

**PACIFIC SALMON COMMISSION
JOINT CHINOOK
TECHNICAL COMMITTEE REPORT**

**CATCH AND ESCAPEMENT OF CHINOOK SALMON
UNDER PACIFIC SALMON COMMISSION JURISDICTION,
1997-2000
REPORT TCCHINOOK (01)-1**

March 26, 2001

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LIST OF ACRONYMS WITH DEFINITIONS

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

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EXECUTIVE SUMMARY

The June 30, 1999 Pacific Salmon Treaty Annexes and Related Agreements (Agreement) substantially changed the objectives and structure of the Pacific Salmon Commission's (PSC) chinook salmon fisheries and assessment of chinook salmon stocks. The Agreement eliminated the previous ceiling and pass-through fisheries and replaced them with Aggregate Abundance Based Management (AABM) and Individual Stock Based Management (ISBM) fisheries. It also directed the Chinook Technical Committee (CTC) to establish Maximum Sustained Yield (MSY) or other biologically based escapement goals for chinook stocks (agreed to goals). It further instructed the CTC to evaluate the status of chinook stocks based on these agreed to goals.

Beginning this year, the CTC is changing its annual reporting format. Previously, we provided a single annual report with catches, escapements and exploitation rates. In this report, we provide a summary of fishery catches by region and an assessment of escapement for those stocks which have CTC agreed goals. In addition, escapement data and agency comments have been provided for those stocks which do not currently have agreed to goals. Beginning this year, we will provide a second annual report, available in May, that will summarize the exploitation rate analysis and results of the calibration for the 2001 fisheries.

CHINOOK CATCH 1997-2000

The four years summarized span two distinctly different management regimes. In 1997 and 1998, there were no bilateral chinook agreements and the fisheries were managed according to agency objectives. In 1999 and 2000, the fisheries were managed according to the Agreement. However, only catches and not compliance by fishery can be reported at this time since the Agreement calls for a comparison with output from the CTC's chinook model for compliance. The necessary output was not available at the time of publication of this report.

Total catches for all years reported herein were less than during previous years of the Pacific Salmon Treaty (PST).

ESCAPEMENTS THROUGH 2000

The escapement review includes 50 naturally spawning escapement indicator stocks. Fifteen of the stocks have CTC agreed escapement goals. Of these 15 stocks, 14 were judged to be healthy with respect to the agreed goals, while one was deemed to be a management concern by the management agency. It was not possible to provide this assessment for the other stocks without agreed escapement goals. The CTC will continue to review analyses to develop CTC agreed goals for the remaining stocks as they are provided.

1 CHINOOK CATCH 1997-2000

The June 30, 1999 Pacific Salmon Treaty Annexes and Related Agreements (Agreement) substantially changed the objectives and structure of the Pacific Salmon Commission's (PSC) chinook salmon fisheries. The Agreement eliminated the previous ceiling and pass-through fisheries and replaced them with Aggregate Abundance Based Management (AABM) and Individual Stock Based Management (ISBM) fisheries. Chinook catches by these fisheries are summarized in Table 1-1. Previously, only the ceiling fisheries had overage/underage provisions but the new Agreement will implement this provision for both fisheries. Implementation of overage/underage provisions has not been accomplished for AABM fisheries and ISBM fisheries.

1.0 REVIEW OF AABM FISHERIES

Prior to the Agreement, the PSC fisheries consisted of four ceiling fisheries and numerous pass-through fisheries (all other fisheries within the PSC jurisdiction). All, or portions of three of the former ceiling fisheries: Southeast Alaska All Gear, North/Central BC All Gear, and West Coast Vancouver Island (WCVI) Troll, have been converted to AABM fisheries. Only the Southeast Alaska fishery remains unchanged. The North/Central fishery was modified to remove the Central area. The WCVI fishery was modified to include outside sport. The fourth ceiling fishery, Georgia Strait Troll and Sport, will become an ISBM fishery. Catches for these fisheries are found in Appendix A. This section will focus on the three AABM fisheries, but will include the Georgia Strait fishery through 1998.

1.0.1 Southeast Alaska Fisheries

In 1997 and 1998, SEAK fisheries were managed according to the June 24, 1996 "Letter of Agreement regarding an Abundance-Based Approach to Managing Chinook Salmon Fisheries in Southeast Alaska"(LOA). In 1999 and 2000, the SEAK fishery was managed according to the Agreement. Annual harvest quotas at lower Abundance Indices (AI) are lower in the Agreement than in the LOA. The Southeast Alaska chinook fishery is managed to achieve the annual all gear PSC quota through a plan established by the Alaska Board of Fisheries. Once the all gear quota is specified each spring, this plan establishes gear quotas for the troll, net, and recreational fisheries. The allocation plan reserves 4.3% of the total PSC catch for purse seine, and 8,600 fish for set and drift gillnets. After the net quotas are subtracted, 80% of the remainder is reserved for troll gear and 20% for the recreational fishery. To meet the recreational target catch, the recreational fishery is managed in-season with bag-limit constraints.

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 based on a 1 in 10 chance of error.
- 2) A wild stock terminal exclusion on the Situk, Taku, and Stikine Rivers.
- 3) To comply with provisions established by the National Marine Fisheries Service in accordance with the United States (U.S.) Endangered Species Act (ESA).
- 4) To be consistent with the provisions of the PST as required by the Salmon Fishery Management Plan of the North Pacific Fishery Management Council established by the U.S. Magnuson-Stevens Act.

In 1997, the all gear harvest was 342,994 including an Alaska hatchery add-on of 45,630 and a terminal exclusion of 9,846. The Treaty harvest was 287,519.

In 1998, the all gear harvest was 270,590 including an Alaska hatchery add-on of 24,708 and a terminal exclusion of 2,420. The Treaty harvest was 243,462.

In 1999, the all gear harvest was 251,019 including an Alaska hatchery add-on of 46,316 and a terminal exclusion of 4,453. The Treaty harvest was 200,250.

In 2000, the all gear harvest was 252,304 including an Alaska hatchery add-on of 66,144 and a terminal exclusion of 2,181. The Treaty harvest was 183,979.

1.0.1.1 *Troll Fishery*

Troll fishery regulations were similar throughout the period of the report (1997-2000). The accounting year began with the start of the winter fishery on October 11 of the previous calendar year and ends the following September; eg., the 1997 accounting is Oct. 1996 through Sept. 1997. The winter fishery continues until 45,000 total chinook salmon are caught or through April 14, whichever is earlier. In each year, the harvest in the winter fishery was less than 45,000 and the troll fishery continued through April 14. The spring fisheries were also managed in a similar manner each year. Fishing time was managed so that each fishery would not exceed a predetermined number of non-Alaskan chinook salmon based on the Alaska hatchery percentage in each of the small fisheries. Also, in each year, the first summer fishery opening began on July 1 and was managed to harvest 70% of the remaining troll gear chinook quota based on a pre-season AI. After the first summer opening, the areas of high chinook abundance were closed while the fishery was directed primarily on coho (in recent years, a large portion of the troll fleet has targeted on chums). In each year, an in-season estimate of the AI was made using methodology established by the CTC. The harvest remaining was based on this new index. A second summer chinook retention period began after necessary management actions for coho salmon were determined. In some years there were multiple openings and in two years the areas of high abundance were reopened for a portion of the time to harvest the remaining quota.

In 1997, the troll fishery harvested a total of 246,400 chinook salmon (Table 1-1), including 28,800 Alaska hatchery fish (Table 1-2). The winter fishery harvested 21,000 of which 1,700 (8.1%) were from Alaska hatcheries. The spring fishery harvested a total of 42,700 of which 22,700 (53.2%) were Alaska hatchery fish. The pre-season AI was 1.33 which allowed an initial all-gear catch of 277,000 fish (LOA). The initial July 1 summer opening was seven days. The inseason estimate of the AI was 1.46 and the remainder of the fishery was managed to achieve a total harvest of 302,320 chinook. Two more openings encompassing a total of 14 days were allowed. The total harvest during the summer period was 182,700 of which 4,300 were Alaska hatchery fish. There were a total of 9,126 boat-days of chinook effort and 17,653 boat days of effort during the chinook non-retention periods.

In 1998, the troll fishery harvested a total of 192,100 chinook salmon including 12,400 Alaska hatchery fish (Table 1-2). The winter fishery harvested 32,800 of which 2,400 (7.3%) were from Alaska hatcheries. The spring fishery harvested a total of 20,500 chinook of which 6,200 (30.2%) were Alaska hatchery fish. The pre-season AI was 1.25 which allowed an initial all gear catch of 261,700 fish (LOA). The initial July 1 summer opening lasted 11 days. The in-season

estimate was 1.24 and the fishery was managed to achieve a total harvest of 259,779. The summer chinook retention period was reopened on August 20 and continued until the end of the season (September). A total of 138,700 fish of which 3,800 were Alaska hatchery fish were harvested during the summer period. There were a total of 12,157 boat-days of effort during the retention periods and 11,928 boat-days during chinook non-retention periods.

In 1999, the troll fishery harvested a total of 146,200 chinook salmon including 29,000 Alaska hatchery fish (Table 1-2). The winter fishery harvested 31,000 of which 2,200 (7.1%) were from Alaska hatcheries. The spring fishery harvested a total of 20,700 chinook of which 11,100 (53.6%) were Alaska hatchery fish. The pre-season AI was 1.15 which allowed an initial all gear catch of 192,000 fish (Agreement). The initial July 1 summer opening was for six days. The in-season estimate of the AI was 1.16, so the fishery was managed for 195,640. The summer chinook retention period was reopened on August 18 for five days. The total summer harvest was 94,500 of which 3,700 were Alaska hatchery fish. There were a total of 4,624 boat-days of retention effort and 21,581 boat-days of non-retention effort.

In 2000, the troll fishery harvested a total of 158,800 chinook salmon including 29,000 Alaska hatchery fish (Table 1-2). The winter fishery harvested 36,100 of which 3,100 (8.6%) were from Alaska hatcheries. The spring fishery harvested a total of 28,900 chinook of which 19,100 (66%) were Alaska hatchery fish. The pre-season AI was 1.14 which allowed an initial all-gear catch of 190,000 fish (Agreement). The initial July 1 summer opening was for five days. The in-season estimate of the AI was 1.14, so the fishery was managed for 190,000. The initial opening resulted in less than the 70% management goal and the fishery was reopened for two days prior to a ten-day closure for coho salmon management. Two additional retention periods occurred after the closure for a total of 16 days. The areas of high abundance were reopened for the last eight days of the season. The total summer harvest was 93,800 of which 6,900 were from Alaska hatcheries. There were a total of 8,800 boat-days of chinook effort and 13,118 boat-days of chinook non-retention effort.

Table 1-1. Summary of the 1997-2000 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 previous ceiling fisheries.

Area	Troll				Net				Sport				Indian Food				Total			
	00	99	98	97	00	99	98	97	00	99	98	97	00	99	98	97	00	99	98	97
SEAK ¹	159	146	192	246	41	33	24	25	52	72	55	72					252	251	271	343
BRITISH COLUMBIA ²																				
Transboundary					5.6	4.5	2.8	6.0	0.25	0.4	0.5	0.6	1.2	1.0	0.8	1.5	7	6	4	8
North/Cent Coast	9.2	47	119	96	24	14	12	24	32	46	49	47	26	28	23	15	91	135	203	182
Outer WCVI ³	63	0	11	52					37	31	4.2	11					100	31	15	63
Terminal WCVI					0.1	0.7	1.6	0.5	5.2	47	56	48	0	3.6	7.2	5.7	5	51	65	54
Georgia St/Fraser ⁴	1.0	0	0.1	0.2	4.3	3.9	6.8	29	22	38	14	43	26	28	19	29	53	70	40	101
Johnstone St ⁵	0.1	0.3	2.5	2.1	0.1	0.1	0.1	1.0	11.4	7.8	3.0	-					12	8	6	3
Juan de Fuca Strait ¹⁶					0.1	0.1	0.1	0.5	11	15	10	17					11	15	10	18
Other Freshwater ⁶									19	22	25	12					19	22	25	12
<i>Subtotal</i>	<i>73</i>	<i>47</i>	<i>133</i>	<i>150</i>	<i>34</i>	<i>23</i>	<i>23</i>	<i>61</i>	<i>138</i>	<i>207</i>	<i>162</i>	<i>179</i>	<i>53</i>	<i>61</i>	<i>50</i>	<i>51</i>	<i>298</i>	<i>338</i>	<i>368</i>	<i>441</i>
WASHINGTON Inside ⁷																				
Juan de Fuca Strait (marine) ⁸	.2	2.1	1	1.1	.6	.7	.3	.4	Na*	1.4	2	12					1	4	3	14
San Juans (marine) ⁹					1.4	0	3	25	Na*	2.2	3	9					1	2	6	34
Other Puget Sound (mar + fw) ¹⁰					69	84	47	45	Na*	34	33	52					69	118	80	97
Coastal (mar + fw) ¹⁰					15.6	11.4	20.5	28.1	Na*	2.2	6.6	6.8	.2	.3	.2	.2	16	14	27	35
<i>Subtotal</i>	<i>.2</i>	<i>2.1</i>	<i>1</i>	<i>1.1</i>	<i>87</i>	<i>96</i>	<i>68</i>	<i>99</i>	<i>40</i>	<i>45</i>	<i>80</i>	<i>.2</i>	<i>.3</i>	<i>.2</i>	<i>.2</i>	<i>87</i>	<i>138</i>	<i>116</i>	<i>180</i>	
COLUMBIA RIVER ^{11,12,13}					51.4	55.9	31.2	49.9	28.1	37.3	25.7	33.4	19.6	29.4	19.5	32.3	98	123	76	116
WA/OR N OF FALCON ¹⁴	20.5	45.0	20.3	20.4					9.9	10.8	2.2	4.1					30	56	23	25
OREGON (Inside) ¹⁵	1.9	1.2	0.9	0.6					Na*	Na*	32.7	37.5					2	1	34	38
GRAND TOTAL	22	46	21	21	213	208	146	235	228	367	333	406	73	91	70	84	768	907	808	1143

- 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/ Troll estimates based on logbook plus catch per unit effort expanded to total effort. Sport is offshore component as described in the Chinook Annex.
- 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 1997.
- 6/ Sport catch includes catches from Fraser and North Coast non-tidal fisheries, Indian Food catch includes freshwater Cowichan fishery only.
- 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, commercial and bank sale catches.
- 12/ Columbia River sport catches include adults only, for Washington, Oregon, Idaho, and Buoy 10 anglers.
- 13/ Columbia River Indian food includes ceremonial and subsistence.
- 14/ 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.
- 15/ Troll = late season troll off Elk River mouth (Cape Blanco); sport = estuary and inland.
- 16/ Juan de Fuca includes area 20-1. The Port Renfrew creel survey initiated in 1997, catches noted in text.

Table 1-2. Catches in the SEAK troll fisheries.

Troll Fishery	Year	Total Catch	Ak Hatchery Catch	Ak Hatchery Percent
Winter	1997	21,000	1,700	8.1%
	1998	32,800	2,400	7.3%
	1999	31,000	2,200	7.1%
	2000	36,100	3,100	8.6%
Spring	1997	42,700	22,700	53.2%
	1998	20,500	6,200	30.2%
	1999	20,700	11,100	53.6%
	2000	28,900	19,100	66.1%
Summer	1997	182,700	4,300	2.4%
	1998	138,700	3,800	2.6%
	1999	94,500	3,700	3.9%
	2000	93,800	6,900	7.4%
Total	1997	246,400	28,800	11.9%
	1998	192,100	12,400	6.4%
	1999	146,200	16,900	11.5%
	2000	158,800	29,000	18.3%

1.0.1.2 The Net Fisheries

Net harvest of chinook salmon in the purse seine fishery is limited to 28” (71 cm) size limit and the use of CNR regulations. Chinook between 21” and 28” may never be sold, while chinook below 21” may be retained at all times. Gillnet harvest of chinook is limited by a delayed season opening. There are terminal exclusions for the Stikine and Taku drift gillnet fisheries and for the Situk set-gillnet fishery. The catches during the base periods were 402 and 1,708 fish for the Stikine and Taku respectively (Table 1-3). The Situk catch was 2,000. Catches that exceed the base period catches are excluded from PSC limits if the escapement goal for the system has been met.

During 1997, the total net harvest was 25,100. The total terminal exclusion was 3,485 chinook (Table 1-4) and the Alaska Hatchery catch was 10,800. The catch minus the terminal exclusion and Alaska hatchery fish was 10,800.

Table 1-3. Base, total, and excluded catch for the SEAK net fisheries on the Stikine, Taku, and Situk Rivers.

	Base Catch	Total Catch				Exclusion Catch			
		1997	1998	1999	2000	1997	1998	1999	2000
Stikine	402	1,789	-	-	823	1,387	0	0	421
Taku	1,708	2,542	-	-	862	834	0	0	0
Situk	2,000	3,264	2,804	5,108	2,460	1,264	804	3,108	460
Total	4,110	7,595	2,804	5,108	4,145	3,485	804	3,108	881

The 1998 total net harvest was 23,500. There was a total of 804 fish excluded, and 10,000 of the net catch were from Alaska hatcheries. The harvest minus the terminal exclusion and Alaska hatchery fish was 12,700.

The 1999 total net harvest was 32,700. There was a total of 3,108 fish excluded and 17,100 were from Alaska hatcheries. The harvest minus the terminal exclusion and Alaska hatchery fish was 12,400.

The 2000 total net harvest was 41,500. There was a total of 881 fish excluded and 31,100 were from Alaska hatcheries. The harvest minus the terminal exclusion and Alaska hatchery fish was 9,500.

1.0.1.3 Recreational Fisheries

Recreational harvests are monitored inseason by creel surveys throughout the region, and sampling programs are in place to recover coded wire tagged (CWT) chinook and coho salmon. In 1997, due to an increasing number of chinook and coho salmon being headed and filleted on the sport fishing grounds prior to landing, the sport fish staff's ability to recover CWTs was diminishing. In response, since 1998, regulations have been placed in statute which prohibit these activities and consequently improved CWT sampling rates to provide better estimates of hatchery and wild stock contributions. The recreational fishery has a 28 inch total length minimum size limit. In "terminal" areas near hatchery release sites, however, bag and size limit regulations are liberalized to provide for increased harvests of returning Alaska hatchery chinook salmon.

From 1997-1999, the initial quota for the recreational fishery was dependent upon the pre-season AI. During these years, the management plan specified that the department determine a bag limit that allowed the projected harvest for the season to come closest to the quota. Inseason restrictions to the recreational fishery occurred in each of these 3 years in order to slow down harvests to stay within a 7.5% management range as outlined by the Southeast Alaska King Salmon Management Plan.

In 1997, the total harvest was 71,500 of which 6,400 wild fish were excluded (Table 1-4), 9,000 were Alaska hatchery fish and 3,900 were caught in terminal Alaska hatchery areas. The regionwide bag limit was reduced from 2 fish to 1 fish on July 7 and remained at 1 fish for the remainder of the season. The total harvest of Treaty chinook was 52,300.

Table 1-4. Terminal base, total, and exclusion catches of the Southeast Alaska recreational fishery.

	Base Catch	Total Catch				Terminal Exclusion Catch			
		1997	1998	1999	2000 ^a	1997	1998	1999	2000 ^a
Stikine	2,302	3,475	-	-	1,260	1,173	0	0	0
Taku	1,857	5,017	-	-	921	3,160	0	0	0
Situk	200	2,228	1,816	1,500	1,500	2,028	1,616	1,345	1,300
Total	4,359	10,720	1,816	1,500	3,681	6,361	1,616	1,345	1,300

^a 2000 catch data are all preliminary.

In 1998, the total harvest was 55,000 of which 1,600 were wild fish that were excluded, 6,000 were Alaska hatchery fish and 2,600 were taken in terminal Alaska hatchery areas. The daily bag limit was increased to 3 fish from 2 fish on July 3 due to slower than expected harvests, and an abundance index higher than for the previous year. However by early September, harvests were projected to exceed the 7.5% management range by 1,200 at which time a daily bag limit reduction back to 1 fish was implemented (effective September 9).

In 1999, the total harvest was 72,100 of which 1,300 were wild fish that were excluded, 14,400 were Alaska hatchery fish and 5,200 were in terminal Alaska hatchery areas. The bag limit was reduced from 2 to 1 fish from July 3 through December 31 due to projected harvests exceeding the 7.5% management range.

The management plan for the recreational fishery was changed in 2000 so that bag limits and other regulations were dependent upon the preseason AI, and inseason regulation changes were minimized. In 2000, the total harvest was 52,000 of which 1,300 were wild fish that were excluded, 10,900 were Alaska hatchery fish and 3,000 were in terminal Alaska hatchery areas. The bag limit was 1 fish from May 3 through December 31.

1.0.2 North/Central British Columbia

The estimated all-gear catch in 1997 was 158,900 excluding a terminal catch of 8,333 in the Skeena River (gillnet in River Gap Slough of Area 4). In 1998 the all-gear catch was 178,300 excluding the terminal catch of 1,268 in the Skeena (Area 4) and 715 chinook in the Bella Coola gillnet (large mesh fishery, Area 8). In 1999 the all-gear catch was 103,900 chinook excluding the terminal catch of 3,000 in the Skeena (Area 4). In 2000 the all-gear catch was 58,012 chinook excluding the terminal catch of 7,173 in the Skeena and 515 in Bella Coola.

Terminal exclusions (Table 1–5), as allowed in the Letter of Transmittal¹, were calculated as follows:

Table 1-5. Terminal exclusions in the Skeena and Bella Coola areas.

Area	Base Catch	Total Catch				Exclusion (Catch – Base)			
		1997	1998	1999	2000	1997	1998	1999	2000
Skeena	2,900	11,233	4,168	5,902	10,072	8,333	1,268	3,002	7,173
Bella Coola	2,950	2,289	3,665	2,669	3,465	0	715	0	515
Total						8,333	1,983	3,002	7,688

¹ PSC file reference no. 70103. Letter dated May 17, 1991. “Exclusion of Selected Terminal Area Chinook Catches from the Northern and Central British Columbia Chinook Catch Ceiling.”

Previous reports note the potential for a terminal exclusion in the terminal recreational fishery near Kitimat. However, there was no creel survey of that fishery for the period 1997 to 2000 and the data are not adequate to calculate terminal exclusions.

1.0.2.1 Troll Fisheries

In 1997, although no PST chinook ceiling was in place for the troll fishery, the summer target catch was limited to 85,000 chinook prior to September because of Canadian concerns over the abundance of west coast of Vancouver Island chinook populations. There was the potential for an additional fall fishery of 10,000 to 20,000 chinook, after mature WCVI chinook emigrate from the area. The troll fishery opened for chinook on July 1, however, the main chinook fishing areas on the westcoast of the Queen Charlotte Islands (QCI) and the southwest portion of Area 1 were closed to pace the chinook harvest. Additional areas were opened for chinook on July 27, coincident with the opening of the sockeye fishery. Chinook trolling remained open through August although there was a complex series of openings and closures to manage for Fraser sockeye allocations and Upper Skeena coho abundance concerns. The fall chinook fishery continued until October 31, again with a series of area openings and closures to manage for other salmon species. The total troll catch was 96,000 chinook, including 9,000 harvested in the September-October fishery. There were no days of chinook non-retention fishing.

In 1998, although no PST chinook ceiling was in place for the troll fishery, the summer target catch was limited to 110,000 chinook prior to September because of Canadian concerns over the abundance of west coast of Vancouver Island chinook populations. An additional fall fishery was again expected. The troll fishery opened for chinook on July 8, with only the west Coast of QCI and the southern portion of the Central Coast open to trolling, because of concerns over the abundance of upper Skeena Coho. Chinook trolling remained open until August 24 (when the summer fishery target was reached) although there was a complex series of openings and closures to manage for Fraser sockeye allocations and Upper Skeena coho abundance concerns. The fall chinook fishery began September 5 and remained open until October 6 when the fall fishery target was reached. The total catch was 119,000 chinook including 21,000 harvested in the September-October fishery. There were no days of chinook non-retention fishing.

In 1999 the summer target catch was limited to 50,000 chinook prior to September because of Canadian concerns over the abundance of west coast of Vancouver Island chinook populations. An additional fall fishery was again expected. The troll fishery opened for chinook on August 1, with only the west coast of QCI and the southern portion of the east coast of QCI open to trolling. Chinook trolling remained open until August 15 when the summer fishery target was reached. The fall chinook fishery was cancelled because of concerns over the very low abundance of WCVI chinook. The total catch was 47,000 chinook. There were no days of chinook non-retention fishing.

In 2000 the summer troll was closed prior to September because of Canadian concerns for west coast of Vancouver Island chinook populations. The troll fishery was only open between September 2 and September 24 in Area 2W (plus one test fishery vessel operating around Langara Island, Area 1). The fishery was intensively monitored and sampled to examine stock composition of the catch, encounter rates by size, and to maximize the number of CWT recovered. The preliminary catch estimate based on the monitoring program was 9,200 chinook (minimum size limit of 67cm).

1.0.2.2 Net Fisheries

In 1997, mandatory release of chinook for seine-net gear in Area 1, 2W, and 2E was continued. The total catch of chinook in NCBC area was 24,217. Harvest in the Queen Charlotte Islands (Areas 1, 2E, 2W) was 608 chinook. Harvest in the Skeena/Nass (Areas 3, 4, 5) was 20,070 chinook and 3,539 chinook were caught in central British Columbia (Areas 6-10). These catches are chinook greater than 5 pounds, including a terminal exclusion of 8,333 in Area 4.

In 1998, mandatory release of chinook for seines in Area 1, 2W, and 2E was continued, and mandatory release of chinook by seines was expanded throughout all of the NCBC after the third week of July (week 30) because of local chinook stock concerns. The total harvest of chinook in NCBC net gear was 12,294. No landed catch was reported from the Queen Charlotte Islands. Harvest in the Skeena/Nass (Areas 3, 4, 5) was 6,748 chinook and 5,546 were caught in central British Columbia (Areas 6-10). These catches are chinook greater than 5 pounds, including terminal exclusions of 1,268 in Area 4 and 715 in Area 8.

In 1999, mandatory release of chinook from seine nets was expanded throughout NCBC for all season. The total harvest of chinook in NCBC area was 13,902. There were no landings in the Queen Charlotte Islands. Harvest in the Skeena/Nass (Areas 3, 4, 5) was 9,710 chinook and 4,192 were caught in central British Columbia (Areas 6-10). These catches are the preliminary catches of chinook greater than 5 pounds, including a terminal exclusion of 3,000 in Area 4.

In 2000, mandatory release of chinook from seine nets was continued in NCBC for all season. The total harvest of chinook in NCBC by gillnets was 24,400. There were no landings in the Queen Charlotte Islands. Harvest in the Skeena/Nass (Areas 3, 4, 5) was 20,400 chinook and 4,000 were caught in central British Columbia (Areas 6-10). These catches are the preliminary catches of chinook (all were greater than 5 pounds), including a terminal exclusion of 7,173 in Area 4 (River Gap Slough) and 515 chinook in the large mesh gillnet fishery of Area 8.

1.0.2.3 Recreational Fisheries

Recreational fisheries in northern and central B.C. (marine statistical Areas 1-11) have usually been open to provide public access and managed under one set of regulations (45 cm minimum size limit, 2 chinook per day and 4 in possession, annual bag limit of 30). Recreational fisheries are also provided in freshwater and regulations described annually in the Freshwater Salmon Supplement to the BC Tidal Waters Sport Fishing Guide. Catch in these freshwater fisheries is included in the section 1.2 Review of Other Fisheries. However, during the past decade, recreational fisheries in the marine areas of north and central BC have expanded substantially, especially in the area of the Queen Charlotte Islands (QCI, areas 1, 2W, 2E). Management and monitoring of these fisheries has also responded. Management of these marine recreational fisheries now recognizes two basic regions: QCI, and the coastal mainland and inlets.

Fisheries along the mainland continue to provide general access (regulations as above) except for some terminal area actions, such as the Wannock chinook conservation program implemented in Area 9 during 2000. In general, these actions involve time and/or area closures to protect local populations. Catch in these fisheries is usually based on Fishery Officer inspections and reports

from lodge operators. Periodic creel surveys have been used to re-enforce estimates provided by the officers and to examine fishery characteristics.

Fisheries in the QCI area (Langara Island, the north shore of Graham Island, and areas 2W and 2E), however, have been subjected to greater restrictions due to the vulnerability of west coast of Vancouver Island fall chinook to fisheries in these areas. Since 1996, fisheries around the QCI have been managed to an allocation of WCVI chinook mortality and priority use of the mortality by the recreational sector (as formalized in the October 1999 Departmental paper “An allocation policy for Pacific Salmon”).

Management of the recreational fishery in QCI is based on:

- 1) annual abundance forecasts of the WCVI fall chinook indicator stock (Robertson Creek Hatchery/Somass chinook, RCH) as reported annually in reports of the Canadian Stock Assessment Secretariat;
- 2) calibration of the PSC coast-wide chinook model for estimation of the stock composition in fisheries;
- 3) distribution of expected fishing mortality on WCVI fall chinook based on the “spreadsheet model” and required terminal runs of RCH chinook (this model was previously reviewed by a working group of the CTC, March 26, 1996 Interim Report of the CTC Workgroup);
- 4) re-allocation of mortality between Canadian fisheries to meet priority needs; and
- 5) regulations to manage for the expected catch in this recreational fishery.

Since 1995, catch in the QCI recreational fisheries have been estimated by creel surveys (supported by the Haida Nation) and independent observations by Departmental staff.

The 1997 tidal water sport fishery catch of chinook was estimated at 47,000. Reported catches by fishery were 30,755 for the Queen Charlotte Islands (Areas 1, 2E, 2W), 4,550 estimated for the Skeena/Nass (Areas 3,4,5), and 12,124 estimated in the central areas (Areas 6-11).

The 1998 tidal water sport fishery catch of chinook was estimated at 49,000. Reported catches by fishery were 36,397 for the Queen Charlotte Islands (Areas 1, 2E, 2W), 4,750 estimated for the Skeena/Nass (Areas 3, 4, 5), and 8,228 estimated in the central areas (Areas 6-11).

The 1999 tidal water sport fishery catch of chinook was estimated at 46,000. Reported catches by fishery were 31,659 for the Queen Charlotte Islands (Areas 1, 2E, 2W), 4,750 estimated for the Skeena/Nass (Areas 3, 4, 5), and 9,224 estimated in the central areas (Areas 6-11).

During 2000, fishery management actions were taken to reduce the impact of QCI sport fisheries on WCVI chinook stocks, and terminal area closures were implemented in a portion of Area 9 to reduce the harvest rate on Wannock River chinook salmon. In the QCI, the normal possession limits of 2/day and 4 in possession was varied to 2/day but only one chinook over 77cm was permitted (effective period June 1 to September 1, 2000). Pre-season assessments indicated that this action could reduce the harvest on large chinook by about 30%. In Area 9, a terminal area where fishing for Wannock chinook was frequently focused, was closed to fishing except for controlled access. Fishers allowed access were limited to catch and release fishing in order to assist DFO radio-tagging and mark-recapture programs. A creel survey of Area 9 was also implemented to estimate the total fishing mortality in this sport fishery. In Areas 3 and 4, the

creel survey for marine recreational fishing did not commence until July 1 and extended through September. However, the May and June portion of the fishery had to be extrapolated based on past years' surveys and reported fishing success in 2000. The creel survey accounted for 2,275 of the estimated 4,000 total Area 3 and 4 marine sport catch.

The 2000 tidal water sport fishery catch of chinook was estimated to be 32,100. Preliminary reported catches by fishery were 22,100 for the QCI (Areas 1, 2E, 2W), 4,000 estimated for the Skeena/Nass (Areas 3, 4, 5), and 6,000 estimated in the central areas (Areas 6-11).

1.0.3 West Coast Vancouver Island Troll

In the 1997 troll season, there were only limited opportunities for the retention of chinook salmon, mainly due to conservation concerns for coho stocks present off the WCVI. In addition, concerns for WCVI chinook stocks prevented chinook fisheries in August and September. A directed chinook fishery occurred on July 1 to 4 and July 11 to 13 off the WCVI in portions of Area 121, and in Areas 123 to 127. The catch in this fishery was 51,400 chinook, the minimum size limit was 67 cm. In the fall period (October 2 to 24) the retention of incidentally caught chinook was permitted in a directed chum fishery off the WCVI. The chinook catch was only 350. The total chinook catch in the 1997 troll fishery was 51,750.

In the 1998 troll season, fishing opportunities for chinook were further restricted due to conservation concerns for Thompson River coho stocks that were present off the WCVI during this period and due to concerns for WCVI chinook. These concerns prevented chinook fisheries during the June through September period. In February 1998, the Department and industry representatives developed a three year experimental pilot proposal for fall/winter chinook troll fishing off the WCVI in Areas 123 to 127. The fishery was intended to be a more stable fishing opportunity with a low harvest rate and outside the traditional summer fishing period, and provide economic opportunities for industry to develop specialty niche markets. Specific objectives of the proposal were to:

- ensure that conservation objectives for all chinook stocks are met including other stocks of concern such as coho,
- ensure a more evenly distributed exploitation of chinook stocks present off the WCVI,
- explore the viability of chinook troll fisheries during the non-summer time period,
- provide greater flexibility for management of weak stocks, and
- improve the information base for stock assessment outside the regular summer fishing period.

The vessels were required to carry observers to collect basic biological information, (CWT and DNA) and record the encounter rates of all species. The pilot fishery started April 19 to May 20 with a catch of 4,200 chinook in Areas 123 to 127. In this fishery, the minimum size limit was reduced to 45 cm. Chinook retention was also permitted in conjunction with a fall chum fishery off the WCVI from October 7 to November 30 with a catch of 6,500 chinook. The minimum chinook size limit in this fishery was 55 cm. The total catch in the 1998 troll fishery was 10,700 chinook.

In the 1999 season, chinook opportunities were again restricted due to conservation concerns for Thompson River coho stocks that were present off the WCVI and concerns over WCVI chinook. The only chinook fishing opportunity was in the fall from October 1 to 22 in Areas 123 to 127, but the catch is accounted for in the 2000 troll season.

