	212606
									050840	051049	051345	211629	211707	211761									

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	BY 93	BY 94
											051363	211616	211658	211919	212208		213132	211827	212015	212215	212324	212451	212617
											632721	633038	633419	211920				211828					212618
											632722	633039	633420	211921									635332
														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	BY 93	BY 94
														211935	212216	211907		211829	212018	212218	212327	212453	212609

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	BY 93	BY 94
										632606	632607	632608	633353	633323	633314	634744			633114			635027	635842
													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	BY 93	BY 94
										632411	632546		633452		633247	634962	634422	635261	634123		634529	635018	635815
													633453		633248	635059							635830
															633336								635835

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	BY 93	BY 94
			130208	131010			631834	632047	632136	632341	632853	633049	632508	633131	633246	634702	630161	635542	635908	634224	634619	635046	635827
										632604	633009	633050	633060	633648	634145	634704	630162						635832
													633108										

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	BY 93	BY 94
														051744	051907	051950		051955	052353	052822	053131	053133	053753
														051745					052354	052823	053132	053134	053754
														051746					052355	052824		053519	053755
														051747					052356	052825		053520	053756

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	BY 93	BY 94
						050361	050520	050661	050830	050962	051425	211621		211908	212101	212835	213144	211835	212010	212260	212328	212452	212425
							050521		050833	051016													212624
							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	BY 93	BY 94
						631802	631942	632154	632156	632462	632503	633019	633235	634108	634126	635231	635250	630452	634056	634526	635015	635539	635620
									632255			633020	633236										635523
												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	BY 93	BY 94
	050101	050401	050901	050202	054101	055501	050433	050639	050740	051050	051142	051151	051534	B50109	051855	051445	052013	052207	052106	052127	052133	053356	053757
	050201	050501	051001	050302	054201	055601	050434	050640	050741	051051	051143	051152	051535	B50110	051856	051449	052015	052208	052109	052129	052134	053357	053758
	050301	050601	051101	050402	054401	055701	050444	050641	050742	051052			051536	B50111	051857	051450	052016	052209	052110	052130	052146	053430	053759
			051201	050502	054501	056001	050446		050748				051537	B50112	051858	051451	052017	052210	052112	052544	052149	053431	053760
			051301	050602	054601	056201			050749				051538	B50113	051859	051659	052018	052211	052115	052545	052732	053432	053761
			051401	050702					050750				051539	B50114	051860	051660	052019	052212	052117	052553	052733	053433	053762
				050802					050751					B50115	051861	051661	052020	052213	052118	052554	052735	053434	
														B50208	051862	051662	052021	052214	052123	052557	052736	053435	
														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	BY 93	BY 94
					091605	071656	071842	072157	072156	072407	072729	073120	073322								075942	076143	
								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	BY 93	BY 94
							071841	072055	072335	072662	072328	073144	073352	073818	074050	074526	075012	075218	075227	071601		070234	
											072830	073145	073353	073819	074051	074527	075015	075219	075228	071602		070235	
											072831	073146	073354	073820	074052	074528	075017	075220	075229	071603		070516	
											072832	073147	073355	073821	074053	074529	075018	075221	075230	071604		070517	
											072833	073148	073356	073822	074054	074530	075020	075222	075231	075905		070518	
											072834											070519	
																						070520	

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	BY 93	BY 94
				130713	631662	631741	631821	631948	632155	632252	632611	632859	633221	634102	634128	635226	635249	630732	634057	634341	635010	635540	
				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	BY 93	BY 94
															634152	635232	635252	630755	634115	634527	635017	635704	635759

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	BY 93	BY 94
						631611	631813	632123			632737	633126	633411	633821	634151	635061	630456	631350	634217	634206	634940	635157	635627
						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	BY 93	BY 94
													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	BY 93	BY 94
				090509	091701	071737	071925	072219	072237	072521	072863	073024	073163	073428	073707	074653	073721	075347	075021	075811	070133	070231	
					091703	071738	072042	072222	072418	072522	072905	072902	073201	073429	073708	074654	075158	075348	075346	070017	070134	070361	
					091621	071741	072047	072224	072422	072719	072930	073023	073202	073902	074962	075028	075159	075349	075452	075904	070240	070830	
					091622	071742	072049	072225	072517	072720			073203	073903	075002	075038	075160	075350	075626	071457	070253	070831	
					091623		072053	072226	072528				073651	073906	075004	075041	075161	075438	075627	075734	070346	070832	
					091624			072252	072529				073652	073907	075013	075042	075162	075439	075628	075735	070428	070833	
					091625			072253	072530				073653	073908		075047	075163	075501	075630	075655	070430	070834	
					091626			072254					073654	073909		075049	075202	075502	075643	073722	070431	070835	
					091627								073655	073910		075050	075203	075504	075644	076114	071535	070233	
					091628								073656	073911		075052	075205	075506	075656	076115	071536	070553	
					091629								073663	073944			075206	075514	075661	076116	075902	070446	
					091630								073701	073945			075207	075515	075710	076117	075903	076338	
					091631								073702	073948			075208	075516	075711	076118	076122	076125	
													073729	073949			075210	075522		076119	076123	070563	
													073730	073950			075211	075523		071458		070616	
													073731	073951				075524		075732		070444	
													073732	073952				075525		071459		070850	
													073733	073953				075526		075921		070851	
													073734					075527		075922		070442	
													073735					075528		075923		070443	
													073736							075924		070343	
																				075933		070344	
																				075934		070345	

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	BY 93	BY 94
						071643	071849	072239	072504		072647	072726	073051	073329	073342	074629	075131	075458	075705	071559	070417	070459	070962
						071644	071850	072240	072505				073052	073330	074321	074635	075132	075459	075706	071560	070418	070460	
															074322	074636	075133	075460	075707	071561	070419	070461	
															074323	074637	075134	075461	075708	071562	070420	070462	
															074324	074638	075135	075462	075709	071563	070421	070463	
																	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]
1995	6,435	6,904	10,735 [9]
1996	6,734	7,224	8,088 [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]
1995	21,525	23,092	68,701 [9]
1996	23,586	25,304	68,304 [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]
1995	6,435	6,904	10,735 [9]
1996	6,734	7,224	8,088 [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]
1995	21,525	23,092	68,701 [9]
1996	23,586	25,304	68,304 [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]
1995	52,446	56,264	17,731 [9]
1996	47,607	51,073	8,245 [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]
1995	52,446	56,264	17,731 [9]
1996	47,607	51,073	8,245 [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 Department of 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 Department of 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 Department of 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 1990-1996 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
1995	283	935	4
1996	283	935	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
1988	17,968	5,359	4,5
1989	66	9	3
1989	21,239	435	4,5
1990	18,964	6,431	4,5
1991	26,754	3,042	4,5
1992	15,798	5,778	4
1993	16,427	3,496	4
1994	22,159	2,490	4
1995	9,682	9,518	4
1996	0	11,326	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] Commercial catch database, Pacific Biological Station, Nanaimo, B.C.; number of boat days of troll fishing effort during the chinook retention fishery and during chinook nonretention period.

[5] Base period fishing effort used in calculation of 1996 incidental mortality.

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
1988	5,799	1,246	4,5
1989	66	9	3
1989	4,706	167	4,5
1990	6,032	1,591	4,5
1991	4,891	641	4,5
1992	5,739	1,070	4
1993	2,867	1,153	4
1994	7,156	409	4
1995	1,218	1,327	4
1996	0	390	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] Commercial catch database, Pacific Biological Station, Nanaimo, B.C.; number of boat days of troll fishing effort during the chinook retention fishery and during chinook nonretention period.

[5] Base period fishing effort used in calculation of 1996 incidental mortality.

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
1988	40,576	7,170	4,5
1989	41.470	0	4,5
1990	47,910	0	4,5
1991	46,710	0	4,5
1995	12,081	9.273	4
1996	0	12,850	4

[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.

[4] Commercial catch database, Pacific Biological Station, Nanaimo, B.C.; number of boat days of troll fishing effort during the chinook retention fishery and during chinook nonretention period.

[5] Base period fishing effort used in calculation of 1996 incidental mortality.

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
1995			0	0	3
1996			0	0	3

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 Commercial catch database, Pacific Biological Station, Nanaimo, B.C.; number of boat days of troll fishing effort during the chinook retention fishery and during chinook nonretention period.

3 No chinook or coho directed troll fishery in 1995 or 1996.

Table C-9. Sources and estimates of CNR for the North and Central B.C. net fisheries. Voluntary release of chinook from seines has become increasingly prevalent during 1995 and 1996. Retention effort is number of boat days effort by gillnet and seine for a season. Non-retention effort is twice (2x) the boat days of seine effort by Region (see footnote 2).

	Northern Nets		Central Nets		
Year	Retention	Non-retention	Retention	Nonretention	Source
1994	17,100	0	7,550	0	1
1995	29,290	8,280	7,140	1,840	2
1996	25,660	5,800	2,330	600	2

1 Commercial catch database, Pacific Biological Station, Nanaimo, B.C.; number of boat days of net fishing effort.

2 Seine effort during "non-retention" is based on the release of 2 of every 3 chinook encountered by seine vessels. To simulate this effect, seine fishing effort is included in the "retention" column and doubled in the 'non-retention" column. Monitoring of this release rate has been very limited, but the Department is confident that the release rate is at least this rate; consequently this is likely to be a conservative estimate of the associated mortality rate.

Table C-10. Number of angler days of chinook retention, chinook nonretention, and source of information for the NCBC (all statistical areas 1 through 11) sport fishery.

Year	Chinook Retention	Chinook Nonretention	Source
1995	79,680	11,544	[1,2]
1996	38,220	26,230	[1,3]

[1] Departmental records from the North Coast sport fishery, maintained by E. Fast (North Coast Sport Fishery Co-ordinator, Prince Rupert, B.C.).

[2] Non-retention effort determined based on recorded fishing effort following the reduction in bag and possession limits on July 19, 1995. Catch limits were reduced by one-half but chinook could still be retained. Effort during the period July 19 through October 31 was included in both the retention and non-retention effort values.

[3] Non-retention effort determined based on recorded fishing effort in Areas 1, 2W, and 2E (Queen Charlotte Islands) between June 1 and October 31, 1996. Since this was complete non-retention of chinook, this effort is NOT included in effort from the remaining NCBC sport areas.

APPENDIX D: TOTAL MORTALITY EXPLOITATION RATE AND FISHERY INDEX DATA

Southeast Alaska Troll

TOTAL MORTALITY AEQ FISHERY INDICES

Year	Winter/ Spring	June Inside	June Outside	July Inside	July-Sept Outside	SPFI
79	1.216	0.686	1.171	0.657	0.998	1.010
80	0.721	1.110	0.954	0.864	1.210	1.076
81	1.077	0.765	0.979	0.954	1.115	1.037
82	0.985	1.439	0.896	1.525	0.677	0.877
83	0.917	0.949	0.730	0.992	1.603	1.099
84	0.394	1.464	1.139	0.399	0.521	0.681
85	0.480	0.946	0.707	0.812	1.246	0.896
86	0.468	0.556	0.200	0.786	1.680	0.619
87	0.542	0.688	0.203	2.373	0.838	0.619
88	1.237	0.197	0.012	1.723	0.727	0.671
89	0.753	0.758	0.134	1.020	0.675	0.595
90	0.829	1.359	0.160	1.609	1.814	1.103
91	1.352	1.247	0.251	1.084	0.851	0.735
92	1.044	0.832	0.081	0.451	0.647	0.577
93	0.744	0.333	0.029	0.487	1.220	0.684
94	0.684	0.240	0.045	0.591	1.067	0.659
95	0.497	0.976	0.061	1.416	1.169	0.720
96	0.510	0.789	0.066	0.660	0.801	0.484

North/Central B.C. Troll

TOTAL MORTALITY EXPLOITATION RATES

Year	AKS Age 4	BQR Age 3	QUI Age 3	QUI Age 4	QUI Age 5	RBT Age 3	RBT Age 4	RBT Age 5	SRH Age 3	SRH Age 4	SRH Age 5	URB Age 3	URB Age 4	URB Age 5	WSH Age 4
79	NA	0.087	0.050	0.178	0.117	0.107	0.154	0.106	NA	NA	NA	0.011	0.090	NA	NA
80	NA	0.098	0.050	0.172	NA	0.087	0.156	0.153	0.075	NA	NA	0.026	0.068	0.073	0.102
81	NA	0.097	0.080	0.184	0.197	0.062	0.141	0.240	0.112	0.155	NA	NA	0.076	0.080	0.056
82	0.004	0.069	0.033	0.085	0.127	0.067	0.165	0.122	0.040	0.120	0.076	0.026	0.034	0.020	0.015
83	0.007	NA	0.064	0.150	0.232	0.076	0.115	0.079	0.034	0.090	0.095	0.035	0.077	NA	0.040
84	0.005	0.067	0.012	0.068	0.082	0.035	0.142	0.232	NA	0.097	0.320	0.025	0.110	NA	0.015
85	0.003	0.035	0.017	0.049	0.038	0.063	0.208	0.214	0.055	NA	0.237	0.024	0.084	0.070	0.015
86	0.003	0.064	0.054	0.088	0.090	NA	0.119	NA	0.016	0.093	NA	0.020	0.073	0.068	NA
87	0.003	NA	0.028	0.080	0.137	0.044	NA	NA	0.025	0.055	0.294	0.038	0.104	0.144	0.020
88	0.008	NA	0.018	0.053	0.022	0.029	0.083	NA	NA	0.043	0.130	0.017	0.056	0.097	0.026
89	0.004	0.026	0.026	0.039	0.039	0.030	0.102	0.148	0.016	0.039	0.191	NA	0.053	0.181	0.011
90	0.009	0.028	0.029	0.108	0.050	0.032	0.108	0.099	0.020	0.035	0.237	NA	0.067	0.098	0.012
91	0.003	0.019	0.036	0.121	0.090	0.041	0.109	0.199	0.018	0.056	0.199	NA	NA	NA	0.008
92	0.001	0.044	NA	0.164	0.169	0.032	0.108	0.147	0.013	0.034	0.102	NA	NA	NA	0.003
93	0.001	0.031	0.048	NA	NA	0.026	0.092	0.134	0.017	0.082	0.213	0.005	0.054	NA	0.006
94	0.001	NA	NA	0.079	NA	0.039	0.113	0.127	0.019	0.072	0.188	NA	0.047	NA	0.005
95	0.000	NA	NA	NA	NA	NA	0.068	0.062	0.006	0.000	0.071	NA	NA	0.028	0.005
96	NA	0.002	0.003	0.000	NA	NA	NA	NA	0.005	0.002	0.006	0.002	0.002	NA	0.001
Base	0.004	0.088	0.053	0.155	0.147	0.081	0.154	0.155	0.076	0.138	0.076	0.021	0.067	0.058	0.058

TOTAL MORTALITY EXPLOITATION RATE INDEX

Year	AKS Age 4	BQR Age 3	QUI Age 3	QUI Age 4	QUI Age 5	RBT Age 3	RBT Age 4	RBT Age 5	SRH Age 3	SRH Age 4	SRH Age 5	URB Age 3	URB Age 4	URB Age 5	WSH Age 4	Fishery
79	NA	0.994	0.934	1.151	0.795	1.326	0.999	0.682	NA	NA	NA	0.520	1.346	NA	NA	0.977
80	NA	1.117	0.940	1.112	NA	1.076	1.011	0.985	0.996	NA	NA	1.243	1.015	1.262	1.763	1.098
81	NA	1.104	1.499	1.191	1.340	0.771	0.918	1.546	1.476	1.126	NA	NA	1.135	1.393	0.975	1.206
82	1.000	0.786	0.626	0.546	0.866	0.827	1.072	0.787	0.527	0.874	1.000	1.237	0.504	0.345	0.262	0.755
83	1.644	NA	1.210	0.973	1.579	0.937	0.747	0.509	0.445	0.651	1.246	1.683	1.143	NA	0.694	0.924
84	1.161	0.762	0.225	0.437	0.557	0.434	0.922	1.493	NA	0.705	4.183	1.190	1.638	NA	0.268	1.010
85	0.707	0.403	0.317	0.317	0.256	0.779	1.348	1.379	0.731	NA	3.103	1.158	1.244	1.207	0.257	0.932
86	0.647	0.728	1.014	0.571	0.610	NA	0.770	NA	0.213	0.674	NA	0.968	1.086	1.186	NA	0.716
87	0.594	NA	0.528	0.520	0.934	0.540	NA	NA	0.337	0.401	3.844	1.796	1.541	2.497	0.348	1.041
88	1.867	NA	0.333	0.343	0.150	0.364	0.539	NA	NA	0.313	1.698	0.800	0.833	1.678	0.453	0.575
89	0.911	0.294	0.485	0.249	0.265	0.365	0.660	0.951	0.207	0.282	2.502	NA	0.789	3.134	0.189	0.689
90	2.169	0.317	0.548	0.701	0.337	0.394	0.699	0.635	0.263	0.254	3.101	NA	0.995	1.696	0.208	0.711
91	0.748	0.215	0.681	0.783	0.610	0.505	0.707	1.278	0.237	0.405	2.602	NA	NA	NA	0.138	0.758
92	0.239	0.498	NA	1.059	1.150	0.395	0.699	0.945	0.170	0.247	1.330	NA	NA	NA	0.046	0.721
93	0.243	0.354	0.893	NA	NA	0.327	0.597	0.861	0.224	0.594	2.788	0.249	0.797	NA	0.103	0.730
94	0.133	NA	NA	0.508	NA	0.481	0.734	0.817	0.249	0.522	2.456	NA	0.695	NA	0.093	0.714
95	0.107	NA	NA	NA	NA	NA	0.438	0.397	0.079	0.000	0.931	NA	NA	0.479	0.092	0.333
96	NA	0.018	0.059	0.000	NA	NA	NA	NA	0.061	0.012	0.076	0.104	0.034	NA	0.023	0.031

Stock Identifiers

AKS = ALASKA SPRING
BQR = BIG QUALICUM
QUI = QUINSAM
RBT = ROBERTSON CREEK
SRH = SALMON RIVER
URB = COLUMBIA UPRIVER BRIGHT
WSH = WILLAMETTE SPRING