In the 2000 troll season (October 1, 1999 through September 30, 2000), chinook opportunities were again restricted due to conservation concerns for Thompson River coho stocks that were present off the WCVI and for returning WCVI chinook. Chinook fishing occurred in:

- a) the fall from October 1 to 22, 1999 in Areas 123 to 127; catch 56,000 chinook with a minimum size limit of 55 cm;
- b) a winter experimental or test fishery from March 28 through May 14, 2000; catch 5,300 with a minimum size limit of 55 cm (controlled number of boats for comprehensive sampling);
- c) and a fall experimental fishery from Sept. 23 to 30, 2000; catch 2,089 with a minimum size limit of 55 cm.

Total catch for the 2000 season was 63,400 chinook. Each of these fisheries was extensively sampled for total encounters, size distributions, and stock composition. A full troll fishery was opened between October 3-13, 2000 and harvested 25,238 chinook (same size limit) but these fish will be counted against the 2001 season.

During the period 1997 to 2000, chinook retention was also permitted as incidental catch during directed sockeye troll fishing within Area 23 (July in Barkley Sound). Incidental chinook catches in this fishery averaged less than 25 chinook per year. Monitoring of the fishery during 2000 reported that 411 chinook were released during this fishery.

1.0.4 Strait of Georgia

1.0.4.1 Troll Fisheries

During the years of 1997 to 2000, there was mandatory use of single barbless hooks during all fisheries as part of the Salmon Area H (Strait of Georgia) license conditions. "Barbless hook" was defined as a barbed hook, the barb of which was compressed and in complete contact with the shaft of the hook. There was no directed chinook fishery; however, chinooks were retained during directed sockeye, pink, and chum fisheries. The management strategy included chinook non-retention if unacceptable by-catch levels of chinook were observed. The minimum size limit for troll caught chinook was 62 cm nose-fork length for Areas 12 to 18 and 29. There was a chinook non-retention restriction in effect in a portion of Area 29 after September 1, and in the Strait during Mainland Inlet pink fisheries. The numbers of chinook releases, however, was minimal with only 32 estimated.

Chinook were also released during a 2000 Fraser sockeye fishery conducted by Area G trollers (WCVI troll fishers) in Areas 11 and 12. The estimated number of chinook released was 5,632.

Catches of chinook in the Strait of Georgia for 1997, 1998, 1999, and 2000 were 190, 124, 3, and 956 respectively.

1.0.4.2 Recreational Fisheries

The 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 2000. This plan consists of the following management actions plus additional actions taken during 1998 and 2000 (Table 1-6).

Table 1-6. Recreational daily bag, annual catch limit, and size limits in Southern BC marine recreational fisheries.

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, 19A, 28, & 29)	2	2	15	8	20	62	45
Juan de Fuca (S. A. 19B, 20)	2	2	20	8	20	45	45
Johnstone Strait (S. A. 12)	2	4	15	30	30	62	45

- 1989: (February 1) 62 cm minimum size limit for chinook in DFO Statistical Areas 12-19A, 28, 29.
- 1998: (February 15-May 20) Maximum size of 77cm for chinook in Statistical Areas 13 through 19, 28, 29, 20; instituted to protect mature Nooksack River spring chinook.
- 1998: (July 1) Barbless hooks in tidal waters. Effort and chinook catch was affected by closures to protect Thompson River coho. Portions of Area 29 closed to salmon fishing from the last week of August to early October. Area 19 south of Cadboro Point closed to salmon fishing August 15 to September 30 except some near shore areas open to salmon except coho. Area 20 was closed to salmon fishing July 1 to August 31, except inside a line from San Juan Point to Bonilla Point light and inside a line from William Head to Sheringham Point (except coho). Port San Juan was closed for chinook from July 15 to October 15. After September 1, all area 20 inside Sheringham Point was closed to salmon fishing.
- 1999: Effort and chinook catch was affected by closures to protect Thompson River coho. No fishing for salmon was allowed in Area 19 south of Cadboro Point from August 16 to September 30 except some near shore areas open to salmon except coho. No fishing for salmon was allowed in Area 20 from June 28 to September 30 except some nearshore areas open to retention of all salmon except coho.
- 2000: Effort and chinook catch was affected by closures to protect Thompson River coho. Sport fishing in Area 20 was open for chinook retention but non-retention of coho salmon, size limits were 45 cm west of Cadboro Point and 62 cm eastward of the Point.
- 2000: Spot closures in the Strait of Georgia were eliminated except for the terminal area closures. The closures were not considered to be necessary at the reduced level of effort in the present fishery. Alternative actions will be taken when necessary.

For the purpose of this report, the Strait of Georgia area includes Statistical Area 13 (from Quadra and Sonora Islands south) through Area 18, 19A (Saanich Inlet), 28, and portions of 29 outside the Fraser River. Juan de Fuca includes creel survey area 19B (Sydney to Race Rocks) and 19B+ (Race Rocks to Sheringham) and outer Area 20 at Port Renfrew.

In 1997 and 1998, a creel survey was conducted in Statistical Areas 13 through 20-5, 28, and portions of 29 outside the Fraser River, from April through to October. In 1999, the survey went from April to September in most areas, but included October for Statistical Area 13, and October through end of March in the Victoria area (areas 19B and 19B+). Full coverage of all the Georgia Strait recreational fishery for 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% 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 period of April to September-October would be expected to account for 95% to 98% of the annual catch. In the Juan de Fuca area, the period from April through December 1999 would account for 92% of the annual chinook catch.

In 1997, the chinook catch in the Strait of Georgia was 42,800 and effort was 187,000 boat trips. In Juan de Fuca Strait the catch was 17,150 including 13,600 in the Victoria area plus 3,550 in the Port Renfrew area. Effort was estimated to be over 80,000 boat trips, similar to the 1990-94 average.

In 1998, the chinook catch in the Strait of Georgia was only 14,400 with an effort of 119,500 boat trips. In Juan de Fuca Strait the catch was 9,700 including 6,500 in the Victoria area plus 3,200 chinook in the Port Renfrew area. Effort in these Juan de Fuca fisheries totaled 48,000 boat trips.

In 1999, the chinook catch in the Strait of Georgia was 38,500 and the effort was 124,000 boat trips. In Juan de Fuca Strait, the catch totaled 14,800 including 9,000 in the Victoria area and 5,800 in the Port Renfrew area. Effort in these Juan de Fuca fisheries totaled 45,600 boat trips.

In 2000, the chinook catch in the Strait of Georgia was 21,900 and the effort was 126,700 boat trips. In Juan de Fuca Strait, the catch totaled 11,200 including 6,750 in the Victoria area and 4,450 in the Port Renfrew area. Effort in these Juan de Fuca fisheries totaled 36,900 boat trips.

1.1 REVIEW OF OTHER FISHERIES

1.1.1 Canadian Fisheries

1.1.1.1 Transboundary Rivers

Chinook (CN) catches in the Canadian Stikine and Taku gillnet (commercial and test fishery catches) and Aboriginal fisheries were:

Year	STIKINE				TAKU			
	Comm.+Test Fish.		Aboriginal		Comm.+Test Fish.		Aboriginal	
	Jacks	Large CN	Jacks	Large CN	Jacks	Large CN	Jacks	Large CN
1996	341	2,047	156	722	144	3,331	-	63
1997	199	3,358	94	1,155	84	2,731	-	103
1998	339	1,651	95	538	227	1,107	-	60
1999	898	3,004	463	765	259	1,485	-	50
2000	260	2,684	386	1,109	174	2,888	-	56

The catch of large chinook in Aboriginal and recreational fisheries in the Alsek system was:

Year	Aboriginal	Recreational
1996	448	650
1997	232	298
1998	154	175
1999	238	136
2000	65	58

Details of these fisheries are available from the annual reports of the PSC's Transboundary Technical Committee (TTC).

1.1.1.2 Southern BC Commercial Net Fisheries

In all these fisheries, regulations and research programs are attempting to limit the incidental mortality of juvenile chinook and coho salmon. Fishing time, location, and gear are limited in southern BC net fisheries to conserve juvenile and adult chinook salmon. In Johnstone and Juan de Fuca straits, areas of high chinook vulnerability are closed and fishing inside of a minimum water depth strata is precluded to reduce the catch of juvenile chinook and coho. In Juan de Fuca, a maximum number of juvenile chinook caught per set is used to limit total chinook mortality. If encounters exceed this value, then the fishery is moved or closed. In the Fraser River area, net fishing is usually limited to gillnets and chinook are caught incidentally during sockeye, pink, or chum fisheries. Also, gillnet fishing in September in the Fraser River has been restricted to limit impacts on natural Harrison River chinook and returning Thompson coho salmon.

Management plans required seine nets to brail, sort all sets, and release coho, chinook and steelhead to the water with the least possible harm. Gillnet fisheries were required to sort and release all coho to the water with the least possible harm. Depending on local stock concerns, gillnets were required to release chinook and steelhead as well. It was illegal to land coho from any areas. All fishers were required to sort their catch accurately and release all non-target salmon. Fish revival tanks were required as a condition of license; these tanks may be used to revive these fish prior to release.

There were no directed net fisheries on South Coast chinook stocks, including Somass, Conuma, and Fraser River stocks. For seine gear, there was non-retention and non-possession of chinook during all fisheries. The normal seine Ribbon Boundary restrictions remained in effect in Johnstone Strait. For gillnets, there was voluntary release of all live chinook. The net catches in the WCVI occur in the inlets primarily during the Barkley Sound sockeye and Nootka chum fisheries. There were no directed chinook fisheries along the WCVI during these years.

Catch by net gears in the Strait of Georgia occur mainly from the Fraser River gillnet sockeye fishery, the Fraser River chinook test fishery, and minor catches during chum fisheries. Fraser gillnet catches since 1997 have been 28,700, 6,815, 3,911, and 4,340 respectively. Net fisheries in the Strait of Georgia and Johnstone Strait on Fraser sockeye and southern inside chum stocks resulted in chinook by-catch of 981 in 1997, and 100 to 200 per year in 1998 to 2000. For Juan de Fuca, fisheries occurred in 1997 which resulted in a by-catch of 465 chinook. No commercial net fisheries occurred in Juan de Fuca Strait from 1998 through 2000. Limited catches reported for Juan de Fuca are from gillnet test fisheries.

1.1.1.3 Outer West Coast Vancouver Island

For 1997, daily bag and total possession was limited to 2 /4 respectively in all areas. In order to address conservation concerns of returning WCVI stocks, time/area closures were put into effect in terminal areas starting July 14 above Estevan Point and July 28 below Estevan Point.

For 1998, non-retention of coho and limitations on coho mortality considerably reduced the effectiveness of the WCVI chinook fishery and the length of the chinook retention period. Measures to protect coho also protected chinook stocks. The WCVI (Areas 121, 123-127) was declared a red zone outside of the surf line and closed to all salmon fishing from June 15 to October 13. Red zones were areas/times where the fishery management objective was zero mortality on coho stocks of concern. After October 1, WCVI was declared a yellow zone, which permitted fishing, but limited coho encounters to a very low level. Chinook bag limit was 2 daily, 4 in possession and the minimum size limit was 45cm in open portions of areas 20-27.

For 1999, special management zones were introduced to most of WCVI to ensure coho conservation but allow limited fishing on other species. Chinook fishing was permitted in the special management zones only if coho catch rates remained low. Finfish and salmon closures in extreme terminal areas were expanded in 1999 to limit chinook catch and coho encounters. On September 18, those waters of Area 23 inside a line from Whittlestone Point to Quisitis Point were closed to chinook fishing.

For 2000, additional management actions were implemented to protect returning WCVI chinook. A new "conservation corridor" was implemented in Areas 21 through 25 (Carmanah Point to

Tatchu Point). Examination of CWT recoveries by sport catch locations during 1997 – 1999 indicate that WCVI chinook are vulnerable in nearshore waters during their return migration, but not observed outside of a narrow corridor. Consequently, recreational fishing for all species was prohibited within the conservation corridor when it was in effect. The inner boundary of the corridor was generally defined as the surfline. The outer boundary was generally one nautical mile seaward of the surfline. Outside of the corridor and in Areas 26 and 27, salmon fishing with non-retention of coho was permitted but with the same altered size and possession limits as implemented in the QCI sport fishery. Inside of the surfline, there was generally non-retention of chinook salmon, except in terminal areas of the Conuma and Nitinat Hatcheries. Sport catches outside of the corridor were extensively sampled for bi-catch of WCVI chinook stocks using CWT recoveries and sampling for otolith marks.

The timing of the corridor varied with return timing of the local populations. In Areas 25 and 26 the corridor was implemented between July 15 to September 30. In Areas 23 and 24, it was implemented between August 1 to October 15. In Areas 21, 121, and 22, it was in place between August 1 and September 30.

Under the new Pacific Salmon Treaty (PST) agreement, it was required to estimate the portion of the WCVI recreational fishery chinook catch in the offshore area (more than one mile offshore). This portion includes all the catch in NWVI prior to July 1 and the catch outside one mile offshore after July 1, plus all the catch in SWVI prior to August 1 and the catch outside one mile offshore after August 1. The definition of “Outside WCVI sport fishery” is contained in the Chinook Annex to the Agreement.

In 1997 to 2000, 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 occurred from mid-July through mid-September. Creel surveys are generally conducted from late May or early June 1 to September 30 but may vary with the run timing in certain areas.

Outer WCVI sport catches 1997-2000 by statistical areas.						
	23A	23B	24	25	26	Total
1997	0	8,011	2,957	125	NA	11,093
1998	129 ^a	2,316	1,546	186	NA	4,177
1999	0	23,203	7,186	604	92	31,085
2000	0	24,544	12,039	NA	47	36,630

^a 129 chinook in the terminal area of Barkley Sound due to expansion of a non-terminal CWT recovery.

1.1.1.4 WCVI Terminal

Terminal WCVI sport catch is from inshore areas of Areas 23A (Alberni Inlet), 23B (Barkley Sound), 24 (Clayoquot Sound), 25 (Nootka Sound), and 26 (Kyuquot Sound). It includes catch inside these areas in August and September in Areas 23/24 and July-September in Areas 25, 26, and 27 (no creel surveys in Area 27 due to minimal sport fishing).

WCVI terminal sport catches 1997-2000 by statistical area.						
	23A	23B	24	25	26	Total

1997	10,835	15,111	3,296	18,113	1,000	48,355
1998	13,323	19,460	3,324	18,264	1,326	55,697
1999	7,585	17,158	4,579	15,362	2,500	47,184
2000	0	0	0	3,476	1,811	5,240

In recent years, small sport fisheries have occurred in the Stamp River. In 1998 an angler survey was conducted on the Stamp River for an opening on September 9 to November 15, initially from Summer Creek on the Stamp River to Paper Mill Dam Park on the Somass River. Several key holding areas for fish were closed throughout the fishery which was generally restricted to single, barbless hooks, with a daily limit of two chinook (<75cm). All areas below Stamp Falls were closed on October 6 for chinook conservation. The estimated catch was 68 chinook caught and 2,643 released. In 1999 the Somass/ Stamp Rivers opened for coho fishing on September 10 but remained closed for chinook for the season. Only single, barbless hooks were allowed in non-tidal rivers and streams. Use of bait was banned until October 31. There were 93 chinook released during this fishery. No in-river fishery was allowed during 2000.

A Native fishery occurs in the Area 23 terminal area. Based on landing slips and dockside monitoring, the catches in 1997, 1998, and 1999 were 5,726, 7,172, and 3,591, respectively. No Native fishery occurred in the terminal area of Area 23 during 2000. Data are insufficient to estimate harvests by food fisheries outside of Area 23.

1.1.1.5 Georgia Strait/Fraser

Commercial net fisheries in these areas were addressed above. However, freshwater sport and Native fisheries also operate in these areas. Native catches in the Fraser River were estimated to be 29,400, 18,600, and 28,200 chinook during 1997, 1998, and 1999 respectively. These catches are determined through catch monitoring programs in the lower river and surveys to estimate catch in the upper river fisheries. The preliminary estimate for the 2000 Native catch is 26,000 chinook. Sport catches in the lower mainstem of the river were estimated by creel surveys but the duration of the sampled period varied between years. Estimated catches during 1997 through 2000 respectively were 1,540, 7,160, 914, and 5,900 chinook. Recreational fishing occurs in several upper tributaries to the Fraser. Catches are monitored by Fishery Officers, and creel surveys are used in the larger fisheries (particularly those associated with indicator stock programs). Total catch in these up-river sport fisheries were estimated to be 2,250, 2,610, 2,890, and 2,200 during 1997 to 2000, respectively. During 1998 and 1999, a significant increase in sport fishing in the Chilliwack River (lower Fraser River) occurred on the large returns of Fraser fall chinook stock (Harrison white fall chinook transplanted to Chilliwack River). Catch in this sport fishery was monitored by creel surveys. Catch estimates for the Chilliwack sport fishery in 1998 and 1999 were 8,200 and 10,500 white chinook. The preliminary catch estimate for October 2000 is 4,544 large chinook plus 1,200 jack chinook.

Aboriginal catch of chinook also occurs in the Cowichan River, the principal indicator stock for the Lower Strait of Georgia fall chinook stock. Catches are monitored by the tribe's River Management staff and are estimated by gear counts and interviews. Catches reported for 1997 through 1999 were 191, 1,073, and 700 respectively. The low catch in 1997 resulted from a major flood event in early October. The catch reported for 2000 was 500 large chinook plus 200 jack chinook.

1.1.1.6 Johnstone Strait

Comments on the net fishery in Areas 11-13 were included above. During 1997 through 2000, chinook could be retained during troll fisheries for sockeye salmon in these areas. Catch of chinook in these troll fisheries was included in Table 1-1.

Surveys of recreational fishing in the Strait were undertaken in 1998 through 2000 (Area 12) from mid July to mid September. Full coverage for the year was not possible due to budget limitations, but based on previous surveys (1992-1993; April – August), this sample coverage could be expected to account for 72-75% of the annual catch. Due to weather conditions the fishery is much smaller in the off-season.

In 1998, the chinook catch in Johnstone Strait was 3,000 and effort was 19,630 boat trips. This represents only 32% of the catch during previous surveys in 1992 and 1993, and 60% of the effort. In 1999, the chinook catch in Johnstone Strait was up considerably to 7,800 and the effort was 39,150. This represents an increase of 5% over the 1992-3 average catch and an increase in effort of 40%. In 2000, the catch increased further to 11,400 chinook during 36,165 boat trips.

1.1.1.7 Other Freshwater

Freshwater recreational fisheries occur in many BC rivers, including the Alsek, Skeena, Nass, Kitimat, Bella Coola, Somass, and Fraser Rivers and various streams on the east coast of Vancouver Island. Some of these fisheries have already been commented on above. In North and Central BC, freshwater recreational fishery harvest was estimated to be 7,989 in 1997, 7,629 in 1998, 7,986 in 1999, and approximately 6,000 in 2000. These values are estimated using local creel surveys, reports from lodge operators, and Fishery Officer monitoring.

Native food fisheries occur in Transboundary, North/Central BC, WCVI, Strait of Georgia, and Juan de Fuca Strait rivers. Catch in north and central BC rivers has not been reported above. The catch in these fisheries was estimated to be 15,000 in 1997, 22,500 in 1998, 27,500 in 1999, and 26,400 in 2000 (preliminary value).

1.1.2 Southern U.S. Fisheries

Several of the Southern U.S. fisheries are managed in accordance with legal obligations stemming from treaties between Indian tribes and the United States. In 1974, the U.S. v Washington set forth sharing obligations to meet Treaty fishing rights in Washington. On the Columbia River, treaty rights were defined by U.S. v Oregon, and were implemented by the Columbia River Fisheries Management Plan in 1977. In these fisheries, fishermen are termed “treaty” if they are fishing under the Native Treaty fishing rights and “non treaty” otherwise. Catches are tabulated in Table 1-1 and detailed summaries are presented below.

1.1.2.1 Strait of Juan de Fuca and the San Juan Islands

Chinook salmon were harvested in the Strait of Juan de Fuca and the San Juan Islands by recreational anglers and treaty commercial fisheries; there were no non-treaty commercial catches during 1997-2000. Management measures were taken to protect depressed spring chinook stocks. Treaty commercial fisheries were closed during the spring chinook management period (April 16-June 15) and the recreational fishery was restricted by a 30-inch maximum size limit for chinook during the spring chinook management period and the use of barbless hooks. The reported treaty troll catches do not include catches in Area 4B during the May 1 to September 30 Pacific Fishery Management Council (PFMC) area. These are included in the North of Cape Falcon summary.

Although 1996 catches are outside the general scope of this report, recreational catches in 1996 are reported here because they were not available for inclusion in the previous CTC catch summary (CTC 1999). In 1996, the recreational catch of blackmouth (resident chinook) in the Strait of Juan de Fuca (Areas 5 and 6) was 4,825 and 12,674 in the San Juans (Areas 7 and 7A). Commercial catches for 1996 were reported in CTC (1999).

Total catch of chinook in this region in 1997 was 47,797. The recreational catch of blackmouth in the Strait of Juan de Fuca was 12,238 with 181 days of fishing. The recreational catch in the San Juan Islands was 9,155. The treaty commercial net harvest in the San Juan Islands was 25,292 and in the Strait of Juan de Fuca was 438. The troll harvest in the Strait of Juan de Fuca was 1,112.

Total catch of chinook in this region in 1998 was 9,341 fish. The recreational catch of blackmouth in the Strait of Juan de Fuca was 2,159 with 119 days of fishing. The recreational catch in the San Juan Islands was 3,069. The treaty commercial net harvest in the San Juan Islands was 2,777 and in the Strait of Juan de Fuca was 286. The troll harvest in the Strait of Juan de Fuca was 1,050.

Total catch of chinook in this region in 1999 was 6,566. The recreational catch of blackmouth in the Strait of Juan de Fuca was 1,429 with 84 days of fishing. The recreational catch in the San Juan Islands was 2,247. The treaty net catch was in the San Juan Islands was 31 and in the Strait of Juan de Fuca was 731. The treaty troll harvest in the Strait of Juan de Fuca was 2,128.

Only commercial catch data are available for this region in 2000; estimates of recreational harvests have not been made yet. Total commercial catch in 2000 was 2,223. The treaty commercial catch in the San Juan Islands was 1,465 and in the Strait of Juan de Fuca was 593. The troll harvest in the Strait of Juan de Fuca was 175.

1.1.2.2 Puget Sound

In Puget Sound areas, exclusive of the Straits of Juan de Fuca and the San Juan Islands, chinook salmon are harvested in recreational and in treaty and non-treaty commercial net fisheries. The fisheries are managed to protect depressed spring and fall chinook and coho stocks. To protect depressed summer/fall stocks, there were no directed chinook commercial net fisheries in the Skagit and Stillaguamish/Snohomish terminal areas with the exception of the tribal fishery in Tulalip Bay, which targeted hatchery-origin chinook. Additionally, some tribal ceremonial and

subsistence (C&S) harvest occurred in these areas as well as an evaluation fishery to maintain annual fishery data. In 1997, the WDFW Commission adopted a rule to require the completion of logbooks for all non Treaty purse seine vessel operators during the 7/7A sockeye/pink fishery, and the release of all chinook. In 1999 the logbook program was expanded to include all commercial gear in the 7/7a sockeye/pink fishery, and the use of brailers or hand dip nets became mandatory for removal of salmon from seine nets. For the rest of Puget Sound, additional restrictions were also in place. However, harvest opportunities existed in local terminal areas where hatchery surpluses existed.

Although 1996 catches are outside the general scope of this report, recreational catches in 1996 are reported here because they were not available for inclusion in the previous CTC catch summary (CTC 1999). In 1996, the recreational catch was 65,932 fish.

Cumulative recreational and commercial catches for the region are shown in Table 1-1 for 1997-1999, and 2000 for fisheries with available data. In 1997, a total of 96,188 chinook were harvested, 44,660 in net fisheries and 51,528 in recreational fisheries. In 1998, a total of 80,140 were harvested, 47,118 in net fisheries and 33,022 in recreational fisheries. In 1999, a total of 117,887 chinook were harvested, 83,928 in net fisheries and 33,959 in recreational fisheries. In 2000, data are not available for recreational fisheries; commercial net fisheries harvested 68,700 chinook.

1.1.2.3 Washington Coast

The annual harvests in Washington Coastal fisheries for 1997-2000 are reported in Table 1-1. Chinook salmon are harvested in treaty commercial net fisheries, sport and tribal ceremonial and subsistence fisheries. Harvests include harvests in Grays Harbor, Willapa Bay, and the Quinalt, Queets, Hoh and Quillayute Rivers. Harvests are from spring/summer and fall stocks in Grays Harbor and the Quinalt, Queets, How and Quillayute Rivers and the fall stock in Willapa Bay.

In 1997, the total Washington Coast harvest was 35,127 of which 28,142 were harvested with commercial gillnets, 222 for ceremonial and subsistence and 6,763 in recreational fisheries.

In 1998, the total harvest was 27,326 of which 20,522 were harvested with commercial gillnets, 247 for ceremonial and subsistence and 6,557 in recreational fisheries.

In 1999, the total harvest was 13,949 of which 11,449 were harvested with commercial gillnets, 261 for ceremonial and subsistence and 2,239 in recreational fisheries.

In 2000, the total harvest excluding the recreational catch was 15,827 of which 15,597 were harvested in commercial gillnet fisheries and 230 in ceremonial and subsistence fisheries. Estimates of the recreational harvest are not available.

1.2.2.4. Ocean Fisheries North of Cape Falcon

The U.S. ocean fisheries operating north of Cape Falcon, Oregon are managed through the domestic regulatory process of the PFMC. Recreational and commercial catches for the region are shown in Table 1-1 and specific management concerns and catches by gear are detailed below.

In 1997, the chinook harvest was limited in order to meet NMFS exploitation rates for Snake River Fall chinook. In addition, the Oregon portion was restricted to May and the first two weeks of June and the retention of coho prohibited. The Oregon recreational fishery was 14 days. In Washington, non-treaty troll seasons were restricted to May and early June with additional openings for all salmon in July through September. The total chinook harvest was 24,500 with a non treaty troll harvest of 14,000 and a treaty troll harvest of 6,400 and the recreational fishery harvested 4,100.

In 1998, low returns were expected for the Oregon coast natural coho. In the Oregon portion, the troll fishery was restricted to May and the first two weeks of June and the retention of coho was prohibited. The Oregon recreational fishery was 6 days. In Washington, non-treaty troll seasons were restricted to May and early June with additional openings for all salmon in July through September. The total chinook harvest was 22,500 with a non-treaty troll harvest of 14,400 and a treaty troll harvest of 5,900 and a recreational harvest of 2,200.

In 1999, low returns were expected for the Oregon coast natural coho and there were concerns for lower Columbia River hatchery chinook and the Lewis River wild chinook. The Oregon commercial troll fishery was restricted to May and the first two weeks of June and the retention of coho salmon was prohibited. The Oregon recreational fishery was open 62 days. The total chinook harvest was 55,800 with a non treaty troll harvest of 27,400 a treaty troll harvest of 17,600 and a recreational harvest of 10,800.

In 2000, the fishery was restricted due to expected low returns to the Lewis River. There were an additional 21 days were open for chinook and hatchery coho in August and the first week of September. The recreational fishery was open 35 days. The total chinook harvest was 30,400 with a non treaty troll harvest of 7,600, a treaty troll harvest of 12,900 and a recreational harvest of 9,900.

1.1.2.4 Columbia River

Chinook from the Columbia River are divided into eight stock groups for management. These groups are delineated by run timing and area of origin: (1) spring run originating below Bonneville Dam; (2) spring run originating above Bonneville Dam; (3) summer run originating above Bonneville Dam; (4) fall run returning to Spring Creek Hatchery; (5) fall run originating in hatchery complexes below Bonneville Dam; (6) wild bright fall run originating below Bonneville Dam; (7) upriver bright fall run; and (8) mid-Columbia bright fall hatchery fish. Columbia River fisheries are constrained by escapement objectives for these stock groups and restrictions resulting from Ecologically Significant Units (ESUs) listed under the Endangered Species Act. There are five chinook ESUs in the Columbia River: (1) Snake River falls – *threatened* April 1992; (2) Snake River spring/summer – *threatened* April 1992; (3) Upper Columbia spring – *endangered* March 1999; (4) Lower Columbia River wild – *threatened* March 1999; (5) Upper Willamette spring – *threatened* March 1999. The Columbia River also has several ESUs of other species that could affect the capacity to harvest chinook: (1) chum – *threatened* March 1999; (2) Snake River sockeye – *endangered* November 1991; (3) upper Columbia River steelhead – *endangered* August 1997; (4) Snake River steelhead – *threatened* August 1997; (5) Lower Columbia River steelhead – *threatened* March 1998; (6) Upper Willamette steelhead – *threatened* March 1999; (7) mid Columbia steelhead – *threatened* March 1999.

Annual harvest management plans are developed based on the Columbia River Fishery Management Plan and agreements reached between the parties to *U.S. v. Oregon*.

In 1997, the total harvest was 115,666 of which the commercial harvest was 49,908, the recreational harvest was 33,422, and the Indian food fishery harvested 32,336 chinook.

In 1998, the total harvest was 76,439 of which the commercial harvest was 31,240, the recreational harvest was 25,717, and the Indian food fishery harvested 19,482 chinook.

In 1999, the total harvest was 122,533 of which the commercial harvest was 55,873, the recreational harvest was 37,297, and the Indian food fishery harvested 29,363 chinook.

In 2000, the total harvest was 99,205 of which the commercial harvest was 51,426, the recreational harvest was 28,133 and the Indian food fishery harvested 19,646 chinook.

1.1.2.5 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.

Late Season Troll Catch in the Elk River Terminal Troll Fishery

Year	Harvest
1997	616
1998	900
1999	1,233
2000	1,860

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 1997 estuary and freshwater recreational catch was 30,264 and 7,234 for the NOC and MOC groups respectively. The 1998 estuary and freshwater recreational catch was 23,031 and 9,706 for the NOC and MOC groups respectively. The 1999 and 2000 estimates of recreational catch are unavailable at this time.

2 ESCAPEMENTS THROUGH 2000

2.0 INTRODUCTION

The June 30,1999 agreement of the Pacific Salmon Treaty (Pacific Salmon Treaty Fishing Annexes & Related Agreements, June 30,1999) established a chinook management program that:

“introduces harvest regimes that are based on estimates of chinook abundance, that are responsive to changes in chinook production, that take into account all fishery induced mortalities and that are designed to meet MSY or other agreed biologically-based escapement objectives”

This chapter compares yearly escapements with MSY or other agreed biologically-based escapement goals established for the stocks. In previous CTC annual reports, this chapter focused on reporting whether or not stocks were increasing (which was interpreted as rebuilding) or whether they were decreasing. Consistent with the new Agreement, the CTC has agreed to use MSY or other biologically-based escapement goals. The CTC has reviewed and accepted escapement goals for a number of stocks included in this report. For these stocks, the CTC can evaluate trends in stock status in relation to these goals. For stocks without agreed goals the CTC must rely on the data, graphs and agency comments in the individual stock narratives to provide a perspective on stock status and escapement trends. The narratives provide information, on escapement assessment methodology, on factors affecting annual observations such as poor visibility or floods, and on the basis for setting escapement goals. The information is included to assist the reader in understanding the relative quality of data and to present management agencies’ assessments of stock status.

2.1 FRAMEWORK

2.1.1 Escapement Indicator Stocks

This year's escapement review includes 50 naturally spawning escapement indicator stocks. These stocks may be distinct populations, or they may be groups of several populations aggregated by region and life history type for management purposes. Distribution of the indicator stocks by run timing and area of origin is shown in Table 2-1.

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

Area of Origin	Run Timing ¹					Total
	Spring	Spring/ Summer	Summer	Summer/ Fall	Fall	
Southeast Alaska	8					8
SEAK/Transboundary	3					3
British Columbia	2	4	3	1	3	13
Puget Sound	2			3	2	7
Washington Coastal	1		3		5	9
Columbia River	1		1		3	5
Oregon Coastal					5	5
Total	17	4	7	4	18	50

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

2.1.2 Escapement and Terminal Run Data

2.1.2.1 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 B. Table 2-2 lists the sources of mortality included in estimates of terminal run size for the 32 stocks with terminal harvest or broodstock removal.

Table 2-2. Terminal run composition for 32 stocks with broodstock removal, rack sales or terminal fisheries.

Stock	Brood Stock /Rack Sales	Commercial Net	Ceremonial/ Subsistence	Freshwater Sport
Situk		✓	✓	✓
Alek ¹		NI	NI	NI
Taku ¹		NI	NI	NI
Stikine ¹		NI	NI	NI
Chilkat	✓		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		✓	✓	✓
Nehalem				✓
Siletz			✓	✓
Siuslaw Falls				✓
Umpqua	✓			✓

✓ 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 TTC (2000). 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 B), 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.

2.1.2.2 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, influences 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 (Sections 2.3.1 to 2.3.4).

- 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 management program. 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 and summer stocks, mainstem dam counts were reduced by the number of hatchery fish in the count in order to estimate the natural stock return; estimated upriver harvests were also subtracted.
- 3) For Oregon coastal stocks there are no hatchery releases in the Nehalem, Siletz, Siuslaw or South Umpqua Rivers. For the mid-Oregon coast (MOC) stock aggregate, several stocks have extensive enhancement programs. An attempt, however, is made to minimize inclusion of hatchery strays by conducting spawning surveys greater than 10 miles away from hatchery smolt release sites.

2.1.3 MSY or Biologically-based Escapement Goals

2.1.3.1 Origin of Goals

Escapement goals accepted by the CTC were based on analyses that followed the guidelines developed in the CTC escapement goal report (CTC 1999a). In the stock-specific narratives presented with the escapement graphs, the agencies may refer to agency goals but only CTC-accepted escapement goals and ranges are shown on the escapement graphs and used for evaluation. Table 2-3 presents the status of escapement goal reviews by the CTC.

Table 2-3. Status of escapement goal reviews.