North B.C. Troll

TOTAL MORTALITY EXPLOITATION RATES

Year	AKS Age 4	QUI Age 4	RBT Age 3	RBT Age 4	RBT Age 5	SRH Age 3	SRH Age 4	SRH Age 5	URB Age 3	URB Age 4	URB Age 5	WSH Age 4
79	NA	NA	0.056	0.074	0.075	NA	NA	NA	0.009	0.059	NA	NA
80	NA	0.060	0.048	0.075	0.078	0.069	NA	NA	0.020	0.052	0.062	0.099
81	NA	0.086	0.033	0.088	0.175	0.112	0.148	NA	NA	0.063	0.069	0.054
82	0.004	0.032	0.042	0.109	NA	0.032	0.120	0.076	0.023	0.034	0.020	0.015
83	0.007	0.086	0.045	0.060	0.058	0.034	0.084	0.095	0.030	0.065	NA	0.040
84	0.005	0.027	0.026	0.116	0.203	NA	0.085	0.262	0.017	0.095	NA	0.014
85	0.003	0.031	0.056	0.208	NA	NA	NA	0.237	0.021	0.081	0.070	0.013
86	0.003	0.043	NA	0.119	NA	0.009	0.093	NA	0.017	0.063	0.059	NA
87	0.003	0.036	0.030	NA	NA	0.024	0.055	0.294	0.029	0.094	0.133	0.017
88	0.008	0.039	0.021	0.076	NA	NA	0.043	0.108	0.015	0.052	0.093	0.023
89	0.004	0.026	0.025	0.097	0.134	0.016	0.039	0.191	NA	0.050	0.181	0.011
90	0.009	0.058	0.024	0.088	0.085	0.019	0.035	0.237	NA	0.062	0.091	0.011
91	0.003	0.035	0.030	0.085	0.158	0.018	0.055	0.193	NA	NA	NA	0.008
92	0.001	0.103	0.025	0.072	0.104	0.011	0.034	0.095	NA	NA	NA	0.003
93	0.001	NA	0.022	0.069	0.112	0.017	0.081	0.207	0.005	0.054	NA	0.006
94	0.001	NA	NA	0.097	0.122	0.019	0.072	0.183	NA	0.047	NA	0.003
95	0.000	NA	NA	0.068	0.053	0.005	0.000	0.071	NA	NA	0.028	0.005
96	NA	NA	NA	NA	NA	0.005	0.002	0.006	0.002	0.002	NA	0.001
Base	0.004	0.059	0.045	0.086	0.109	0.071	0.134	0.076	0.017	0.052	0.050	0.056

TOTAL MORTALITY EXPLOITATION RATE INDEX

Year	AKS Age 4	QUI Age 4	RBT Age 3	RBT Age 4	RBT Age 5	SRH Age 3	SRH Age 4	SRH Age 5	URB Age 3	URB Age 4	URB Age 5	WSH Age 4	Fishery
79	NA	NA	1.248	0.856	0.683	NA	NA	NA	0.537	1.131	NA	NA	0.880
80	NA	1.017	1.074	0.871	0.714	0.973	NA	NA	1.146	0.994	1.234	1.767	1.031
81	NA	1.444	0.741	1.016	1.602	1.571	1.103	NA	NA	1.221	1.371	0.963	1.248
82	1.000	0.539	0.937	1.257	NA	0.456	0.897	1.000	1.317	0.654	0.395	0.269	0.779
83	1.644	1.454	0.997	0.694	0.530	0.474	0.625	1.246	1.718	1.251	NA	0.705	0.848
84	1.161	0.453	0.571	1.338	1.859	NA	0.630	3.427	0.957	1.836	NA	0.253	1.326
85	0.707	0.515	1.252	2.403	NA	NA	NA	3.103	1.221	1.560	1.380	0.237	1.609
86	0.647	0.722	NA	1.372	NA	0.130	0.692	NA	1.009	1.216	1.162	NA	0.854
87	0.594	0.606	0.666	NA	NA	0.335	0.411	3.844	1.686	1.807	2.642	0.300	1.262
88	1.867	0.666	0.475	0.878	NA	NA	0.321	1.408	0.844	0.995	1.845	0.407	0.821
89	0.911	0.443	0.559	1.120	1.225	0.220	0.289	2.502	NA	0.960	3.583	0.194	1.039
90	2.129	0.982	0.534	1.019	0.780	0.266	0.260	3.101	NA	1.190	1.797	0.191	0.965
91	0.748	0.595	0.673	0.978	1.442	0.253	0.409	2.529	NA	NA	NA	0.141	0.911
92	0.239	1.733	0.562	0.837	0.953	0.157	0.254	1.237	NA	NA	NA	0.048	0.698
93	0.243	NA	0.478	0.801	1.019	0.236	0.603	2.713	0.300	1.033	NA	0.105	0.879
94	0.133	NA	NA	1.128	1.119	0.265	0.533	2.395	NA	0.900	NA	0.062	0.922
95	0.107	NA	NA	0.781	0.480	0.076	0.000	0.931	NA	NA	0.548	0.094	0.391
96	NA	NA	NA	NA	NA	0.065	0.013	0.076	0.125	0.045	NA	0.024	0.044

Stock Identifiers

AKS = ALASKA SPRING
QUI = QUINSAM
RBT = ROBERTSON CREEK
SRH = SALMON RIVER
URB = COLUMBIA UPRIVER BRIGHT
WSH = WILLAMETTE SPRING

Central B.C. Troll

TOTAL MORTALITY EXPLOITATION RATES

Year	BQR Age 3	QUI Age 4	RBT Age 3	RBT Age 4
79	0.075	NA	0.051	0.080
80	0.050	0.112	0.039	0.080
81	0.087	0.099	0.029	0.054
82	0.036	0.053	0.025	0.056
83	NA	0.064	0.031	0.055
84	NA	0.041	NA	0.026
85	0.018	0.019	NA	NA
86	0.058	0.046	NA	NA
87	NA	0.045	0.014	NA
88	NA	0.014	0.008	0.007
89	0.003	0.012	0.004	0.005
90	NA	0.050	0.008	0.020
91	0.010	0.086	0.011	0.024
92	NA	0.061	0.007	0.035
93	NA	NA	0.005	0.023
94	NA	NA	NA	0.016
95	NA	NA	NA	NA
96	0.000	NA	NA	NA
Base	0.062	0.088	0.036	0.068

TOTAL MORTALITY EXPLOITATION RATE INDEX

Year	BQR Age 3	QUI Age 4	RBT Age 3	RBT Age 4	Fishery
79	1.209	NA	1.425	1.182	1.244
80	0.810	1.274	1.079	1.190	1.110
81	1.405	1.126	0.809	0.793	1.061
82	0.576	0.600	0.687	0.835	0.669
83	NA	0.733	0.862	0.813	0.786
84	NA	0.465	NA	0.390	0.432
85	0.294	0.211	NA	NA	0.245
86	0.938	0.519	NA	NA	0.693
87	NA	0.508	0.383	NA	0.472
88	NA	0.155	0.224	0.105	0.150
89	0.054	0.140	0.122	0.071	0.098
90	NA	0.573	0.216	0.289	0.406
91	0.168	0.980	0.294	0.361	0.518
92	NA	0.696	0.185	0.523	0.539
93	NA	NA	0.137	0.336	0.267
94	NA	NA	NA	0.230	0.230
95	NA	NA	NA	NA	
96	0.000	NA	NA	NA	0.000

Stock Identifiers

BQR = BIG QUALICUM QUI = QUINSAM RBT = ROBERTSON CREEK

West Coast Vancouver Island Troll

TOTAL MORTALITY EXPLOITATION RATES

Year	BON Age 3	BON Age 4	CWF Age 4	GAD Age 3	GAD Age 4	LRW Age 4	RBT Age 3	RBT Age 4	RBT Age 5	SAM Age 3	SAM Age 4	SPR Age 3	SPR Age 4	SPS Age 3	SPS Age 4	SRH Age 3	SRH Age 4	STP Age 3	STP Age 4	URB Age 3	URB Age 4	UWA Age 3	UWA Age 4	WSH Age 4
79	0.193	NA	NA	NA	NA	NA	0.036	0.064	NA	NA	0.211	0.191	0.177	NA	0.257	NA	NA	NA	NA	0.044	0.084	0.069	0.171	NA
80	0.108	0.150	NA	NA	NA	NA	0.041	0.077	NA	NA	NA	0.231	0.298	NA	NA	NA	NA	NA	NA	0.042	0.052	0.136	0.123	0.047
81	0.177	0.157	0.130	0.043	NA	0.060	0.021	0.028	0.030	NA	NA	0.184	0.146	0.058	NA	NA	0.022	0.227	NA	NA	0.051	0.099	0.190	0.008
82	0.280	0.357	0.199	0.077	0.210	0.082	0.023	0.035	NA	0.059	NA	0.191	0.260	0.101	0.205	NA	NA	0.211	0.223	0.030	0.021	0.139	0.227	0.028
83	0.338	0.304	0.228	NA	0.288	0.069	0.011	0.033	0.074	NA	0.196	0.282	0.212	0.116	0.198	NA	NA	0.297	0.342	0.011	0.022	0.083	0.205	0.018
84	0.287	0.575	0.220	0.114	NA	NA	0.046	0.049	0.053	NA	NA	0.248	0.318	0.110	0.226	NA	0.019	0.436	0.527	0.024	0.065	0.194	0.157	0.013
85	0.260	0.309	0.153	NA	0.173	NA	0.021	0.000	NA	NA	NA	0.113	0.229	0.055	0.162	NA	NA	0.227	0.202	0.021	0.050	0.098	0.222	0.010
86	NA	NA	0.212	NA	NA	0.032	NA	NA	NA	NA	NA	0.234	0.200	NA	0.257	NA	NA	0.204	0.226	0.040	0.035	0.098	0.237	NA
87	0.217	NA	0.139	NA	NA	0.104	0.011	NA	NA	NA	NA	0.088	NA	0.067	0.133	NA	0.012	0.228	NA	0.033	0.049	0.054	0.093	0.014
88	NA	0.264	0.151	0.032	NA	0.076	0.018	0.040	NA	0.042	NA	0.202	NA	0.029	0.180	NA	0.032	0.256	0.313	0.015	0.097	NA	0.170	0.015
89	NA	NA	0.092	0.024	0.110	0.041	0.007	0.021	0.000	0.021	0.135	0.128	0.097	0.030	0.100	NA	NA	0.063	0.120	NA	0.047	NA	NA	0.012
90	NA	NA	0.127	0.082	0.205	0.089	0.026	0.039	NA	0.041	0.194	0.184	0.174	0.073	0.219	NA	0.022	0.226	NA	NA	0.082	NA	NA	0.015
91	NA	NA	NA	NA	0.210	0.054	0.026	0.036	0.031	0.025	0.128	0.116	0.128	0.040	0.140	NA	0.018	0.142	NA	NA	NA	NA	NA	0.001
92	NA	NA	0.195	NA	0.107	0.024	0.075	0.172	0.239	0.058	0.058	0.103	0.176	0.056	0.184	NA	0.129	0.148	NA	NA	NA	NA	NA	0.010
93	NA	NA	NA	NA	NA	NA	0.061	0.144	0.101	0.069	0.102	0.121	0.236	0.083	0.142	NA	0.061	0.234	0.156	0.026	0.098	NA	NA	0.010
94	NA	NA	0.019	NA	NA	0.016	0.032	0.056	0.059	0.015	0.150	0.161	0.143	0.018	0.117	NA	0.019	NA	NA	NA	0.049	NA	NA	0.006
95	NA	NA	NA	0.019	NA	0.034	NA	NA	0.023	0.012	0.094	0.092	0.071	0.019	0.070	NA	0.010	NA	NA	NA	NA	NA	NA	0.003
96	NA	NA	0.005	0.005	0.005	NA	NA	NA	NA	0.003	0.004	0.008	NA	0.005	0.005	NA	0.001	NA	NA	0.002	0.002	NA	NA	0.001
Base	0.190	0.221	0.165	0.060	0.210	0.071	0.030	0.051	0.030	0.059	0.211	0.199	0.220	0.079	0.231	-1.000	0.022	0.219	0.223	0.039	0.052	0.111	0.178	0.028

TOTAL MORTALITY EXPLOITATION RATE INDEX

Year	BON Age 3	BON Age 4	CWF Age 4	GAD Age 3	GAD Age 4	LRW Age 4	RBT Age 3	RBT Age 4	RBT Age 5	SAM Age 3	SAM Age 4	SPR Age 3	SPR Age 4	SPS Age 3	SPS Age 4	SRH Age 3	SRH Age 4	STP Age 3	STP Age 4	URB Age 3	URB Age 4	UWA Age 3	UWA Age 4	WSH Age 4	Fishery
79	1.017	NA	NA	NA	NA	NA	1.206	1.256	NA	NA	1.000	0.961	0.802	NA	1.113	NA	NA	NA	NA	1.138	1.614	0.624	0.961	NA	0.991
80	0.569	0.678	NA	NA	NA	NA	1.347	1.514	NA	NA	NA	1.158	1.355	NA	NA	NA	NA	NA	NA	1.093	0.993	1.228	0.689	1.684	0.989
81	0.935	0.710	0.791	0.717	NA	0.846	0.681	0.541	1.000	NA	NA	0.923	0.664	0.735	NA	NA	1.000	1.036	NA	NA	0.984	0.895	1.070	0.299	0.848
82	1.479	1.612	1.209	1.283	1.000	1.154	0.766	0.688	NA	1.000	NA	0.958	1.179	1.265	0.887	NA	NA	0.964	1.000	0.768	0.408	1.252	1.280	1.017	1.122
83	1.780	1.375	1.383	NA	1.369	0.961	0.378	0.641	2.436	NA	0.932	1.415	0.963	1.458	0.857	NA	NA	1.352	1.533	0.280	0.428	0.746	1.151	0.665	1.205
84	1.513	2.601	1.335	1.900	NA	NA	1.510	0.966	1.757	NA	NA	1.245	1.444	1.382	0.975	NA	0.833	1.988	2.365	0.612	1.244	1.751	0.883	0.456	1.566
85	1.372	1.396	0.926	NA	0.825	NA	0.695	0.000	NA	NA	NA	0.566	1.041	0.690	0.701	NA	NA	1.035	0.907	0.542	0.964	0.887	1.250	0.357	0.942
86	NA	NA	1.285	NA	NA	0.442	NA	NA	NA	NA	NA	1.173	0.908	NA	1.112	NA	NA	0.928	1.012	1.040	0.680	0.886	1.335	NA	1.039
87	1.144	NA	0.842	NA	NA	1.451	0.376	NA	NA	NA	NA	0.444	NA	0.841	0.574	NA	0.539	1.038	NA	0.864	0.953	0.484	0.524	0.491	0.769
88	NA	1.193	0.919	0.542	NA	1.064	0.607	0.778	NA	0.711	NA	1.014	NA	0.367	0.777	NA	1.433	1.167	1.405	0.379	1.875	NA	0.954	0.551	1.002
89	NA	NA	0.558	0.401	0.523	0.569	0.244	0.412	0.000	0.360	0.639	0.645	0.439	0.383	0.431	NA	NA	0.285	0.541	NA	0.897	NA	NA	0.436	0.490
90	NA	NA	0.774	1.366	0.976	1.240	0.869	0.765	NA	0.705	0.921	0.926	0.790	0.918	0.947	NA	0.986	1.030	NA	NA	1.585	NA	NA	0.548	0.943
91	NA	NA	NA	NA	1.001	0.761	0.859	0.699	1.035	0.424	0.609	0.584	0.583	0.506	0.605	NA	0.823	0.648	NA	NA	NA	NA	NA	0.045	0.660
92	NA	NA	1.182	NA	0.508	0.332	2.485	3.375	7.894	0.986	0.277	0.516	0.800	0.705	0.794	NA	5.736	0.675	NA	NA	NA	NA	NA	0.360	0.949
93	NA	NA	NA	NA	NA	NA	2.022	2.822	3.343	1.182	0.482	0.609	1.071	1.049	0.615	NA	2.722	1.065	0.699	0.673	1.879	NA	NA	0.358	0.971
94	NA	NA	0.116	NA	NA	0.224	1.063	1.092	1.943	0.255	0.711	0.809	0.649	0.230	0.507	NA	0.843	NA	NA	NA	0.949	NA	NA	0.215	0.594
95	NA	NA	NA	0.325	NA	0.474	NA	NA	0.753	0.212	0.444	0.464	0.324	0.243	0.301	NA	0.436	NA	NA	NA	NA	NA	NA	0.093	0.369
96	NA	NA	0.032	0.084	0.025	NA	NA	NA	NA	0.054	0.017	0.042	NA	0.058	0.022	NA	0.038	NA	NA	0.056	0.045	NA	NA	0.024	0.034

Stock Identifiers

BON = BONNEVILLE TULE
CWF = COWLITZ FALL TULE
GAD = G ADAMS FALL FING
LRW = LEWIS RIVER WILD
RBT = ROBERTSON CREEK
SAM = SAMISH FALL FING
SPR = SPRING CREEK TULE
SPS = SO SOUND FALL FING
SRH = SALMON RIVER
STP = STAYTON POND TULE
URB = COLUMBIA UPRIVER BRIGHT
UWA = U OF W FALL ACCEL
WSH = WILLAMETTE SPRING

Strait of Georgia Troll and Sport

TOTAL MORTALITY EXPLOITATION RATES

Year	BQR Age 3	BQR Age 4	PPS Age 3	SAM Age 3	SAM Age 4	SPS Age 3	SPS Age 4	UWA Age 3
79	0.238	0.167	0.241	NA	0.097	NA	0.064	0.042
80	0.282	0.201	0.275	NA	NA	NA	NA	0.061
81	0.323	0.390	0.297	NA	NA	0.069	NA	0.037
82	0.151	0.154	0.159	0.110	NA	0.058	0.098	0.023
83	0.199	0.170	0.180	NA	0.107	0.031	0.043	0.035
84	0.280	0.286	0.268	NA	NA	0.056	0.059	0.053
85	0.170	0.123	0.153	NA	NA	NA	0.056	0.033
86	0.262	0.189	0.339	NA	NA	NA	NA	0.026
87	0.169	0.247	0.093	NA	NA	0.065	NA	0.036
88	0.213	0.099	NA	0.058	NA	0.029	NA	NA
89	0.167	0.198	0.234	0.073	0.093	0.021	0.036	NA
90	0.199	0.157	NA	0.045	0.132	0.012	0.038	NA
91	0.259	0.303	0.289	0.116	0.058	0.011	0.013	NA
92	0.402	0.225	0.262	0.060	0.215	0.027	0.036	NA
93	0.361	0.360	NA	0.127	0.137	0.029	NA	NA
94	0.284	0.237	NA	0.108	0.121	0.022	0.030	NA
95	0.267	NA	NA	0.041	0.030	0.012	0.058	NA
96	0.234	NA	0.253	0.044	0.136	0.011	0.034	NA
Base	0.248	0.228	0.243	0.110	0.097	0.063	0.081	0.041