Stock #	Stock Name	Region	Stock Group	Run Type	Completion Dates Esc. Goal Analysis
1	Situk	SEAK	Yakutat	Spring	Done
2	Alsek	SEAK/TBR	Yakutat	Spring	Done
3	Taku	SEAK/TBR	TBR	Spring	Done
4	Stikine	SEAK/TBR	TBR	Spring	Done
5	Chilkat	SEAK	Northern Inside	Spring	2001
6	King Salmon	SEAK	Northern Inside	Spring	Done
7	Andrew Creek	SEAK	Central Inside	Spring	Done
8	Unuk	SEAK	Southern Inside	Spring	Done
9	Chickamin	SEAK	Southern Inside	Spring	Done
10	Blossom	SEAK	Southern Inside	Spring	Done
11	Keta	SEAK	Southern Inside	Spring	Done
12	Yakoun	BC	NBC-Area 1	Summer	Indeterminate
13	Nass	BC	NBC-Area 3	Sp/Sum	Indeterminate
14	Skeena	BC	NBC-Area 4	Sp/Sum	Indeterminate
15	Dean	BC	CBC-Area 8	Spring	2003
16	Rivers Inlet	BC	CBC-Area 9	Spr/sum	2003
17	Smith Inlet ¹	BC	CBC-Area 10	Summer	
18	W. Coast Van. Is. ²	BC	WCVI	Fall	
19	Upper Georgia St.	BC	UGS	Sum/fall	Indeterminate
20	Cowichan/Nanaimo	BC	LGS	Fall	2001
21	Upper Fraser ²	BC	Fraser River	Spring	
22	Middle Fraser ²	BC	Fraser River	Spr/Sum	
23	Thompson ²	BC	Fraser River	Summer	
24	Harrison	BC	Fraser River	Fall	2001
25	Skagit spring	PS	PS	Spring	2001
26	Skagit sum/fall	PS	PS	Sum/fall	2001
27	Stillaguamish	PS	PS	Sum/fall	2001
28	Snohomish	PS	PS	Sum/fall	2001
29	Green	PS	PS	Fall	2001
30	Nooksack	PS	PS	Spring	2001
31	Lake Washington	PS	PS	Fall	2001
32	Quillayute sum.	WAC	WAC	Summer	Indeterminate
33	Quillayute fall	WAC	WAC	Fall	2001
34	Queets spr/sum	WAC	WAC	Summer	Indeterminate
35	Queets fall	WAC	WAC	Fall	2001
36	Grays Hbr. Spr.	WAC	WAC	Spring	Indeterminate
37	Grays Hbr. Fall	WAC	WAC	Fall	2001
38	Hoh spr/sum	WAC	WAC	Summer	Indeterminate
39	Hoh Fall	WAC	WAC	Fall	Indeterminate
40	Hoko	WAC	WAC	Fall	Indeterminate
41	Col. Upr. Spring	CR	CR	Spring	Indeterminate
42	Col. Upr. Summer	CR	CR	Summer	Done interim
43	Col. Upriver Bright	CR	CR	Fall	Indeterminate
44	Lewis	CR	CR	Fall	Done
45	Deschutes	CR	CR	Fall	2001
46	Nehalem	ORC	NOC	Fall	Done
47	Siletz	ORC	NOC	Fall	Done
48	Siuslaw	ORC	NOC	Fall	Done
49	Umpqua	ORC	MOC	Fall	2002
50	Coquille	ORC	MOC	Fall	2001

¹ Data limitations preclude the development of an escapement goal.

² Habitat estimates for spawner capacity are being developed for individual populations. Individual goals will be developed for each WCVI stream over the next 1-3 years.

2.2 ESCAPEMENT ASSESSMENTS

The new PST Agreement tasks the CTC to “*report annually on the escapement of naturally spawning chinook stocks in relation to the agreed escapement objectives referred to below, evaluate trends in the status of stocks, and report on progress in rebuilding of naturally spawning chinook stock*” (Annex IV, Chapter 3, paragraph 1.b.iii). In this report, escapement assessments are limited to the stock specific graphs of escapements and agency comments, presented to provide a perspective on stock status and escapement trends.

The analysis of agreed escapement objectives is guided by footnote 3, paragraph 9.b in Chapter 3: “*By the end of 2001, the CTC will recommend, for adoption by the Commission, criteria defining the lower bound of escapements for the purposes of taking additional management actions pursuant to this paragraph. Until the end of 2001, the escapement level at which the MSY production is reduced by more than 15% will be defined as the lower bound of escapement.*” Confusion resulted with the interpretation of the interim method described in the footnote. At the February 2001 PSC meeting, the Commissioners instructed the CTC to disregard application of the interim measure and to focus on the development of the lower bound escapement.

2.3 STOCK SPECIFIC GRAPHS AND DESCRIPTIONS

Descriptions for chinook stocks are included in sections for Alaska, Canada, and Washington/Columbia River/Oregon. Each stock is described separately with a graph and narrative text. Each graph contains the name of the stock and the type of data depicted (total escapement, index counts, terminal runs, etc.). For the graphs which include estimates of the terminal run size, the harvests in terminal runs include both jacks and adults in some cases, whereas the escapement is usually reported in adults. The x-axis (ordinate) represents calendar years. CTC escapement goals are shown where they have been established. Escapements, escapement estimation methods and agency comments are included in the narrative.

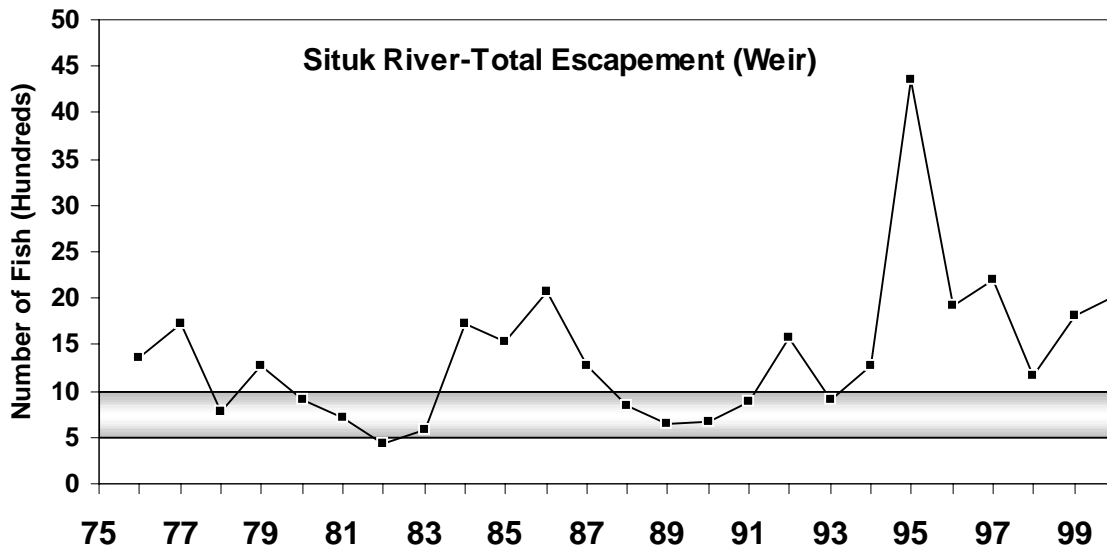
2.3.1 SEAK/TBR Stocks

Of the 11 SEAK/TBR stocks included in the escapement assessment, six (Taku, Stikine, Situk, King Salmon, Chilkat, and Andrew Creek) include estimates of total escapement of large fish. Large fish refers to age-.3 (three-ocean-age) and older chinook salmon; age-.1 and -.2 fish (jack males) are not included in these estimates. Escapement estimates for the other five systems are 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. Except for the Chilkat, survey methods have been standardized for all systems since 1975 (since 1971 for some). The assessment of Chilkat chinook salmon was standardized in 1991 as an annual mark-recapture estimate of escapement. 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 those chinook returning to 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 seven SEAK/TBR indicator stocks. Note that there is some overlap in these stocks within these two broad classifications.

All SEAK/TBR indicator stocks produce primarily yearling smolt except the Situk River, which presently produces primarily sub-yearling smolt. Sub-yearling smolt also comprise about 10% of the annual runs in the Keta and Blossom rivers.

ADF&G established a 15-year rebuilding program in 1981 (ADF&G 1981). ADF&G established interim point escapement goals in 1981 for all 11 systems, based on the highest observed escapement count prior to 1981. ADF&G (and CDFO for three TBR stocks) has revised escapement goals for ten stocks since 1991. An updated escapement goal for the Chilkat stock of chinook salmon is currently underway. The 10 revised escapement goal changes have been reviewed, accepted and adopted by the CTC. ADF&G uses escapement goal ranges as policy to conform with the ADF&G Salmon Escapement Goal Policy. These ranges are shown on the stock-specific graphs in this section. ADF&G, CDFO, Tribal organizations on the transboundary rivers, 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).

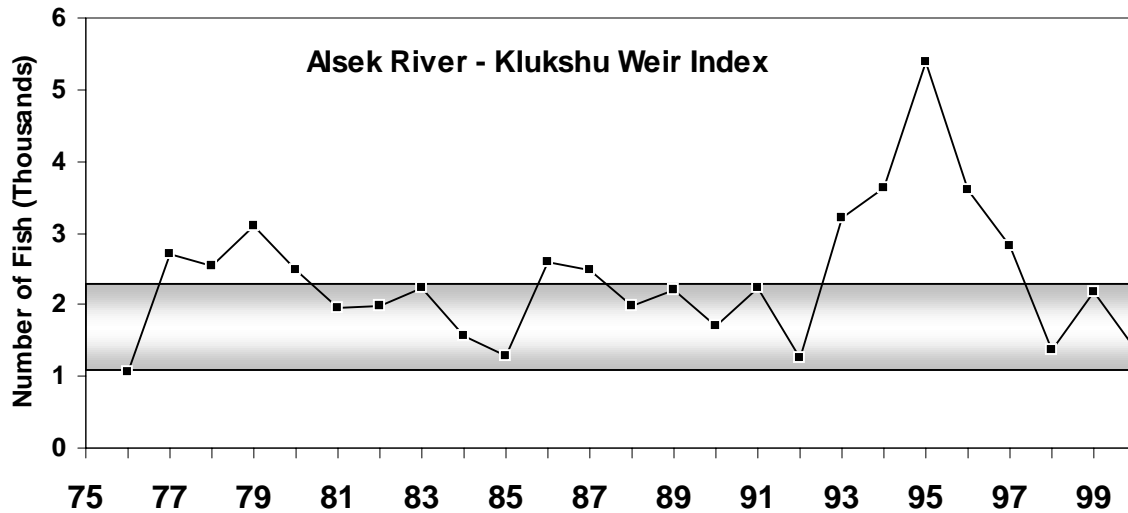
The State of Alaska adopted a Sustainable Salmon Fisheries Policy in March of 2000 (ADFG/ABF 2000) The term “management concern” used later in this SEAK section of this report has the same meaning as given in the policy document described above, i.e., “Management concern: a concern arising from a chronic inability, despite use of specific management measures, to maintain escapements for a stock within the bounds of the Sustainable Escapement Goal, Biological Escapement Goal, Optimal Escapement Goal, or other specified management objectives for the fishery.” “Chronic inability” means the continuing or anticipated inability to meet escapement thresholds over a four to five year period, which is roughly equivalent to a generation time of most salmon species.” The term “healthy” used in this SEAK portion of this report refers to chinook stocks that by State of Alaska standards are not conservation or management concerns.



Escapement Methodology: The Situk River is a non-glacial system located near Yakutat, Alaska, that supports a moderate-sized, outside-rearing stock of chinook salmon. Escapements are weir counts minus upstream sport fishery harvests, which are estimated from an on-site creel survey and a postseason mail-out survey. 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 salmon 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 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 department's escapement goal policy and to provide a more realistic maximum sustained yield range for management. The CTC reviewed and accepted this change in 1998.

Agency Comments: During the 25-year period of 1976-2000, the Situk River chinook salmon escapements have been below the goal range only once (1982). Directed U. S. sport, commercial and subsistence fisheries located both inside the river and lagoon and in near-by surf waters target this stock under a management plan directed at achieving MSY escapement levels. Total annual terminal harvest rates from all gear groups have averaged about 60% during the 1990s. Escapements since 1990 have averaged 1,704 chinook salmon, over 3.4-fold the lower end of the escapement goal range. From 1997 to 2000, escapements have averaged 1,794 fish ranging from 1,156 to 2,190 large fish, 2.3 and 4.4-fold the lower end of the escapement goal range. ADF&G considers the Situk stock of chinook salmon to be healthy, but underutilized in some years.

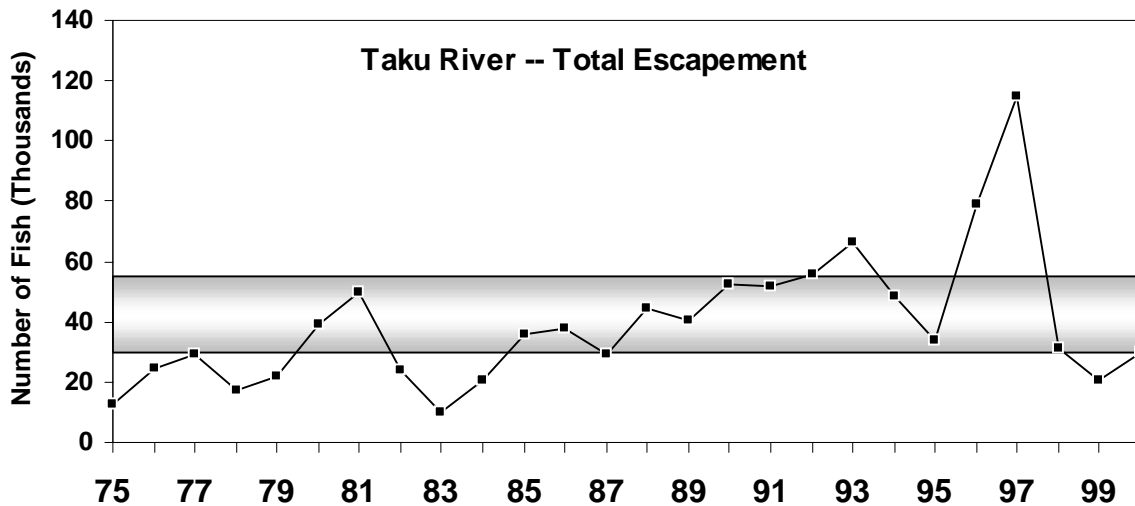


Escapement Methodology: The Asek River is a large, glacial, transboundary river, which originates in the SW Yukon and NW British Columbia and flows into the Gulf of Alaska, southeast of Yakutat, Alaska. It supports a moderate-sized, outside-rearing stock of chinook salmon. Since 1976, chinook salmon escapements in the Asek drainage have been principally monitored by weir in the Klukshu River (shown above), one of 51 tributaries of the Tatshenshini River, the principle salmon-producing branch of the Asek River. These data are augmented by helicopter surveys of spawning chinook salmon in three other tributaries (not shown above). The weir counts from the Klukshu River represent an index of the overall chinook salmon escapement into the Asek River drainage.

Escapement Goal Basis: In 1981, ADF&G set the Asek River goal at 5,000 chinook salmon based on the 1979 Klukshu River weir count of 3,200 and a guessed expansion factor of 1.56 for the remainder of the drainage. The initial Transboundary Technical Committee (TTC) system-wide escapement goal range, developed circa 1985, was 7,200 (U.S. estimate) to 12,500 (Canadian estimate) which was in effect through 1991. In 1991, the joint goal was revised to an index goal of 4,700 (Klukshu weir). A stock-recruit analysis was initially developed in 1996 but underwent review by the ADFG, CDFO (including Pacific Science and Assessment Review Committee), TTC, and CTC with subsequent revision through 1998. In the final technical report, McPherson, Etherton, and Clark (1998) recommended a revised Klukshu River chinook salmon escapement goal of 1,100 to 2,300 chinook salmon and this revised goal was accepted by ADF&G and the CTC in 1998. Internal review by DFO (PSARC) suggested it was premature to agree on the upper end of this range, since returns from a record weir count in 1995 were pending. The upper end of the range will be re-evaluated by CDFO once these 1995 brood year returns are completed in 2001. From 1998-2000, the TTC has agreed on a minimum escapement goal of 1,100 at Klukshu weir.

Joint Agency Comments: Directed Canadian sport and aboriginal fisheries take place in-river while directed U. S. commercial and subsistence fisheries are located both inside the river and lagoon and in nearby surf waters. Total annual harvest rates have averaged 20% to 25% since 1981 (McPherson, Etherton and Clark 1998). Escapements in the Klukshu River have averaged about 2,357 chinook salmon over the 25-year period of 1976-2000. The 1997-2000 escapements

ranged from 1,362 to 2,829 spawners; all four of these annual escapements were within or above the escapement goals range. The joint ADF&G-CDFO assessment is that the Alsek River system stock of chinook salmon is healthy. No expansion factor has been scientifically generated to develop a system-wide escapement goal. A joint adult mark-recapture program has been implemented since 1998 and it is hoped that information from this program will form the basis for future evaluation of a system-wide escapement goal. There remains some uncertainty regarding the total in-river escapement and run timing of various Alsek River stocks. Studies to collect these data have been implemented and must continue in order to develop a new abundance-based management regime for Alsek River chinook salmon.



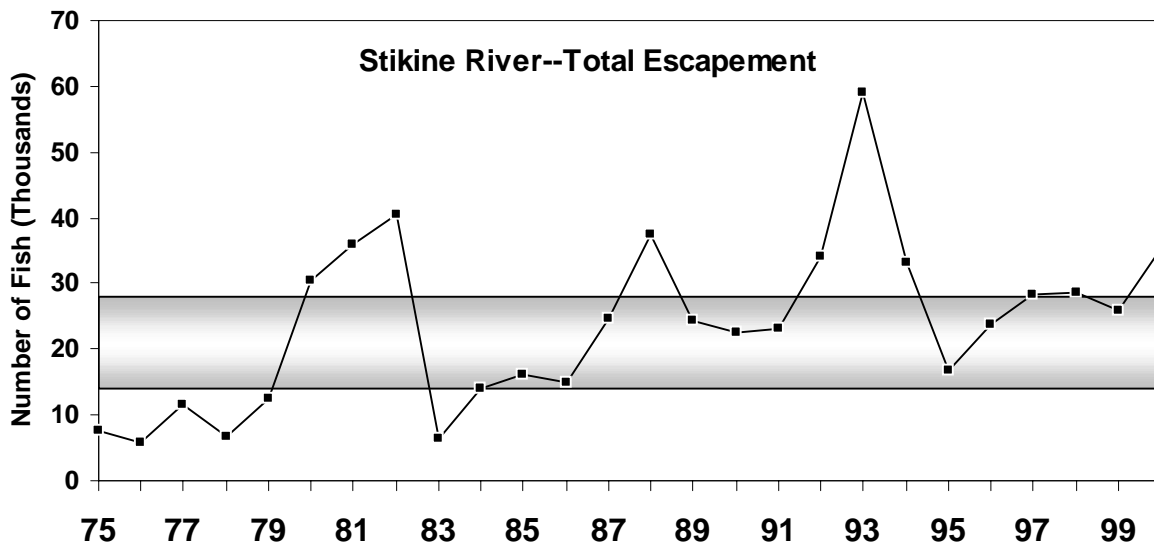
Escapement Methodology: The Taku River is a large, glacial, transboundary river originating in northern British Columbia and flowing into Taku Inlet east of Juneau, Alaska. It supports a large, outside-rearing stock of chinook salmon. Escapements of large fish (above) were estimated with joint U.S.-Canada mark-recapture experiments in 1989, 1990, and 1995-1998. Aerial survey counts in other years were expanded by a factor of 5.2 (McPherson et al. 2000).

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 count in 1952, the highest historical survey count for this tributary. The first system-wide goals were expressed in about 1985 as a range from 25,600 (U.S. estimate) to 30,000 (Canadian estimate), both estimates were based on professional judgement. In 1991, the TTC revisited the goal and agreed on an index goal of 13,200 counted in aerial surveys. This goal was implemented in 1992. All of these earlier goals were based on limited data. Staff of ADF&G and CDFO cooperatively developed a new escapement goal range of 30,000 to 55,000 large spawners (not an index) in an analysis of adult and smolt production completed and accepted by the CTC, ADF&G, CDFO (including PSARC) and the TTC in 1999 (McPherson et al. 2000).

Joint Agency Comments: Estimated harvest rates on this stock range from 5% to 17% (estimated average = 10%) under the current management regime (McPherson et al. 2000),

though these estimates are based on incomplete troll harvest data. Some smolts in 1976-1981 and 1991-1999 were marked with coded-wire tags, which permitted estimation of marine harvests and smolt production. We should continue to obtain better estimates of harvest rates based on joint CWT and mark-recapture data. 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, although incidental harvests occur in other U.S. and Canadian commercial fisheries. Sport fisheries in the U. S. and in Canada target this stock. The Parties are actively developing the background data for potential implementation of an abundance-based management regime for Taku River chinook salmon.

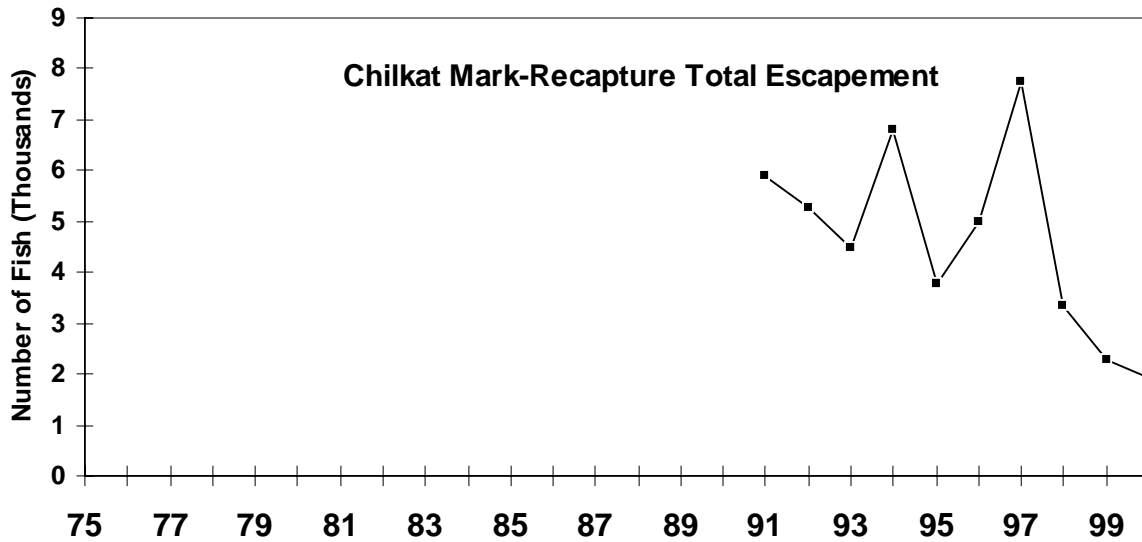
Estimated escapements to the Taku River were within or above the escapement goal range from 1988 through 1998. Estimated escapement in 1997 was 114,938 large fish, the highest on record and was due to exceptionally good survival of the 1991 brood. Production has decreased over the past three years. The estimated escapements in 1998-2000 were 31,039, 20,545, and 30,014, respectively. This drop in escapement was due to exceptionally poor marine survival of the 1993 brood and not due to an increase in exploitation. Since 1990, Taku River escapements have averaged 55,351 large spawners and have only once been below the escapement goal range. The joint ADFG-CDFO assessment is that the Taku River stock is healthy.



Escapement Methodology: The Stikine River is a transboundary river originating in British Columbia and flowing to the sea near Wrangell, Alaska. The Stikine River is a large, glacial river that supports a large, outside-rearing stock of chinook salmon. Escapements have been indexed since 1985 by weir counts from the Little Tahltan River; from 1975-1984, survey counts on the Little Tahltan River provided the index. Since 1996, cooperative studies by ADF&G, CDFO, the Tahltan and Iskut Bands, and NMFS involving mark-recapture experiments, coupled with radio telemetry, were used to estimate abundance (in-river return) in the entire Stikine River watershed. Comparison of aerial counts and counts at the weir against estimates from mark-recapture experiments indicate that Little Tahltan River counts represent 17% to 20% of the total in-river return to the Stikine River (Pahlke and Etherton 1999).

Escapement Goal Basis: In 1981, ADF&G set an index escapement goal at 3,360 large fish, counted from the air over the Little Tahltan River, based upon an aerial count of 2,137 fish in 1980 expanded by a factor of 1.6. The first joint system-wide goal, developed by the TTC in about 1985, was expressed as a range from 19,800 (U.S. estimate) to 25,000 (Canadian estimate) and was in effect through 1991. In 1991, the TTC agreed on an index goal of 5,300 large spawners counted through the Little Tahltan River weir. These earlier goals were all based on limited data. In a cooperative analysis by ADF&G and CDFO, recent results from mark-recapture experiments were used to expand aerial counts and weir counts into in-river returns to the watershed prior to 1996. In 1999, these data along with estimated harvests were used in a stock-recruit analysis to establish an escapement goal range for the Stikine River of 14,000 to 28,000 large chinook salmon (Bernard et al. 2000). This biological escapement goal range has been accepted by the CTC, ADF&G, and the joint TTC.

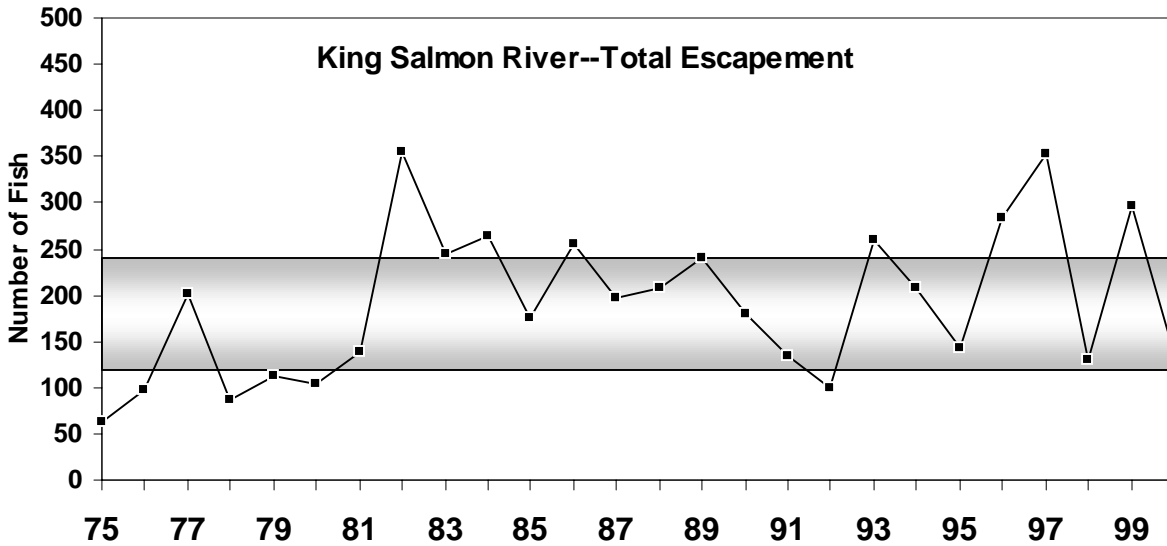
Joint Agency Comments: Under the current management regime, total harvest rates are believed to have ranged from 10% to 33% (estimated average = 18%; Bernard et al. 2000), based on limited data. Prior to the early 1980s, a significant terminal U.S. marine gillnet fishery near the river mouth harvested this stock. Currently, there are no directed U.S. commercial marine fisheries targeting this stock, but incidental harvests occur in some U.S. commercial fisheries. A relatively small U. S. marine sport fishery exploits this stock. In-river harvests occur in Canadian gillnet and aboriginal fisheries. Management agencies have recently embarked on joint programs, CWT and adult mark-recapture, that should provide improved estimates of harvest, escapement, and harvest rates.



Escapement Methodology: The Chilkat River is a glacial system located near Haines, Alaska, that supports a moderate-sized, inside-rearing stock of chinook salmon. Escapements are based on estimates of large spawners from a mark-recapture program. Escapements have been estimated in this program annually since 1991 (Ericksen 2000). From 1975-1992, aerial survey counts were conducted on two small tributaries with relatively clear water; results from these estimates appeared inconsistent. Radio telemetry studies conducted in 1991 and 1992 found that spawners in these two tributaries represented less than 5% of the total escapement and the aerial surveys were discontinued.

Escapement Goal Basis: The 1981 escapement goal was set at 2,000 large fish, based on a guess of the fraction of the total escapement represented by the survey counts. To date, no analysis has been completed with which to judge the efficacy of this agency goal. ADF&G plans to compile available data and present a draft analysis for assessment of an appropriate biologically-based escapement goal range to ADF&G and the CTC for review by fall of 2001.

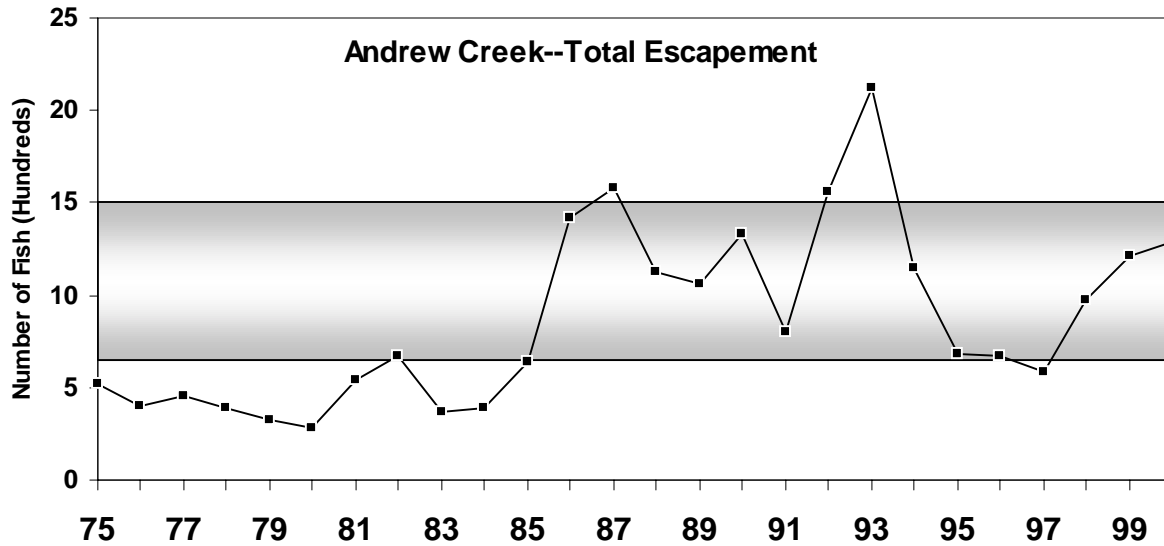
Agency Comments: Relatively small directed U. S. marine sport and in-river subsistence fisheries target this stock. This stock is also caught incidentally in SEAK commercial drift gillnet and troll fisheries. Limited coded-wire tag data for this stock indicate that brood-year exploitation rates are between 10% and 30% at present. During the 10-year period of 1991-2000, the Chilkat River chinook salmon escapements have averaged 4,652 large spawners. Escapements from 1997 to 2000 have averaged 3,821 chinook salmon, ranging from 1,922 in 2000 to 7,728 in 1997. All but one of the escapements since 1991 have been above the 1981 agency goal. Further assessment of this stock is dependent upon development of an escapement goal range based upon the available data. The escapement database for this stock since 1991 is relatively precise with coefficients of variation for annual escapements averaging 15%. Estimates of the number of female spawners and spawners by age are also well above minimum USCTC data standards. The database is limited by the number of years of spawner estimates and by incomplete harvest/exploitation rate data.



Escapement Methodology: The King Salmon River is a small non-glacial 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 and 1993-2000). 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). 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 and has been accepted by the CTC as a biologically-based escapement goal.

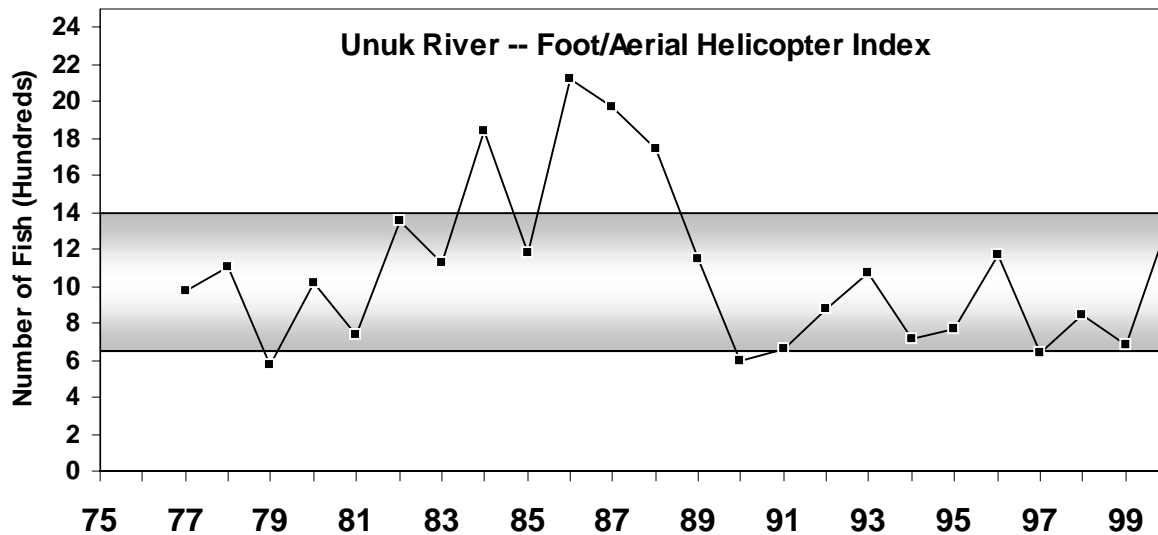
Agency Comments: There is no terminal fishery targeting this stock, though harvests of immature and mature fish occur in SEAK. During the 25 year-period 1975-1996, 13 of the annual escapements were within the 1997 management range, five were below the range and seven exceeded the range. Since 1990, one escapement was below the 1997 range by 17% (1992) and the remaining ten have been within or exceeded the range. The 1997-2000 escapements ranged from 132 to 357 large spawners, with 1997 and 1999 exceeding the escapement goal range and 1998 and 2000 being within the escapement goal range. The ADF&G considers the King Salmon River stock of chinook salmon to be healthy.