TOTAL MORTALITY EXPLOITATION RATE INDEX

Year	BQR Age 3	BQR Age 4	PPS Age 3	SAM Age 3	SAM Age 4	SPS Age 3	SPS Age 4	UWA Age 3	Fishery
79	0.956	0.732	0.992	NA	1.000	NA	0.791	1.029	0.904
80	1.136	0.884	1.132	NA	NA	NA	NA	1.486	1.078
81	1.300	1.709	1.222	NA	NA	1.092	NA	0.912	1.355
82	0.608	0.676	0.654	1.000	NA	0.908	1.209	0.573	0.742
83	0.803	0.748	0.741	NA	1.104	0.488	0.529	0.867	0.765
84	1.126	1.253	1.102	NA	NA	0.889	0.733	1.305	1.108
85	0.683	0.539	0.630	NA	NA	NA	0.698	0.802	0.636
86	1.054	0.829	1.394	NA	NA	NA	NA	0.648	1.073
87	0.680	1.082	0.383	NA	NA	1.029	NA	0.875	0.740
88	0.858	0.433	NA	0.526	NA	0.453	NA	NA	0.613
89	0.672	0.871	0.965	0.660	0.958	0.331	0.449	NA	0.768
90	0.801	0.690	NA	0.406	1.366	0.184	0.469	NA	0.704
91	1.041	1.327	1.190	1.055	0.601	0.168	0.159	NA	0.979
92	1.620	0.987	1.078	0.542	2.228	0.429	0.445	NA	1.147
93	1.454	1.581	NA	1.158	1.415	0.456	NA	NA	1.359
94	1.145	1.041	NA	0.978	1.251	0.345	0.376	NA	0.970
95	1.073	NA	NA	0.369	0.314	0.188	0.717	NA	0.680
96	0.943	NA	1.043	0.401	1.404	0.176	0.417	NA	0.846

Stock Identifiers

BQR = BIG QUALICUM
PPS = PUNTLEDGE
SPS = SO SOUND FALL FING
UWA = U OF W FALL ACCEL
SAM = SAMISH FALL FING

Strait of Georgia Troll

TOTAL MORTALITY EXPLOITATION RATES

Year	BQR Age 3	SAM Age 3
79	0.151	NA
80	0.151	NA
81	0.123	NA
82	0.081	0.017
83	0.110	NA
84	0.083	NA
85	0.018	NA
86	0.067	NA
87	0.035	NA
88	0.009	NA
89	0.012	0.005
90	0.060	NA
91	0.051	NA
92	0.118	NA
93	0.029	0.020
94	NA	NA
95	NA	NA
96	0.000	0.000
Base	0.126	0.017

TOTAL MORTALITY EXPLOITATION RATE INDEX

Year	BQR Age 3	SAM Age 3	Fishery
79	1.197	NA	1.197
80	1.193	NA	1.193
81	0.971	NA	0.971
82	0.639	1.000	0.681
83	0.874	NA	0.874
84	0.659	NA	0.659
85	0.145	NA	0.145
86	0.534	NA	0.534
87	0.280	NA	0.280
88	0.074	NA	0.074
89	0.097	0.314	0.123
90	0.478	NA	0.478
91	0.406	NA	0.406
92	0.936	NA	0.936
93	0.231	1.189	0.343
94	NA	NA	
95	NA	NA	
96	0.000	0.000	0.000

Stock Identifiers
BQR = BIG QUALICUM
SAM = SAMISH FALL FING

Strait of Georgia Sport

TOTAL MORTALITY EXPLOITATION RATES

Year	BQR Age 3	BQR Age 4	PPS Age 3	SAM Age 3	SAM Age 4	SPS Age 3	SPS Age 4	UWA Age 3
79	0.086	0.106	0.086	NA	0.077	NA	0.055	0.028
80	0.131	0.119	0.146	NA	NA	NA	NA	0.058
81	0.200	0.313	0.178	NA	NA	0.064	NA	0.033
82	0.070	0.065	0.064	0.093	NA	0.053	0.062	0.023
83	0.089	0.125	0.078	NA	0.097	0.029	0.038	0.026
84	0.196	0.286	0.157	NA	NA	0.048	0.059	0.048
85	0.151	0.123	0.153	NA	NA	NA	0.053	0.033
86	0.194	0.186	0.222	NA	NA	NA	NA	0.026
87	0.134	0.240	0.093	NA	NA	0.065	NA	0.027
88	0.204	0.079	NA	0.055	NA	0.027	NA	NA
89	0.155	0.198	0.234	0.067	0.093	0.020	0.034	NA
90	0.139	0.157	NA	0.021	0.107	0.009	0.036	NA
91	0.207	0.303	0.289	0.096	0.049	0.009	0.013	NA
92	0.284	0.207	0.230	0.044	0.197	0.027	0.032	NA
93	0.332	NA	NA	0.108	0.125	0.023	NA	NA
94	0.240	0.216	NA	0.094	0.117	0.022	0.030	NA
95	NA	NA	NA	0.041	0.030	0.012	0.058	NA
96	0.234	NA	0.253	0.044	0.136	0.011	0.034	NA
Base	0.122	0.151	0.119	0.093	0.077	0.059	0.059	0.035

TOTAL MORTALITY EXPLOITATION RATE INDEX

Year	BQR Age 3	BQR Age 4	PPS Age 3	SAM Age 3	SAM Age 4	SPS Age 3	SPS Age 4	UWA Age 3	Fishery
79	0.707	0.704	0.722	NA	1.000	NA	0.938	0.784	0.778
80	1.077	0.789	1.231	NA	NA	NA	NA	1.641	1.065
81	1.641	2.074	1.503	NA	NA	1.091	NA	0.930	1.623
82	0.575	0.433	0.543	1.000	NA	0.909	1.062	0.645	0.677
83	0.729	0.829	0.658	NA	1.263	0.502	0.652	0.725	0.777
84	1.608	1.895	1.329	NA	NA	0.810	1.008	1.354	1.459
85	1.240	0.815	1.291	NA	NA	NA	0.904	0.924	1.057
86	1.592	1.233	1.875	NA	NA	NA	NA	0.746	1.474
87	1.094	1.590	0.785	NA	NA	1.113	NA	0.757	1.150
88	1.669	0.524	NA	0.585	NA	0.469	NA	NA	0.859
89	1.266	1.316	1.978	0.722	1.210	0.345	0.579	NA	1.181
90	1.135	1.044	NA	0.226	1.404	0.149	0.617	NA	0.838
91	1.698	2.006	2.440	1.031	0.640	0.156	0.218	NA	1.424
92	2.328	1.371	1.942	0.470	2.576	0.464	0.550	NA	1.505
93	2.721	NA	NA	1.152	1.634	0.398	NA	NA	1.677
94	1.966	1.431	NA	1.007	1.529	0.373	0.518	NA	1.284
95	NA	NA	NA	0.435	0.396	0.204	0.987	NA	0.490
96	1.920	NA	2.137	0.473	1.774	0.190	0.573	NA	1.350

Stock Identifiers

BQR = BIG QUALICUM
PPS = PUNTLEDGE
SAM = SAMISH FALL FING
SPS = SO SOUND FALL FING
UWA = U OF W FALL ACCEL

U.S. South Ocean Troll and Sport: Puget Sound Stocks

TOTAL MORTALITY EXPLOITATION RATES

Year	SAM Age 3	SAM Age 4	SPS Age 3	SPS Age 4	UWA Age 3
79	NA	0.017	NA	0.021	0.012
80	NA	NA	NA	NA	0.023
81	NA	NA	0.006	NA	0.026
82	0.008	NA	0.007	0.043	0.026
83	NA	0.039	0.005	0.026	0.017
84	NA	NA	0.007	0.025	0.007
85	NA	NA	0.000	0.018	0.013
86	NA	NA	0.034	0.024	0.013
87	NA	NA	0.032	0.086	0.026
88	0.025	NA	0.035	0.094	NA
89	0.028	0.054	0.051	0.076	NA
90	0.044	0.079	0.057	0.081	NA
91	0.068	0.069	0.046	0.091	NA
92	0.046	0.109	0.053	0.087	NA
93	0.012	0.098	0.026	0.073	NA
94	0.003	0.028	0.001	0.010	NA
95	0.030	0.011	0.008	0.000	NA
96	0.003	0.050	0.005	0.037	NA
Base	0.008	0.017	0.007	0.032	0.022

TOTAL MORTALITY EXPLOITATION RATE INDEX

Year	SAM Age 3	SAM Age 4	SPS Age 3	SPS Age 4	UWA Age 3	Fishery
79	NA	1.000	NA	0.657	0.531	0.700
80	NA	NA	NA	NA	1.057	1.057
81	NA	NA	0.914	NA	1.199	1.133
82	1.000	NA	1.086	1.343	1.213	1.235
83	NA	2.314	0.822	0.805	0.766	1.124
84	NA	NA	1.030	0.779	0.337	0.647
85	NA	NA	0.000	0.574	0.593	0.519
86	NA	NA	5.172	0.758	0.608	1.180
87	NA	NA	4.892	2.685	1.174	2.377
88	2.937	NA	5.328	2.922	NA	3.258
89	3.247	3.211	7.771	2.385	NA	3.267
90	5.171	4.680	8.782	2.541	NA	4.090
91	8.021	4.101	7.035	2.840	NA	4.289
92	5.381	6.526	8.110	2.712	NA	4.621
93	1.416	5.820	3.985	2.278	NA	3.270
94	0.321	1.645	0.187	0.299	NA	0.645
95	3.497	0.657	1.300	0.000	NA	0.770
96	0.375	2.980	0.831	1.161	NA	1.501

Stock Identifiers

SAM = SAMISH FALL FING
UWA = U OF W FALL ACCEL
SPS = SO SOUND FALL FING

U.S. South Ocean Troll and Sport: Columbia River Stocks

TOTAL MORTALITY EXPLOITATION RATES

Year	BON Age 3	CWF Age 3	CWF Age 4	SPR Age 3	SPR Age 4	STP Age 3
79	0.222	NA	NA	0.203	0.157	NA
80	0.210	0.121	NA	0.294	0.102	NA
81	0.205	0.098	0.163	0.276	0.214	0.181
82	0.177	0.154	0.273	0.323	0.106	0.315
83	0.117	0.078	0.186	0.114	0.045	0.175
84	0.091	0.010	0.040	0.076	0.000	0.056
85	0.170	0.093	0.042	0.162	0.021	0.210
86	0.086	0.120	0.055	0.066	0.032	0.240
87	0.156	0.067	0.109	0.221	0.000	0.142
88	NA	0.070	0.152	0.145	0.136	0.203
89	NA	0.061	0.273	0.224	0.116	0.264
90	NA	0.117	0.137	0.171	0.112	0.184
91	NA	0.060	0.073	0.193	0.027	0.146
92	NA	0.098	0.032	0.284	0.077	0.287
93	NA	0.091	0.445	0.249	0.150	0.201
94	NA	0.000	0.033	0.031	0.010	0.000
95	0.000	0.020	0.000	0.008	0.004	NA
96	0.000	0.006	0.073	0.055	0.250	0.000
Base	0.203	0.124	0.218	0.274	0.145	0.248

TOTAL MORTALITY EXPLOITATION RATE INDEX

Year	BON Age 3	CWF Age 3	CWF Age 4	SPR Age 3	SPR Age 4	STP Age 3	Fishery
79	1.092	NA	NA	0.741	1.085	NA	0.936
80	1.031	0.971	NA	1.074	0.706	NA	0.974
81	1.007	0.791	0.747	1.007	1.477	0.731	0.938
82	0.869	1.238	1.253	1.178	0.733	1.269	1.111
83	0.576	0.629	0.853	0.418	0.314	0.706	0.591
84	0.450	0.077	0.184	0.276	0.000	0.227	0.225
85	0.834	0.751	0.194	0.590	0.144	0.845	0.575
86	0.424	0.961	0.254	0.240	0.224	0.969	0.494
87	0.765	0.539	0.498	0.808	0.000	0.571	0.572
88	NA	0.564	0.697	0.529	0.942	0.818	0.700
89	NA	0.494	1.251	0.816	0.801	1.067	0.930
90	NA	0.941	0.629	0.623	0.777	0.742	0.715
91	NA	0.483	0.333	0.706	0.184	0.590	0.494
92	NA	0.791	0.149	1.038	0.530	1.158	0.772
93	NA	0.734	2.042	0.910	1.032	0.812	1.126
94	NA	0.000	0.153	0.114	0.066	0.000	0.073
95	0.000	0.162	0.000	0.030	0.027	NA	0.034
96	0.000	0.047	0.334	0.199	1.726	0.000	0.316

Stock Identifiers

BON = BONNEVILLE TULE
CWF = COWLITZ FALL TULE
SPR = SPRING CREEK TULE
STP = STAYTON POND TULE

APPENDIX E: REPORTED CATCH EXPLOITATION RATE AND FISHERY INDEX DATA

Southeast Alaska Troll

REPORTED CATCH AEQ FISHERY INDICES

Year	Winter/ Spring	June Inside	June Outside	July Inside	July-Sept Outside	SPFI
79	1.260	0.702	1.186	0.716	1.038	1.045
80	0.746	1.199	0.986	1.026	1.321	1.151
81	1.082	0.753	0.955	1.078	1.094	1.034
82	0.912	1.346	0.873	1.180	0.547	0.770
83	0.933	0.890	0.711	1.133	1.181	0.963
84	0.380	1.497	1.132	0.405	0.526	0.685
85	0.459	0.979	0.723	0.846	0.858	0.731
86	0.424	0.545	0.203	0.739	1.416	0.546
87	0.523	0.745	0.212	1.548	0.683	0.523
88	1.300	0.169	0.006	1.440	0.705	0.638
89	0.779	0.797	0.135	0.701	0.617	0.537
90	0.654	1.271	0.137	1.668	1.255	0.817
91	1.421	1.346	0.264	0.787	0.801	0.694
92	1.087	0.904	0.086	0.415	0.450	0.502
93	0.768	0.355	0.027	0.443	0.944	0.578
94	0.699	0.144	0.044	0.438	0.786	0.532
95	0.495	0.948	0.061	1.312	0.874	0.568
96	0.555	0.873	0.070	0.577	0.600	0.391

North/Central B.C. Troll

REPORTED CATCH EXPLOITATION RATES

Year	AKS Age 4	BQR Age 3	QUI Age 3	QUI Age 4	QUI Age 5	RBT Age 3	RBT Age 4	RBT Age 5	SRH Age 3	SRH Age 4	SRH Age 5	URB Age 3	URB Age 4	URB Age 5	WSH Age 4
79	NA	0.076	0.042	0.178	0.115	0.093	0.150	0.106	NA	NA	NA	0.008	0.088	NA	NA
80	NA	0.088	0.041	0.168	NA	0.078	0.152	0.153	0.066	NA	NA	0.023	0.067	0.071	0.089
81	NA	0.085	0.068	0.182	0.194	0.055	0.138	0.236	0.100	0.152	NA	NA	0.074	0.080	0.049
82	0.004	0.061	0.029	0.082	0.127	0.057	0.161	0.122	0.034	0.118	0.076	0.022	0.034	0.020	0.012
83	0.006	NA	0.058	0.147	0.228	0.067	0.112	0.077	0.027	0.088	0.095	0.031	0.075	NA	0.035
84	0.005	0.061	0.010	0.066	0.082	0.026	0.139	0.228	NA	0.095	0.316	0.022	0.108	NA	0.013
85	0.003	0.031	0.014	0.048	0.038	0.049	0.201	0.208	0.048	NA	0.234	0.021	0.082	0.070	0.013
86	0.002	0.052	0.047	0.088	0.088	NA	0.115	NA	0.012	0.093	NA	0.017	0.071	0.068	NA
87	0.002	NA	0.017	0.075	0.134	0.035	NA	NA	0.011	0.052	0.284	0.022	0.098	0.140	0.014
88	0.007	NA	0.012	0.050	0.022	0.023	0.079	NA	NA	0.040	0.127	0.006	0.052	0.093	0.020
89	0.003	0.021	0.020	0.037	0.039	0.022	0.099	0.145	0.007	0.035	0.187	NA	0.050	0.177	0.009
90	0.007	0.020	0.018	0.103	0.050	0.020	0.102	0.096	0.010	0.032	0.225	NA	0.062	0.095	0.009
91	0.002	0.014	0.021	0.117	0.090	0.027	0.104	0.194	0.007	0.053	0.194	NA	NA	NA	0.006
92	0.001	0.027	NA	0.152	0.164	0.017	0.101	0.141	0.008	0.032	0.098	NA	NA	NA	0.002
93	0.001	0.022	0.034	NA	NA	0.011	0.086	0.129	0.007	0.078	0.207	0.000	0.052	NA	0.005
94	0.000	NA	NA	0.074	NA	0.019	0.107	0.124	0.009	0.069	0.183	NA	0.044	NA	0.004
95	0.000	NA	NA	NA	NA	NA	0.063	0.057	0.003	0.000	0.066	NA	NA	0.025	0.003
96	NA	0.000	0.000	0.000	NA	NA	NA	NA	0.000	0.000	0.000	0.000	0.000	NA	0.000
Base	0.004	0.078	0.045	0.153	0.145	0.071	0.150	0.154	0.067	0.135	0.076	0.018	0.066	0.057	0.050

REPORTED CATCH EXPLOITATION RATE INDEX

Year	AKS Age 4	BQR Age 3	QUI Age 3	QUI Age 4	QUI Age 5	RBT Age 3	RBT Age 4	RBT Age 5	SRH Age 3	SRH Age 4	SRH Age 5	URB Age 3	URB Age 4	URB Age 5	WSH Age 4	Fishery
79	NA	0.980	0.927	1.167	0.790	1.315	0.998	0.686	NA	NA	NA	0.443	1.340	NA	NA	0.973
80	NA	1.132	0.908	1.100	NA	1.101	1.013	0.992	0.996	NA	NA	1.298	1.022	1.246	1.786	1.098
81	NA	1.099	1.524	1.193	1.335	0.778	0.919	1.529	1.501	1.125	NA	NA	1.125	1.406	0.974	1.208
82	1.000	0.789	0.641	0.541	0.875	0.806	1.071	0.793	0.504	0.875	1.000	1.259	0.514	0.348	0.240	0.757
83	1.764	NA	1.284	0.966	1.567	0.942	0.743	0.501	0.408	0.651	1.246	1.761	1.138	NA	0.705	0.923
84	1.250	0.787	0.216	0.431	0.563	0.364	0.921	1.478	NA	0.702	4.139	1.230	1.644	NA	0.257	1.022
85	0.726	0.404	0.305	0.315	0.259	0.687	1.338	1.350	0.725	NA	3.065	1.208	1.247	1.218	0.267	0.936
86	0.684	0.669	1.051	0.579	0.602	NA	0.767	NA	0.172	0.689	NA	0.963	1.082	1.196	NA	0.713
87	0.587	NA	0.368	0.490	0.922	0.490	NA	NA	0.166	0.384	3.709	1.262	1.491	2.453	0.286	0.997
88	1.798	NA	0.264	0.326	0.152	0.329	0.524	NA	NA	0.295	1.656	0.358	0.793	1.629	0.397	0.547
89	0.959	0.274	0.455	0.241	0.268	0.310	0.655	0.943	0.103	0.262	2.444	NA	0.755	3.091	0.184	0.681
90	1.914	0.260	0.395	0.674	0.341	0.285	0.676	0.622	0.147	0.235	2.949	NA	0.935	1.670	0.171	0.678
91	0.677	0.175	0.468	0.764	0.617	0.380	0.690	1.257	0.101	0.390	2.539	NA	NA	NA	0.124	0.734
92	0.161	0.347	NA	0.994	1.130	0.239	0.674	0.917	0.125	0.236	1.278	NA	NA	NA	0.034	0.686
93	0.285	0.282	0.751	NA	NA	0.154	0.574	0.837	0.100	0.579	2.713	0.000	0.783	NA	0.092	0.692
94	0.063	NA	NA	0.487	NA	0.263	0.711	0.801	0.141	0.510	2.395	NA	0.668	NA	0.085	0.684
95	0.000	NA	NA	NA	NA	NA	0.421	0.370	0.048	0.000	0.864	NA	NA	0.443	0.065	0.315
96	NA	0.000	0.000	0.000	NA	NA	NA	NA	0.000	0.000	0.000	0.000	0.000	NA	0.000	0.000

Stock Identifiers

AKS = ALASKA SPRING
BQR = BIG QUALICUM
QUI = QUINSAM
RBT = ROBERTSON CREEK
SRH = SALMON RIVER
URB = COLUMBIA UPRIVER BRIGHT
WSH = WILLAMETTE SPRING

North B.C. Troll

REPORTED CATCH EXPLOITATION RATES

Year	AKS Age 4	QUI Age 4	RBT Age 3	RBT Age 4	RBT Age 5	SRH Age 3	SRH Age 4	SRH Age 5	URB Age 3	URB Age 4	URB Age 5	WSH Age 4
79	NA	NA	0.049	0.072	0.075	NA	NA	NA	0.007	0.057	NA	NA
80	NA	0.059	0.043	0.074	0.078	0.061	NA	NA	0.017	0.051	0.061	0.087
81	NA	0.084	0.029	0.086	0.173	0.100	0.145	NA	NA	0.062	0.069	0.047
82	0.004	0.031	0.036	0.106	NA	0.027	0.118	0.076	0.020	0.034	0.020	0.012
83	0.006	0.085	0.040	0.058	0.056	0.027	0.082	0.095	0.026	0.063	NA	0.035
84	0.005	0.026	0.019	0.113	0.200	NA	0.083	0.259	0.014	0.094	NA	0.012
85	0.003	0.030	0.042	0.201	NA	NA	NA	0.234	0.018	0.080	0.070	0.012
86	0.002	0.043	NA	0.115	NA	0.006	0.093	NA	0.015	0.062	0.059	NA
87	0.002	0.033	0.024	NA	NA	0.010	0.052	0.284	0.016	0.089	0.130	0.011
88	0.007	0.037	0.016	0.072	NA	NA	0.040	0.104	0.005	0.048	0.089	0.017
89	0.003	0.025	0.018	0.094	0.132	0.007	0.035	0.187	NA	0.047	0.177	0.009
90	0.007	0.055	0.015	0.083	0.083	0.009	0.032	0.225	NA	0.057	0.088	0.008
91	0.002	0.034	0.020	0.081	0.154	0.007	0.052	0.188	NA	NA	NA	0.006
92	0.001	0.096	0.014	0.068	0.100	0.007	0.032	0.091	NA	NA	NA	0.002
93	0.001	NA	0.009	0.065	0.108	0.007	0.077	0.202	0.000	0.052	NA	0.005
94	0.000	NA	NA	0.092	0.119	0.009	0.068	0.178	NA	0.044	NA	0.002
95	0.000	NA	NA	0.063	0.048	0.003	0.000	0.066	NA	NA	0.025	0.003
96	NA	NA	NA	NA	NA	0.000	0.000	0.000	0.000	0.000	NA	0.000
Base	0.004	0.058	0.039	0.084	0.109	0.063	0.131	0.076	0.014	0.051	0.050	0.049

REPORTED CATCH EXPLOITATION RATE INDEX

Year	AKS Age 4	QUI Age 4	RBT Age 3	RBT Age 4	RBT Age 5	SRH Age 3	SRH Age 4	SRH Age 5	URB Age 3	URB Age 4	URB Age 5	WSH Age 4	Fishery
79	NA	NA	1.241	0.850	0.688	NA	NA	NA	0.464	1.124	NA	NA	0.870
80	NA	1.012	1.107	0.873	0.719	0.972	NA	NA	1.171	0.996	1.215	1.789	1.026
81	NA	1.455	0.742	1.020	1.593	1.592	1.102	NA	NA	1.215	1.386	0.965	1.255
82	1.000	0.533	0.911	1.258	NA	0.436	0.898	1.000	1.365	0.665	0.399	0.246	0.781
83	1.764	1.459	1.008	0.689	0.517	0.433	0.624	1.246	1.793	1.239	NA	0.714	0.845
84	1.250	0.447	0.476	1.337	1.836	NA	0.635	3.382	0.944	1.835	NA	0.242	1.335
85	0.726	0.518	1.069	2.382	NA	NA	NA	3.065	1.267	1.560	1.395	0.242	1.619
86	0.684	0.738	NA	1.366	NA	0.092	0.707	NA	1.016	1.209	1.174	NA	0.865
87	0.587	0.569	0.600	NA	NA	0.158	0.394	3.709	1.094	1.746	2.593	0.226	1.212
88	1.798	0.638	0.418	0.856	NA	NA	0.302	1.366	0.337	0.947	1.790	0.350	0.782
89	0.959	0.423	0.467	1.110	1.213	0.109	0.269	2.444	NA	0.913	3.539	0.189	1.027
90	1.876	0.944	0.372	0.988	0.760	0.144	0.242	2.949	NA	1.110	1.768	0.156	0.925
91	0.677	0.581	0.498	0.955	1.417	0.107	0.394	2.466	NA	NA	NA	0.128	0.886
92	0.161	1.651	0.358	0.802	0.921	0.111	0.242	1.186	NA	NA	NA	0.035	0.668
93	0.285	NA	0.236	0.771	0.992	0.106	0.587	2.639	0.000	1.013	NA	0.094	0.846
94	0.063	NA	NA	1.089	1.094	0.150	0.520	2.335	NA	0.865	NA	0.051	0.906
95	0.000	NA	NA	0.749	0.441	0.044	0.000	0.864	NA	NA	0.508	0.067	0.369
96	NA	NA	NA	NA	NA	0.000	0.000	0.000	0.000	0.000	NA	0.000	0.000

Stock Identifiers

AKS = ALASKA SPRING
QUI = QUINSAM
RBT = ROBERTSON CREEK
SRH = SALMON RIVER
URB = COLUMBIA UPRIVER BRIGHT
WSH = WILLAMETTE SPRING

Central B.C. Troll

REPORTED CATCH EXPLOITATION RATES				
	BQR	QUI	RBT	RBT
Year	Age 3	Age 4	Age 3	Age 4
79	0.066	NA	0.044	0.078
80	0.045	0.109	0.034	0.079
81	0.078	0.098	0.026	0.052
82	0.031	0.052	0.021	0.055
83	NA	0.063	0.027	0.054
84	NA	0.040	NA	0.026
85	0.016	0.018	NA	NA
86	0.047	0.046	NA	NA
87	NA	0.042	0.011	NA
88	NA	0.013	0.007	0.007
89	0.003	0.012	0.004	0.005
90	NA	0.048	0.006	0.018
91	0.008	0.083	0.007	0.023
92	NA	0.056	0.003	0.034
93	NA	NA	0.002	0.021
94	NA	NA	NA	0.015
95	NA	NA	NA	NA
96	0.000	NA	NA	NA
Base	0.055	0.086	0.031	0.066

REPORTED CATCH EXPLOITATION RATE INDEX					
	BQR	QUI	RBT	RBT	
Year	Age 3	Age 4	Age 3	Age 4	Fishery
79	1.202	NA	1.408	1.187	1.238
80	0.814	1.267	1.093	1.192	1.119
81	1.413	1.134	0.824	0.789	1.062
82	0.572	0.599	0.675	0.832	0.667
83	NA	0.729	0.859	0.813	0.782
84	NA	0.463	NA	0.389	0.431
85	0.285	0.210	NA	NA	0.239
86	0.858	0.529	NA	NA	0.657
87	NA	0.484	0.352	NA	0.449
88	NA	0.148	0.219	0.099	0.143
89	0.061	0.143	0.114	0.073	0.101
90	NA	0.557	0.177	0.276	0.391
91	0.153	0.963	0.233	0.350	0.510
92	NA	0.648	0.092	0.510	0.503
93	NA	NA	0.052	0.322	0.235
94	NA	NA	NA	0.229	0.229
95	NA	NA	NA	NA	
96	0.000	NA	NA	NA	0.000

Stock Identifiers
BQR = BIG QUALICUM QUI = QUINSAM RBT = ROBERTSON CREEK

West Coast Vancouver Island Troll

REPORTED CATCH EXPLOITATION RATES

Year	BON Age 3	BON Age 4	CWF Age 4	GAD Age 3	GAD Age 4	LRW Age 4	RBT Age 3	RBT Age 4	RBT Age 5	SAM Age 3	SAM Age 4	SPR Age 3	SPR Age 4	SPS Age 3	SPS Age 4	SRH Age 3	SRH Age 4	STP Age 3	STP Age 4	URB Age 3	URB Age 4	UWA Age 3	UWA Age 4	WSH Age 4
79	0.176	NA	NA	NA	NA	NA	0.032	0.062	NA	NA	0.205	0.174	0.170	NA	0.250	NA	NA	NA	NA	0.040	0.081	0.063	0.166	NA
80	0.098	0.150	NA	NA	NA	NA	0.037	0.075	NA	NA	NA	0.212	0.290	NA	NA	NA	NA	NA	NA	0.038	0.050	0.125	0.119	0.041
81	0.159	0.153	0.127	0.036	NA	0.058	0.018	0.028	0.030	NA	NA	0.169	0.141	0.050	NA	NA	0.021	0.208	NA	NA	0.050	0.092	0.190	0.007
82	0.259	0.347	0.195	0.065	0.206	0.080	0.021	0.034	NA	0.051	NA	0.165	0.251	0.089	0.200	NA	NA	0.192	0.215	0.027	0.021	0.123	0.219	0.025
83	0.306	0.290	0.223	NA	0.283	0.067	0.009	0.032	0.072	NA	0.191	0.263	0.207	0.105	0.193	NA	NA	0.271	0.331	0.010	0.020	0.074	0.199	0.017
84	0.266	0.566	0.215	0.103	NA	NA	0.041	0.047	0.051	NA	NA	0.236	0.310	0.097	0.219	NA	0.017	0.398	0.505	0.021	0.063	0.182	0.154	0.011
85	0.222	0.294	0.150	NA	0.166	NA	0.020	0.000	NA	NA	NA	0.096	0.222	0.047	0.157	NA	NA	0.201	0.191	0.018	0.048	0.091	0.214	0.009
86	NA	NA	0.208	NA	NA	0.032	NA	NA	NA	NA	NA	0.212	0.195	NA	0.252	NA	NA	0.198	0.226	0.037	0.034	0.088	0.230	NA
87	0.177	NA	0.131	NA	NA	0.099	0.009	NA	NA	NA	NA	0.080	NA	0.046	0.125	NA	0.012	0.155	NA	0.024	0.045	0.039	0.085	0.011
88	NA	0.242	0.138	0.022	NA	0.072	0.015	0.037	NA	0.029	NA	0.180	NA	0.019	0.169	NA	0.030	0.189	0.280	0.002	0.089	NA	0.159	0.013
89	NA	NA	0.086	0.013	0.105	0.039	0.006	0.020	0.000	0.010	0.128	0.106	0.092	0.022	0.094	NA	NA	0.048	0.108	NA	0.042	NA	NA	0.011
90	NA	NA	0.118	0.056	0.192	0.084	0.022	0.037	NA	0.019	0.182	0.162	0.164	0.047	0.205	NA	0.020	0.195	NA	NA	0.080	NA	NA	0.013
91	NA	NA	NA	NA	0.196	0.051	0.021	0.033	0.030	0.012	0.121	0.099	0.121	0.025	0.132	NA	0.016	0.135	NA	NA	NA	NA	NA	0.001
92	NA	NA	0.188	NA	0.099	0.022	0.054	0.161	0.232	0.051	0.055	0.078	0.165	0.043	0.176	NA	0.123	0.112	NA	NA	NA	NA	NA	0.008
93	NA	NA	NA	NA	NA	NA	0.042	0.134	0.097	0.054	0.094	0.096	0.224	0.064	0.132	NA	0.056	0.185	0.135	0.016	0.092	NA	NA	0.008
94	NA	NA	0.019	NA	NA	0.014	0.024	0.051	0.057	0.004	0.143	0.135	0.133	0.013	0.114	NA	0.018	NA	NA	NA	0.047	NA	NA	0.005
95	NA	NA	NA	0.011	NA	0.027	NA	NA	0.021	0.008	0.085	0.071	0.060	0.015	0.063	NA	0.010	NA	NA	NA	NA	NA	NA	0.002
96	NA	NA	0.000	0.000	0.000	NA	NA	NA	NA	0.000	0.000	0.000	NA	0.000	0.000	NA	0.000	NA	NA	0.000	0.000	NA	NA	0.000
Base	0.173	0.217	0.161	0.051	0.206	0.069	0.027	0.050	0.030	0.051	0.205	0.180	0.213	0.070	0.225	-1.000	0.021	0.200	0.215	0.035	0.051	0.101	0.174	0.024

REPORTED CATCH EXPLOITATION RATE INDEX

Year	BON Age 3	BON Age 4	CWF Age 4	GAD Age 3	GAD Age 4	LRW Age 4	RBT Age 3	RBT Age 4	RBT Age 5	SAM Age 3	SAM Age 4	SPR Age 3	SPR Age 4	SPS Age 3	SPS Age 4	SRH Age 3	SRH Age 4	STP Age 3	STP Age 4	URB Age 3	URB Age 4	UWA Age 3	UWA Age 4	WSH Age 4	Fishery
79	1.019	NA	NA	NA	NA	NA	1.171	1.247	NA	NA	1.000	0.966	0.797	NA	1.111	NA	NA	NA	NA	1.133	1.610	0.628	0.958	NA	0.991
80	0.566	0.693	NA	NA	NA	NA	1.381	1.514	NA	NA	NA	1.177	1.363	NA	NA	NA	NA	NA	NA	1.088	0.988	1.245	0.685	1.679	0.994
81	0.919	0.706	0.788	0.715	NA	0.841	0.685	0.556	1.000	NA	NA	0.940	0.662	0.718	NA	NA	1.000	1.039	NA	NA	0.983	0.909	1.096	0.274	0.849
82	1.496	1.601	1.212	1.285	1.000	1.159	0.763	0.683	NA	1.000	NA	0.917	1.177	1.282	0.889	NA	NA	0.961	1.000	0.779	0.419	1.217	1.261	1.047	1.118
83	1.767	1.339	1.385	NA	1.375	0.966	0.340	0.640	2.378	NA	0.931	1.461	0.973	1.503	0.859	NA	NA	1.355	1.540	0.277	0.405	0.739	1.149	0.694	1.206
84	1.536	2.614	1.332	2.038	NA	NA	1.522	0.952	1.694	NA	NA	1.309	1.457	1.394	0.976	NA	0.843	1.993	2.352	0.601	1.244	1.803	0.885	0.445	1.581
85	1.283	1.359	0.929	NA	0.806	NA	0.732	0.000	NA	NA	NA	0.534	1.044	0.680	0.698	NA	NA	1.008	0.891	0.522	0.949	0.908	1.231	0.361	0.926
86	NA	NA	1.293	NA	NA	0.455	NA	NA	NA	NA	NA	1.174	0.914	NA	1.124	NA	NA	0.989	1.050	1.047	0.671	0.877	1.323	NA	1.054
87	1.024	NA	0.816	NA	NA	1.426	0.346	NA	NA	NA	NA	0.442	NA	0.662	0.556	NA	0.584	0.774	NA	0.694	0.885	0.387	0.490	0.455	0.688
88	NA	1.118	0.855	0.440	NA	1.040	0.568	0.751	NA	0.572	NA	1.001	NA	0.273	0.753	NA	1.430	0.947	1.305	0.059	1.764	NA	0.917	0.525	0.928
89	NA	NA	0.535	0.251	0.510	0.555	0.218	0.411	0.000	0.202	0.623	0.590	0.431	0.310	0.421	NA	NA	0.241	0.505	NA	0.835	NA	NA	0.439	0.459
90	NA	NA	0.730	1.100	0.935	1.207	0.799	0.739	NA	0.369	0.884	0.899	0.769	0.678	0.912	NA	0.979	0.978	NA	NA	1.576	NA	NA	0.523	0.884
91	NA	NA	NA	NA	0.953	0.731	0.781	0.667	1.004	0.229	0.588	0.550	0.569	0.365	0.586	NA	0.797	0.674	NA	NA	NA	NA	NA	0.041	0.633
92	NA	NA	1.168	NA	0.482	0.315	2.011	3.244	7.656	1.006	0.267	0.430	0.774	0.620	0.785	NA	5.949	0.562	NA	NA	NA	NA	NA	0.321	0.905
93	NA	NA	NA	NA	NA	NA	1.550	2.699	3.190	1.073	0.456	0.535	1.054	0.920	0.587	NA	2.722	0.926	0.629	0.444	1.815	NA	NA	0.345	0.896
94	NA	NA	0.118	NA	NA	0.205	0.879	1.031	1.867	0.081	0.697	0.751	0.626	0.192	0.507	NA	0.855	NA	NA	NA	0.923	NA	NA	0.214	0.565
95	NA	NA	NA	0.219	NA	0.396	NA	NA	0.678	0.154	0.416	0.394	0.280	0.214	0.279	NA	0.472	NA	NA	NA	NA	NA	NA	0.071	0.327
96	NA	NA	0.000	0.000	0.000	NA	NA	NA	NA	0.000	0.000	0.000	NA	0.000	0.000	NA	0.000	NA	NA	0.000	0.000	NA	NA	0.000	0.000