Escapement Methodology: Andrew Creek, near Petersburg, Alaska, is a non-glacial U. S. tributary of the lower Stikine River that supports a moderate-sized, inside-rearing stock of chinook salmon. Data shown in the above graph are total estimated escapements of large chinook salmon 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 2000). An expansion factor (1.89 or 1/0.53) was used to expand the survey counts for 1975 and 1985-2000 into estimates of total escapement. Jacks have represented an average of 19% of the weir counts and are not included in the above graph.

Escapement Goal Basis: In the early 1980s, ADF&G set the Andrew Creek chinook salmon escapement goal at 750 large fish total escapement. In 1997, an initial stock-recruit analysis was developed that underwent review by ADF&G and the CTC. This analysis was completed in 1998 and the technical report (Clark, McPherson, and Gaudet 1998) recommended a revised biological escapement goal range of 650 to 1,500 large chinook salmon that was accepted and adopted by the ADF&G and the CTC.

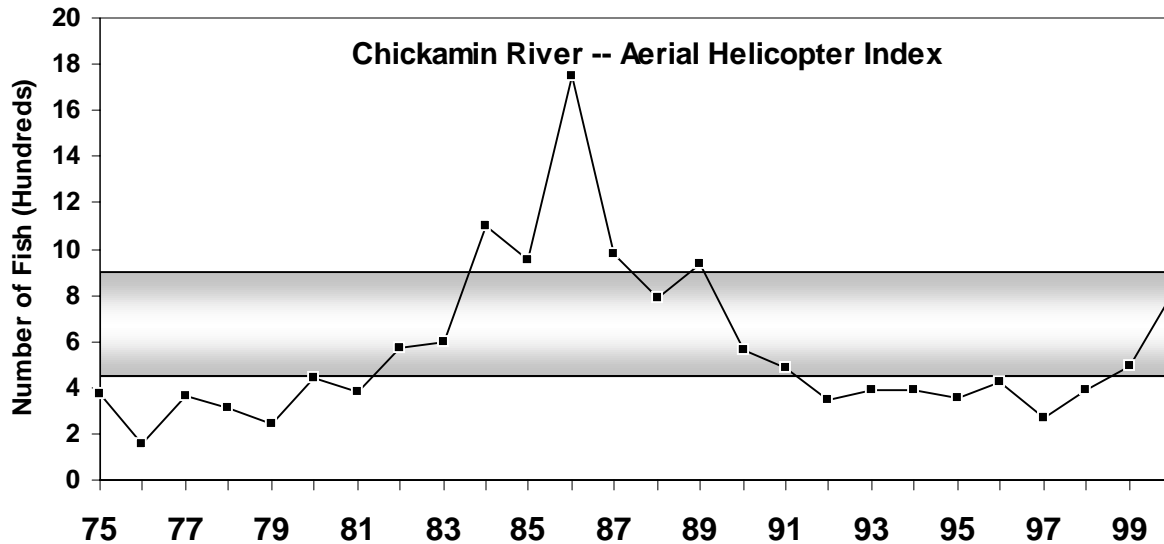
Agency Comments: Historically, a significant, terminal, marine gillnet fishery occurred in the spring, targeting Stikine River and other nearby chinook salmon stocks. Currently, there is no terminal fishery targeting this stock. Harvests of immature and mature fish occur primarily in SEAK and to a small extent in NCBC fisheries, based on CWT recoveries of hatchery chinook salmon from SEAK hatcheries using Andrew Creek brood stock. Escapements since 1986 have all been above the lower end of the biological escapement goal range of 650 to 1,500 except in 1997 when the escapement of 586 chinook salmon represented 90% of the lower end of the biological escapement goal range. The 1998 escapement of 974 chinook salmon was within the escapement goal range and was about 1.5 times the lower end of the escapement goal range. The 1999 escapement of 1,210 chinook salmon was within the escapement goal range and was over 1.8 times the lower end of the escapement goal range. The 2000 escapement of 1,286 chinook salmon was within the escapement goal range and was about double the lower end of the escapement goal range. Escapements since 1990 have averaged 1,124 chinook salmon, over 1.7 times the lower end of the escapement goal range. ADF&G considers the Andrew Creek stock of chinook salmon to be healthy.



Escapement Methodology: The Unuk River empties into Behm Canal near Ketchikan, Alaska, and is a glacial system with non-glacial spawning tributaries which support a moderate-sized, inside-rearing stock of chinook salmon. Reported escapements are indices (peak counts) of large fish from six tributaries using standardized methodology since 1977 (Pahlke 2000). Four mark-recapture studies conducted in 1994 and 1997-1999 found that, on average, 18% of the total escapement is counted during peak surveys (Pahlke et al. 1996; Jones and McPherson 2000). A radio telemetry study in 1994 found that the surveys are conducted in stream reaches where 80% of the spawning occurs. These mark-recapture studies and associated expansion factors will allow conversion of this entire database to total escapement estimates in the near future.

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 accepted. In 1997, ADF&G revised the goal to a range of 650-1,400 large index spawners as recommended in the McPherson and Carlile (1997) report and in compliance with the ADF&G Escapement Goal Policy. The CTC reviewed and accepted this change in 1998.

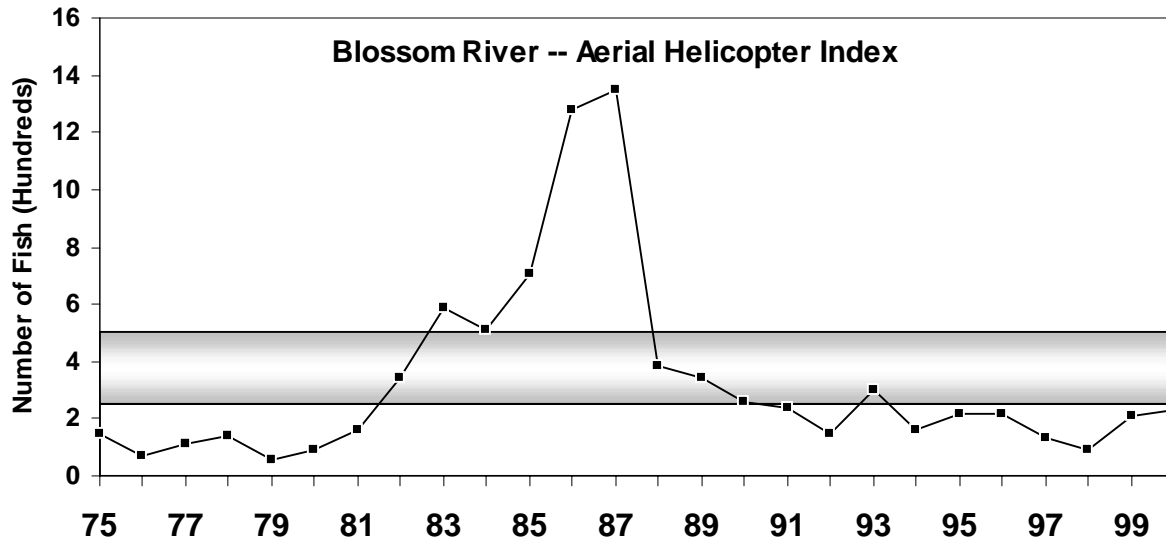
Agency Comments: There is no terminal fishery targeting this stock; harvests of immature and mature fish occur in SEAK and NCBC fisheries. Estimated total exploitation rates average about 20% under current management (McPherson and Carlile 1997). Coded-wire tagging of this stock was conducted for the 1982-1986 (Pahlke 1995) and the 1992-present broods; Unuk wild and hatchery stock tagging both indicate that marine survival decreased through about 1998, relative to levels in the mid-1980s, but that survival has increased for the 1994-1996 broods. In the 23 years since 1977, the index counts been within the escapement goal range, except for four which were above and three which were slightly below the range. The 1997 survey count was 636 (98% of the lower goal level), while counts in 1998-2000 were all within the escapement goal range. ADF&G judges the Unuk stock of chinook salmon to be healthy.



Escapement Methodology: The Chickamin River drains into Behm Canal near Ketchikan, Alaska, and is a glacial system with non-glacial spawning tributaries which support a moderate-sized, inside-rearing stock of chinook salmon. Reported escapements are survey counts of large fish in eight tributaries using standardized methodology (Pahlke 2000). 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 1997). A radio telemetry study in 1996 indicated that the annual surveys are conducted in stream reaches where over 80% of all spawning occurs.

Escapement Goal Basis: In 1981, ADF&G set the escapement goal at 900 large index fish based upon a count of 860 chinook salmon 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 accepted. In 1997, ADF&G revised the goal to 450-900 large index spawners as recommended in the McPherson and Carlile (1997) report and in compliance with the ADF&G Escapement Goal Policy (ADF&G 1997). The CTC reviewed and accepted this change in 1998.

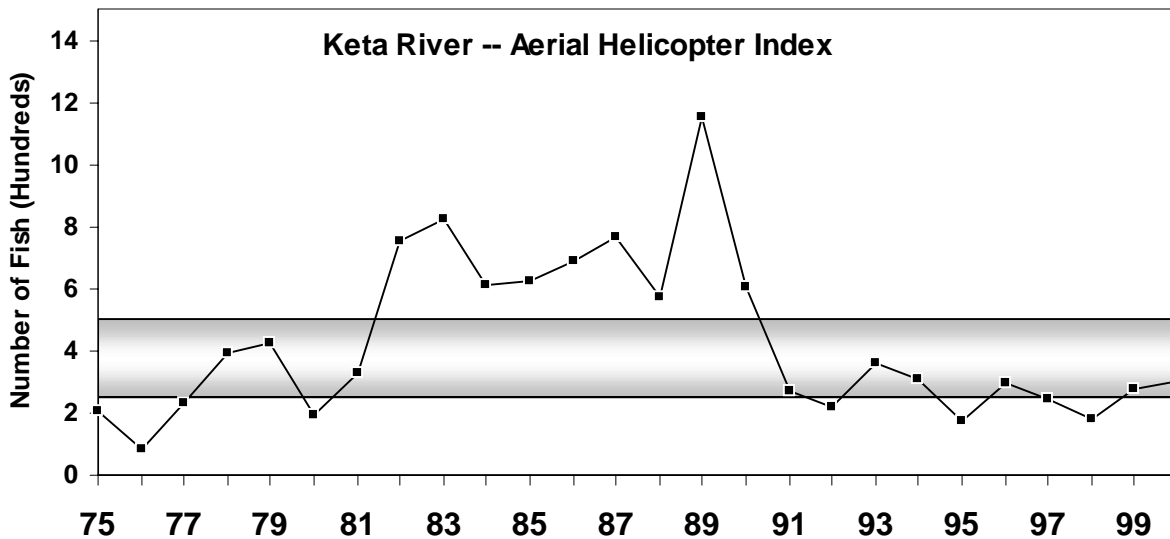
Agency Comments: There is no terminal fishery targeting this stock; harvests of immature and mature fish occur in SEAK and NCBC fisheries. Coded-wire tagging was conducted for the 1982-1986 broods (Pahlke 1995). Estimated total exploitation rates ranged from 35% to 40% under the current management regime (McPherson and Carlile 1997). Between 1975 and 1981, survey 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 limit of the escapement goal range of 900 large fish in five years. The 1992-1998 index counts were all below the escapement goal range, they differed from the lower bound of that range by an average of 15%. The survey count in 1999 was 492 and was within the escapement goal range for the first time in eight years. The escapement in 2000 of 801 large chinook salmon also fell within the escapement goal range of 450-900 large fish. Age composition data collected in 1999 and 2000 as well as coded-wire tag data from the nearby Unuk River indicates that survival and returns are on the increase. ADF&G considers the Chickamin River stock of chinook salmon healthy. However, ADF&G has some concern for this stock because escapements over the past nine years have hovered around the lower bound of the escapement goal range rather than across the entire width of the escapement goal range.



Escapement Methodology: The Blossom River empties into Behm Canal near Ketchikan, Alaska, and is a non-glacial river that supports a small, inside-rearing stock of chinook salmon. Recent studies indicate that about 10% of the annual run is comprised of progeny from under-yearling smolt. Escapements are indices (peak counts) of large fish made by helicopter survey conducted using standardized methodology since 1975 (Pahlke 2000).

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 accepted in 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. This range is ADF&G's most current estimate of maximum sustained yield escapement. The CTC reviewed and accepted this change in 1998.

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, survey counts were below the current escapement 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, with counts averaging 796 fish. This six-year period of larger escapements has been followed by a 13-year period (1988-2000) of reduced, but relatively stable, run abundance. Counts since 1995 have averaged 184 large spawners. The 1997-2000 survey counts ranged from 91 (1998) to 231 fish (2000). In 1998, ADF&G estimated total escapement at 364 large spawners with funding provided by chinook LOA monies. The 1999 and 2000 index counts increased to 212 and 231 fish, respectively, and age composition sampling in the Blossom (and the other three Behm Canal systems) indicate that survival is increasing, judged by the percentage of jacks seen in these samples. Although recent trends are encouraging, ADF&G considers the Blossom River stock of chinook salmon to be a management concern.



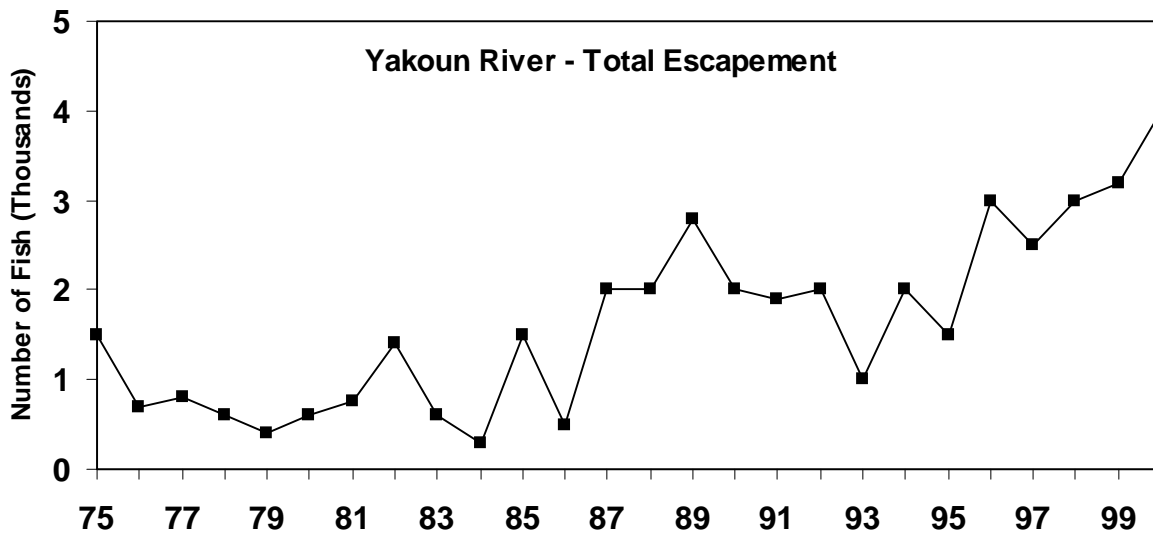
Escapement Methodology: The Keta River is located near Ketchikan and is a non-glacial system which supports a small, inside-rearing stock. Recent studies indicate that about 10% of the annual run is from under-yearling smolt. The escapements are indices (peak counts) of large fish made by helicopter 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 accepted in 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). The CTC reviewed and accepted this change in 1998.

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 survey counts were within or below the goal of 250-500 with the average being 265 large fish. Production from the 1975-1981 escapements was high and survey counts from 1982 to 1990 averaged 734 large fish. This was followed by a ten-year period (1991-2000) of smaller survey counts, averaging 263 large fish. ADF&G believes the reduction was due to reduced marine survival coupled with density dependent mortality (McPherson and Carlile 1997). The 1997-2000 survey counts were 246 (near the lower end of goal), 180 (72% of the lower end), 276 (within goal range), and 300 (within goal range) large spawners. ADF&G estimated total escapements of 446 (1998) and 968 (1999) large spawners in mark-recapture projects funded with chinook LOA funds. These and the year 2000 results will yield an expansion factor that ADF&G believes can be used to develop total escapement estimates for survey counts prior to 1998. Production from the 1995-2000 escapements are expected to be within about 90% of estimated maximum yield. ADF&G judges this stock to be healthy. However, ADF&G has some concern for the stock because escapements during the past nine years have hovered around the lower bound of the goal rather than being spread out within the escapement goal range.

2.3.2 Canadian Stocks

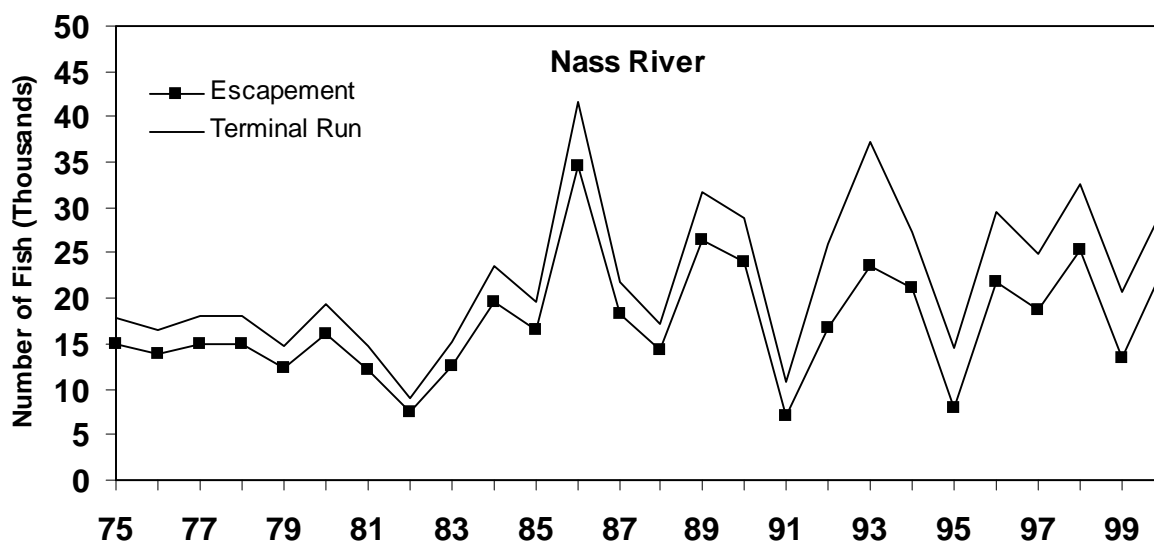
Since the beginning of the chinook rebuilding of the 1985 PST, escapement goals for Canadian chinook stocks are generally based on doubling the average escapements observed between 1979-1982. The doubling was based on the premise that Canadian chinook stocks were overfished and that doubling the escapement 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 expected to be a large enough change in escapements to allow detection of the change in numbers of spawners and the subsequent production. The escapement goals for many of the Canadian indicator stocks are currently being reviewed so that these interim goals may be replaced with goals based on quantitative stock assessments and/or evaluations of habitat capacity.



Escapement Methodology: 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. Visual estimates of escapement are made by 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.

Escapement Goal Basis: There is no CTC agreed escapement goal for this stock.

Agency Comments: The increase in the Yakoun chinook escapements have been attributed to reductions in NBC chinook fisheries. A small enhancement program also exists on the system. Escapement in 2000 continued to increase reaching the highest spawning level observed in this time series.



Escapement Methodology: The Nass River is the Area 3 indicator stock representing a group of approximately 25 streams in the Nass River and Portland Inlet area. These streams extend over a diverse range of habitats and large geographical area. Portland Inlet chinook streams generally have only very small returns. CDFO observations of escapement were based on visual counts, vary considerably between streams and have been inconsistent between years. The escapements used in past escapement analyses represent local fishery managers’ estimates based on stream walks and aerial surveys; the frequency of which were dependent on resource and staff availability and weather.

Since 1992, the Nisga’a Tribal Council has conducted mark-recapture programs to estimate the total spawning escapement in the Nass River. Independent of this but only through 1994, local DFO guardians continued to conduct escapement surveys on individual Area 3 rivers, including the Nass River. After 1994 in the Nass River only, Nisga’a mark-recapture estimates of spawning escapement are available.

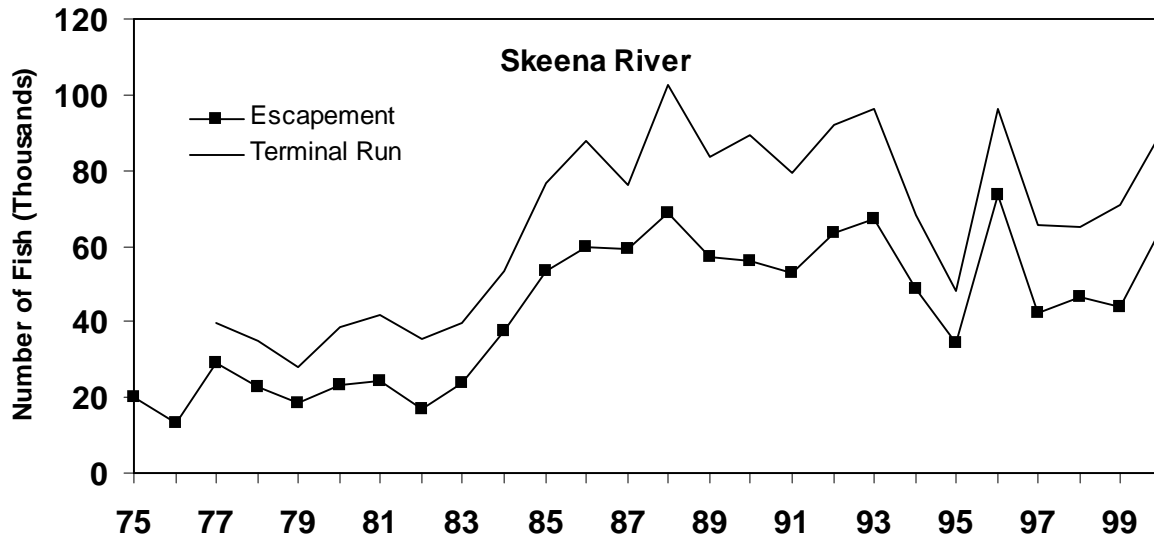
The Nass mark-recapture program uses two fishwheels in the lower Nass canyon to apply tags and two wheels in the upper canyon for recovery. Tags are also recovered in up-river fisheries and on the spawning grounds. A modified Petersen mark-recapture estimator, stratified by size category (500-730 cm nose-fork length (NF), ≥ 731 cm NF), is used to estimate the total population of chinook passing the tagging location. Reports of each year’s program are available from LGL Ltd. (Sidney, BC) or CDFO (e.g., Link and Nass 1999).

Because of these major changes in escapement methodology, the Nisga’a Tribal Council and CDFO have agreed to standardize the escapement time series. The consulting firm LGL Ltd., in conjunction with the Nisga’a Tribal Council, has developed a revised escapement data set using two years (1992-1993) of the CDFO field estimates that overlapped with their radio-tracking and mark-recapture studies. The difference between the two estimates was used to develop a “multiplier” for previous CDFO visual estimates (average expansion was 1.78). Estimates of the terminal run of chinook to the Nass River were similarly derived. The harvest rate in the lower river Native fishery in 1992 and 1993 averaged 35% while fishing seven days per week. Estimates of the historical terminal run assumed the harvest rate in past years was four-sevenths

of 35% since typically fishing was allowed four days per week. The method and data used are documented in the Fisheries Operational Guidelines (FOG, March 9, 2000) that was prepared for the Nisga'a Tripartite Comprehensive Claims Negotiation.

Escapement Goal Basis: There is no CTC agreed escapement goal for this stock. The FOG states two goals for managing fisheries: an operational target escapement of 20,000 chinook on the spawning grounds, and a minimum escapement of 10,000 chinook. If escapements are projected to be below 10,000 chinook, then no fishing on Nass River chinook would be recommended. No biological-basis for an escapement goal has been developed for this system.

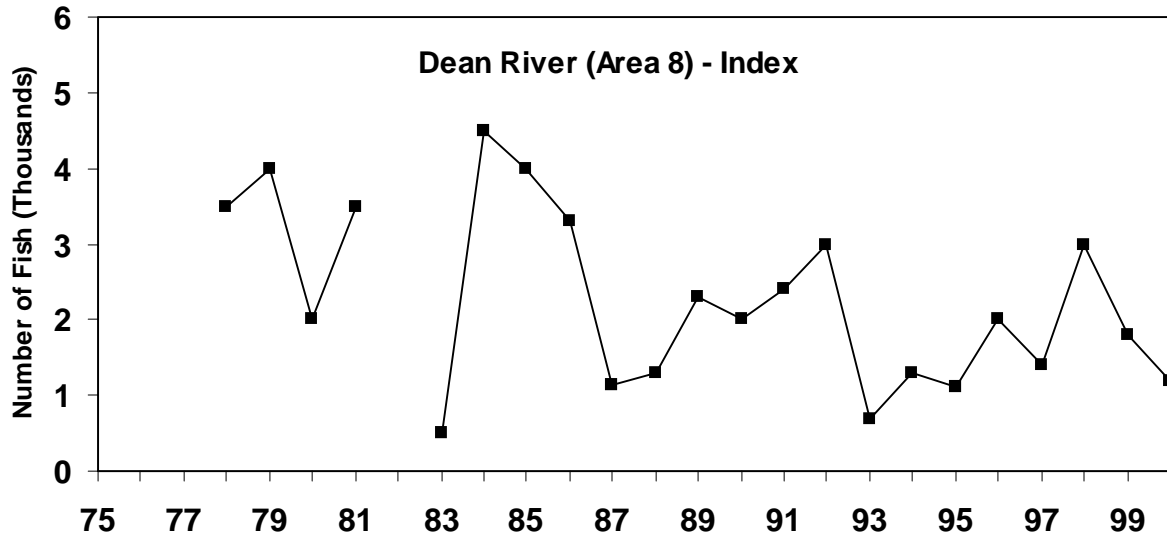
Agency Comments: The Nisga'a Fisheries Working group, including CDFO, has accepted the revised historical escapement and terminal run values for Nass River chinook. **These values have been applied in this report** and will differ from past CTC reports. The data presented only reports escapements and terminal runs into the Nass River and does include the other smaller streams in Area 3 outside of the Nass basin.



Escapement Methodology: The Skeena chinook stock index represents 40 streams which are consistently surveyed. As a system, the Skeena supports over 75 separate chinook spawning populations, but three spawning populations (Kitsumkalum, Morice, and Bear Rivers) account for about 70% of the total spawner abundance. 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 stock. Escapement estimates are generally based on visual observations from helicopter, fixed wing aircraft and/or from stream walking surveys. The Kitsumkalum River, however, is the exploitation rate indicator stock for the Skeena chinook complex. Spawning escapements have been estimated using a mark-recapture program since 1984. Escapement values presented are for total escapement into the Skeena River system.

Escapement Goal Basis: There is no CTC agreed escapement goal for this stock. Biologically-based goals for this complex of chinook spawning populations have not yet been developed. Future assessments will partition this large aggregate into stocks by run-timing and geographic areas.

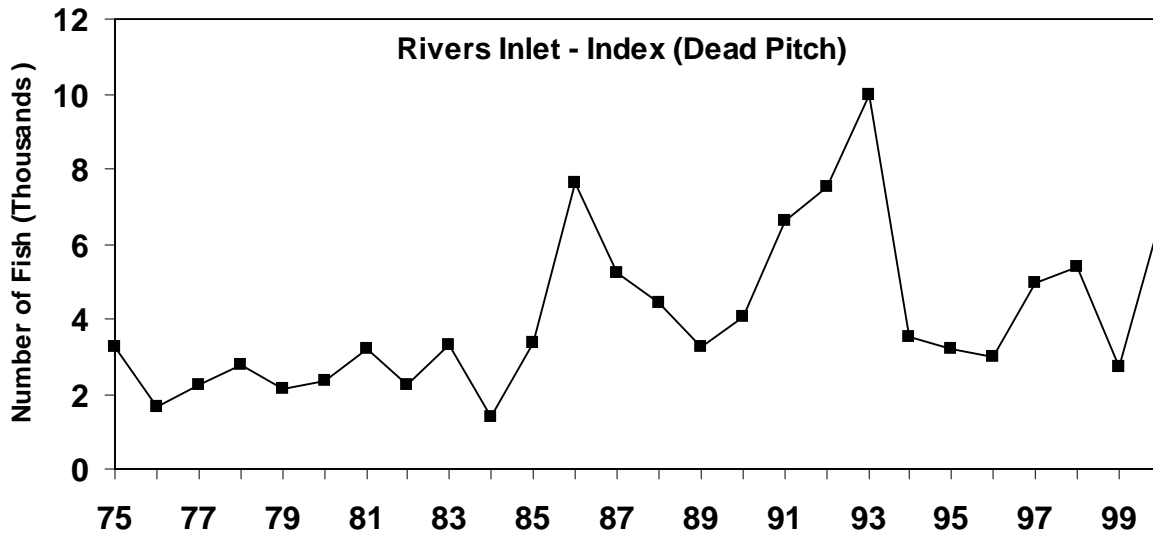
Agency Comments: Since 1995, escapement surveys in the Skeena River have been conducted by a contractual arrangement with a former Fishery Officer, very experienced in escapement enumeration. Escapements to the Skeena between 1997 and 1999 were quite stable but lower than previously observed, even though substantial reductions in the northern troll and net fisheries occurred. However, escapements in 2000 were large (approximately 65,000) and the Skeena test fishery index was a record high value. Terminal catch in the Skeena River includes commercial gillnet catch in the terminal exclusion area (River Gap Slough, Area 4), in-river sport catch, and Native catch. No sport creel surveys were conducted in 2000 (based on past years, 4,000 chinook were included in the total terminal run estimate).



Escapement Methodology: The Area 8 chinook stock consists 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 the best indicator in terms of consistent survey coverage and methodology. Chinook returning to the Dean River have an early summer timing; largely being in the lower river by July. Escapement enumeration in the Dean River has been quite consistent over the past several years and surveys have observed fish distributed throughout the system. Fishing guides operating throughout the lower river monitor spawning activity of chinook. When spawning activity appears to be at peak numbers in late August, helicopter surveys are conducted. Counts of spawning chinook are made by 1-3 surveys and the peak count is used annually as the escapement index. Survey counts may be expanded to sections of the river that could not be surveyed in any year, but the counts are not extrapolated to total escapement of chinook to the river.

Escapement Goal Basis: There is currently no CTC agreed escapement goal for this stock.

Agency Comments: 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 be used to represent stock strength in Area 8. In calculating the interim escapement goal for the Dean River chinook, CDFO applied a doubling of the average escapements from 1979-1981 producing a goal of 6,400 (1982 escapement is unknown). Funds allocated for implementation of the 1999 PST Agreement will be allocated to quantify chinook surveys in the Dean River.



Escapement Methodology: The Wannock, Chuckwalla, and Kilbella Rivers are the primary chinook streams in Area 9 (Rivers Inlet area). Small tributaries of Owikeno Lake also contain chinook but these populations are much smaller. The Wannock River contains the largest chinook population, averaging 5,200 chinook in the 1990s, while the Chuckwalla and Kilbella together, averaged around 300. The Wannock River drains Owikeno Lake, is about six kilometers long, and is wide and turbid. The Chuckwalla and Kilbella rivers are much longer, drain from coastal mountains, and their visibility is much more variable depending on local weather (glacial flour to clear). The timing of these stocks also differs: the Wannock has late summer/fall run timing, the other two are early summer chinook stocks.

Escapement estimates in the Chuckwalla and Kilbella rivers are derived from aerial surveys and brood stock collection programs, whereas Wannock escapement is derived from sampling of carcasses along the spawning area. The number of carcasses sampled is expanded to an estimate of total spawning escapement. Since 1986 documentation has been provided for each expansion, but previous documentation is very limited. Mark recapture programs were conducted in the Wannock River from 1991-1994, but tag recovery proved very difficult. Given the uncertainty in the mark-recapture estimates and to maintain consistency with past years, DFO has maintained the expanded carcass estimates for comparison between years. However, during 1991-1994, it is possible that the greater effort and increased financial support for escapement surveys may have increased the escapement estimated based on carcass sampling.

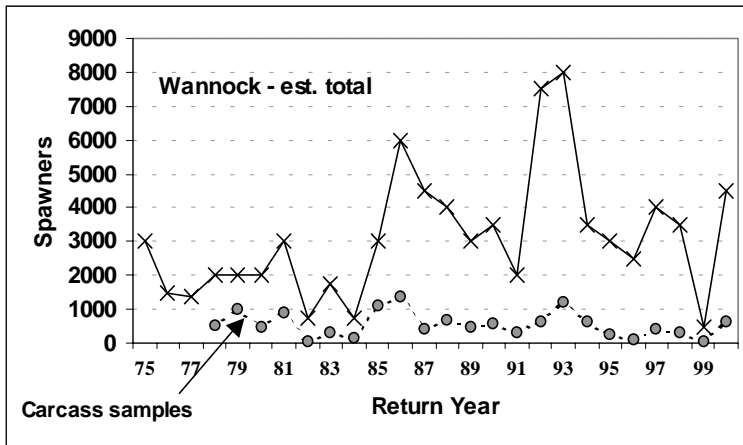
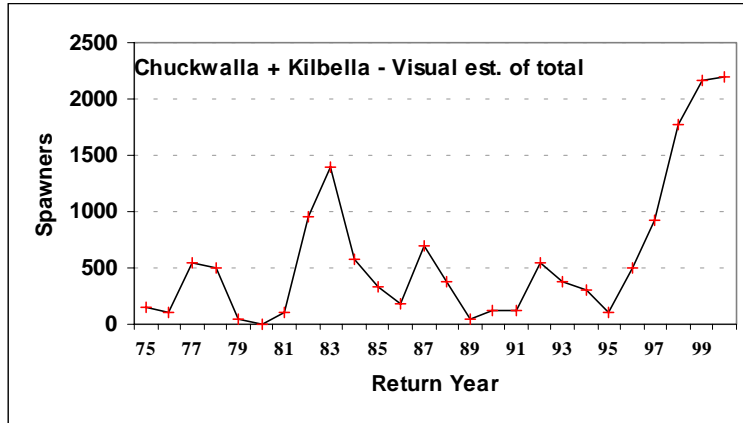
Escapement Goal Basis: There are currently no CTC agreed escapement goals for any of these stocks.