Stock Identifiers

BON = BONNEVILLE TULE
CWF = COWLITZ FALL TULE
GAD = G ADAMS FALL FING
LRW = LEWIS RIVER WILD
RBT = ROBERTSON CREEK
SAM = SAMISH FALL FING
SPR = SPRING CREEK TULE
SPS = SO SOUND FALL FING
SRH = SALMON RIVER
STP = STAYTON POND TULE
URB = COLUMBIA UPRIVER BRIGHT
UWA = U OF W FALL ACCEL
WSH = WILLAMETTE SPRING

Strait of Georgia Troll and Sport

REPORTED CATCH EXPLOITATION RATES

Year	BQR Age 3	BQR Age 4	PPS Age 3	SAM Age 3	SAM Age 4	SPS Age 3	SPS Age 4	UWA Age 3
79	0.229	0.159	0.232	NA	0.092	NA	0.060	0.040
80	0.271	0.191	0.261	NA	NA	NA	NA	0.057
81	0.307	0.371	0.283	NA	NA	0.065	NA	0.035
82	0.145	0.151	0.150	0.103	NA	0.054	0.093	0.022
83	0.190	0.163	0.174	NA	0.100	0.029	0.041	0.033
84	0.265	0.265	0.252	NA	NA	0.053	0.056	0.050
85	0.158	0.117	0.143	NA	NA	NA	0.052	0.031
86	0.233	0.174	0.307	NA	NA	NA	NA	0.024
87	0.155	0.231	0.084	NA	NA	0.062	NA	0.033
88	0.197	0.092	NA	0.053	NA	0.027	NA	NA
89	0.127	0.183	0.172	0.057	0.086	0.016	0.034	NA
90	0.166	0.142	NA	0.032	0.123	0.008	0.035	NA
91	0.197	0.277	0.229	0.098	0.054	0.008	0.012	NA
92	0.322	0.203	0.198	0.040	0.201	0.021	0.033	NA
93	0.276	0.337	NA	0.096	0.125	0.021	NA	NA
94	0.227	0.216	NA	0.086	0.112	0.017	0.029	NA
95	0.222	NA	NA	0.031	0.028	0.008	0.053	NA
96	0.175	NA	0.187	0.032	0.129	0.008	0.032	NA
Base	0.238	0.218	0.231	0.103	0.092	0.060	0.077	0.039

REPORTED CATCH EXPLOITATION RATE INDEX

Year	BQR Age 3	BQR Age 4	PPS Age 3	SAM Age 3	SAM Age 4	SPS Age 3	SPS Age 4	UWA Age 3	Fishery
79	0.961	0.729	1.001	NA	1.000	NA	0.788	1.039	0.907
80	1.139	0.877	1.127	NA	NA	NA	NA	1.475	1.074
81	1.291	1.700	1.223	NA	NA	1.090	NA	0.915	1.351
82	0.609	0.694	0.649	1.000	NA	0.910	1.212	0.571	0.745
83	0.799	0.747	0.750	NA	1.091	0.487	0.529	0.846	0.764
84	1.112	1.216	1.089	NA	NA	0.885	0.732	1.297	1.091
85	0.663	0.538	0.617	NA	NA	NA	0.685	0.798	0.624
86	0.980	0.797	1.326	NA	NA	NA	NA	0.629	1.016
87	0.652	1.060	0.362	NA	NA	1.040	NA	0.861	0.719
88	0.829	0.422	NA	0.513	NA	0.454	NA	NA	0.597
89	0.531	0.840	0.745	0.552	0.934	0.267	0.444	NA	0.662
90	0.698	0.651	NA	0.306	1.337	0.137	0.457	NA	0.642
91	0.827	1.271	0.989	0.946	0.582	0.136	0.152	NA	0.858
92	1.350	0.930	0.857	0.390	2.183	0.348	0.434	NA	0.999
93	1.157	1.546	NA	0.924	1.359	0.354	NA	NA	1.201
94	0.952	0.989	NA	0.830	1.215	0.285	0.374	NA	0.870
95	0.933	NA	NA	0.302	0.300	0.142	0.696	NA	0.602
96	0.735	NA	0.806	0.311	1.398	0.136	0.411	NA	0.701

Stock Identifiers

BQR = BIG QUALICUM

SPS = SO SOUND FALL FING

SAM = SAMISH FALL FING

PPS = PUNTLEDGE

UWA = U OF W FALL ACCEL

Strait of Georgia Troll

REPORTED CATCH EXPLOITATION RATES

Year	BQR Age 3	SAM Age 3
79	0.148	NA
80	0.148	NA
81	0.120	NA
82	0.079	0.016
83	0.107	NA
84	0.081	NA
85	0.016	NA
86	0.052	NA
87	0.033	NA
88	0.006	NA
89	0.010	0.004
90	0.055	NA
91	0.040	NA
92	0.095	NA
93	0.020	0.014
94	NA	NA
95	NA	NA
96	0.000	0.000
Base	0.124	0.016

REPORTED CATCH EXPLOITATION RATE INDEX

Year	BQR Age 3	SAM Age 3	Fishery
79	1.196	NA	1.196
80	1.196	NA	1.196
81	0.968	NA	0.968
82	0.640	1.000	0.682
83	0.867	NA	0.867
84	0.658	NA	0.658
85	0.127	NA	0.127
86	0.419	NA	0.419
87	0.264	NA	0.264
88	0.051	NA	0.051
89	0.081	0.223	0.098
90	0.447	NA	0.447
91	0.321	NA	0.321
92	0.771	NA	0.771
93	0.162	0.830	0.240
94	NA	NA	
95	NA	NA	
96	0.000	0.000	0.000

Stock Identifiers
BQR = BIG QUALICUM
SAM = SAMISH FALL FING

Strait of Georgia Sport

REPORTED CATCH EXPLOITATION RATES

Year	BQR Age 3	BQR Age 4	PPS Age 3	SAM Age 3	SAM Age 4	SPS Age 3	SPS Age 4	UWA Age 3
79	0.081	0.100	0.080	NA	0.072	NA	0.052	0.026
80	0.123	0.111	0.136	NA	NA	NA	NA	0.054
81	0.188	0.294	0.167	NA	NA	0.060	NA	0.031
82	0.066	0.063	0.060	0.087	NA	0.050	0.058	0.022
83	0.083	0.117	0.073	NA	0.090	0.028	0.036	0.024
84	0.183	0.265	0.150	NA	NA	0.044	0.056	0.045
85	0.142	0.117	0.143	NA	NA	NA	0.049	0.031
86	0.181	0.174	0.206	NA	NA	NA	NA	0.024
87	0.123	0.224	0.084	NA	NA	0.062	NA	0.025
88	0.191	0.072	NA	0.051	NA	0.026	NA	NA
89	0.116	0.183	0.172	0.053	0.086	0.015	0.032	NA
90	0.111	0.142	NA	0.012	0.099	0.005	0.033	NA
91	0.157	0.277	0.229	0.081	0.044	0.007	0.012	NA
92	0.226	0.188	0.175	0.026	0.182	0.021	0.030	NA
93	0.255	NA	NA	0.082	0.113	0.017	NA	NA
94	0.191	0.194	NA	0.075	0.108	0.017	0.029	NA
95	NA	NA	NA	0.031	0.028	0.008	0.053	NA
96	0.175	NA	0.187	0.032	0.129	0.008	0.032	NA
Base	0.114	0.142	0.111	0.087	0.072	0.055	0.055	0.033

REPORTED CATCH EXPLOITATION RATE INDEX

Year	BQR Age 3	BQR Age 4	PPS Age 3	SAM Age 3	SAM Age 4	SPS Age 3	SPS Age 4	UWA Age 3	Fishery
79	0.706	0.703	0.723	NA	1.000	NA	0.940	0.785	0.778
80	1.077	0.782	1.229	NA	NA	NA	NA	1.635	1.061
81	1.641	2.074	1.507	NA	NA	1.089	NA	0.932	1.625
82	0.575	0.442	0.542	1.000	NA	0.911	1.060	0.647	0.679
83	0.724	0.828	0.660	NA	1.258	0.501	0.658	0.711	0.775
84	1.604	1.871	1.349	NA	NA	0.808	1.021	1.345	1.457
85	1.245	0.827	1.288	NA	NA	NA	0.895	0.927	1.060
86	1.587	1.226	1.860	NA	NA	NA	NA	0.730	1.464
87	1.073	1.582	0.755	NA	NA	1.131	NA	0.750	1.137
88	1.673	0.510	NA	0.581	NA	0.470	NA	NA	0.854
89	1.019	1.292	1.554	0.614	1.196	0.279	0.578	NA	1.036
90	0.969	1.001	NA	0.140	1.382	0.096	0.607	NA	0.767
91	1.374	1.956	2.064	0.933	0.617	0.130	0.212	NA	1.270
92	1.978	1.327	1.574	0.302	2.541	0.379	0.538	NA	1.334
93	2.235	NA	NA	0.941	1.577	0.317	NA	NA	1.427
94	1.672	1.370	NA	0.861	1.500	0.310	0.522	NA	1.169
95	NA	NA	NA	0.358	0.384	0.154	0.971	NA	0.449
96	1.531	NA	1.683	0.370	1.790	0.148	0.574	NA	1.138

Stock Identifiers

BQR = BIG QUALICUM
PPS = PUNTLEDGE
SAM = SAMISH FALL FING
SPS = SO SOUND FALL FING
UWA = U OF W FALL ACCEL

U.S. South Ocean Troll and Sport: Puget Sound Stocks

REPORTED CATCH EXPLOITATION RATES

Year	SAM Age 3	SAM Age 4	SPS Age 3	SPS Age 4	UWA Age 3
79	NA	0.016	NA	0.020	0.010
80	NA	NA	NA	NA	0.020
81	NA	NA	0.004	NA	0.024
82	0.007	NA	0.006	0.042	0.023
83	NA	0.037	0.004	0.025	0.014
84	NA	NA	0.006	0.024	0.006
85	NA	NA	0.000	0.018	0.012
86	NA	NA	0.030	0.024	0.012
87	NA	NA	0.025	0.086	0.022
88	0.020	NA	0.030	0.090	NA
89	0.023	0.052	0.041	0.072	NA
90	0.036	0.074	0.048	0.077	NA
91	0.061	0.064	0.037	0.086	NA
92	0.040	0.106	0.048	0.083	NA
93	0.009	0.094	0.021	0.069	NA
94	0.001	0.026	0.001	0.010	NA
95	0.027	0.011	0.008	0.000	NA
96	0.003	0.050	0.004	0.035	NA
Base	0.007	0.016	0.005	0.031	0.019

REPORTED CATCH EXPLOITATION RATE INDEX

Year	SAM Age 3	SAM Age 4	SPS Age 3	SPS Age 4	UWA Age 3	Fishery
79	NA	1.000	NA	0.652	0.526	0.700
80	NA	NA	NA	NA	1.067	1.067
81	NA	NA	0.861	NA	1.227	1.153
82	1.000	NA	1.139	1.348	1.179	1.241
83	NA	2.320	0.784	0.799	0.725	1.123
84	NA	NA	1.132	0.774	0.313	0.645
85	NA	NA	0.000	0.574	0.622	0.540
86	NA	NA	6.212	0.786	0.633	1.215
87	NA	NA	5.223	2.783	1.133	2.424
88	2.985	NA	6.157	2.913	NA	3.297
89	3.381	3.240	8.459	2.326	NA	3.209
90	5.309	4.607	9.927	2.492	NA	4.016
91	9.121	3.987	7.616	2.793	NA	4.250
92	5.998	6.571	9.840	2.692	NA	4.733
93	1.396	5.820	4.407	2.249	NA	3.313
94	0.203	1.632	0.249	0.310	NA	0.656
95	3.942	0.684	1.621	0.000	NA	0.776
96	0.414	3.104	0.773	1.148	NA	1.570

Stock Identifiers
SAM = SAMISH FALL FING
SPS = SO SOUND FALL FING
UWA = U OF W FALL ACCEL

U.S. South Ocean Troll and Sport: Columbia River Stocks

REPORTED CATCH EXPLOITATION RATES

Year	BON Age 3	CWF Age 3	CWF Age 4	SPR Age 3	SPR Age 4	STP Age 3
79	0.203	NA	NA	0.180	0.149	NA
80	0.184	0.107	NA	0.267	0.093	NA
81	0.169	0.083	0.150	0.248	0.203	0.162
82	0.165	0.140	0.262	0.274	0.091	0.282
83	0.102	0.070	0.181	0.104	0.040	0.158
84	0.085	0.006	0.039	0.071	0.000	0.050
85	0.143	0.088	0.042	0.134	0.014	0.184
86	0.086	0.108	0.049	0.058	0.032	0.234
87	0.139	0.057	0.104	0.204	0.000	0.116
88	NA	0.055	0.143	0.133	0.136	0.184
89	NA	0.045	0.261	0.193	0.106	0.240
90	NA	0.099	0.137	0.154	0.104	0.161
91	NA	0.056	0.073	0.173	0.022	0.135
92	NA	0.088	0.032	0.242	0.065	0.242
93	NA	0.072	0.436	0.224	0.140	0.166
94	NA	0.000	0.033	0.027	0.010	0.000
95	0.000	0.017	0.000	0.008	0.004	NA
96	0.000	0.004	0.073	0.046	0.250	0.000
Base	0.180	0.110	0.206	0.242	0.134	0.222

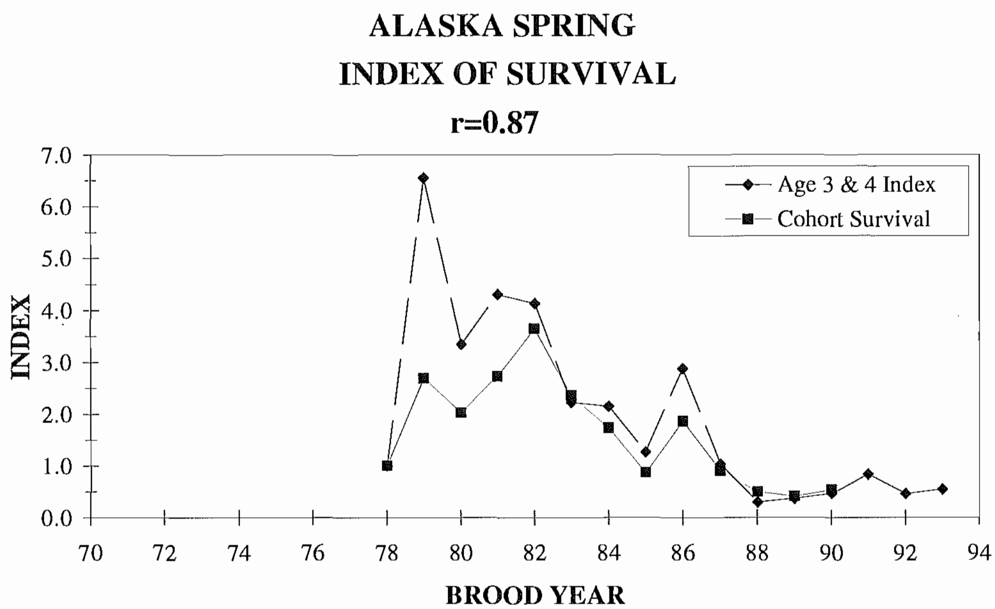
REPORTED CATCH EXPLOITATION RATE INDEX

Year	BON Age 3	CWF Age 3	CWF Age 4	SPR Age 3	SPR Age 4	STP Age 3	Fishery
79	1.124	NA	NA	0.744	1.110	NA	0.955
80	1.023	0.975	NA	1.102	0.693	NA	0.977
81	0.940	0.753	0.728	1.024	1.516	0.730	0.928
82	0.913	1.272	1.272	1.130	0.681	1.270	1.109
83	0.566	0.634	0.882	0.431	0.301	0.709	0.599
84	0.473	0.052	0.189	0.291	0.000	0.223	0.228
85	0.795	0.800	0.206	0.555	0.103	0.826	0.553
86	0.478	0.985	0.237	0.241	0.242	1.053	0.519
87	0.772	0.522	0.504	0.841	0.000	0.522	0.566
88	NA	0.498	0.695	0.551	1.016	0.828	0.713
89	NA	0.413	1.271	0.799	0.792	1.082	0.926
90	NA	0.901	0.667	0.636	0.777	0.724	0.717
91	NA	0.513	0.353	0.714	0.162	0.606	0.501
92	NA	0.801	0.158	0.999	0.487	1.089	0.733
93	NA	0.652	2.121	0.926	1.039	0.745	1.135
94	NA	0.000	0.162	0.113	0.071	0.000	0.077
95	0.000	0.153	0.000	0.034	0.030	NA	0.033
96	0.000	0.036	0.354	0.191	1.862	0.000	0.341

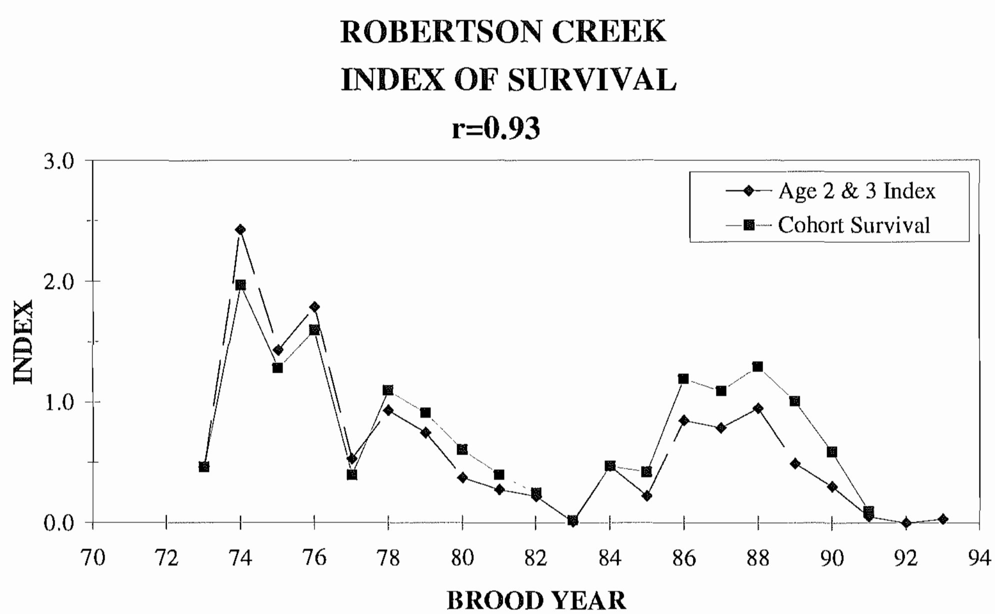
Stock Identifiers
BON = BONNEVILLE TULE
CWF = COWLITZ FALL TULE
SPR = SPRING CREEK TULE
STP = STAYTON POND TULE