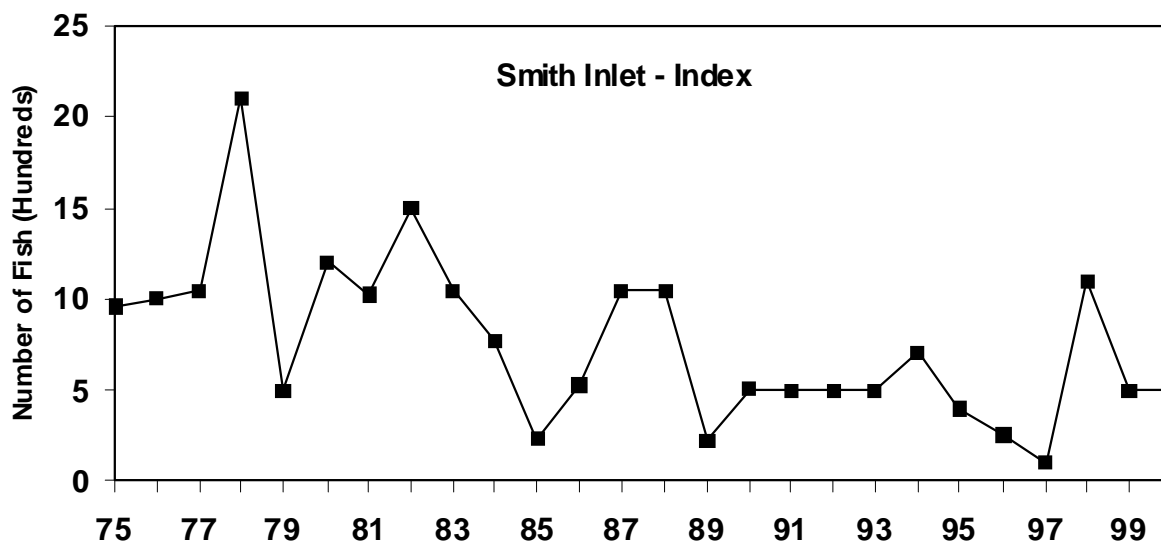
Agency Comments: Escapements to the Chuckwalla and Kilbella Rivers have been increasing in recent years due to improved returns of hatchery fish and reductions to ocean fisheries.

Escapement to the Wannock did not change significantly through 1997 and 1998, but declined sharply in 1999 to an estimated 500 fish. During 2000, the Wannock River chinook stock was a significant conservation concern. Sport fishing restrictions were implemented in the terminal area and new assessment programs were implemented (radio-tagging and mark-recapture

programs). The escapement estimated for 2000 was 4,500 chinook based on carcass sampling and this compares to a preliminary mark-recapture estimate of 7,300 chinook. The Department is continuing to investigate causes of the apparent decline in 1999. Age structure data collected in 2000 is not yet available.

Since these summer (Chuckwalla and Kilbella) and fall (Wannock) chinook are likely to have different ocean exploitation and productivity, separate assessments maybe more accurate than a combined assessment. For example, the increase in recent escapement of spring chinook is dramatic when separated.

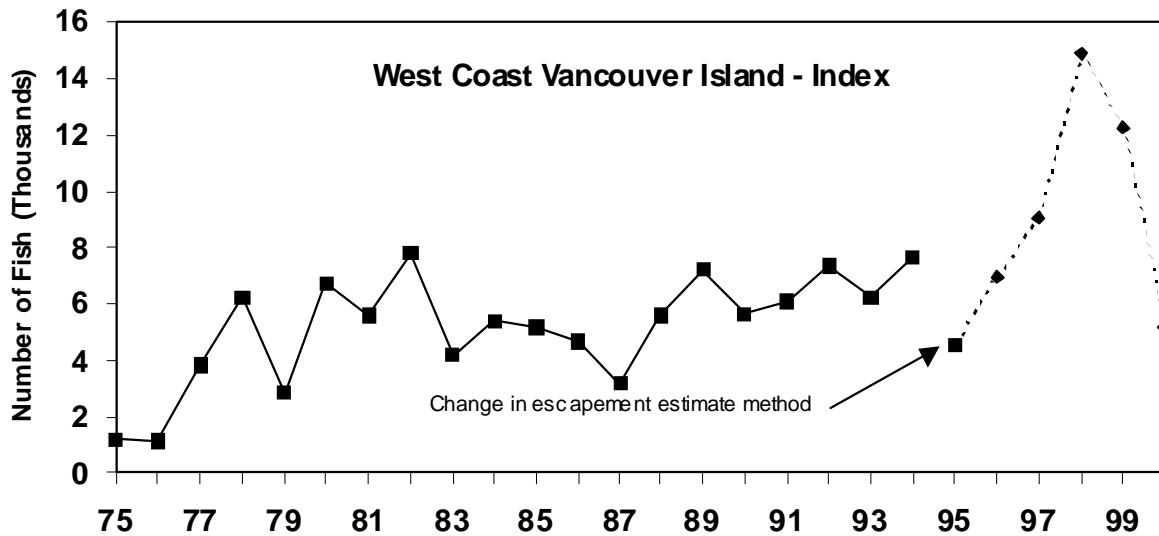




Escapement Methodology: The Docee River is the indicator stock for Area 10 (Smith Inlet) chinook. The river is very short (0.8 km) draining Long Lake into an arm of Smith Inlet. A sockeye salmon counting fence is located at the outlet of the lake but chinook primarily spawn below the fence and their run timing extends past the period of sockeye counts. Chinook move into the river during the beginning of August and spawn in a short reach of the river (approximately 0.5 km in length) below the lake outlet. The river is difficult to survey due to remote access and poor visibility. Escapement survey methods have not been consistent and their accuracy is likely poor.

Escapement Goal Basis: There are currently no CTC agreed escapement goals for any of these stocks.

Agency Comments: Due to inconsistencies of escapement surveys and estimation, the trend of escapements in this river is highly uncertain. CDFO has been unable to standardize the available data due to limited documentation of surveys. Field staff have recommended against maintaining the fence as a chinook assessment tool as only a small portion of the chinook are likely to pass the fence site. Further, the fence may interfere with movement of chinook on the spawning grounds and may provide a site for seals to concentrate the fish. The Department is currently assessing whether chinook escapement in the Docee River is a worthwhile PSC stock “indicator.” The historical data is highly uncertain and accurate escapement assessments would be very expensive for a small population.



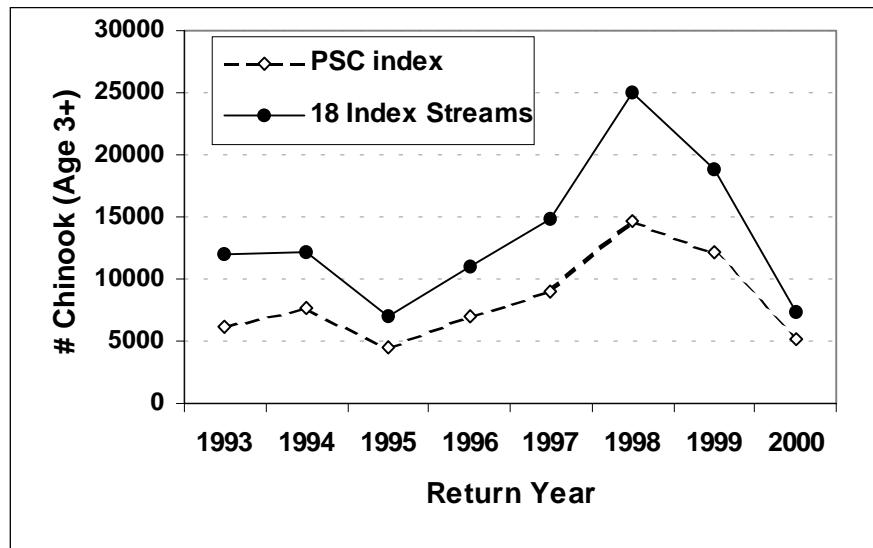
Escapement Methodology: The WCVI indicator stock is an aggregate of seven rivers (Marble, Tahsis, Gold, Burman, Artlish, Kaouk, and Tahsish) chosen by assessing historic data for consistency of surveys. The assessment also showed increased reliability of surveys through time (a combination of more surveys and better timing and methods) and in those systems associated with enhancement. Survey methods consist mainly of walks in lower reaches (greater frequency of use in early years), helicopter over-flights at key spawning periods, and snorkel surveys. More intensive and systematic surveys, based mainly on snorkel swims, were introduced in 1995. Estimates since 1995 have been based on multiple surveys per stream, conducted by trained crews, and Area-Under-the-Curve estimation of total escapement. These estimates are more reliable and are likely to account for a higher portion of the actual escapements. Escapement values presented include the estimated total number of natural spawners in the systems plus the brood stock removed for the small enhancement programs in some streams.

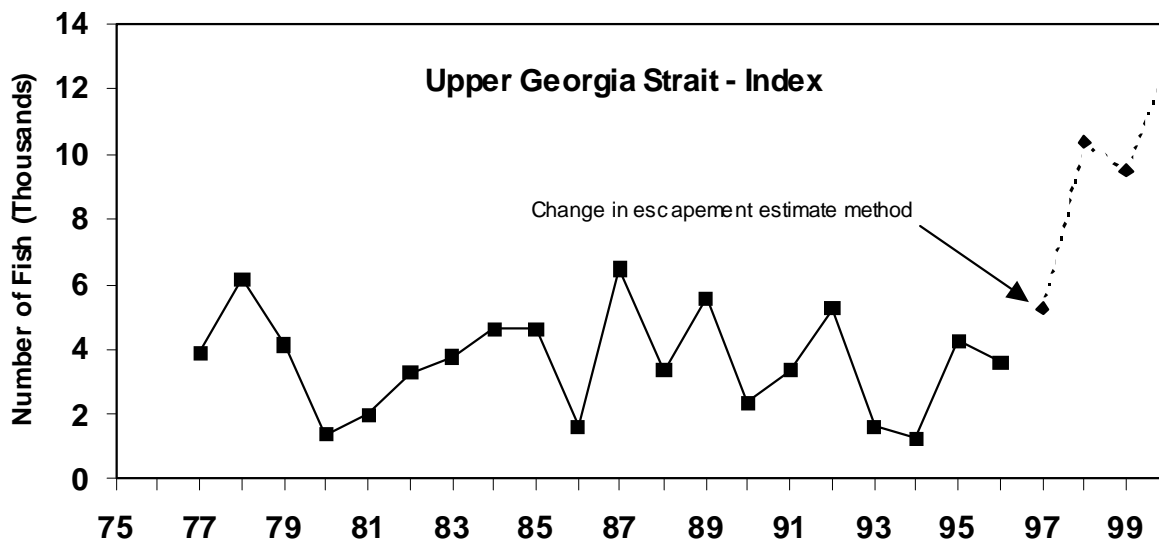
Escapement Goal Basis: There is currently no CTC agreed escapement goal for this stock group.

Agency Comments: The Department notes the need for biologically based escapement goals for individual populations in this stock group. CDFO has been working to develop habitat-based escapement goals for some of these individual rivers. Further, the number of rivers surveyed annually has been expanded. 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 27 streams distributed throughout the WCVI. In total, 22 streams are now monitored with a consistent survey method.

The increased escapement between 1997 and 1999 resulted from a strong 1994 brood year but returns from subsequent broods have been poor. The terminal run forecast for the Robertson Creek Hatchery (RCH) indicator stock in 2000 was expected to be the lowest return of hatchery and wild fish since the establishment of the hatchery during the early 1970s. The spawning escapement to the RCH/Somass stock in 2000 only reached 6,300 total adults (below forecast). However, the return of age-2 males (jack chinook; 1998 brood) was substantially stronger than recent years.

The decline in escapements was also observed in the other WCVI hatcheries and natural populations. Relative to 1999, the escapements estimated in the natural populations declined by 60% in 2000 (see figure below). The figure below compares the 7-stream PSC index with an expanded set of streams that include the PSC streams. The expected return of females in 2001 will be even less than in 2000 but the numbers of small males should begin to increase as the 1998 brood production returns.





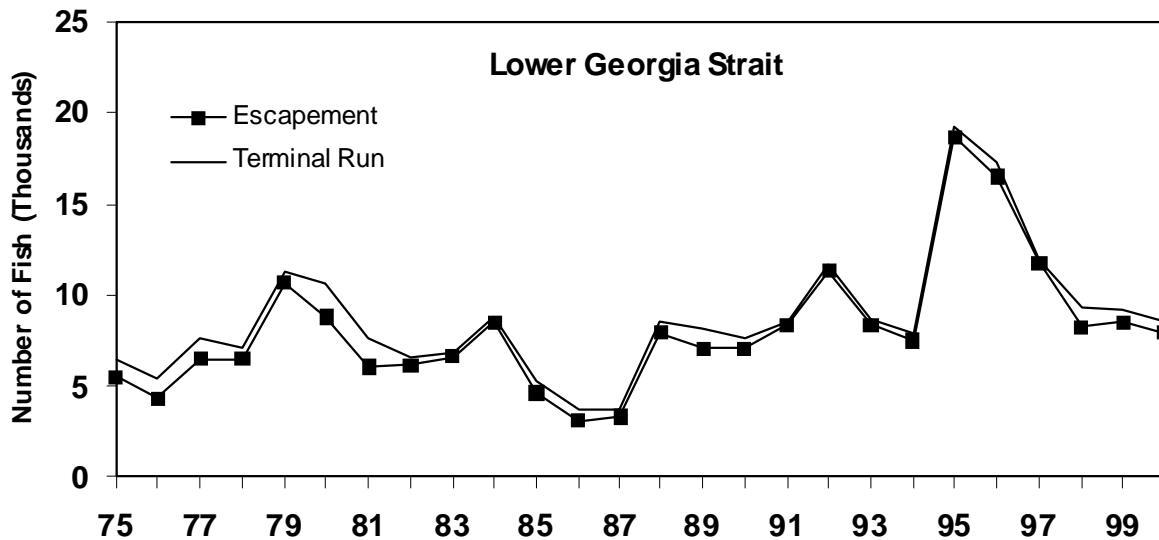
Escapement Methodology: The UGS stock index consists of four river systems (Klinaklini, Kakweiken, Wakeman, Kingcome) in Johnstone Strait mainland inlets and the Nimpkish River on northeast Vancouver Island. The accuracy of escapement estimates in the mainland inlet systems is likely poor due to their glacial nature and remote access. Escapement estimates have primarily been based on aerial counts. Swim surveys and stream walks have been conducted in the Nimpkish River.

Klinaklini: An intensive assessment program on the Klinaklini system began in 1997 with a fishwheel on the mainstem and a fence on Devereux Creek. Fish captured at the fishwheel are tagged and released to estimate efficiency of the wheel and total escapement. Escapement estimates for the system are based on expanded fishwheel catch and counts at the fence. Prior to 1997 only aerial surveys (two flights over lower Devereux Creek and Dice Creek) were used to assess the system. From our experience on these flights we could only see a limited amount of spawners that typically hold in clear pools early in the season. Since 1997, escapement estimates have dramatically increased due to the new methods.

Nimpkish: A more structured assessment program for the Nimpkish system was also established in 1997. The hatchery had been conducting swims and broodstock capture for several years but had not established an assessment program or documented methods. In 1997 these programs were reviewed. Since then escapement estimates have changed little but the confidence of these estimates has improved dramatically.

Escapement Goal Basis: There is currently no CTC agreed escapement goal for this stock group.

Agency Comments: Assessment of stock status is highly uncertain. Recent increases in escapements are likely to reflect improved estimation of escapements and reduced fishing impacts. Differences in ocean distributions and run timing indicate that future assessments should separate the mainland inlet systems from the Nimpkish chinook.



Escapement Methodology: LGS rivers monitored for naturally spawning chinook escapement are the Cowichan and Nanaimo rivers. Prior to 1989, escapement estimates from the Cowichan River, were derived from swim surveys and overflights 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. While the accuracy of these estimation procedures will vary, total chinook returns to the Cowichan and Nanaimo rivers have been estimated since 1975. Chinook return to the Cowichan River in late summer and fall but chinook return to the Nanaimo River in early summer and then a separate fall run. The Nanaimo spring/summer run is smaller than the fall component.

Escapement Goal Basis: There is no CTC agreed escapement goal for this stock. A recent assessment of the Cowichan chinook stock suggests a biologically based goal for the naturally spawning component of 7,400 chinook. CDFO will present documentation of this assessment and a goal for both the Cowichan and Nanaimo chinook.

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. Recovery of the Nanaimo fall population has not been as successful as in the Cowichan. There is a smaller hatchery on the Nanaimo River, but survival of this hatchery stock has usually been lower than for the Cowichan chinook.

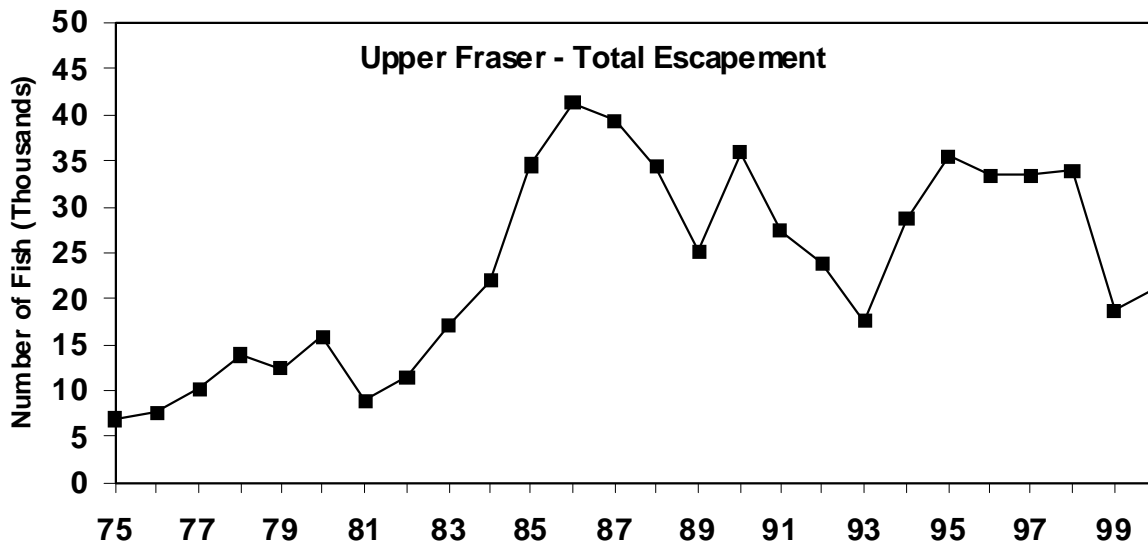
Recent reductions in the LGS chinook escapements likely result from reduced marine survival noted since the 1991 brood year on Cowichan hatchery chinook. However, reduced exploitation rates on this stock (by approximately 50%) are compensating for this reduced survival (Riddell et al. 2000).

2.3.3 Fraser River Stocks

The Fraser River watershed is the largest Canadian producer of chinook salmon. Fraser chinook are comprised of a large number of local populations. For management purposes, they are divided into four major geographical stock complexes, and/or three timing groups. The geographical stock strata are: upper Fraser (those upstream of Prince George and including Nechako), middle Fraser (downstream of Prince George but excluding the Thompson), the Thompson, and the lower Fraser. The timing groups are categorized into three seasonal runs. The early or spring run migrates through the lower Fraser River before July 15 and summer run migrates through the lower Fraser between July 15 and September 1. Fall chinook salmon (Fraser Late stock) are white-fleshed chinook from the Harrison River stock entering the river after early August.

Much of our understanding of the status of Fraser chinook is based on spawner escapement data. Most data are from visual surveys, which are generally biased to low counts although many estimates are considered to be reasonably precise. Visual survey data are generated from aerial over-flight surveys and the escapement estimate is usually obtained by dividing the peak count by 0.65 (Farwell et al. 1999). The Department is currently evaluating the appropriateness of this expansion factor. Counting fences and mark-recapture projects exist for some systems, although most of these time series of escapement data are relatively short.

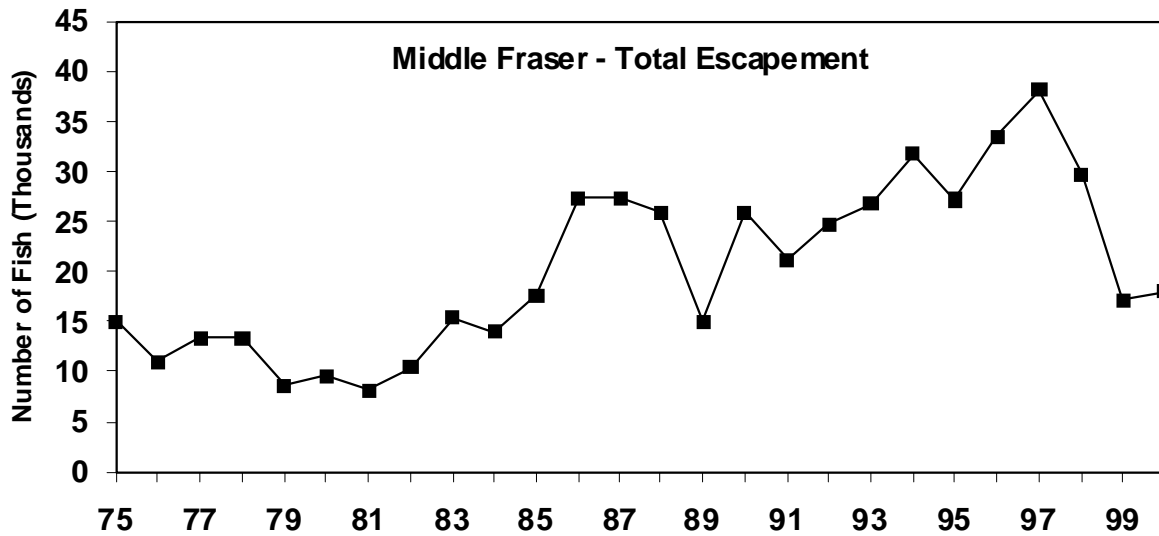
Interim chinook escapement goals developed for the 1985 PST were generally twice the average escapement from 1979 to 1982. A revised escapement goal for the Harrison stock has been proposed and is currently under review. For other populations within the Fraser watershed, habitat-based models are being developed to estimate spawning capacity. This habitat-based assessment will initially focus on spawning habitat, although approaches that relate limited juvenile rearing habitat will also be considered.



Escapement Methodology: The Upper Fraser stock complex 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. In recent years, mark-recapture estimates were produced for the Stuart River, area-under-the-curve estimates for the Nechako, and fence counts for recent years at the Salmon River (Prince George). Estimates for most other systems were generated from aerial over-flight data by dividing the peak count by 0.65. Chinook in the upper Fraser are predominantly stream-type, spending one year in freshwater before migrating to the sea. Most chinook in the Upper Fraser stock have a spring run-timing but summer stocks also exist.

Escapement Goal Basis: There is currently no CTC agreed escapement goal for this stock group.

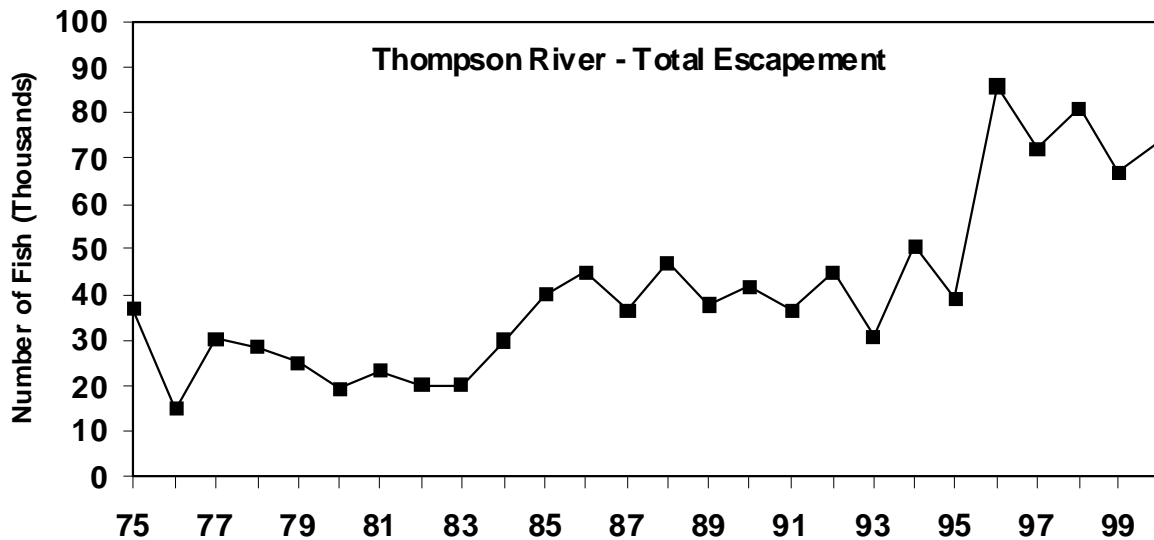
Agency Comments: The Department is currently assessing the returns of early spring components of this stock group. An assessment of Upper Fraser spring chinook will be presented to PSARC in the spring of 2001. In addition to the populations noted above, one of the earliest returning populations is the Birkenhead River chinook stock (headwaters of Harrison Lake in the lower Fraser). A small enhancement program exists on the Birkenhead but escapements have recently declined to a couple of hundred spawners.



Escapement Methodology: The Middle Fraser stock group includes 12 populations downstream of Prince George including chinook from the Chilko, Chilcotin, and Quesnel River systems. Escapement estimates are generated from aerial over-flight data by dividing the peak count by 0.65. Chinook in the Middle Fraser stock are a mix of spring and summer run-timing.

Escapement Goal Basis: There is currently no CTC agreed escapement goal for this stock group.

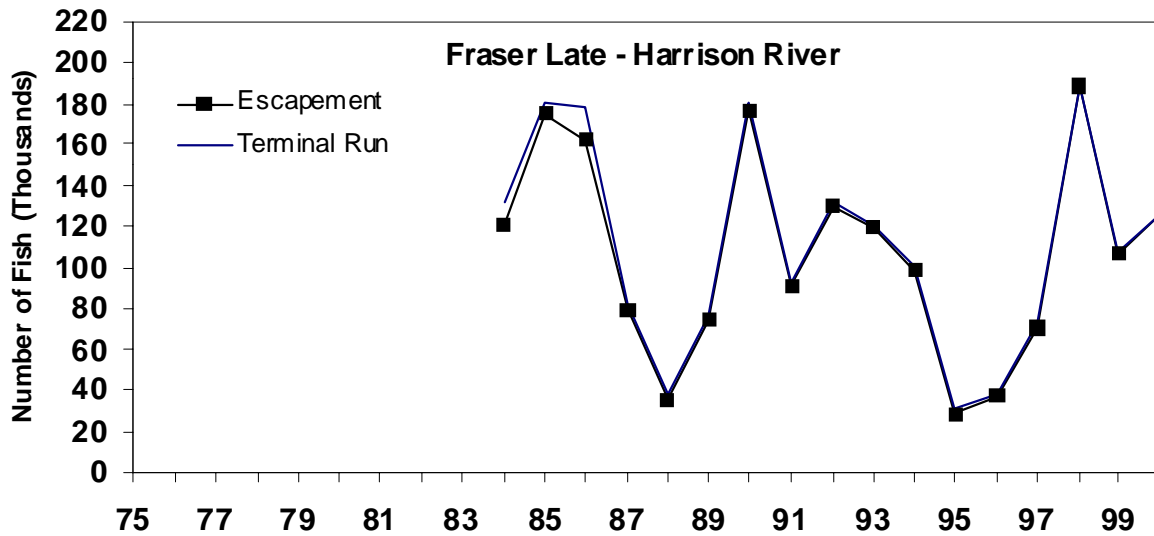
Agency Comments: For most years since 1985, the Middle Fraser stock aggregate was above the interim CTC rebuilding goal. However, DFO staff are concerned about the recent downward trend in the escapement data for this stock aggregate. Low spawner estimates have been recorded for some early timed populations including the upper Chilcotin.



Escapement Methodology: The Thompson River stock aggregate include chinook 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. Most escapement estimates are produced by expanding peak visual survey counts (as in previous two Fraser stock complexes) but counting fences are used in the Salmon and Deadman rivers (resistivity counter used in Deadman in 1999 and 2000). Further, the Nicola and lower Shuswap watersheds are sites for detailed experimental studies examining statistical properties associated with escapement data collected using a variety of approaches.

Escapement Goal Basis: There is currently no CTC agreed escapement goal for this stock group.

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 spring and summer. Recent fishery reductions, designed in part to conserve interior Fraser watershed coho and sockeye salmon, have benefited summer runs of Thompson River chinook. However, low spawner estimates have been recorded for some early components of the spring timing group including Spius Creek and Coldwater River fish.



Escapement Methodology: The lower Fraser stock is dominated by fall returning Harrison-origin chinook which include natural spawners in the Harrison River and Harrison-origin fish that were introduced to the Chilliwack River. In 1984, the Harrison River population was selected as an escapement indicator stock for assessment of chinook rebuilding. Since then mark-recapture studies have been conducted annually 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. Comparison of visual-based estimates with mark-recapture estimates of spawning escapements to the Harrison River indicate that quantitative estimates maybe 4-8 times larger than the visual estimates.

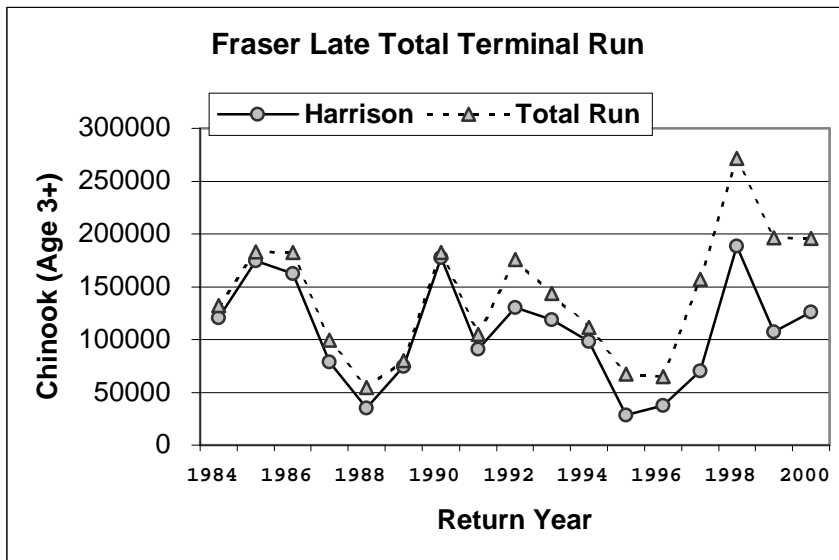
Escapement Goal Basis: There is currently no CTC agreed escapement goal for the Harrison River population. The escapement goal for this stock is under review using a stock-recruitment analysis based on the Harrison escapement data and exploitation rates determined for the Harrison stock reared at the Chilliwack Hatchery. While not finalised, the revised goal is expected to be about one-half of the interim rebuilding goal of 242,000. 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 average adult escapement during 1984-2000 was approximately 104,000 chinook (age 3 and older).

Agency Comments: Harrison River chinook are white fleshed fish that return to spawn during fall. 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. The Harrison River stock is one of the largest naturally spawning chinook populations in the world and makes important contributions to fisheries in the Strait of Georgia, southern BC, and upper Washington State.

The preliminary estimate of the 2000 Harrison River escapement is 125,850 chinook (age 3 and older) plus about 20,000 age-2 male chinook. Further, total terminal runs of white chinook to the Fraser also include returns to the Chilliwack River and hatchery.

The preliminary estimate of the 2000 Chilliwack return of fall chinook is 69,700 (age 3 and older) and also had a large return (15, 700) age-2 male chinook. The increasing importance of Harrison-origin chinook produced in the Chilliwack system is evident in the total (terminal) run of white chinook in the figure below. “Total Run” in the figure below is the sum of the Harrison River return plus the Chilliwack River return, including terminal catches and spawning escapement.

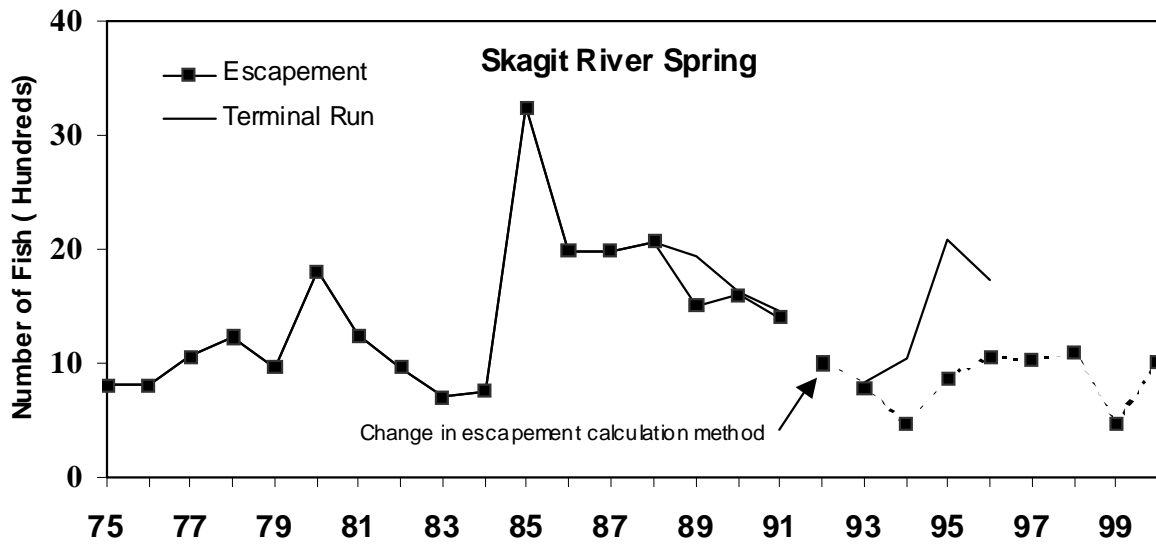
In 2000, a new mark recapture project was implemented in the Chilliwack River system to quantitatively estimate the escapement of fall chinook and to provide an exploitation rate indicator stock to associate with the Harrison escapement data.



2.3.4 Washington, Oregon and Columbia River Stocks

The PSC escapement indicator stocks in Washington, Oregon, and Idaho are separated into five groups: Puget Sound, Washington Coastal, Columbia River, North Oregon Coastal, and Mid Oregon Coastal. The indicator stocks include a variety of run timings and ocean distributions. In general, the marine catch of Puget Sound spring and fall stocks occurs in Puget Sound, Strait of Georgia, and the West Coast of Vancouver Island. Washington Coastal and Columbia River summer and fall stocks marine catch occurs primarily in West Coast Vancouver Island, North/Central British Columbia, and Southeast Alaska. The ocean migration of Columbia River and Washington Coastal spring stocks is largely unknown. Few Columbia Upriver Spring CWT recoveries occurred in ocean fisheries; Washington Coastal spring stocks have been infrequently tagged. Both Oregon groups are falls, with the Northern group migrating to far northern fisheries, while the Middle group migration is more southerly.

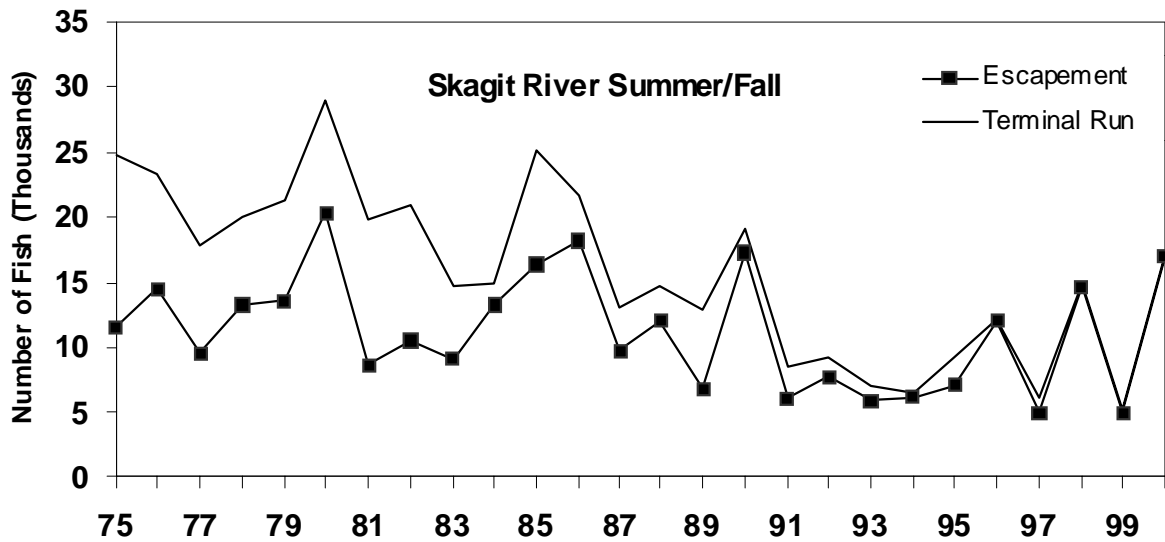
Biologically based escapement goals have been reviewed and accepted by the CTC for three North Oregon Coastal (Nehalem, Siletz, and Siuslaw) stocks and two Columbia River stocks (Lewis River and Columbia River Summers).



Escapement Methodology: The Skagit River drains into northern Puget Sound near Mount Vernon, and is the largest drainage basin in Puget Sound. It supports three stocks of spring chinook, which utilize the upper Sauk, Suiattle, and upper Cascade rivers. 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: There is currently no CTC agreed escapement goal for this escapement indicator stock.

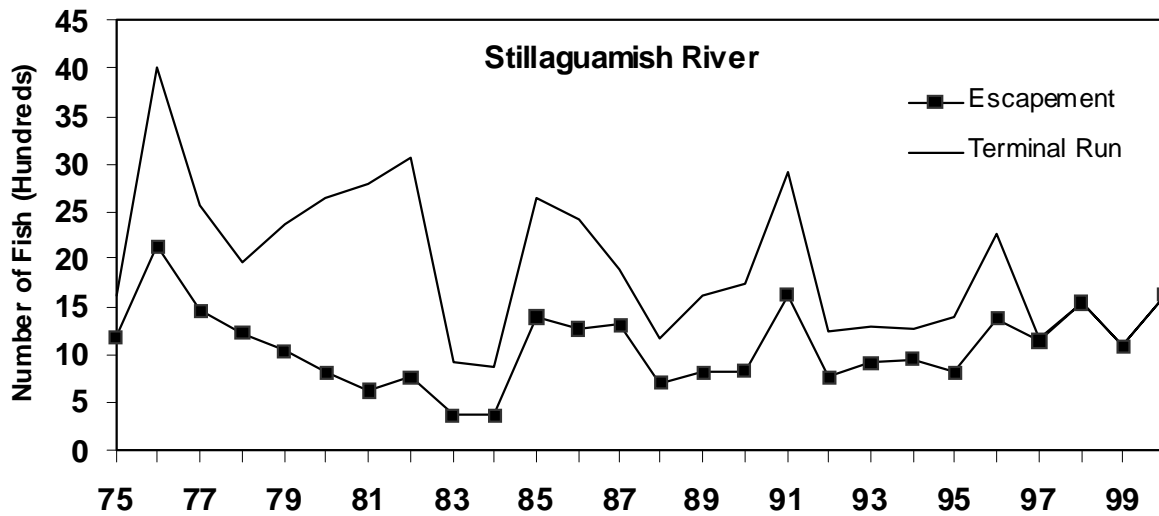
Agency Comments: Due to changes in spawning index areas, beginning in 1992 for the Cascade stock and 1994 for the other two, escapements are calculated differently and not directly comparable to previous numbers. There is no production supplementation program for Skagit River spring chinook. However, each year, wild broodstock are collected, spawned, and 150,000 yearling spring chinook are released with coded-wire tags. The state-tribal escapement goal of 3,000 adults is the average of the estimated escapements from 1959-1968 (PFMC 1997a).



Escapement Methodology: The Skagit River drains into northern Puget Sound near Mount Vernon, and is the largest drainage basin in Puget Sound. It supports two stocks of summer chinook (Upper Skagit and Lower Sauk rivers) and one stock of fall chinook (Lower Skagit). The summer/fall chinook total escapements are estimated annually from redd counts made using 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: There is currently no CTC agreed escapement goal for this group.

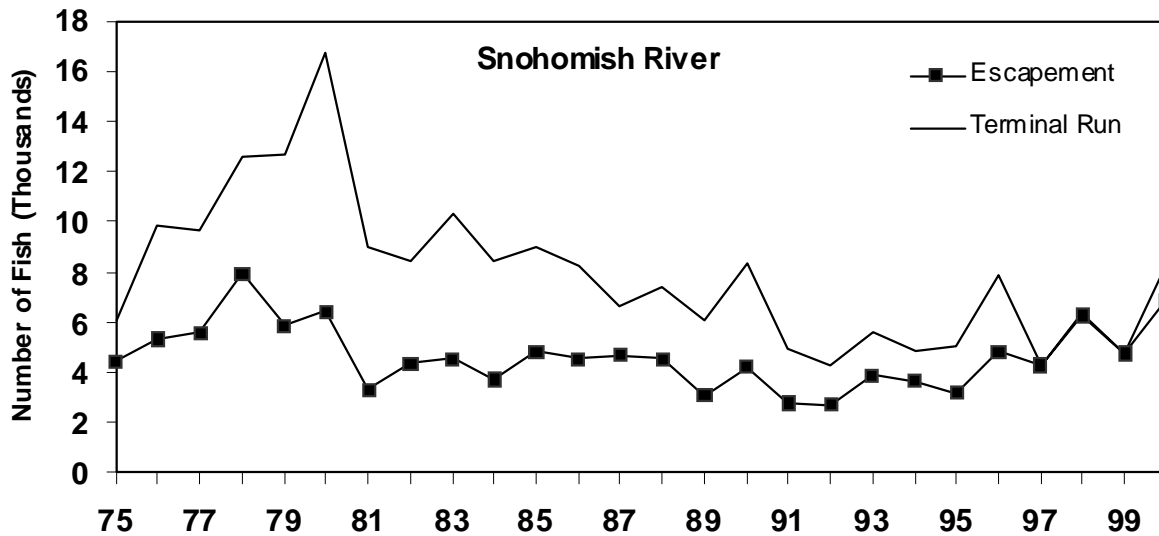
Agency Comments: Efforts are currently being funded through the USCTC to improve escapement estimates of Skagit summer/fall chinook including: development of variance estimates, determination of age and sex composition of the escapement, and evaluation of the 21-day redd life assumption and 2.5 fish/redd expansion value. The state-tribal escapement goal for this stock is 14,850, the average of the 1965-1976 escapements (Ames and Phinney 1977).



Escapement Methodology: The Stillaguamish River drains into northern Puget Sound between Everett and Mount Vernon. A stock of summer chinook utilizes the North Fork, while a stock of fall chinook spawns in the South Fork, the mainstem, and several tributaries. Total escapements in the mainstem 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.

Escapement Goal Basis: There is currently no CTC agreed escapement goal for this escapement indicator stock.

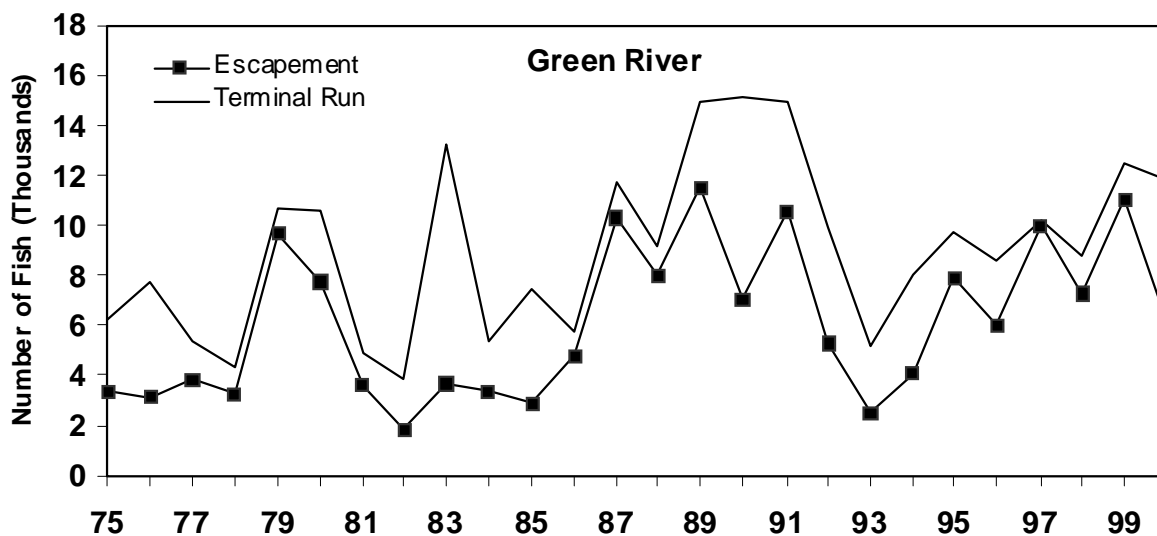
Agency Comments: Broodstock are collected annually in the river for the purpose of maintaining a coded-wire tag indicator stock program and to augment production. From 1989 to 1996, approximately 35% of the escapement has been comprised of returns from this program. Efforts are currently underway with funding provided by the USCTC to evaluate the assumed value for redd life of 21 days. The state-tribal escapement goal of 2,000 fish is the average of the 1973-1976 escapements (Ames and Phinney 1977).



Escapement Methodology: The Snohomish River is located in northern Puget Sound near Everett. It supports at least three stocks of summer and fall chinook; the mainstem, the Skykomish and Snoqualmie rivers. In most areas of the Snohomish River, summer/fall chinook total escapements are estimated annually from redd counts made by 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 (USCTC 1997-1).

Escapement Goal Basis: There is currently no CTC agreed escapement goal for this stock.

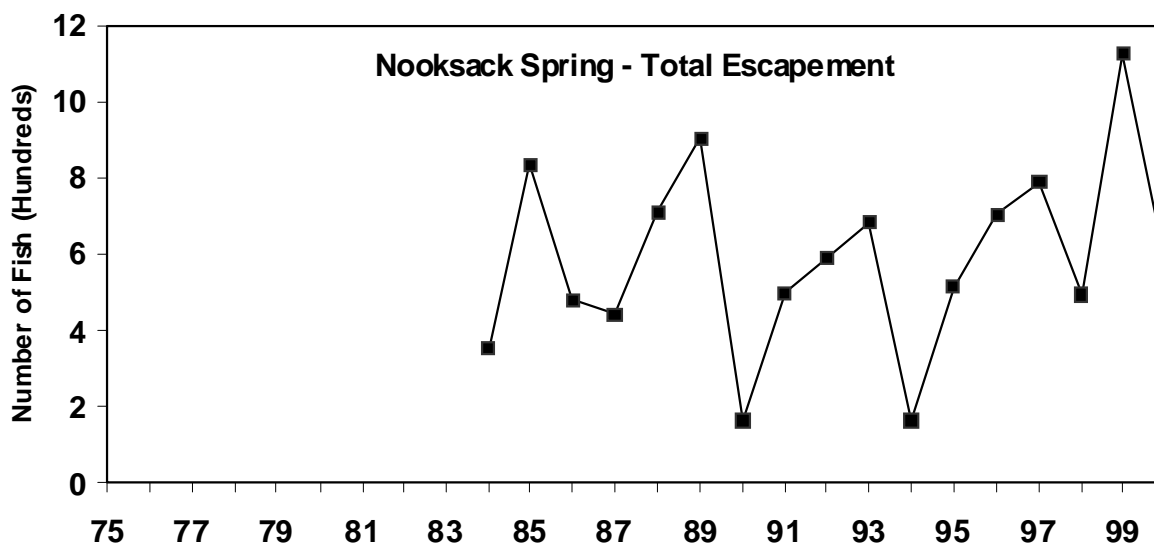
Agency Comments: Some terminal area harvest of Snohomish River chinook occurs in Area 8 incidental to net/sport fisheries targeting Tulalip Hatchery chinook salmon. Reported Snohomish terminal run size and catches derived from run reconstruction are being revised to reflect results of otolith marking studies. Efforts are currently underway to improve escapement estimates including the validity of the 21-day redd life assumption and 2.5 fish/redd expansion value. The state-tribal escapement goal for this stock is 5,250 fish (the average of the 1965-1976 escapements), and is described as a maximum sustained production goal (PFMC Salmon Framework Plan Amendment 14).



Escapement Methodology: The Green River flows through Seattle into central Puget Sound. The basin has few tributaries available to anadromous fish; the only one with significant natural chinook spawning is Newaukem Creek. Total escapement to the Green River system is estimated from a combination of aerial and float counts of redds in index and supplemental areas in the mainstem, combined with foot surveys in Newaukem Creek. Escapement estimation using cumulative redd counts assumes a 21-day redd life and 2.5 adult spawners for each redd (Ames and Phinney 1977). These estimates are then expanded to account for unsurveyed spawning areas in the mainstem. Finally, these estimates are added to the estimated numbers of naturally spawning hatchery-origin chinook in Soos Creek derived from carcass counts to compute the total escapement estimates for the Green River shown in the graph above.

Escapement Goal Basis: There is currently no CTC agreed escapement goal for this escapement indicator stock.

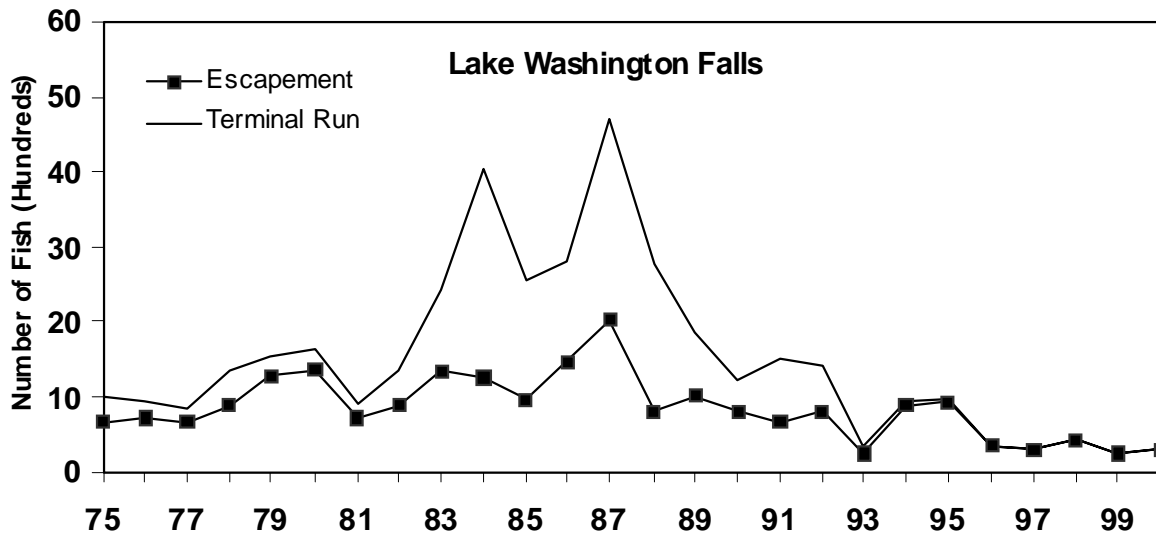
Agency Comments: There is a large hatchery program in this basin and these fish comprise a large portion of the return. Tagging studies were conducted in 1975 and 1976 to estimate numbers of returning adults; results were in close agreement with estimates made from aerial surveys. No attempt is made to adjust the estimate of natural escapement for the presence of hatchery origin fish. Efforts are currently underway to improve escapement estimates of Green River fall chinook including the spatial and temporal distribution of escapement, evaluation of alternative methods of estimating escapement, and the validity of the 21-day redd life assumption and 2.5 fish/redd expansion value. The state-tribal escapement goal of 5,750 naturally spawning adults is the average of the 1965-1976 escapements (Ames and Phinney 1977).



Escapement Methodology: The Nooksack River is the most northerly river in Puget Sound. There are two populations of spring chinook; one spawns in the North Fork and the other spawns in the South Fork. Turbid water often makes visual observation of spawning fish difficult. Carcass counts in the North Fork are multiplied by an expansion factor to estimate the spawning escapement. On the South Fork, escapement is estimated using fish counts and redd survey counts assuming a 21-day redd life and 2.5 adult spawners for each redd (Ames and Phinney 1977). Escapement estimates for the North and South Forks are summed to derive the total estimate presented in the graph above.

Escapement Goal Basis: There is currently no CTC agreed escapement goal for this escapement indicator stock.

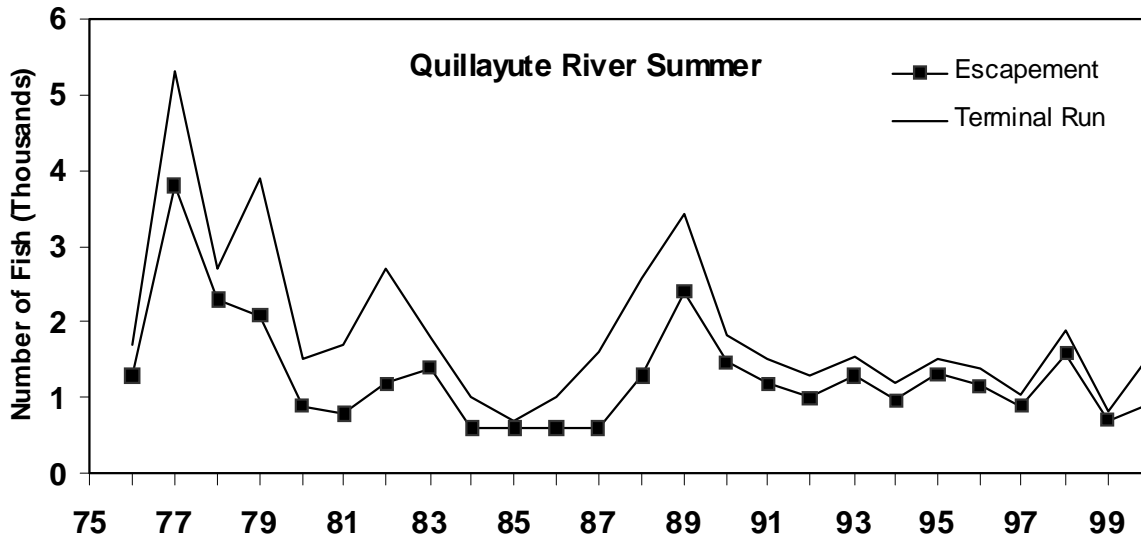
Agency Comments: The Kendall Creek Hatchery, located on the North Fork, is the site of recovery efforts directed at the North Fork chinook. The recovery program involves several strategies, including on-station and off-station releases, with the latter comprised of both acclimated and unacclimated releases. All fish are marked to ascertain survival rates for the various release methods. Although recovery programs on the South Fork have been implemented in the past, they have been discontinued. Methodologies are being developed to discriminate North Fork fish spawning in the South Fork from fish spawned in the South Fork. The state-tribal escapement goal established for this stock is 2000 spawners (PFMC Salmon Framework Plan Amendment 14).



Escapement Methodology: Drainage from Lake Washington flows through the Lake Washington Ship Canal into Central Puget Sound in Seattle. Natural spawning of chinook in the Lake Washington basin occurs primarily in Bear Creek, Cottage Creek, and the Cedar River. Annual surveys are conducted by walking in the north tributaries (Bear and Cottage creeks) and by float on the Cedar River. Escapement estimation uses cumulative redd counts assuming a 21-day redd life and 2.5 adult spawners for each estimated redd (Ames and Phinney 1977).

Escapement Goal Basis: There is currently no CTC agreed escapement goal for this escapement indicator stock.

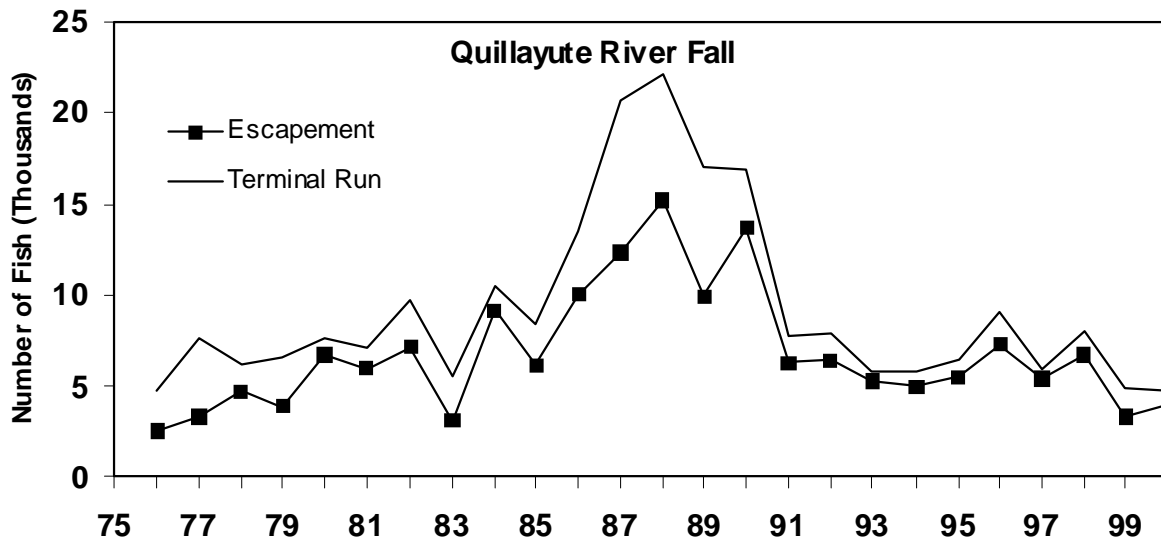
Agency Comments: Substantial artificial production of chinook occurs in Issaquah Creek and at the University of Washington. In 1994, spawning estimates were reviewed, and an attempt was made to find a consistent method to estimate escapement. A state-tribal escapement goal of 1,200 has been established for the Cedar River spawners (PFMC Salmon Framework Plan Amendment 14).



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 estimate includes hatchery strays. 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, pers. comm.). Total natural escapement estimates include hatchery strays and, beginning in 1987, fish taken for hatchery broodstock programs.

Escapement Goal Basis: There is currently no CTC agreed escapement goal for this stock.

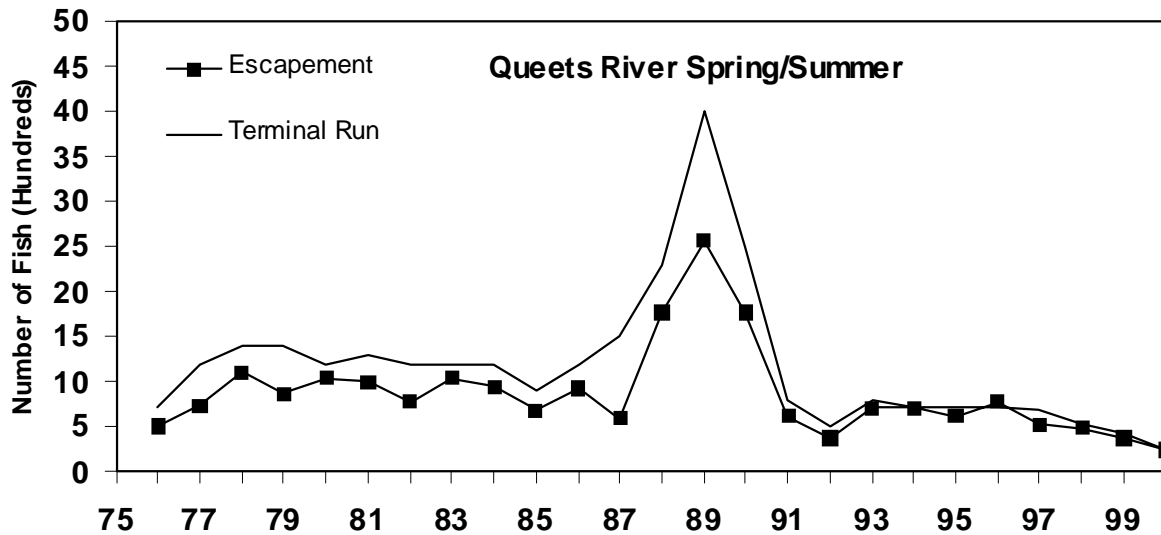
Agency Comments: A summer chinook hatchery program using native stock operated from the mid- 1970s to the mid-1980s. Spring chinook of non-native origin were introduced in a hatchery program in the early 1970s. Coded-wire tag analyses since then have demonstrated significant straying of these spring 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, pers. comm.). Summer chinook are managed for a fixed escapement goal of 1,200 adults and jacks combined (PFMC Salmon Framework Plan Amendment 14).



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, pers. comm.).

Escapement Goal Basis: There is currently no CTC agreed escapement goal for this stock.

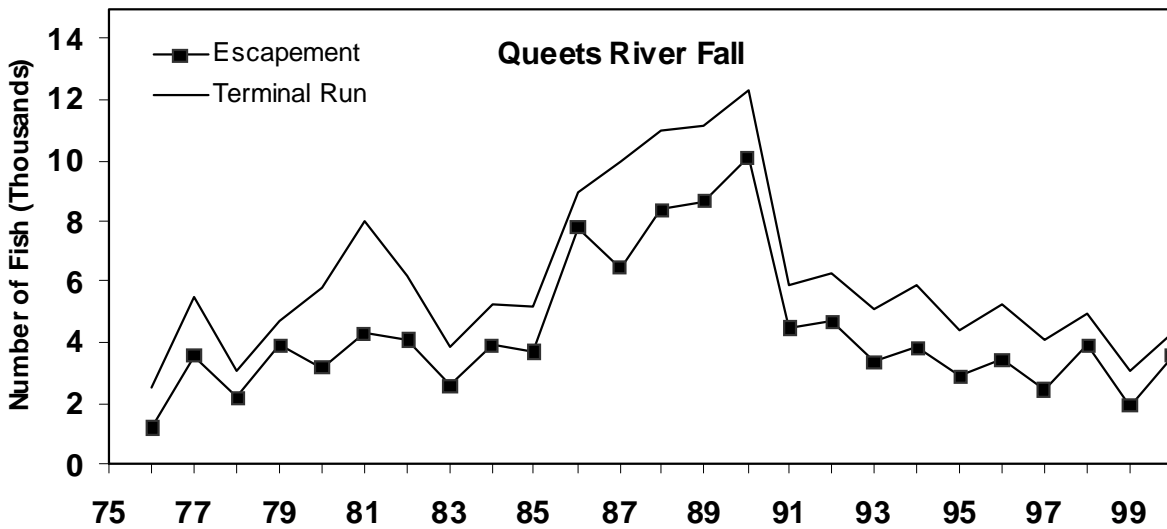
Agency Comments: No current hatchery production of fall chinook occurs in the Quillayute River basin; the program was discontinued in the late 1980s. Since 1991 the returning run size has fluctuated within a lower range comparable to abundances observed prior to 1984. This stock is managed under a court-order establishing a terminal fishery harvest rate of 40%, with an escapement floor of 3,000 fish (PFMC Salmon Framework Plan Amendment 14).



Escapement Methodology: The Queets River is located on the northwestern coast of Washington entering the Pacific Ocean near the village of Queets. Major tributaries to the Queets include the Clearwater and Salmon Rivers. The river supports a naturally spawning stock of spring/summer chinook that 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. 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, pers. comm.).

Escapement Goal Basis: There is currently no CTC agreed escapement goal for this stock.

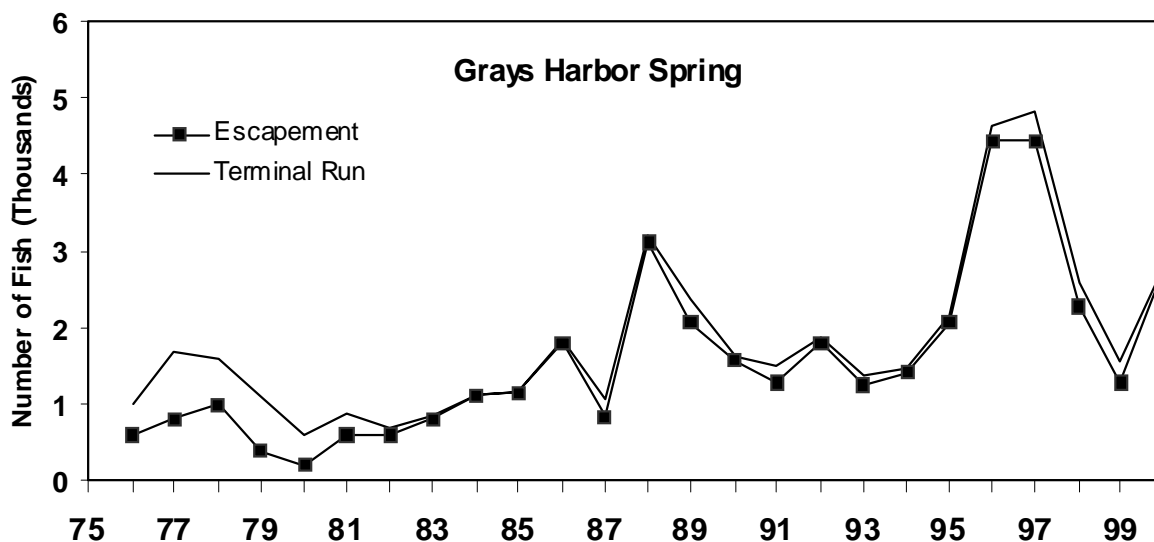
Agency Comments: The escapements between 1976 and 1987 were relatively stable, ranging from 500 to 1,100 fish. The escapements and terminal returns in 1988, 1989, and 1990 were almost double the previous period. Escapements and terminal run sizes have been declining since 1996. Terminal fisheries are managed under a court order to harvest 30% of the river run size, with an escapement floor of 700 fish (PFMC Salmon Framework Plan Amendment 14). In 2000, the terminal run size was below the escapement floor.



Escapement Methodology: The Queets River is located on the northwestern coast of Washington and enters the Pacific Ocean near the village of Queets. The river supports a naturally spawning stock of fall chinook, and is not enhanced by hatchery supplementation, although an indicator stock program has involved rearing of progeny taken from broodstock collected from the spawning grounds. 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. 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, pers. comm.).

Escapement Goal Basis: There is currently no CTC agreed escapement goal for this stock.