APPENDIX F: SURVIVAL RATE GRAPHS

Alaska Spring

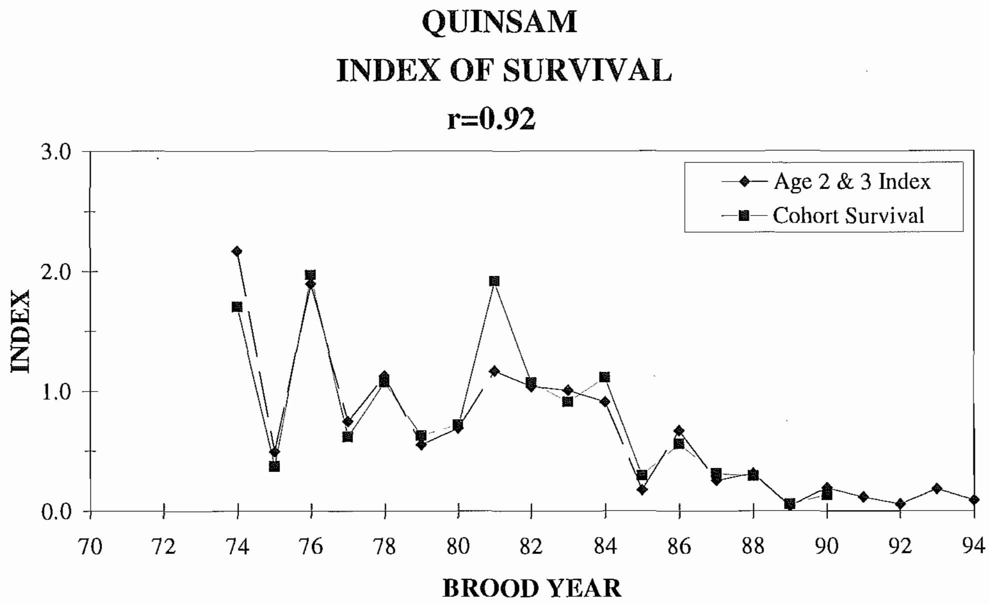


Robertson Creek

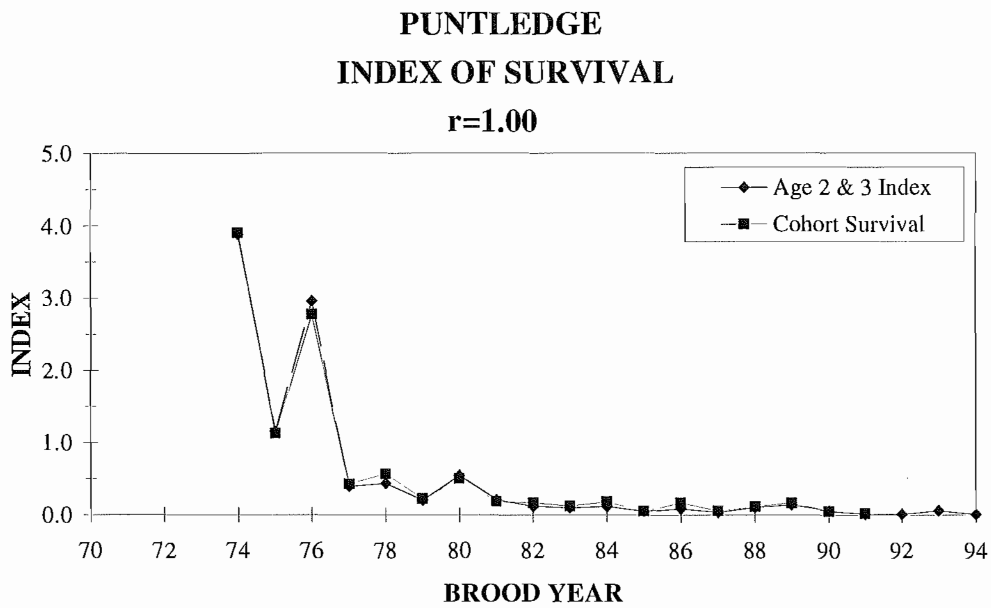


*The survival index was not calculated for brood 1994 since no age-2 chinook were recovered in 1996.