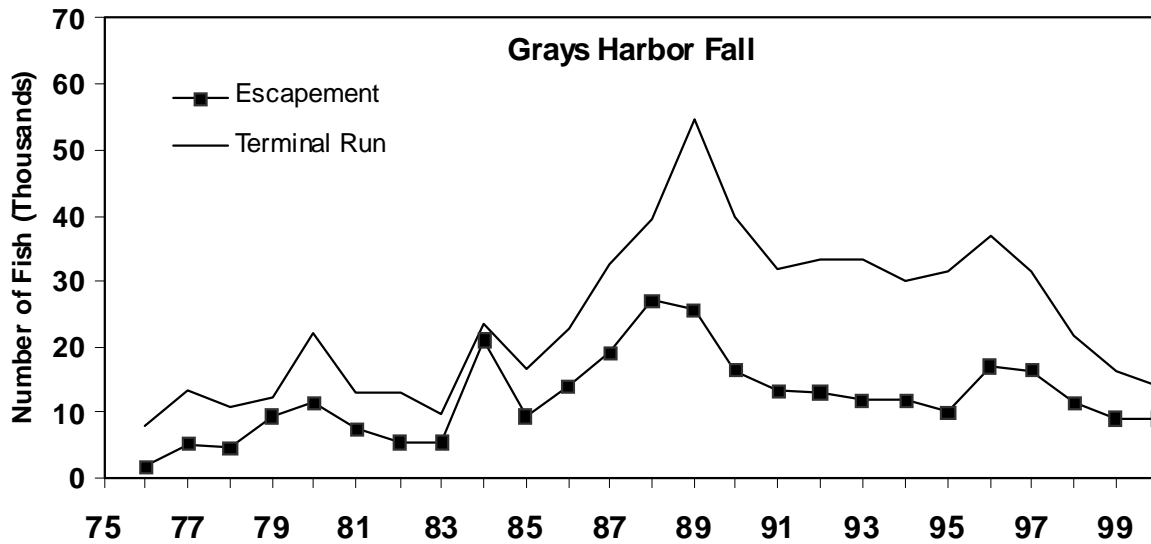
Agency Comments: Between 1975 and 1985, the escapement was relatively stable between 1,500 and 4,000. The 1986–1990 escapements were double the levels estimated for 1975-1985. Escapements since 1991 have been similar to the 1975-1985 levels. Terminal fisheries are managed under a court-order to harvest 40% of the river return, with an escapement floor of 2,500 spawners (PFMC Salmon Framework Plan Amendment 14).



Escapement Methodology: Grays Harbor is located on the Washington coast. Two river systems, the Humptulips and the Chehalis River, flow into Grays Harbor; only the Chehalis River supports a stock of natural-origin spring chinook. Since the early 1980s, annual escapement into the Chehalis has been estimated from redd counts. Surveys are 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: There is currently no CTC agreed escapement goal for Grays Harbor spring chinook.

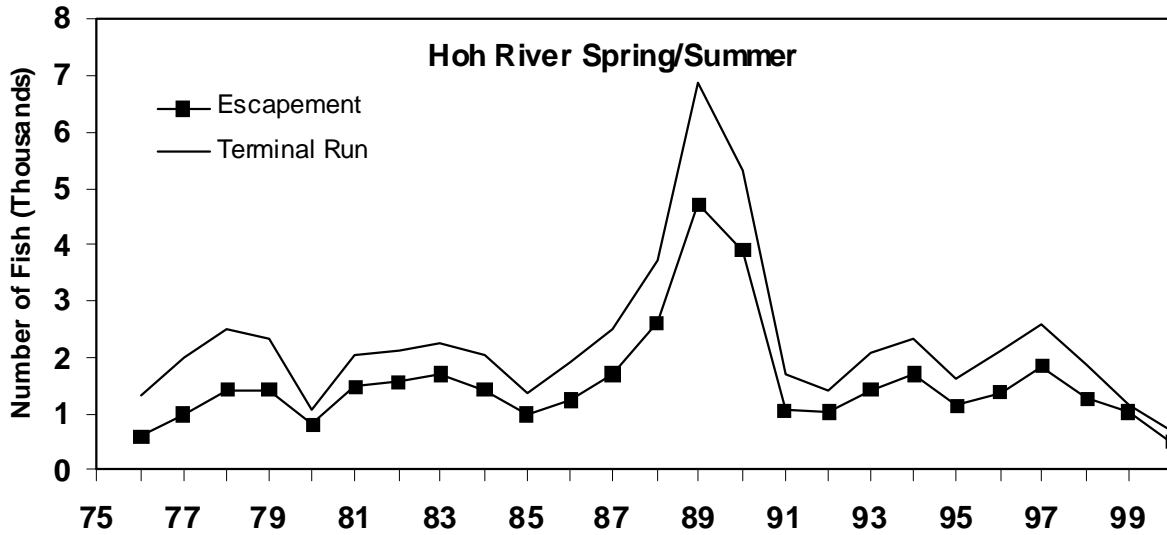
Agency Comments: There are some tribal net fisheries and a very small recreational fishery on the Chehalis River (harvest is typically less than 25 spring chinook) (PFMC 1997b). Broodstock programs in Grays Harbor produce hatchery chinook, which return and spawn naturally because there are no adult collection facilities. Hatchery-origin chinook that spawn naturally in the Chehalis River are included in the natural escapement estimate because little or no tagging occurs to allow differentiation between the two. The Grays Harbor spring chinook stock is managed for a fixed natural spawning escapement goal of 1,400 fish (PFMC 1997b).



Escapement Methodology: The Humptulips and Chehalis Rivers both 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: There is currently no CTC agreed escapement goal for this group of stocks.

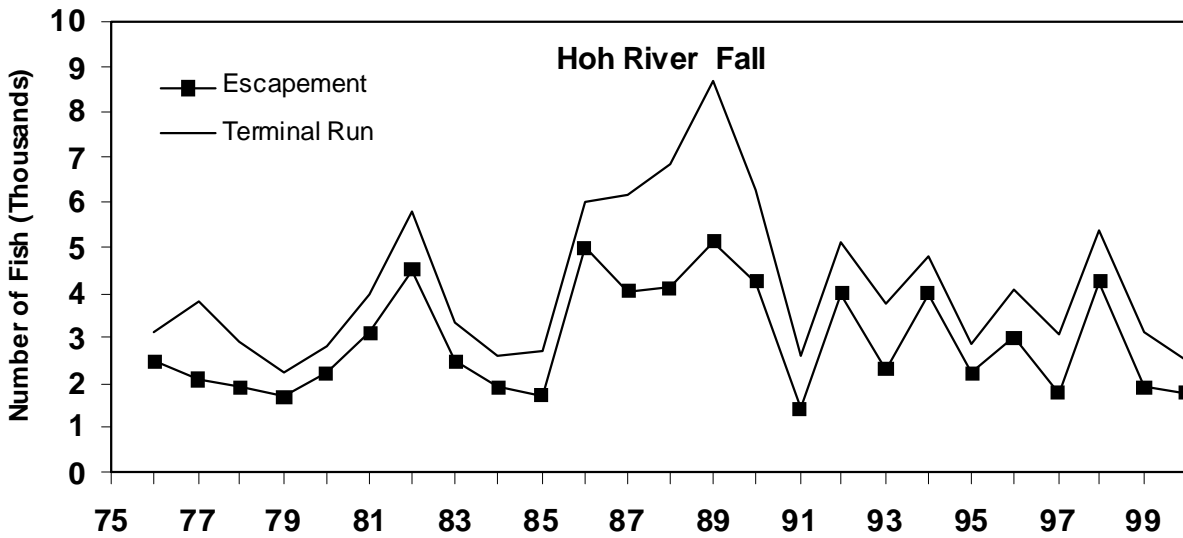
Agency Comments: Terminal fisheries include both directed commercial and recreational harvest. Broodstock programs in Grays Harbor produce hatchery chinook, which return and spawn naturally because there are no adult collection facilities. Hatchery-origin chinook that spawn naturally are included in the natural escapement estimate because little or no tagging occurs to allow differentiation. Grays Harbor fall chinook are managed for a maximum sustained production escapement goal of 14,600 spawners for the Chehalis and Humptulips systems combined (PFMC Salmon Framework Plan Amendment 14).



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, pers. comm.).

Escapement Goal Basis: There is currently no CTC agreed escapement goal for this group.

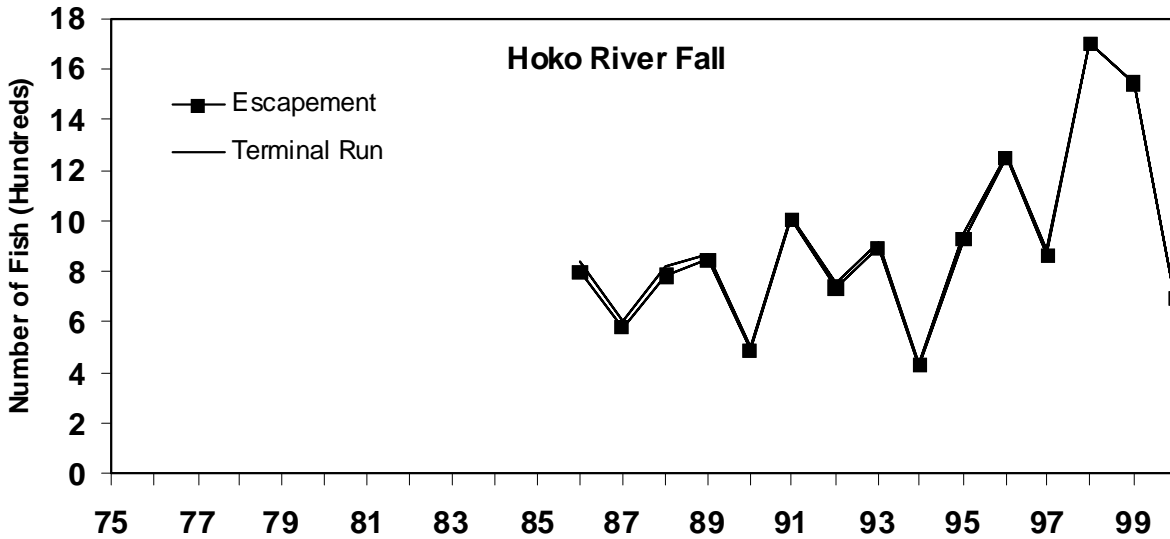
Agency Comments: Similar to many of the other Washington coastal stocks, the escapements have been relatively stable except for much larger returns in 1988, 1989, and 1990; however, the terminal return for this stock has declined since 1997. Terminal fisheries are managed under a court order to harvest 31% of the river run, with an escapement floor of 900 fish (PFMC Salmon Framework Plan Amendment 14). In 2000, the terminal run size was below the floor.



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, pers. comm.).

Escapement Goal Basis: There is currently no CTC agreed escapement goal for this group.

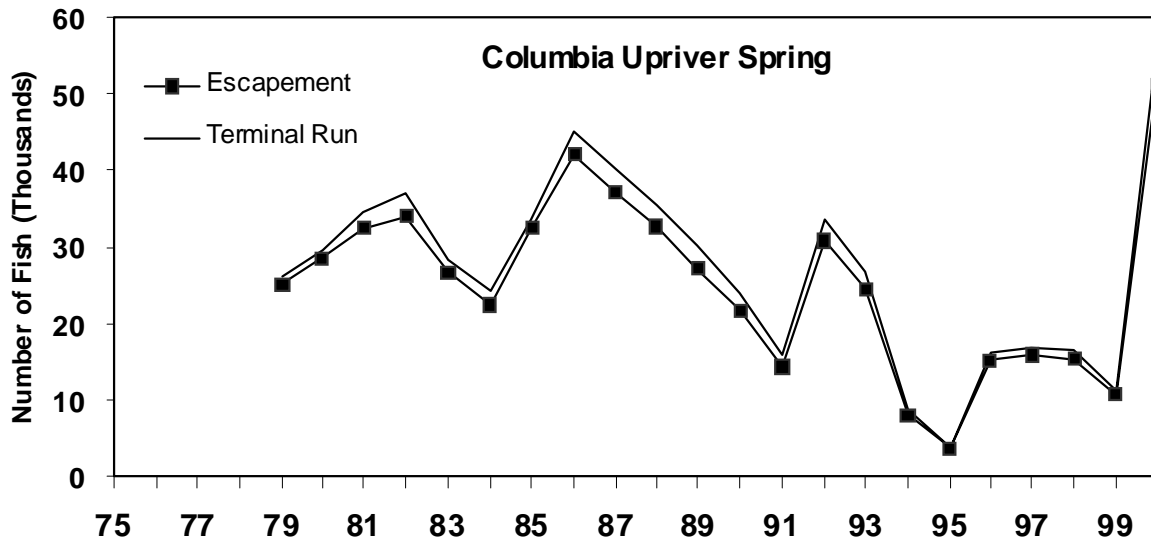
Agency Comments: The natural escapement estimates include fish taken for broodstock in some years. The returns of fall chinook to the Hoh have been much more variable, particularly in recent years, than is the case of chinook returning to other Washington coastal rivers. This stock is managed under a court order to harvest 40% of the terminal run, with an escapement floor of 1,200 spawners (PFMC Salmon Framework Plan Amendment 14).



Escapement Methodology: The Hoko River is located on the Strait of Juan de Fuca. Spawner escapement surveys are conducted on foot, on a weekly basis, from September through December. Methods for expanding the redd counts vary each year depending on visibility and flooding. The total run size is calculated by taking the sum of redds in the upper mainstem and tributaries, added to the expanded number of redds in the lower mainstem. Expansions are used only in the lower mainstem because a 10-year data series is only available for the lower mainstem; better visibility in the upper mainstem allows for direct counts in high-flow periods. Limiting the expansions to the lower mainstem also keeps methods consistent over the years. The total natural escapement is calculated by multiplying the number of redds by 2.5 adults per redd. Natural escapement estimates do not include the broodstock taken by the Hoko Hatchery.

Escapement Goal Basis: There is currently no CTC agreed escapement goal for this group.

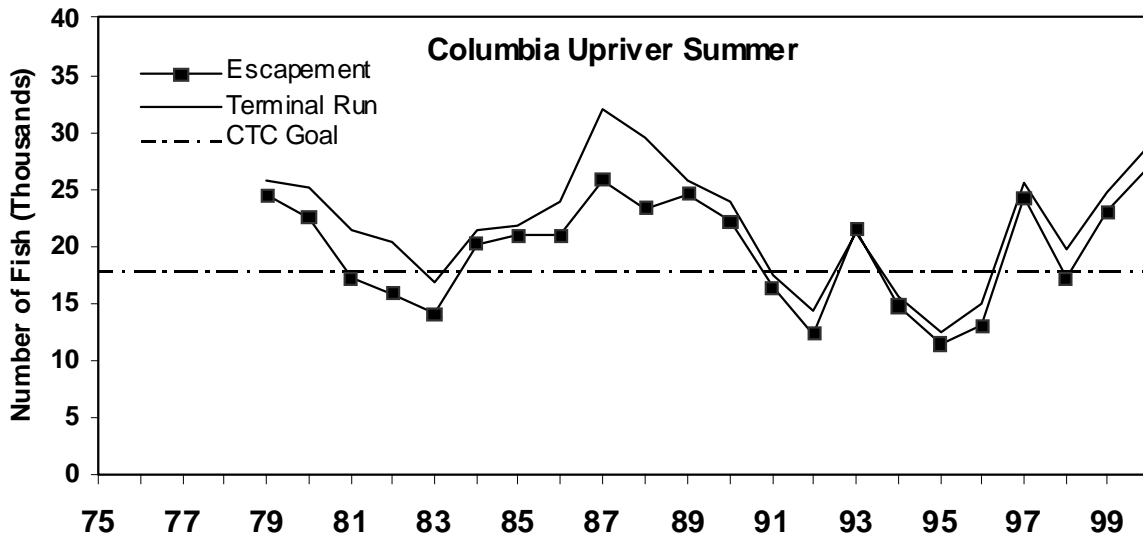
Agency Comments: There are no directed fisheries on chinook returning to rivers entering the Strait of Juan de Fuca. The escapement goal established by state and tribal managers is 850 naturally spawning adults (PFMC Salmon Framework Plan Amendment 14).



Escapement Methodology: Spring chinook escapement past Bonneville Dam is the dam count through May 31 minus harvest above Bonneville Dam, multiplied by the fraction of wild stock estimated from run reconstruction (TAC 1999). The majority of current upriver spring chinook production above McNary Dam is now from the Columbia River, and is mostly of hatchery origin.

Escapement Goal Basis: There is currently no CTC agreed escapement goal for this group.

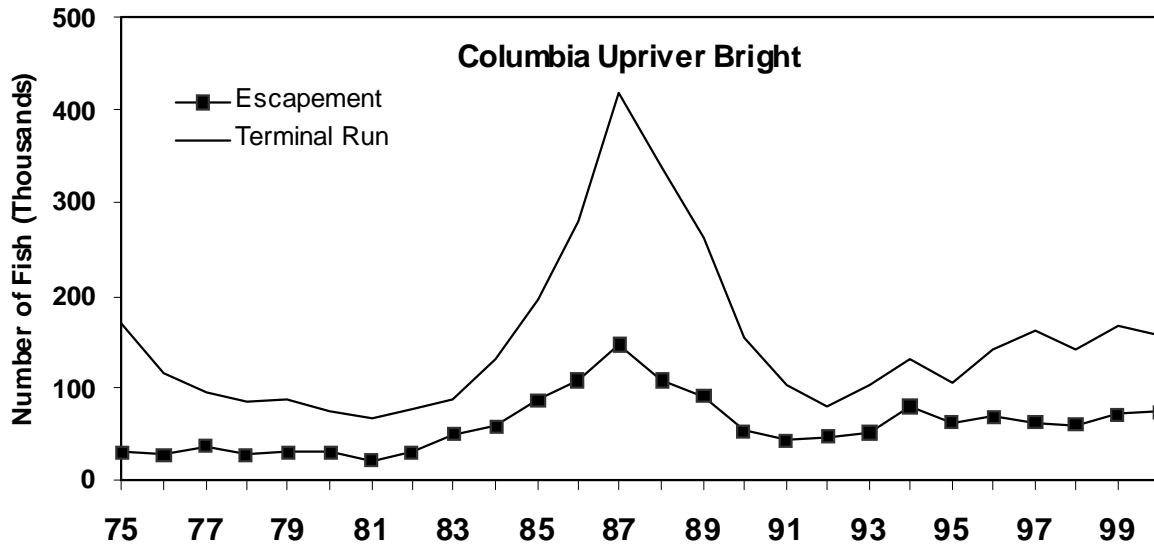
Agency Comments: Historically, the Snake River produced the majority of this stock. The Snake River spring/summer naturally spawning component of this stock was listed under the U.S. Endangered Species Act in 1992. In past escapement assessments, the CTC used the goal of 84,000 natural spawners passing Bonneville Dam. This was 70% (the estimated proportion wild) of the 120,000 total spring chinook 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. There were record low returns of Columbia Upriver Springs in 1994 and 1995. From 1996-1999, escapements ranged between 10,000 and 17,000, and the 2000 escapement of 51,000 was the highest in this data series. Terminal harvests have been severely constrained since 1977, with incidental harvest in lower river fisheries averaging 2% and total harvest in treaty Indian fisheries averaging 6% (TAC 1999). There may be some additional mortality in non-landed catches, but harvest impacts are minimal (Muir et al. 1995). Juvenile mortality and habitat loss are the major sources of mortality.



Escapement Methodology: Estimates of naturally spawned summer chinook escapement at Bonneville Dam (between June 1 to July 31) are based on the dam count, the proportion of Columbia versus Snake Basin production, and the proportion wild at Bonneville estimated from run reconstruction (TAC 1997). Columbia River Summer chinook production is primarily from natural spawning in the Wenatchee, Methow, and Okanogan Rivers.

Escapement Goal Basis: The CTC (1999) has developed an interim MSY escapement goal of 17,857 wild Columbia Upriver Summer stock chinook past Bonneville Dam based on data from the PSC chinook model. The CTC will use this goal until a more thorough analysis based upon detailed stock-production information is completed. The USCTC has funded research by the Washington Department of Fish and Wildlife to develop a detailed stock-production database and to identify a biologically-based goal for the Columbia River summer stock of chinook salmon.

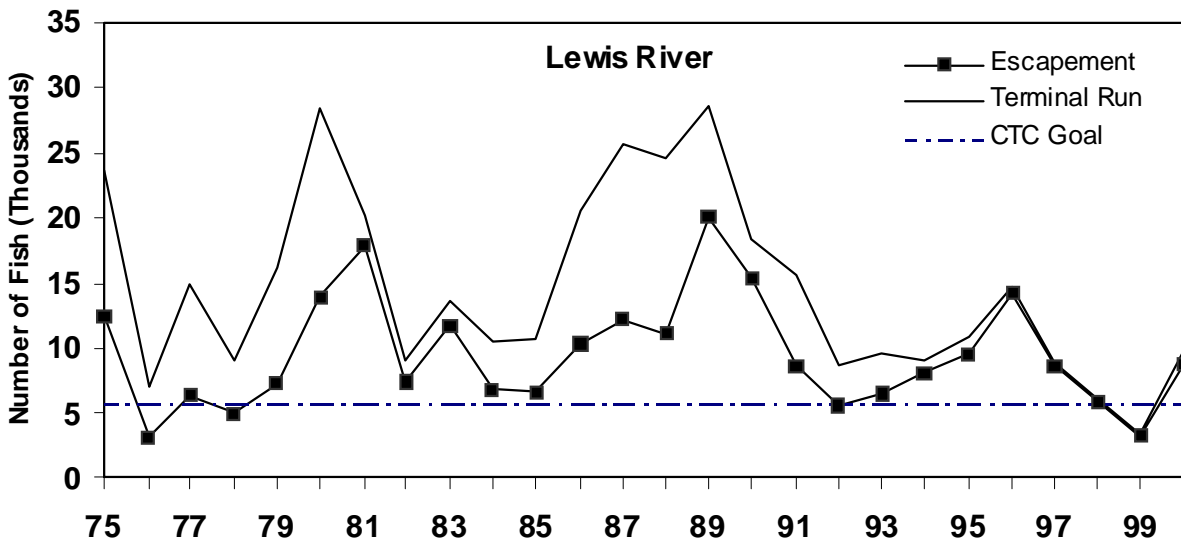
Agency Comments: Most smolt migrate to sea as sub-yearlings and exhibit a far north migration distribution similar to Columbia Upriver Bright chinook, but some migrate in late fall or as yearlings the following spring. Productivity is limited primarily by loss of downstream migrants during passage through 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. In-river commercial fisheries for summer chinook have been closed since the mid-1960s. Incidental harvest in non-Indian fisheries has been under 1% of the run since 1995. Treaty Indian ceremonial and subsistence harvest rates averaged 3% for 1986-1990, 1% for 1991-1995, and 2% from 1995-1999 (TAC 1999).



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 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 B. Fall chinook at McNary Dam are defined as those counted after August 9. Escapements past McNary Dam (graphed above) are the dam counts minus sport catch upstream. McNary Dam upstream migration from winter 1999 to October 2000 was under-counted due to misplacement of guidance racks in the Oregon Shore fish ladder. A 2000 McNary Dam count of 77,230 was estimated by applying the 1999 John Day Dam to McNary Dam conversion rate to the 2000 John Day Dam count (Rick Watson –WDFW, pers. comm.). The 2000 number in Appendix B is the escapement *at McNary Dam* based on this adjusted McNary count minus sport catch.

Escapement Goal Basis: The Columbia Upriver Bright stock does not have a PSC agreed upon escapement goal.

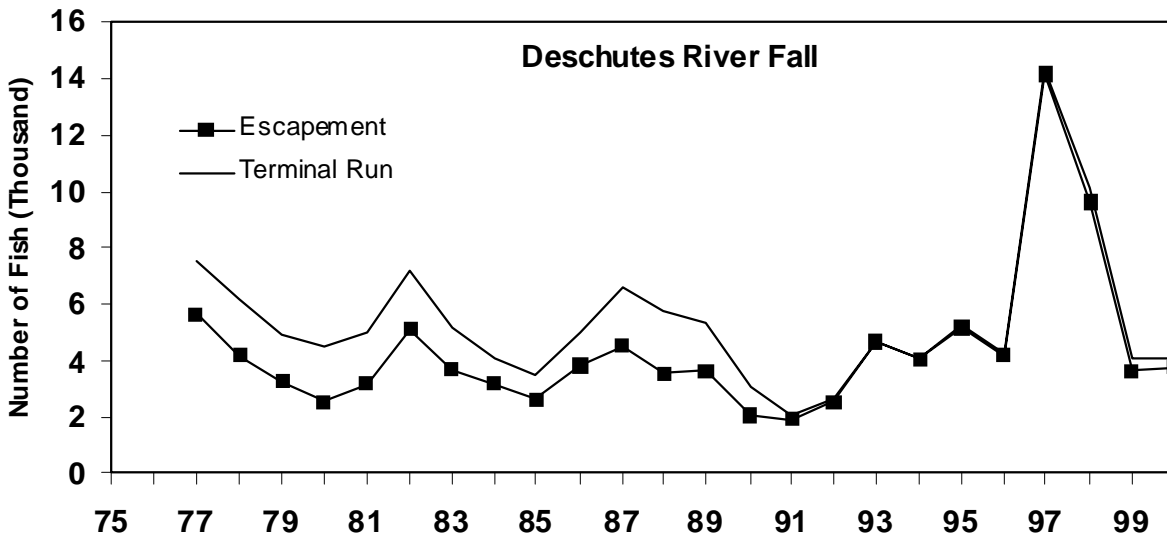
Agency Comments: The CRFMP interim escapement goal for Columbia Upriver Brights is 40,000 naturally spawning adults above McNary Dam. In 1990, a CRFMP escapement goal of 45,000 was established to provide for increased broodstock, including hatchery and wild fish. In 1994, a CRFMP management goal of 46,000 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. Comparisons to the goal of 40,000 naturally produced spawners at McNary should be improved by estimating natural-origin escapement of Columbia Upriver Brights over McNary Dam. Although it does not affect estimates of spawners at McNary, spawning above Priest Rapids was substantial in 1999 and 2000, and the definition of the Upriver Bright fall chinook spawning population and methods of calculating spawning ground escapement should be re-evaluated. According to radio-tagging results (Dr. Ted Bjornn, pers. Comm.), the maximum number of spawners on the Hanford Reach in 2000 was 49,000. Of 73 tagged fall chinook passing Priest Rapids Dam (0.19% of the count), 32 of 73 (44%) of the Columbia Upriver Bright fall chinook tagged at Priest Rapids Dam fell back below the dam. The WDFW estimate of Hanford Reach spawning in 2000 was 35,547 assuming 50% fall-back at Priest Rapids Dam.



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. Prior to 1996, total escapements for the Lower River Wild management unit were assessed. In this report, the time series of escapements is for only the Lewis River component and this is compared with the Lewis River goal. Annual estimates of Lewis River spawners are obtained by expanding peak counts from weekly counts of live and dead fish in the 6.4 km area below Merwin Dam (rkm 31.4) by the ratio of 5.2685 (total spawners/peak count). This expansion factor is from a 1976 carcass tagging and recapture study (McIsaac 1977). A coded-wire tag program for wild fish has been in place since the 1977 brood. Methods of CWT recovery, escapement counting, and expansion of the index area fish counts have been consistent since 1964. All naturally spawning fish, both from hatchery and natural production, are included in the estimated abundance of the spawning population. Escapement estimates for natural spawners produced from the North Fork Lewis River (with strays removed) were obtained from the WDFW (Bob Woodard, pers. comm.).

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. This analysis was updated in CTC (1999a) based on analysis of brood years 1964-1999 and the goal of 5,700 was reaffirmed and accepted as a biologically based goal.

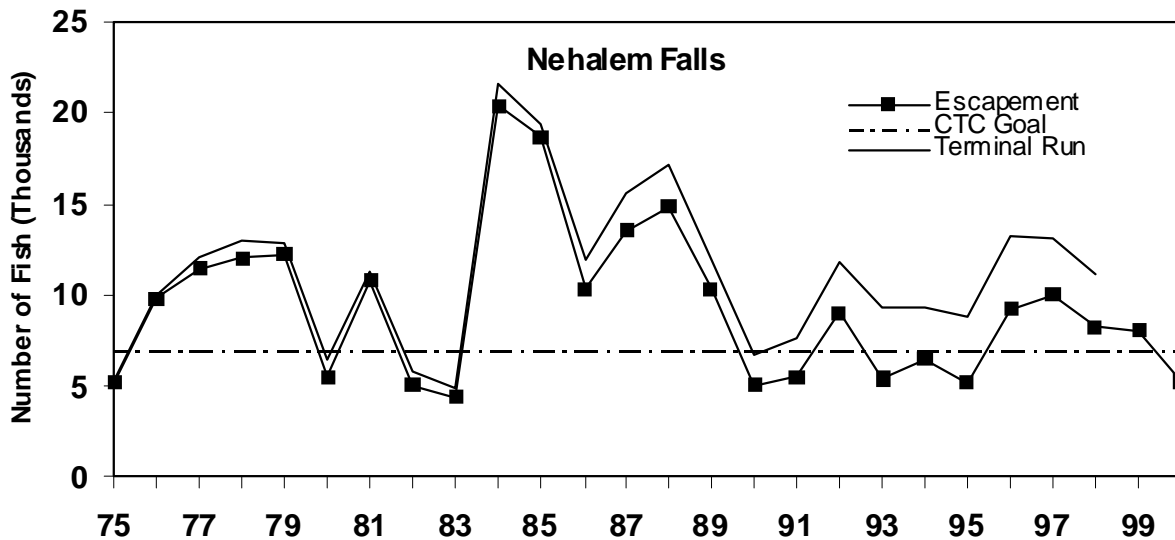
Agency Comments: The 1997-2000 Lewis River escapements have been above their escapement goal except in 1999. The PFM "Review of 1999 Ocean Salmon fisheries" states "The ocean escapement of Lewis River Wild stock in 1999 was the lowest on record and due, in part, to flooding in 1995 and 1996."



Escapement Methodology: Fall chinook are found throughout the mainstem Deschutes below the Pelton Reregulating Dam (rkm 161). Fish are trapped and marked at the fish ladder at Sherar’s Falls (71 km upriver). Marked fish are recaptured during carcass surveys, and the spawning population above Sherar’s Falls is estimated using Chapman’s modification of the Peterson mark-recapture estimate. The proportion of redd counts above the falls from helicopter surveys is used to expand the mark-recapture estimate for spawning below the falls. In 1989, surveys were expanded from a standardized set of “random” survey areas to the total river. From 1989 on, the agency estimates of spawning are expanded by the proportion of total redds above based on the census of the entire river. To maintain consistency with past years, the graphed estimates of escapement are based on the standardized “random” survey areas for the entire time series. The terminal run is the escapement plus Deschutes River harvest.

Escapement Goal Basis: The Deschutes chinook salmon stock does not have a PSC agreed upon escapement goal.

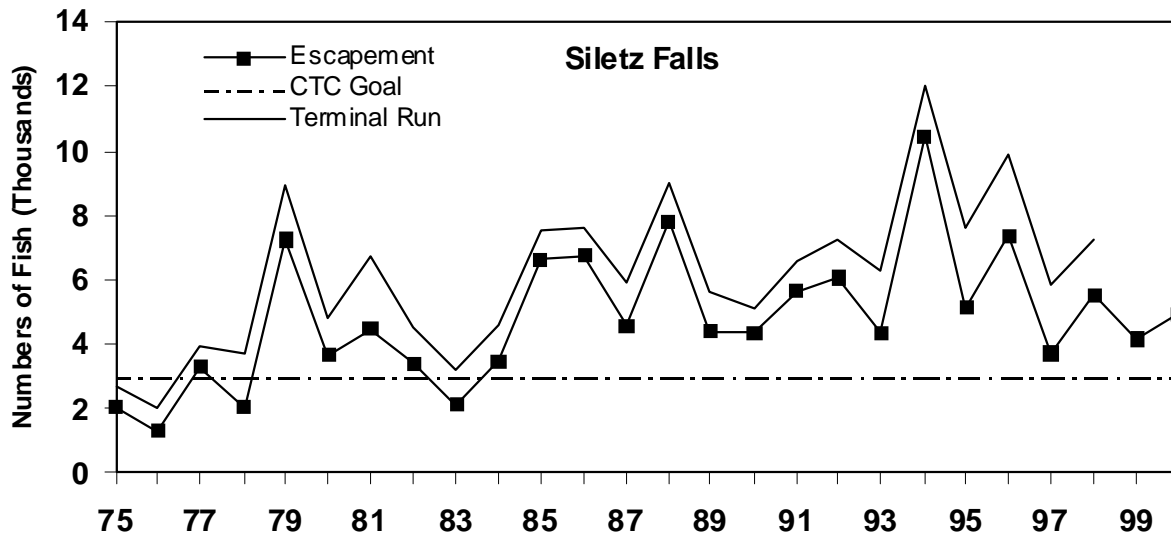
Agency Comments: Local management agencies use a management goal of 4,000 adult chinook, which includes an escapement goal of 2,000 fish above Sherar’s Falls. This goal is based on average spawning escapement. A PSC funded project to estimate the total spawning population in the Deschutes River via mark-recapture is underway for 2001.



Escapement Methodology: The Nehalem River fall chinook stock is an escapement indicator stock for the Nehalem/Ecola gene conservation group (GCG). This GCG includes both summer and fall run populations from the Nehalem River, as well as a fall run from the Ecola River. This GCG is part of the NOC aggregate of stocks used in the CTC assessments. Each year multiple foot surveys are conducted on a weekly basis at numerous sites in the basin. There are six established standard survey sites ranging from 0.5 to 1.0 miles each that are surveyed every year. Additionally, numerous randomly selected sites are also surveyed each year. Counts of live and dead chinook are made for each survey section. The measurement unit used to index escapement is the maximum (peak) count obtained during the season. Peak counts from all survey sites are summed and divided by the sum of the miles in the survey sections to derive a density index (fish/mile). The density in standard survey sites is considered biased and is adjusted by results from the random surveys. The total number of adult spawners is estimated by multiplying the density index by the total mileage of chinook spawning habitat and an observation efficiency factor. The total mileage of spawning habitat in the Nehalem River is 120.8 miles and the observation efficiency factor is 0.5. Data used to provide the estimated escapements shown above were made from spawning ground surveys that were not statistically designed and may therefore be biased. Because the MSY goal was derived from this data, the goal may be biased in the same direction. Research is currently underway to provide an unbiased estimate of the terminal run and spawning escapement, which will conform to the stock assessment criteria established by the CTC in 1997.

Escapement Goal Basis: The CTC has accepted a biologically based escapement goal of 6,989 adult spawners (90% CI: 5,789-9,405). This goal was derived from stock-recruitment analysis on brood years 1967-1991(CTC 1999a).