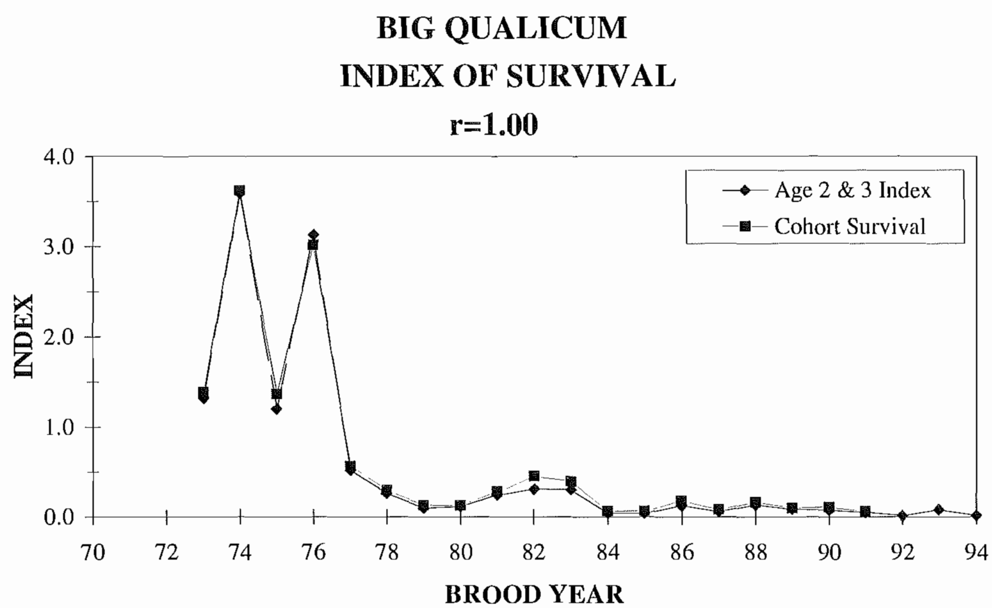
Quinsam



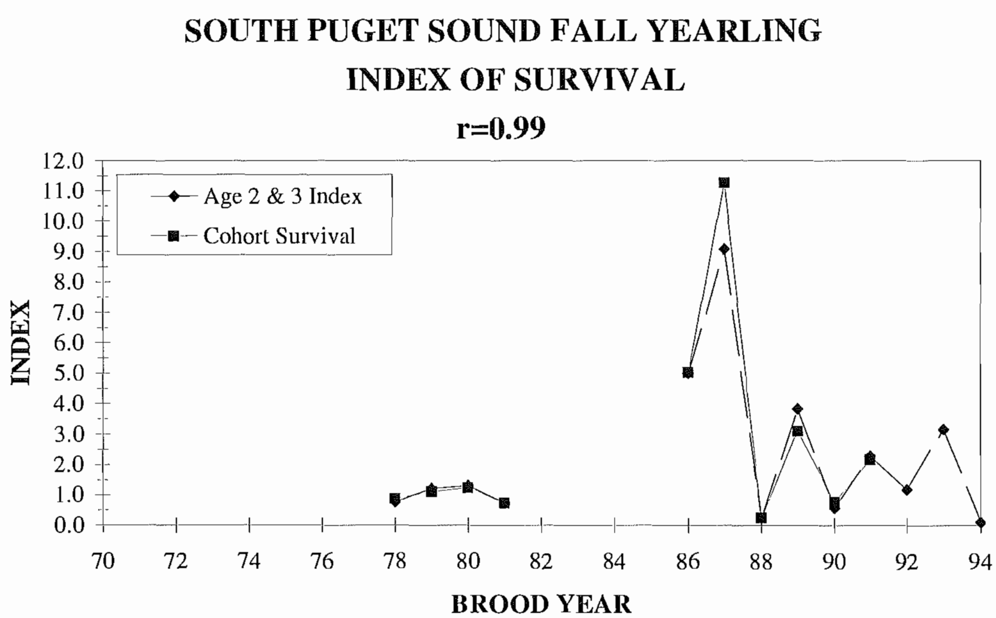
Puntledge



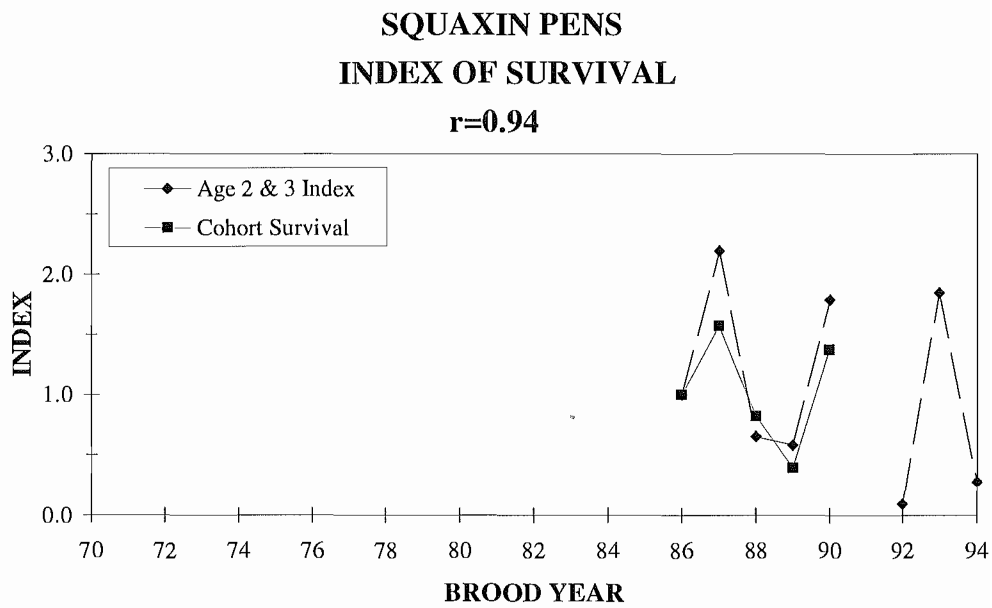
Big Qualicum



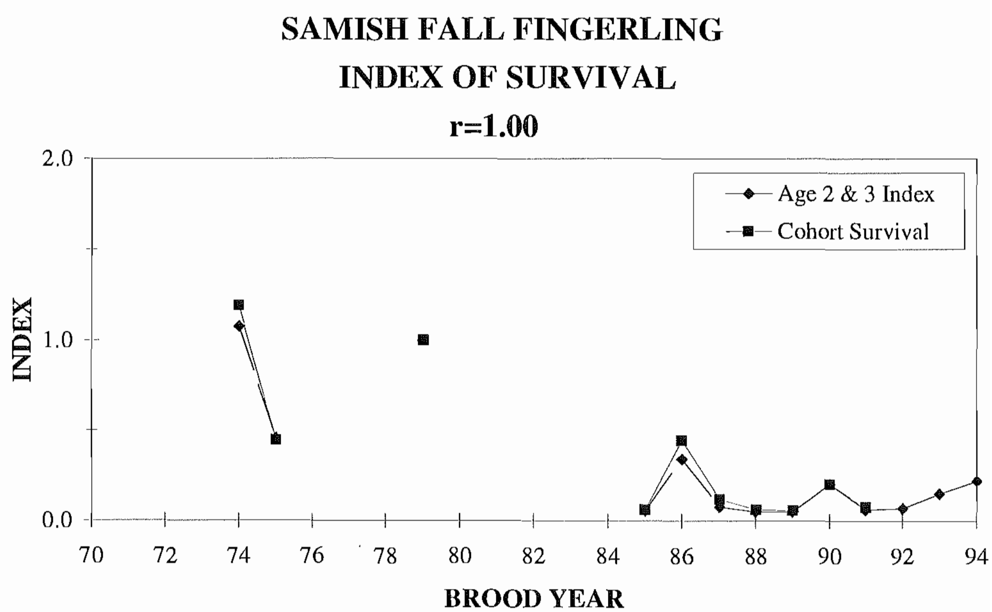
South Puget Sound Fall Yearling



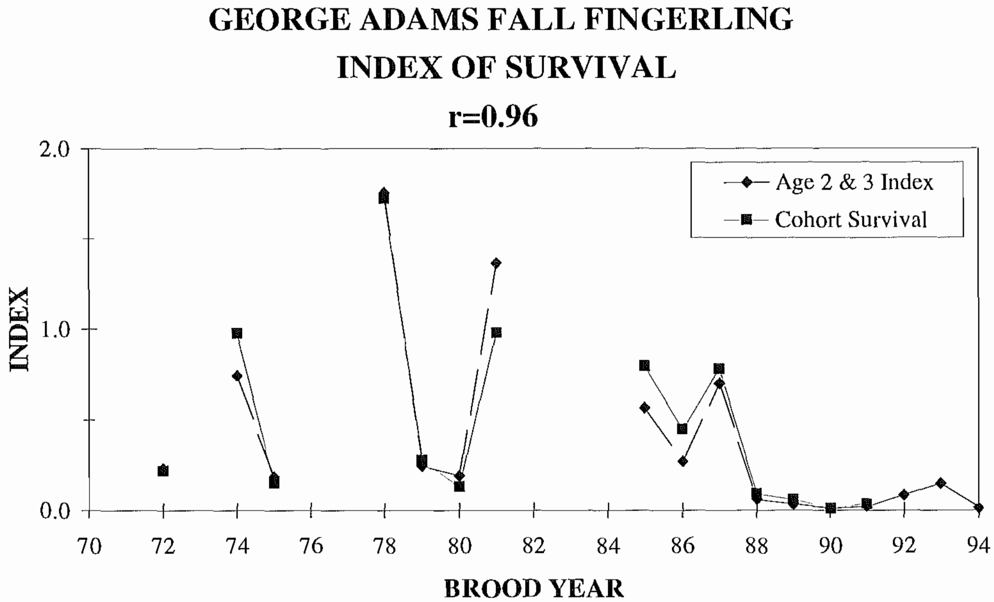
Squaxin Pens Fall Yearling



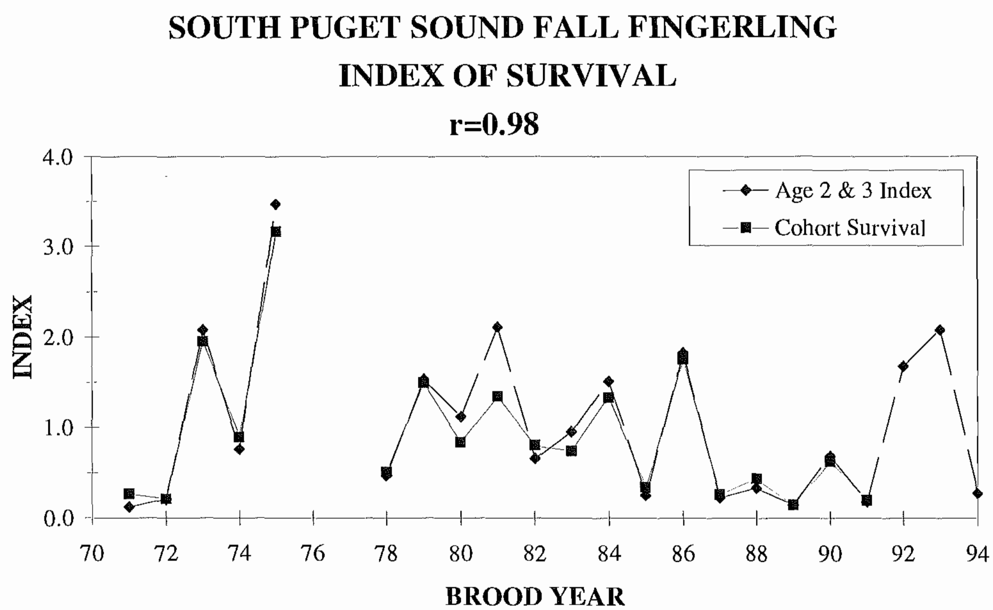
Samish Fall Fingerling



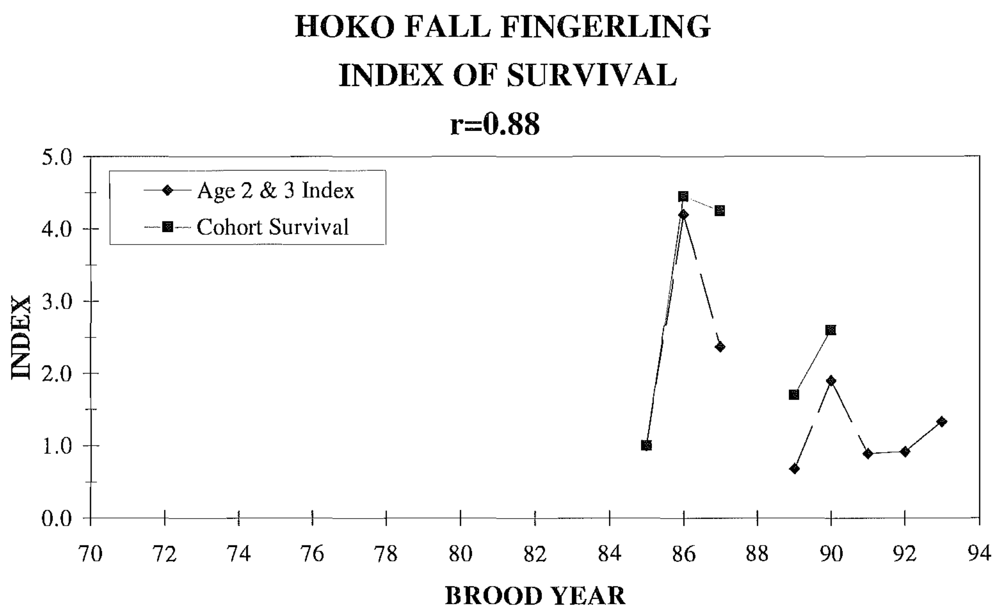
George Adams Fall Fingerling



South Puget Sound Fall Fingerling

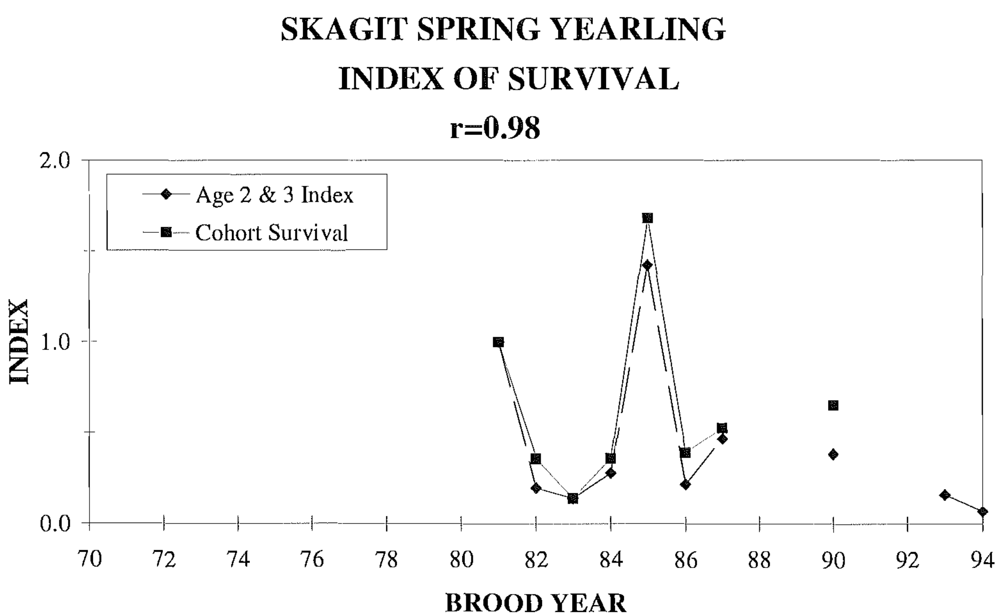


Hoko Fall Fingerling

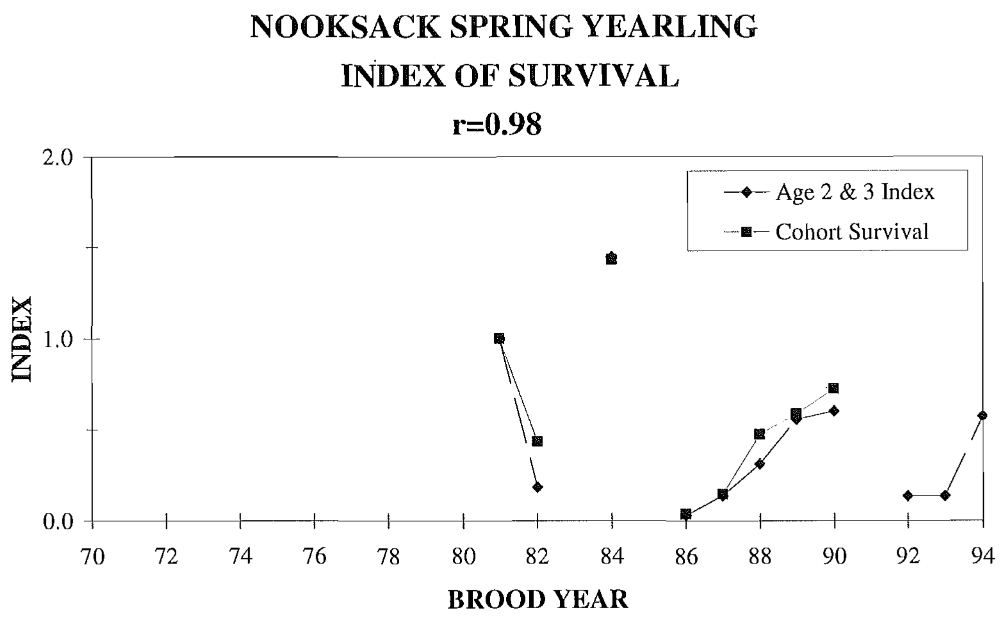


*The survival index was not calculated for brood 1994 since no age-2 chinook were recovered in the base period.

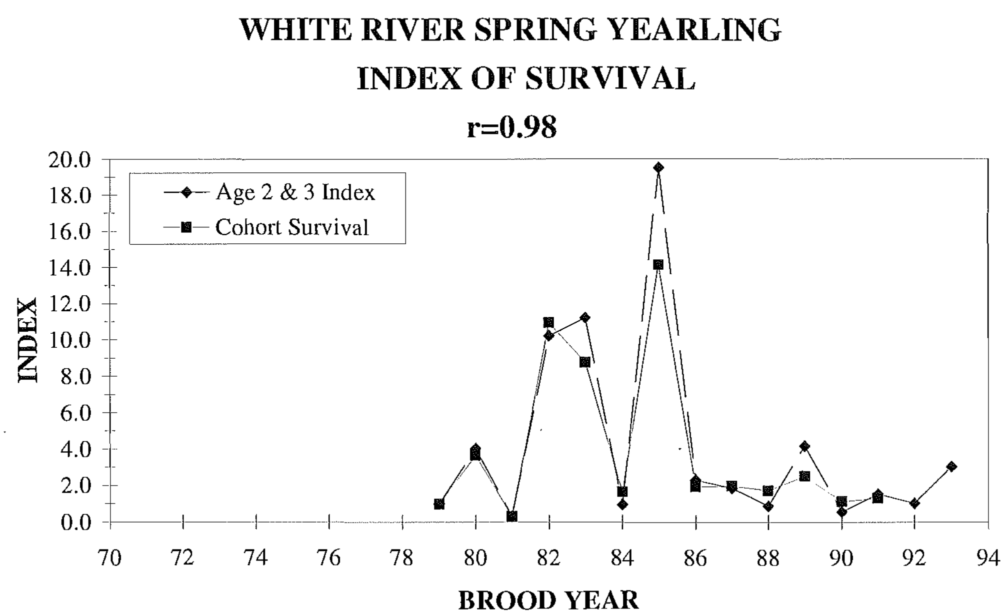
Skagit Spring Yearling



Nooksack Spring Yearling

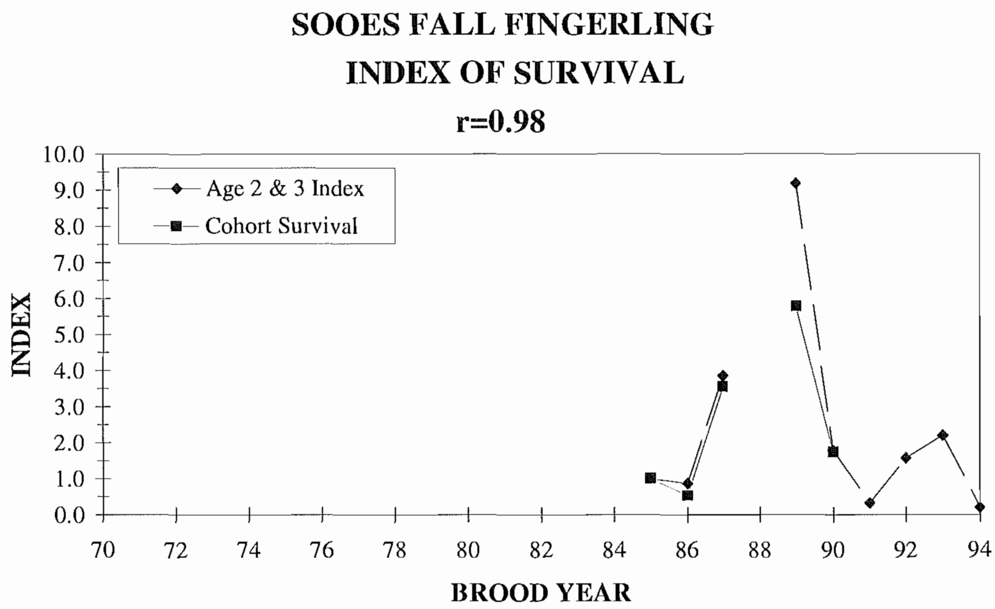


White River Spring Yearling

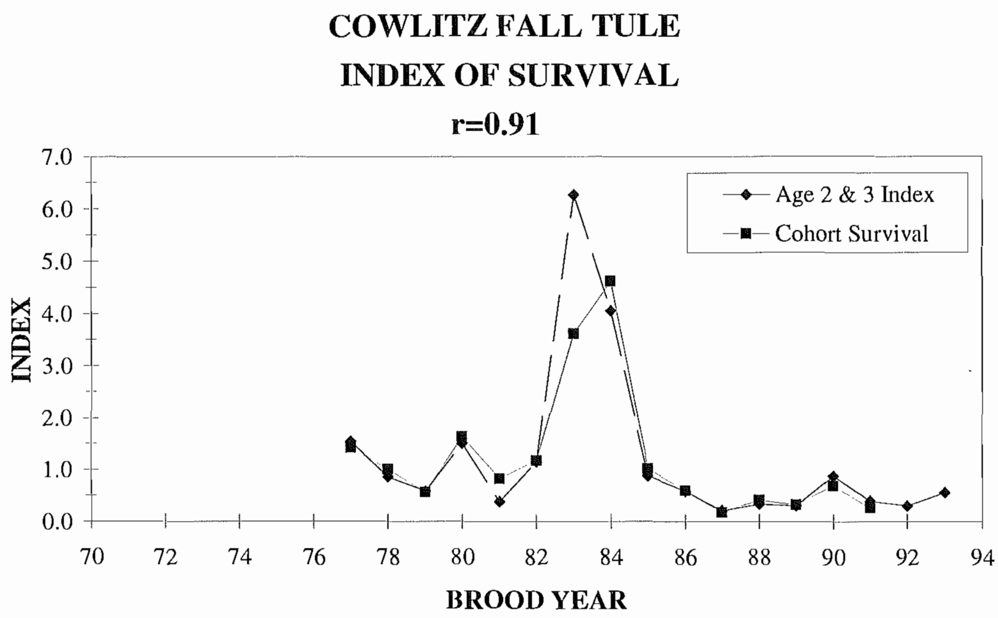


*The survival index was not calculated for brood 1994 since no age-2 chinook were recovered in the base period.

Sooes Fall Fingerling

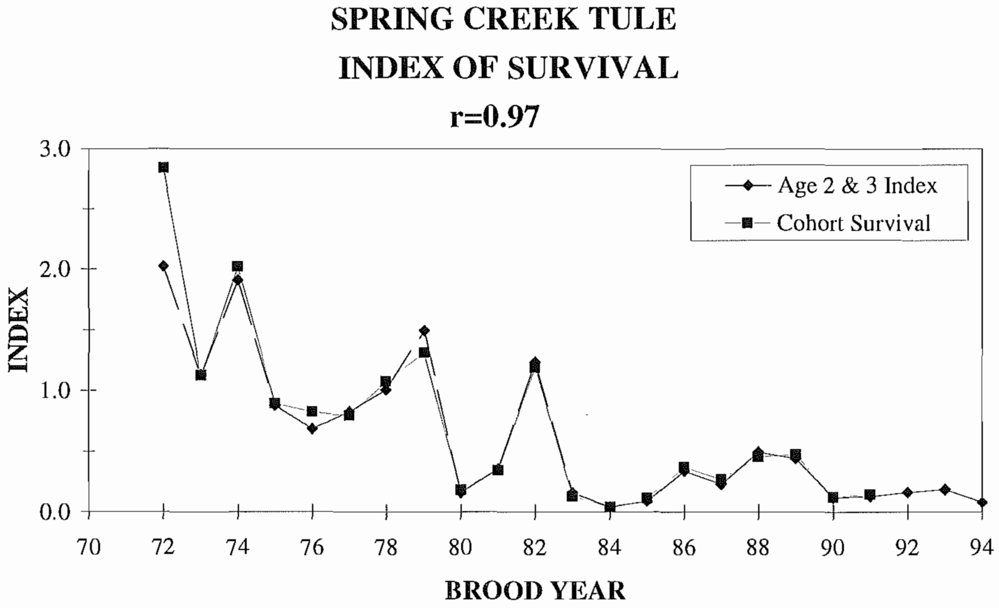


Cowlitz Fall Tule

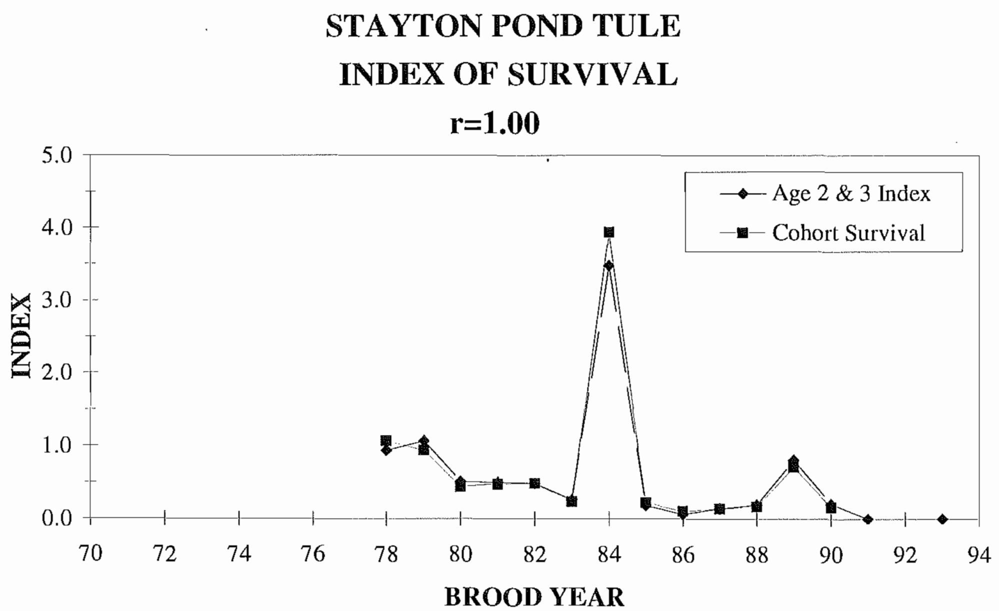


*The survival index was not calculated for brood 1994 since no age-2 chinook were recovered in 1996.

Spring Creek Tule

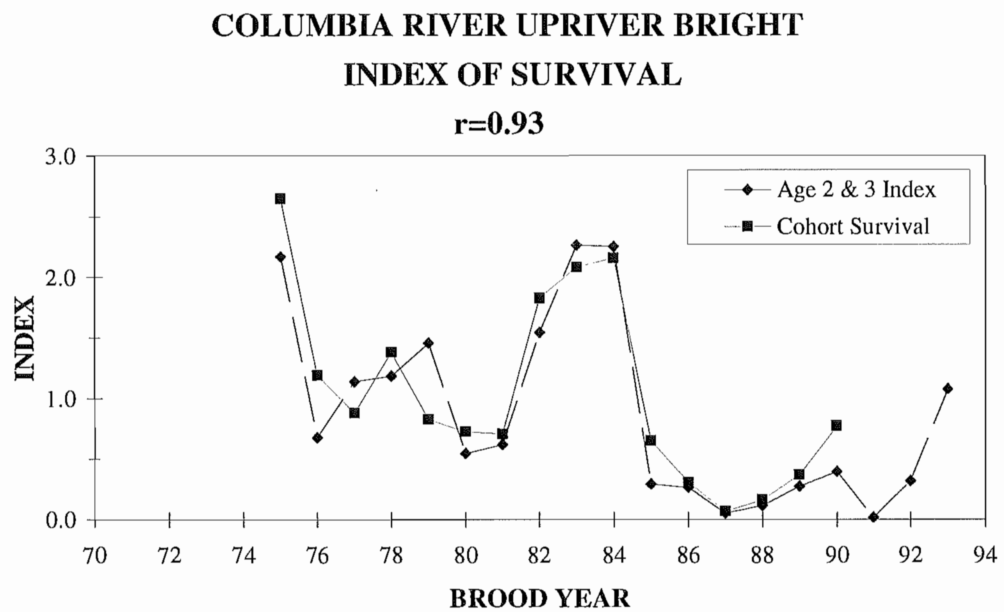


Stayton Pond Tule



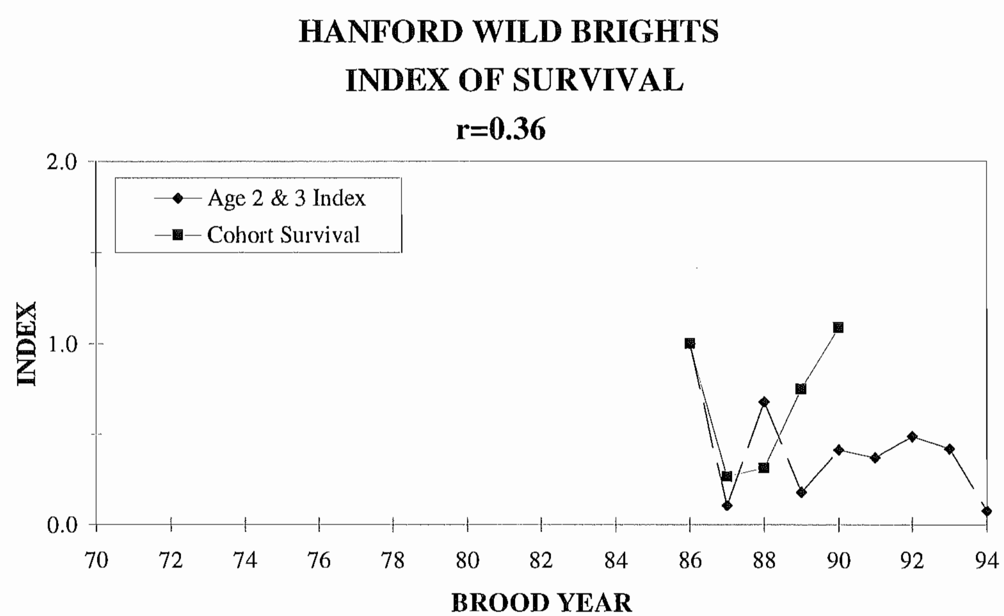
*The survival index was not calculated for brood 1994 since no age-2 chinook were recovered in 1996.