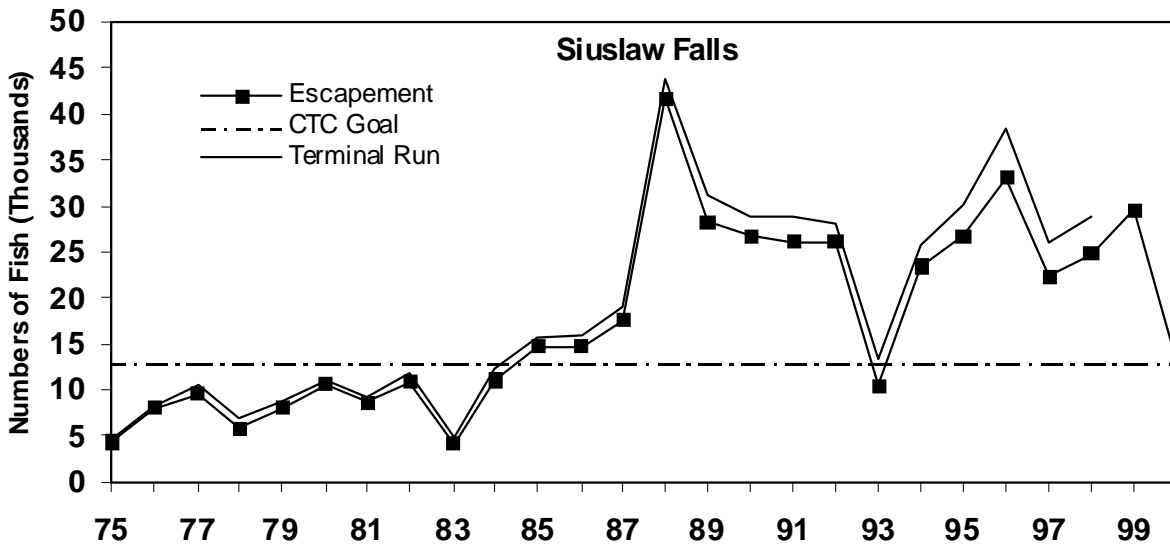
Agency Comments: Escapements have declined since the very large numbers observed in the mid-1980s. Escapement in year 2000 was 5,257, about 1,300 less than the goal. Punch card data to estimate the recreational sport catch are unavailable for 1999 and 2000, hence terminal run sizes are not available for those years.



Escapement Methodology: The Siletz River fall chinook stock is an escapement indicator stock for the North-Mid Coast gene conservation group (GCG), which includes 14 rivers ranging from the Tillamook Bay area down the coast to the Siuslaw River. This GCG is part of the NOC aggregate of stocks used in the CTC assessments. Within this group both spring as well as fall run populations exist. The Siletz River has both a spring and fall run of chinook. Each year multiple foot surveys are conducted on a weekly basis at numerous sites in the basin. There are four established standard survey sites ranging from 0.9 to 1.6 miles each that are surveyed every year. Additionally, numerous randomly selected sites are also surveyed each year. Counts of live and dead chinook are made for each survey section. The measurement unit used to index escapement is the maximum (peak) count obtained during the season. Peak counts from all survey sites are summed and divided by the sum of the miles in the survey sections to derive a density index (fish/mile). The density in standard survey sites is considered biased and is adjusted by results from the random surveys. The total number of adult spawners is estimated by multiplying the density index by the total mileage of chinook spawning habitat and an observation efficiency factor. The total mileage of spawning habitat in the Siletz River is 98.5 miles and the observation efficiency factor is 0.5. Data used to provide the estimated escapements shown above were made from spawning ground surveys that were not statistically designed and may therefore be biased. Because the MSY goal was derived from these data, the goal may be biased in the same direction.

Escapement Goal Basis: The CTC has accepted a biologically based escapement goal of 2,944 adult spawners (90% CI: 2,527-3,481). This goal was derived from stock-recruitment analysis on brood years 1973-1991(CTC 1999a).

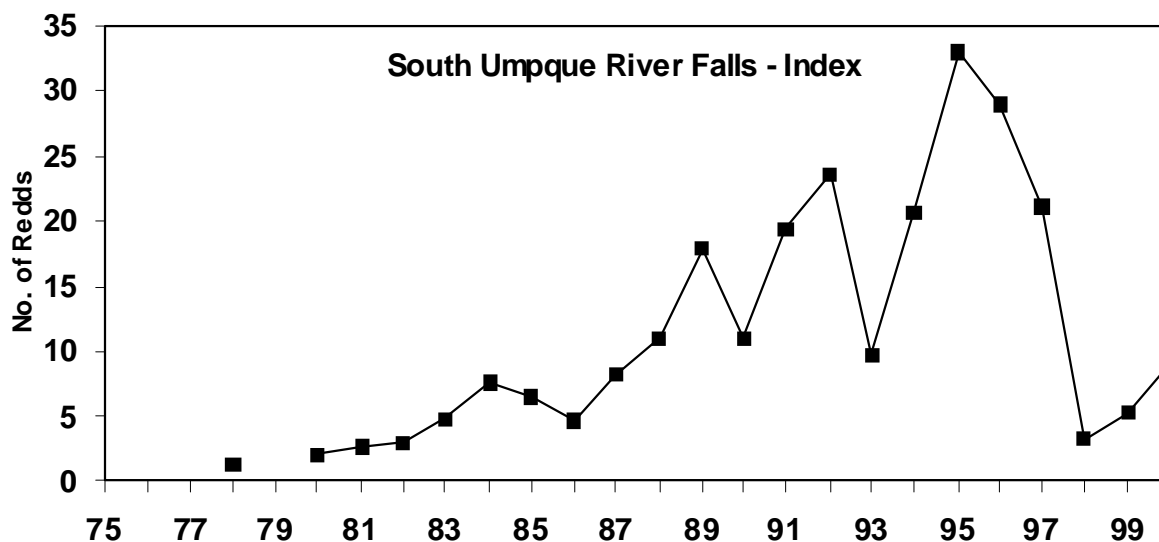
Agency Comments: Escapements are currently above the estimated MSY escapement goal. Punch card data to estimate the recreational sport catch are unavailable for 1999 and 2000, hence terminal run sizes are not available for those years.



Escapement Methodology: The Siuslaw River fall chinook stock is the southern most escapement indicator stock for the North-Mid Coast GCG. Only a fall run is endemic to this river. Each year multiple foot surveys are conducted on a weekly basis at numerous sites in the basin. There are eight established standard survey sites ranging from 0.5 to 1.2 miles each that are surveyed every year. Additionally, numerous randomly selected sites are also chosen each year. Counts of live and dead chinook are made for each survey section. The measurement unit used to index escapement is the maximum (peak) count obtained during the season. Peak counts from all survey sites are summed and divided by the sum of the miles in the survey sections to derive a density index (fish/mile). The density in standard survey sites is considered biased and is adjusted by results from the random surveys. The total number of adult spawners is estimated by multiplying the density index by the total mileage of chinook spawning habitat and an observation efficiency factor. The total mileage of spawning habitat in the Siletz River is 237.9 miles and the observation efficiency factor is 0.5. Data used to provide the estimated escapements shown above were made from spawning ground surveys that were not statistically designed and may therefore be biased. Because the MSY goal was derived from these data, the goal is thought to be biased in the same direction.

Escapement Goal Basis: The CTC has accepted a biologically based escapement goal of 12,925 adult spawners (90% CI: 9,541-20,958). This goal was derived from stock-recruitment analysis on brood years 1967-1991(CTC 1999a).

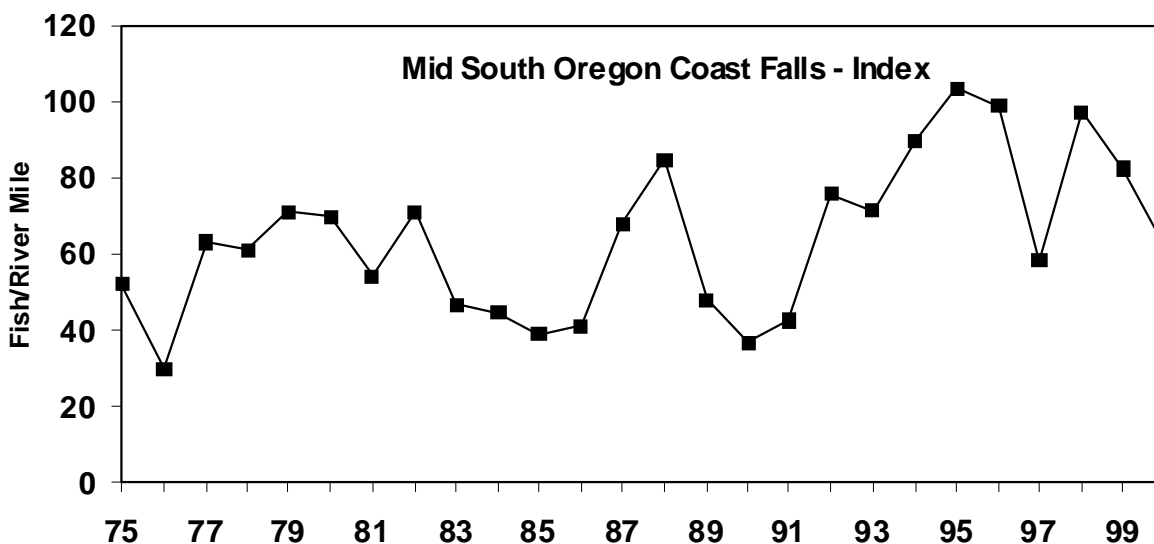
Agency Comments: Escapements have been well above those needed to achieve MSY. The year 2000 escapement was less than previous years but are currently above the estimated MSY escapement goal. Punch card data to estimate the recreational sport catch are unavailable for 1999 and 2000, hence terminal run sizes are not available for those years.



Escapement Methodology: The Umpqua River system is an extensive and diverse watershed that includes both coastal Douglas fir rainforest as well as an interior valley oak savanna environment. There are at least five distinct chinook populations in this watershed with both spring (river) and fall (ocean) run types that together comprise the Umpqua gene conservation group (GCG). The Smith River fall run is a lower river tributary located in a moist coastal rainforest environment. The remaining four interior populations are located in a much dryer oak savanna environment. The South Umpqua tributary population is currently the only group with data available to evaluate stock status for fall run populations from this GCG. This GCG is part of the MOC aggregate of stocks used in the CTC assessments. Two aerial flights are made each fall (October– November) when viewing conditions are acceptable. Redds are counted on the South Fork and Cow Creek tributaries. The maximum number of redds counted on any single day (peak count) is the annual index unit used to monitor relative long-term changes in the breeding population of fall chinook in this GCG.

Escapement Goal Basis: No escapement goals have been proposed for this stock.

Agency Comments: The spring run populations are generally not intercepted in PSC fisheries and are currently not proposed for CTC analysis. Coded-wire tagged fall run chinook from the Umpqua River are harvested in PSC fisheries, and need to be evaluated by the CTC. Research is currently underway to calibrate the aerial redd counts with an independent population estimate of fall run chinook in the South Umpqua River.



Escapement Methodology: This composite index represents populations classified as the Mid-South Coast gene conservation group (GCG). This GCG is part of the MOC aggregate of stocks used in the CTC assessments. The index is composed of spawning survey data from four rivers, the Coos, Coquille and Sixes Rivers and Floras Creek. To date there is no escapement indicator stock designated for this GCG. Foot or boat surveys are made weekly at several standard 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 summed 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.

Escapement Goal Basis: No goals have been proposed for populations within this GCG at this time.

Agency Comments: Research is planned to designate one or more of these chinook populations as CTC escapement indicator stocks pending adequate funding. These populations are generally considered healthy with no immediate conservation concerns.

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APPENDIX

Appendix A. Annual catches, add on, and terminal exclusion for Pacific Salmon Treaty ceiling fisheries. The catches do not include the add-on or exclusions noted separately.

Year	SEAK (T, N, S)			NCBC (T, N, S)			WCVI (T)		GS (T, S)	
	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	62.2
1996	NA ¹	149.0	68.2	NA ¹	30.4	16.1	NA ¹	0	NA ¹	89.6
1997	NA ¹	288.0	45.2	NA ¹	158.9	8.3	NA ¹	51.7	NA ¹	62.2 ⁴
1998	NA ¹	243.6	24.6	NA ¹	178.3	2.0	NA ¹	10.7 ⁵	NA ¹	26.7 ⁴
1999	NA ³	200.5	46.0	NA ³	103.9	3.0	NA ³	0.0	NA ³	53.7 ⁴
2000	NA ³	184.3	65.8	NA ³	58.0	7.7	NA ³	63.4 ⁵	NA ³	33.5 ⁴

¹ There were no PSC agreed ceilings in 1993 through 1998. Management regimes for 1997 and 1998 are discussed in the text.

² Due to budget restraints in each year 1993 through 1999, 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).

³ The first post-season calibration for 1999 is preliminary and for 2000 is incomplete at this time.

⁴ Strait of Georgia sport catches since 1997 include the catch reported for Area 20-1 Port Renfrew (values in text).

⁵ Size limits in WCVI troll fisheries have varied in the 1998 to 2000 experimental fisheries, values in text.

Appendix B.1. Southeast Alaska escapements and terminal runs of PSC Chinook Technical Committee natural chinook escapement indicator stocks, 1975-2000.

Year	Southeast Alaska					
	Situk esc.	t. run	King Salmon esc.	Andrew esc.	Blossom Index esc.	Keta Index 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	1,416	1,278	690
1987	1,884	2,215	196	1,576	1,349	768
1988	885	1,337	208	1,128	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	1,579	3,103	99	1,556	150	217
1993	899	1,717	259	2,120	303	362
1994	1,263	2,974	207	1,144	161	306
1995	4,355	13,335	144	686	217	175
1996	1,915	6,633	284	670	220	297
1997	2,190	5,203	357	586	132	246
1998	1,156	3,479	132	974	91	180
1999	1,811	5,453	300	1,210	212	276
2000	2,018		137	1,286	231	300
Goal LL	500		120	650	250	250
Goal UL	1,000		240	1,500	500	500

(continued)

Appendix B.1. Transboundary River escapements and terminal runs of PSC Chinook Technical Committee natural chinook escapement indicator stocks, 1975-2000.

Year	Transboundary Rivers					
	Alsek (Klukshu) esc.	Taku esc.	Stikine esc.	Unuk Index esc.	Chickamin Index esc.	Chilkat esc.
1975		12,920	7,571		370	
1976	1,064	24,582	5,723		157	
1977	2,698	29,496	11,445	974	363	
1978	2,530	17,124	6,835	1,106	308	
1979	3,104	21,617	12,610	576	239	
1980	2,487	39,239	30,573	1,016	445	
1981	1,963	49,559	36,057	731	384	
1982	1,969	23,847	40,488	1,351	571	
1983	2,237	9,795	6,424	1,125	599	
1984	1,572	20,778	13,995	1,837	1,102	
1985	1,283	35,916	16,037	1,184	956	
1986	2,607	38,110	14,889	2,126	1,745	
1987	2,491	28,935	24,632	1,973	975	
1988	1,994	44,524	37,554	1,746	786	
1989	2,202	40,329	24,282	1,149	934	
1990	1,698	52,143	22,619	591	564	
1991	2,223	51,645	23,206	655	487	5,897
1992	1,243	55,889	34,129	874	346	5,284
1993	3,221	66,125	58,962	1,068	389	4,472
1994	3,620	48,368	33,094	711	388	6,795
1995	5,397	33,805	16,784	722	356	3,790
1996	3,599	79,019	23,886	1,167	422	4,997
1997	2,829	114,938	28,185	636	272	7,728
1998	1,362	31,039	28,567	840	391	3,337
1999	2,166	20,545	25,968	680	492	2,298
2000	1,363	30,014	35,447	1,341	801	1,922
Goal LL	1,100	30,000	14,000	650	450	
Goal UL	2,300	55,000	28,000	1,400	900	

Appendix B.2. Northern B.C. escapements and terminal runs of PSC Chinook Technical Committee natural chinook escapement indicator stocks, 1975-2000.

Year	Northern B.C.							
	Area 1 Yakoun esc.	Area 3 Nass esc. t. run		Area 4 Skeena esc. t. run		Area 8 Dean Index	Area 9 Rivers Inlet	Area 10 Smith Inlet
1975	1,500	14,895	17,874	20,319			3,280	960
1976	700	13,819	16,583	13,078			1,640	1,000
1977	800	15,076	18,091	29,018	39,606		2,225	1,050
1978	600	15,076	18,091	22,661	35,055	3,500	2,800	2,100
1979	400	12,234	14,681	18,488	28,166	4,000	2,150	500
1980	600	16,135	19,362	23,429	38,626	2,000	2,325	1,200
1981	750	12,220	14,664	24,523	42,018	3,500	3,175	1,020
1982	1,400	7,593	9,112	17,092	35,185		2,250	1,500
1983	600	12,576	15,091	23,562	39,510	500	3,320	1,050
1984	300	19,694	23,633	37,598	53,516	4,500	1,400	770
1985	1,500	16,425	19,710	53,599	76,544	4,000	3,371	230
1986	500	34,642	41,570	59,968	87,566	3,300	7,623	532
1987	2,000	18,231	21,877	59,120	76,349	1,144	5,239	1,050
1988	2,000	14,284	17,141	68,705	102,563	1,300	4,429	1,050
1989	2,800	26,456	31,747	57,202	83,439	2,300	3,265	225
1990	2,000	23,999	28,798	55,976	89,447	2,000	4,039	510
1991	1,900	7,013	10,790	52,753	79,343	2,400	6,635	500
1992	2,000	16,837	26,015	63,392	92,184	3,000	7,500	500
1993	1,000	23,676	37,178	66,977	96,018	700	10,000	500
1994	2,000	21,169	27,382	48,712	68,127	1,300	3,500	700
1995	1,500	7,844	14,560	34,390	48,351	1,100	3,196	400
1996	3,000	21,899	29,599	73,684	96,453	2,000	3,000	250
1997	2,500	18,700	24,875	42,539	65,350	1,400	4,980	100
1998	3,000	25,304	32,548	46,744	65,167	3,000	5,367	1,100
1999	3,200	13,421	20,603	43,775	70,993	1,800	2,739	500
2000	4,000	23,481	30,133	65,000	90,600	1,200	6,700	500

Year	Southern B.C.			Fraser River						
	W. Coast Vancouver I. esc.	Lower Georgia Strait esc. t. run	Upper Georgia Strait esc.	Upper Fraser esc.	Middle Fraser esc.	Thompson esc.	Fraser spr/sum t. run	Harrison esc. t. run		
1975	1,200	5,475	6,390		7,028	15,050	37,035	119,081		
1976	1,100	4,340	5,390		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	10,686	11,209	4,127	12,495	8,595	25,145	101,252		
1980	6,724	8,819	10,519	1,367	15,796	9,625	19,330	71,504		
1981	5,610	6,007	7,607	1,945	9,021	8,175	23,375	62,668		
1982	7,813	6,186	6,657	3,260	11,603	10,470	20,385	85,140		
1983	4,200	6,582	6,862	3,770	17,185	15,404	20,381	72,526		
1984	5,362	8,456	8,861	4,600	21,938	13,957	29,972	95,681	120,837	131,740
1985	5,200	4,589	5,242	4,600	34,527	17,595	39,997	121,941	174,778	181,367
1986	4,660	3,105	3,776	1,630	41,207	27,349	45,130	144,617	162,596	177,662
1987	3,170	3,276	3,781	6,450	39,420	27,330	36,730	128,699	79,038	81,799
1988	5,560	7,957	8,638	3,300	34,400	25,924	47,103	129,587	35,116	38,285
1989	7,220	7,087	8,142	5,550	25,310	15,095	37,975	106,843	74,685	76,294
1990	5,660	7,023	7,627	2,320	35,902	26,060	41,995	135,124	177,375	180,837
1991	6,060	8,343	8,613	3,340	27,317	21,150	36,483	116,555	90,638	93,363
1992	7,330	11,377	11,637	5,268	23,853	24,779	45,008	115,249	130,411	132,042
1993	6,230	8,418	8,713	1,574	17,569	26,876	30,860	110,237	118,998	120,600
1994	7,680	7,463	7,808	1,237	28,627	31,732	50,656	145,303	98,334	100,839
1995	4,515	18,732	19,265	4,227	35,435	27,243	39,052	134,478	28,616	29,840
1996	6,928	16,465	17,275	3,600	33,531	33,625	86,042	185,559	37,394	38,568
1997	9,071	11,742	11,933	5,266	33,465	38,235	72,370	201,642	70,514	72,061
1998	14,872	8,246	9,319	10,350	33,949	29,753	81,000	178,664	188,425	189,103
1999	12,256	8,481	9,181	9,500	18,762	17,294	67,000	137,500	107,000	107,884
2000	5,175	7,933	8,500	12,850	21,000	18,000	74,000	145,000	125,850	125,850

Appendix B.3. Puget Sound and Washington Coast escapements and terminal runs of PSC Chinook Technical Committee natural chinook escapement indicator stocks, 1975-2000.

Year	Puget Sound													
	Skagit spring		Skagit sum/fall		Stillaguamish		Snohomish		Green		Nooksak Spring		Lake Washington Fall	
	esc.	t. run	esc.	t. run	esc.	t. run	esc.	t. run	esc.	t. run	N. Fork	S. Fork	esc.	t. run
1975	803	803	11,555	24,625	1,198	1,635	4,485	6,123	3,394	6,238			656	1004
1976	812	812	14,479	23,306	2,140	4,002	5,315	9,889	3,140	7,732			719	922
1977	1,049	1,049	9,497	17,693	1,475	2,549	5,565	9,618	3,804	5,366			675	850
1978	1,220	1,220	13,209	20,030	1,232	1,959	7,931	12,591	3,304	4,349			890	1341
1979	968	968	13,605	21,243	1,042	2,366	5,903	12,706	9,704	10,730			1289	1542
1980	1,803	1,803	20,345	28,938	821	2,647	6,460	16,688	7,743	10,608			1360	1617
1981	1,250	1,250	8,670	19,675	630	2,783	3,368	8,968	3,606	4,912			721	909
1982	965	965	10,439	21,022	773	3,058	4,379	8,470	1,840	3,850			885	1340
1983	710	710	9,080	14,671	387	925	4,549	10,386	3,679	13,290			1332	2432
1984	747	747	13,239	15,005	374	883	3,762	8,480	3,353	5,381	309	44	1252	4030
1985	3,249	3,249	16,298	25,075	1,409	2,641	4,873	9,005	2,908	7,444	585	252	949	2552
1986	1,978	1,978	18,127	21,585	1,277	2,416	4,534	8,267	4,792	5,784	257	221	1470	2807
1987	1,979	1,979	9,647	13,037	1,321	1,906	4,689	6,670	10,338	11,724	266	177	2038	4695
1988	2,064	2,064	11,954	14,647	717	1,176	4,513	7,389	7,994	9,207	263	445	792	2769
1989	1,515	1,924	6,776	12,787	811	1,642	3,138	6,142	11,512	15,000	608	296	1011	1832
1990	1,592	1,627	17,206	19,172	842	1,739	4,209	8,345	7,035	15,200	152	10	787	1214
1991	1,411	1,448	6,014	8,425	1,632	2,913	2,783	4,964	10,548	14,967	379	123	661	1517
1992	1,001	1,025	7,671	9,201	780	1,254	2,708	4,319	5,267	9,941	122	468	790	1407
1993	788	818	5,916	6,879	928	1,294	3,866	5,602	2,476	5,202	244	439	245	321
1994	470	1,027	6,231	6,479	954	1,285	3,626	4,885	4,078	7,963	118	44	888	924
1995	855	2,079	7,155	9,301	822	1,398	3,176	5,000	7,939	9,743	290	224	930	969
1996	1,051	1,728	12,025	12,193	1,384	2,260	4,851	7,921	6,026	8,668	203	503	336	345
1997	1,041		4,996	6,055	1,156	1,167	4,295	4,337	9,967	10,264	180	612	294	305
1998	1,086		14,609	14,885	1,544	1,558	6,306	6,344	7,312	8,824	157	336	432	436
1999	471		4,924	5,171	1,098	1,101	4,803	4,817	11,025	12,447	213	911	240	242
2000	1,021	2,045	16,930	17,112	1,643	1,643	6,902	8,400	6,170	11,866	432	150	300	300

Year	Washington Coast																	
	Quillayute summer		Quillayute fall		Hoh spr/sum		Hoh fall		Hoko 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	esc.	t. run
1975																		
1976	1,300	1,700	2,500	4,700	600	1,300	2,500	3,100			505	700	1,200	2,500	600	1,000	1,836	7,847
1977	3,800	5,300	3,300	7,600	1,000	2,000	2,100	3,800			732	1,200	3,600	5,500	800	1,700	5,195	13,477
1978	2,300	2,700	4,700	6,200	1,400	2,472	1,900	2,900			1,110	1,400	2,200	3,100	1,000	1,600	4,555	10,907
1979	2,100	3,900	3,900	6,600	1,400	2,326	1,700	2,200			870	1,400	3,900	4,700	400	1,100	9,581	12,258
1980	900	1,500	6,700	7,600	800	1,079	2,200	2,800			1,038	1,200	3,200	5,800	200	600	11,656	22,002
1981	800	1,700	5,963	7,102	1,498	2,005	3,100	4,000			988	1,300	4,300	8,000	600	900	7,577	13,182
1982	1,200	2,700	7,107	9,651	1,553	2,125	4,500	5,800			781	1,200	4,100	6,200	610	669	5,606	13,084
1983	1,400	1,800	3,069	5,530	1,696	2,233	2,500	3,300			1,044	1,200	2,600	3,800	800	850	5,482	9,852
1984	600	1,000	9,128	10,447	1,430	2,005	1,900	2,600			958	1,200	3,900	5,300	1,128	1,130	21,058	23,466
1985	600	700	6,145	8,367	978	1,353	1,725	2,720			677	900	3,702	5,200	1,157	1,159	9,537	16,852
1986	600	1,000	10,006	13,529	1,248	1,912	4,981	6,000	801	839	925	1,200	7,805	8,900	1,795	1,826	13,988	22,677
1987	600	1,600	12,352	20,663	1,710	2,480	4,006	6,147	581	606	598	1,500	6,504	10,000	841	1,071	19,175	32,553
1988	1,300	2,600	15,168	22,166	2,605	3,712	4,128	6,873	784	821	1,765	2,300	8,390	11,000	3,106	3,208	27,216	39,346
1989	2,407	3,445	9,951	17,102	4,697	6,863	5,148	8,682	845	862	2,568	4,000	8,689	11,200	2,068	2,393	25,599	54,354
1990	1,483	1,826	13,711	16,937	3,886	5,294	4,236	6,298	493	498	1,780	2,500	10,103	12,300	1,567	1,630	16,581	39,869
1991	1,190	1,507	6,292	7,655	1,078	1,693	1,420	2,611	1,008	1,024	630	800	4,486	5,900	1,289	1,489	13,432	32,038
1992	1,008	1,291	6,342	7,850	1,018	1,406	4,003	5,136	741	750	375	500	4,695	6,300	1,813	1,851	13,175	33,124
1993	1,292	1,531	5,254	5,735	1,411	2,077	2,280	3,766	894	908	713	800	3,383	5,100	1,254	1,352	11,824	33,291
1994	974	1,187	4,932	5,692	1,699	2,325	3,967	4,806	429	440	705	700	3,805	5,900	1,403	1,479	11,817	30,239
1995	1,333	1,501	5,532	6,512	1,132	1,637	2,202	2,898	929	949	625	700	2,876	4,400	2,070	2,156	9,952	31,653
1996	1,170	1,414	7,316	9,043	1,387	2,123	3,022	4,067	1,256	1,258	776	700	3,440	5,300	4,462	4,642	16,988	36,733
1997	900	1,051	5,405	5,917	1,826	2,582	1,773	3,059	868	888	540	693	2,458	4,103	4,460	4,812	16,342	31,290
1998	1,599	1,896	6,752	8,010	1,287	1,880	4,257	5,369	1,702	1,702	492	537	3,913	4,956	2,283	2,586	11,476	21,648
1999	713	809	3,334	4,892	1,027	1,148	1,924	3,105	1,550	1,550	373	426	1,933	3,124	1,285	1,561	9,196	16,053
2000	924	1,555	4,000	4,770	492	667	1,786	2,491	700	700	248	250	3,572	4,267	2,805	2,822	9,260	13,860

Appendix B.4. Columbia River escapements and terminal runs of PSC Chinook Technical Committee natural chinook escapement indicator stocks, 1975-2000.

Year	Columbia River													
	Col. Upriver spring		Mid-Columbia summer		Snake summer		Col. Upriver summer		Col. Upriver bright		Lewis fall		Deschutes fall	
	esc.	t. run	esc.	t. run	esc.	t. run	esc.	t. run	esc.	t. run	esc.	t. run	esc.	t. run
1975									29,600	170,100	12,533	23,606	^	
1976									28,800	115,100	3,064	7,117		
1977									37,600	95,100	6,321	15,001	5,631	7,492
1978									27,900	85,300	4,877	9,144	4,154	6,125
1979	25,084	26,270	21,670	23,500	2,714	2,240	24,384	25,740	31,200	89,200	7,307	16,176	3,289	4,881
1980	28,529	29,648	19,773	21,556	2,688	3,567	22,461	25,123	29,400	76,800	13,882	28,302	2,542	4,493
1981	32,426	34,463	13,962	15,774	3,306	5,550	17,268	21,324	21,014	66,600	17,946	20,174	3,183	5,020
1982	33,965	37,032	11,666	13,391	4,210	6,989	15,876	20,380	31,103	79,000	7,353	8,922	5,115	7,131
1983	26,805	28,260	10,166	10,612	3,895	6,245	14,061	16,856	48,735	86,100	11,756	13,492	3,669	5,165
1984	22,455	24,379	14,727	15,294	5,429	6,098	20,156	21,391	59,352	131,400	6,847	10,554	3,162	4,132
1985	32,429	33,771	15,728	16,799	5,062	4,960	20,790	21,760	86,725	195,600	6,629	10,580	2,645	3,452
1986	42,296	45,287	14,700	15,728	6,154	8,101	20,854	23,829	108,193	281,569	10,300	20,560	3,801	4,954
1987	37,249	40,151	19,856	21,318	5,891	10,666	25,747	31,985	147,957	420,656	12,200	25,821	4,550	6,607
1988	32,673	35,579	17,216	18,204	6,145	11,257	23,361	29,461	108,585	339,915	11,172	24,566	3,519	5,750
1989	27,266	30,093	21,307	21,497	3,169	4,324	24,476	25,821	90,285	261,302	20,058	28,754	3,584	5,293
1990	21,870	24,003	16,971	17,153	5,093	6,674	22,064	23,828	53,421	153,593	15,378	18,359	2,037	3,010
1991	14,521	15,893	12,553	12,811	3,809	4,603	16,362	17,414	42,387	103,286	8,667	15,556	1,925	2,079
1992	31,044	33,578	9,280	9,399	3,014	4,849	12,294	14,247	48,428	81,016	5,502	8,650	2,571	2,608
1993	24,635	26,641	13,528	14,096	7,889	6,907	21,417	21,003	51,678	102,908	6,429	9,607	4,670	4,681
1994	8,121	8,660	13,906	14,288	795	1,084	14,701	15,372	81,158	132,839	8,059	9,130	4,029	4,098
1995	3,751	4,047	10,701	11,343	692	1,032	11,393	12,375	63,500	106,459	9,563	10,834	5,202	5,238
1996	15,069	16,195	10,408	11,118	2,607	3,812	13,015	14,930	68,424	143,193	14,166	14,600	4,200	4,278
1997	15,921	17,100	13,573	13,901	10,709	11,665	24,282	25,567	63,028	161,727	8,670	8,766	14,157	14,290
1998	15,470	16,437	12,864	13,349	4,355	6,342	17,219	19,691	59,699	142,301	5,929	6,173	9,636	10,141
1999	10,682	11,363	19,797	20,509	3,260	4,193	23,057	24,703	72,089	165,806	3,184	3,361	3,641	4,014
2000	51,308	55,791	23,140	23,594	3,933	5,362	27,073	28,956	73,024	155,870	8,718	9,820	3,728	4,135
Goal							17,857				5,700			

Year	Oregon									
	Nehalem		Siletz		Siuslaw		Umpqua River	Mid-Oregon		
	esc.	t. run	esc.	t. run	esc.	t. run	Redd Count Index	Coast Density Index		
1975	5,197	5,303	2,062	2,689	4,427	4,548	na	52		
1976	9,807	9,908	1,326	2,036	7,999	8,153	na	30		
1977	11,478	12,093	3,314	3,919	9,492	10,362	na	63		
1978	12,059	12,960	2,062	3,703	5,872	6,879	116	61		
1979	12,205	12,841	7,217	8,907	8,040	8,799	na	71		
1980	5,555	6,379	3,680	4,823	10,630	11,183	202	70		
1981	10,752	11,272	4,435	6,755	8,724	9,342	258	54		
1982	5,085	5,675	3,415	4,514	10,870	11,774	293	71		
1983	4,431	4,892	2,136	3,152	4,186	4,885	472	47		
1984	20,341	21,623	3,461	4,571	11,168	12,437	752	45		
1985	18,670	19,432	6,628	7,531	14,822	15,553	651	39		
1986	10,389	11,873	6,748	7,639	14,844	15,775	456	41		
1987	13,560	15,654	4,577	5,906	17,603	19,031	810	68		
1988	14,889	17,138	7,805	8,992	41,746	43,975	1,095	85		
1989	10,389	11,903	4,401	5,644	28,279	31,065	1,786	48		
1990	5,104	6,726	4,313	5,148	26,799	28,893	1,090	37		
1991	5,557	7,649	5,633	6,597	26,100	29,011	1,947	43		
1992	9,060	11,780	6,044	7,217	26,090	27,958	2,362	76		
1993	5,345	9,309	4,342	6,244	10,446	13,567	975	72		
1994	6,486	9,400	10,475	11,990	23,570	25,584	2,066	90		
1995	5,194	8,797	5,164	7,626	26,715	30,216	3,301	104		
1996	9,211	13,241	7,394	9,917	33,051	38,485	2,904	99		
1997	10,026	13,053	3,726	5,814	22,305	26,195	2,112	59		
1998	8,245	11,134	5,516	7,247	24,708	28,907	320	98		
1999	8,063		4,166		29,610		523	83		
2000	5,257		4,982		12,999		910	62		
Goal	6,989		2,944		12,925					