Columbia River Upriver Bright

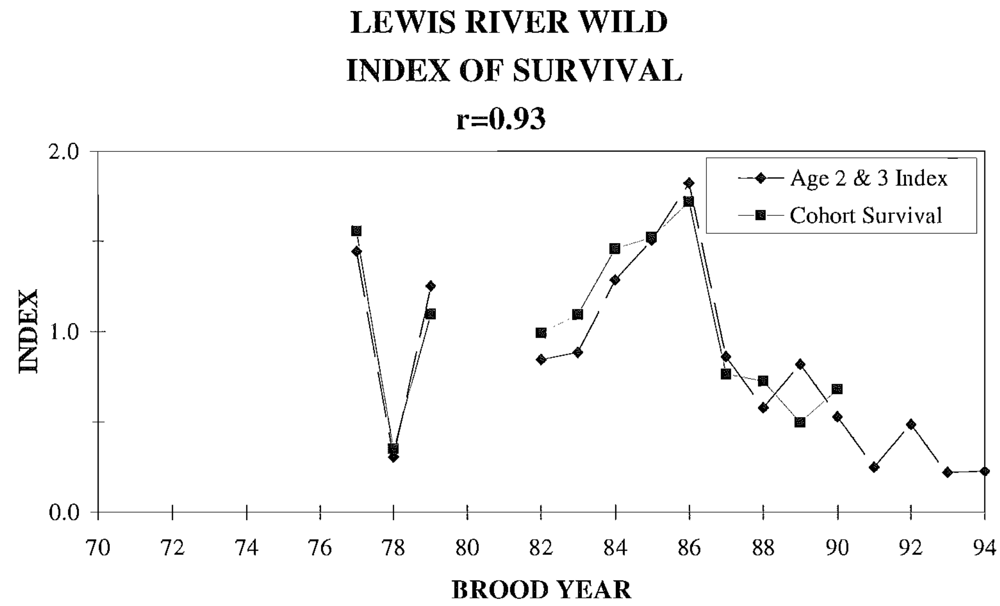


*The survival index was not calculated for brood 1994 since no age-2 chinook were recovered in 1996.

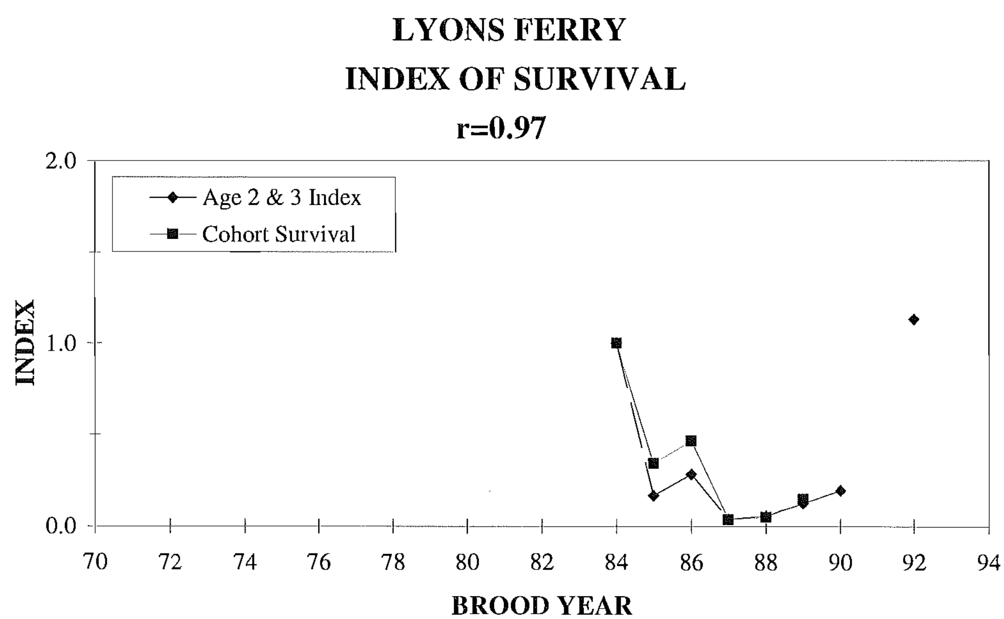
Hanford Wild Brights



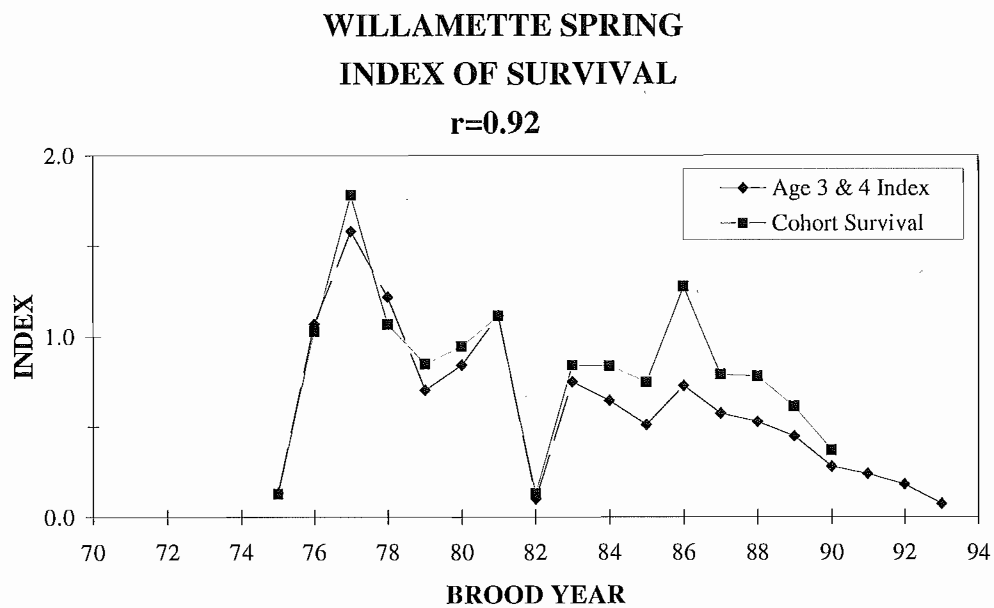
Lewis River Wild



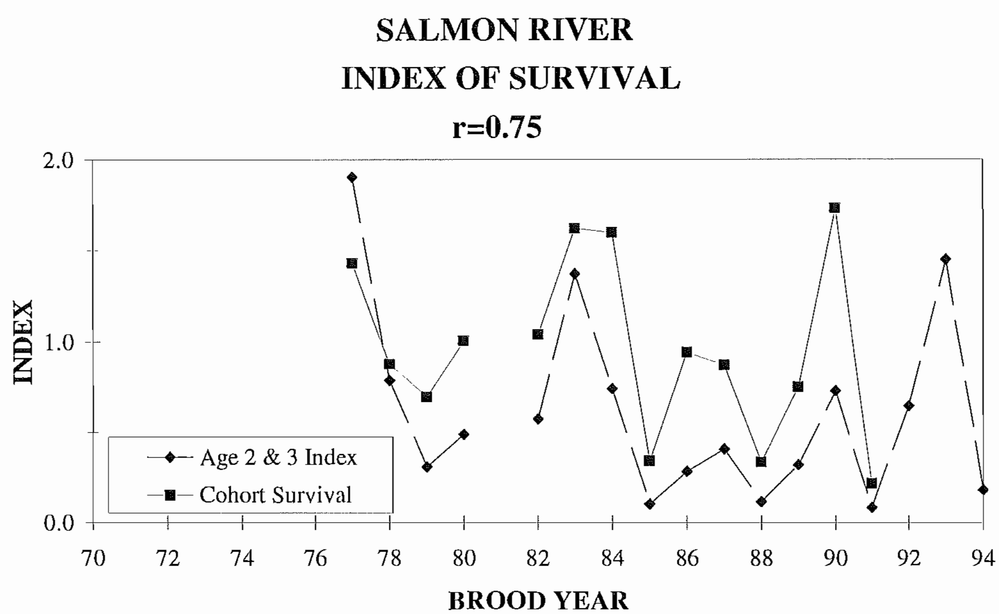
Lyons Ferry



Willamette Spring



Salmon River



APPENDIX G: NEW CHINOOK NONRETENTION METHODS

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G.1 Introduction

During the 1996 fishing season, there were several Canadian fisheries with chinook nonretention (CNR) imposed all season. This was a problem for current CTC analytical methods because incidental mortalities during CNR fisheries have previously been calculated using information from the chinook retention portion of the fishery. Former algorithms relied on observed recoveries by stock within the retention period and estimates of season length (fishing effort) or external estimates of chinook encounter during the current year to estimate CNR mortalities by fishery for each stock. In the absence of any chinook retention period, a new method for estimating incidental moralities (CNR No-catch) was developed. This method can be formulated as either a discrete model or as a more complex continuous model. In both cases, incidental mortality is estimated using fishing effort data from a prescribed base period and the estimated age and stock-specific exploitation rate in the period to calculate a catchability co-efficient or "q". The estimated "q" (by age and stock), fishing effort for 1996, and the revised CTC incidental mortality rates (CTC (97)-1) were then used to estimate release mortalities expected to be associated with these Canadian fisheries during 1996. The continuous model also allows a fish to be encountered multiple times in the non-target fishery, but requires defining a period of sulking (reavailability time) between when a fish is released and subsequently vulnerable to recapture again.

The new method requires that:

> catchability (q) can be calculated for a fishery using base period effort data and an estimate of the base period exploitation rate, and the encounter rate of legal sized fish within a non-targeted fishery in the current year can be calculated knowing its historic catchability rate (q), the current level of effort (f_y), and a selectivity factor (s) representing the decreased vulnerability of the stock as a non-targeted species.

The new method is based on the premise that the catchability in the current year is equal to the catchability (q) in the base year(s). Thus the base period must be chosen such that included years are as representative of the current year as possible (e.g. this period should not contain a time period with a size limit different from the current year). Further, the new method allows for multiple encounters in the non-targeting fishery if an estimate of the reavailability (sulk) time is available.

G.2 Reavailability Time

Some believe that a fish that has been caught and released will stay inactive to heal for a period of time. During this time, they believe the fish is not available to the fishery. Since we do not have any current literature or estimates of reavailability time, the CTC set the season length and reavailability time to be equal in this year's assessment. This is equivalent to saying that, on an annual time step, a fish is only available once to the fishery. This assumption would produce a minimum estimate of the associated mortalities.

The CTC did examine the sensitivity of the new method to reavailability time. This examination confirmed that when the *reavailability time* is the same as the *season length*, there is no difference between the discrete model and the continuous/multiple encounter method. When the *reavailability time* was set at 2 days, and the *selectivity factor* (the difference in the encounter rate between directed fisheries and nonretention periods) was low, the difference between the discrete method and the continuous (multiple encounter) method was small, around 5% depending on the scenario. However, if we increased the *selectivity factor* from 0.2 to 1 (as is assumed for CNR sub-legal chinook), we found that mortality increased more substantially with a corresponding reduction in *reavailability time*. Overall, at lower exploitation rates, which are more realistic for CNR fisheries (e.g. 0.05), the continuous method is insensitive to changes in *reavailability times*. But it is important to note, higher *exploitation rates* and *selectivity factors* (as observed in directed fisheries), would result in substantially higher incidental mortalities that reflect the *reavailability time*. If the *reavailability time* is short relative to the *season length*, multiple encounters will add considerably to incidental mortality in a directed fishery.

G.3 Base Periods

The accuracy of the new method will be dependent on the catchability (q) estimated from a representative base period. The CTC was concerned about estimating catchability for any one year and decided that an average over a period of years was more appropriate. The period selected for the ocean troll fisheries was 1988 through 1991. Later years involved changes in troll effort distribution (e.g., WCVI troll effort directed on mature WCVI chinook in the late summer during 1992 and 1993) or declining abundances in recent years. Fisheries in earlier years (before 1988) operated under smaller size limits. From calculated exploitation rates and known effort, we calculated catchability coefficients (q) in the base period, by age, year, stock, and fishery. Catchability coefficients were then averaged across the four years.

However, for the north and central B.C. sport fishery, this base period was not appropriate. Quantitative catch and effort data were not available for the 1988-1991 period, and fisheries in the Queen Charlotte Islands (QCI) have expanded substantially since that period. The QCI are important in this assessment because it was the area of chinook non-retention during 1996 (closed June 1, 1996). Fishing along the mainland coast remained open for chinook retention. To estimate the incidental mortalities associated with the 1996 QCI chinook nonretention, catchability was estimated for the base period (1993-1995) and the 1996 QCI sport fishing effort (nonretention only) was applied. Selectivity was assumed to be the same during retention and nonretention periods (i.e., equal to 1.0). Since these methods only apply to estimating incidental mortalities, any tags recovered during retention periods are still maintained in the assessment. The estimated incidental mortalities are added to the mortality estimated from recovered tags.

In the WCVI sport fishery, the catchability for mature Robertson Creek/Somass chinook was calculated for the period 1988-1991. The total return of Robertson Creek/Somass chinook has been monitored since 1984 and includes their total catch in all fisheries plus the total return to the hatchery and natural spawning areas. Harvest rates in this terminal sport fishery have typically been about 22% between 1988 and 1994, with effort averaging over 60,000 angler trips per year.

G.4 Methods

To calculate the incidental mortalities, first solve for the catchability *(q)* coefficient for the stock within the fishery, using the base period exploitation rates. Start with the basic continuous fishery equation:

$$C_b = N_b \cdot (1 - e^{q \cdot f})$$

where:

C_b = average catch of the stock during the base period
N_b = average stock size during the base period
q = catchability of a stock within a fishery
f_b = estimate of average effort during the base period

This converts to:

$$\frac{C_b}{N_b} = (1 - e^{-q \cdot f_b}) = ER_b$$

where:

ER_b = average exploitation rate during the base period

Then solving for the catchability using the base period exploitation rate and a base period estimate of effort:

$$q = \frac{-\ln(1 - ER_b)}{f_b}$$

Next, plug in the selectivity value and the current year's fishery effort to calculate a discrete landing rate for the stock over the entire season.

$$LR_{(disc,season)} = 1 - e^{-q \cdot s \cdot f_y}$$

where:

$LR_{(disc,season)}$ = the stock's estimated discrete landing rate for the entire season
s = selectivity value for scaling a non-chinook fishery to chinook impacts (as used in PSC model)
f_y = measure of fishing effort in current year *(y)*.

Convert the discrete landing rate into a continuous landing rate. In order to break it down into a smaller time interval, it must be a continuous value.

$$LR_{cont.,season} = -\ln(1 - LR_{disc.,season})$$

where:

$LR_{cont., season}$ = the stock's estimated continuous landing rate for the entire season

Calculate how many time periods are involved during the season for the multiple encounter estimation using the *reavailability time* of the species. *Reavailability time* reflects the amount of time after a fish is caught and released before the fish is reavailable to the fishery.

$$TimePeriods = \frac{Seasonlength}{Reavail\_time}$$

where:

Time Periods = the number of time periods to break the season into
Season Length = the number of days in the season
Reavail Time = the number of days after a fish is caught and released before it becomes reavailable to the fishery

Next, break the landing rate down into the appropriate rate for the shorter time period associated with reavailability time. This can only accurately be done with a continuous value.

$$LR_{cont,reavail} = \frac{LR_{cont,season}}{TimePeriods}$$

where:

$LR_{cont,season}$ = the stock's estimated continuous landing rate for the shorter time period

Now that the continuous landing rate for the shorter time period is calculated, convert it back to a discrete value.

$$LR_{disc,reavail} = 1 - e^{LR_{cont,reavail}}$$

Assume that the landing rate is equal to the rate fish are encountered that do not drop off the hook.

$$LR_{disc,reavail} = EncRate_{reavail} \cdot (1 - DM)$$

where:

$EncRate_{reavail}$ = the rate the stock is encountered in the fishery during the shorter time period associated with reavailability time
DM = the drop off mortality rate per encounter

Solve for the encounter rate ($EncRate_{reavail}$):

$$EncRate_{reavail} = \frac{LR_{disc,reavail}}{1 - DM}$$

Calculate the discrete incidental mortality rate for the shorter time period as the encounter rate multiplied by the sum of the release mortality rate and the dropoff mortality rate.

$$MortRate_{disc,reavail} = EncRate_{reavail} \cdot (RM + DM)$$

where:

$MortRate_{disc,reavail}$ = the discrete incidental mortality rate for the shorter *Time Period*
RM = the hook and release mortality rate per encounter

The release mortality rate must be converted back to a rate for the entire season. To do this, it must be in a continuous form.

$$MortRate_{cont,reavail} = -\ln(1 - MortRate_{disc,reavail})$$

where:

$MortRate_{cont,reavail}$ = the stock's estimated continuous incidental mortality rate for the shorter time period

Calculate the discrete release mortality rate for the entire season:

$$MortRate_{disc,season} = 1 - e^{-(MortRate_{cont,\,reavail} \cdot TimePeriod)}$$

where:

$MortRate_{disc,season}$ = the discrete incidental mortality rate for the season

Finally, the total number of incidental mortalities is calculated using the cohort size and the discrete incidental mortality rate for the season.

$$M = N \cdot MortRate_{disc,season}$$

where:
M = the total number of incidental mortalities in the fishery
N = the cohort size at the beginning of the year

G.5 Evaluation of the New CNR No Retention Method

We compared CNR mortalities computed using the previous method and the new method for the Robertson Creek catch year 1992, and the NCBC trolls and WCVI troll fisheries for legal and sub-legal, ages 2-5. This stock and fishery combination was chosen for the comparison because the non-retention chinook fishery was expected to have a substantial impact on this stock and these fisheries. As noted previously in the text, no direct comparison of mortalities estimated using the previous method and the new method is possible (1996 was the first year where it was necessary to estimate CNR for a non-retention fishing). The CTC also compared estimated CNR mortalities produced by the cohort analysis to CNR mortalities calculated in a spreadsheet. This comparison confirmed that the model was properly coded and that our understanding of the new method was mathematically correct.

Comparison:

Old= the previous cohort analysis using 1994 CWT (brood year method) and the PSC recommended incidental mortality rates (Section 3.2.1.1, Table 3-6).

New= the new CNR non-retention method using 1994 CWT recoveries (brood year method) and the incorporation of the addition of the PSC recommended incidental mortality rates, and:

1.Old *C* (CWT) files with catch data
2.Current Year effort = effort during the CNR period, 1992
3.Base period = 1988-1991, used to calculate age and fishery specific average >*q*=s=

Table G-1. Incidental mortalities (CNR) calculated using the previous retention method ((Old) before 1996) as compared to those calculated using the new CNR non-retention method (New). *Cohort wt%* represents the difference between mortalities estimated using the new and old methods divided by the cohort size.

		North B.C. Troll			Central B.C. Troll			WCVI troll		
Age	**Legal Sub-leg**	**Old CNR**	**New CNR**	**Cohortwt%diff**	**Old CNR**	**New CNR**	**Cohortwt%diff**	**Old CNR**	**New CNR**	**Cohort Wt%diff**
5	Legal	0	1	0.1	0	1	0.01	0	0	0
5	Sub-legal	5	1	0.4	1	1	0	0	0	0
4	Legal	5	5	0	1	5	0.06	0	0	0
4	Sub-legal	6	1	0.1	1	1	0	0	0	0
3	Legal	2	5	0	1	1	0	0	0	0
3	Sub-legal	24	8	0.2	3	1	0.01	0	0	0
2	Legal	0	0	0	0	0	0	0	0	0
2	Sub-legal	15	6	0.1	1	1	0	0	0	0