

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

**CATCH AND ESCAPEMENT OF CHINOOK SALMON  
UNDER PACIFIC SALMON COMMISSION JURISDICTION,  
2001  
REPORT TCCHINOOK (02)-1**

February 8, 2002

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## LIST OF ACRONYMS WITH DEFINITIONS

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

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## **EXECUTIVE SUMMARY**

The June 30, 1999, Pacific Salmon Treaty (PST) 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 tasked the Chinook Technical Committee (CTC) with a number of assignments (Appendix to Annex IV, Chapter 3).

In this report, we provide a summary of 2001 fishery catches by region and an assessment of escapement for those stocks that have CTC agreed goals. In addition, escapement data and agency comments have been provided for all escapement indicator stocks. We will provide a second annual report, available in the spring or summer, that will summarize the exploitation rate analysis and results of the CTC model calibration postseason for the 2001 fisheries and preseason for the 2002 fisheries, as was done last year (see CTC 2001).

### **CHINOOK CATCH 2001**

In 2001, the fisheries were managed according to the Agreement, and pre-season abundance estimates. Only catches and effort are presented at this time. However, assessment of compliance with the Agreement requires more detailed analyses with CWT data and calibration of the CTC model. These latter analyses will be reported during spring, 2002.

### **ESCAPEMENTS THROUGH 2001**

The escapement review includes 51 naturally spawning escapement indicator stocks/stock aggregates. Biologically-based escapement goals have been accepted by the CTC for 16 of the 51 escapement indicator stocks/stock aggregates. For 11 of these stocks, the agency escapement goal is defined as a range; for the remaining 5 stocks, the escapement goal is the point estimate of  $S_{MSY}$  (escapement producing maximum sustained yield). In 2001, escapements were within the goal range for 6 stocks, above the range or  $S_{MSY}$  point estimate for 9 stocks, and below the goal range for 1 stock. It was not possible to provide this assessment for the other stocks without agreed escapement goals. However, data for other stocks are presented to illustrate trends in escapement but cannot be compared to an agreed escapement goal. Some stocks are managed to an agency goal, but these have not been reviewed by the CTC. The CTC will continue to review analyses to develop CTC agreed goals for the remaining stocks as they are provided.

# 1 CHINOOK CATCH 2001

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.

## 1.1 REVIEW OF AABM FISHERIES

The AABM fisheries, as defined in Annex IV, Chapter 3, paragraph 2, are:

- 1) Southeast Alaska (SEAK) All Gear,
- 2) North BC Troll and Queen Charlotte Islands (QCI) sport, and
- 3) West Coast Vancouver Island (WCVI) Troll and Outside Sport.

Catches for these three fisheries are reported below.

Table 1-1. Annual catches, add on, and terminal exclusion for Pacific Salmon Treaty AABM fisheries. The Treaty catches do not include the add-on or exclusions (noted separately; similar to Appendix A, CTC 2001). Notation is T for Troll, N for Net and S for sport.

Year	SEAK (T, N, S)			NBC (T, S)		WCVI (T, S)	
	Treaty Catch			Treaty Catch		Treaty Catch	
	Target <sup>1</sup>	Observed	Hatchery and Terminal Exclusion Add-on	Target	Observed	Target	Observed
1999	184.2	200.2	50.8	126.1	80.2	107.0	31.1 <sup>2</sup>
2000	178.5	186.8	76.5	123.5	35.9	86.2	101.0 <sup>2</sup>
2001	189.9	189.4	70.6	132.6	40.6	141.2	114.6 <sup>2</sup>

<sup>1</sup> Target catches correspond to the post-season AI's for 1999-2000, and the pre-season AI for 2001.

<sup>2</sup> Size limits in WCVI troll and sport are provided in text.

### 1.1.1 Southeast Alaska Fisheries

The Southeast Alaska chinook fishery was 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 determined from the preseason abundance index (AI) 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-limits and other constraints.



In addition, the SEAK fisheries were managed 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) Compliance with provisions established by the National Marine Fisheries Service in accordance with the United States (U.S.) Endangered Species Act (ESA).
- 4) Consistency with the provisions of the PST as required by the Salmon Fishery Management Plan of the North Pacific Fishery Management Council (PFMC) established by the U.S. Magnuson-Stevens Act.

In 2001, the all gear harvest was 260,044 chinook including an Alaska hatchery add-on of 69,524 chinook and a terminal exclusion of 1,131 chinook. The Treaty harvest was 189,389 chinook.

The 2000 harvests have been updated since last year. In 2000, the all gear harvest was 263,288 chinook including an Alaska hatchery add-on of 73,947 chinook and a terminal exclusion of 2,505 chinook. The Treaty harvest was 186,835 chinook.

#### 1.1.1.1 *Troll Fishery*

Troll fishery regulations were similar in 2001, compared to the period of the previous report (1997-2000). The accounting year began with the start of the winter fishery on October 11 of the previous calendar year and ended the following September; e.g., the 2001 accounting year is October 2000 through September 2001. The winter fishery continues until 45,000 total chinook salmon are caught or through April 14, whichever is earlier. In 2001, the harvest in the winter fishery was less than 45,000 and the troll fishery continued through April 14. The spring fisheries were 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 2001, the first summer fishery opening began on July 1 and was managed to harvest 70% of the remaining troll gear chinook quota based on the 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 2001, an in-season estimate of the AI was made using methodology established by the CTC. A second summer chinook retention period began after necessary management actions for coho salmon were determined.

In 2001, the troll fishery harvested a total of 153,200 chinook salmon including 28,400 Alaska hatchery fish (Table 1-2). The winter fishery harvested 22,600 of which 2,800 (12.4%) were from Alaska hatcheries. The spring fishery harvested a total of 35,300 of which 20,600 (58.4%) 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 six days. The in-season estimate of the AI was 1.10, so the fishery was managed for 178,500 chinook (Agreement). The initial opening resulted in a catch that represented the management goal of 70% for the summer fishery. The first summer opening resulted in a total catch of 64,900 chinook and a treaty catch of 61,900 chinook. The second retention period was open on August 18 after a five-day closure for coho salmon management and remained open through September 5. The second summer opening resulted in a total catch of 30,500 chinook and a treaty catch of 29,400 chinook.

Table 1-2. Summary of the 1999-2001 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). NA indicates catch figures pending.

Area	Troll			Net			Sport			First Nation Food			Total		
	01	00	99	01	00	99	01	00	99	01	00	99	01	00	99
<b>SEAK</b> <sup>1</sup>	153.0	159.0	146.0	39.0	41.0	33.0	68.0	63.0	72.0				260.0	263.0	251.0
<b>BRITISH COLUMBIA</b> <sup>2</sup>															
NBC Troll <sup>1</sup> and QCI Sport	13.1	9.8	43.8				27.5	26.1	36.4				40.6	35.9	80.2
WCVI Troll <sup>1</sup> and Outer Sport <sup>3</sup>	77.5	63.4	0				37.1	36.6	31.1				114.6	100.0	31.1
Transboundary				NA	5.6	4.5	NA	0.3	0.4	NA	1.2	1.0	NA	7.1	5.9
NC Net, Sport, and First Nation				23.0	27.6	12.7	11.0	8.6	11.7	28.0	23.6	24.2	62.0	59.8	48.6
CC Net, Troll <sup>1</sup> , Sport, and First Nation				4.4	4.5	4.2	7.7	7.4	10.3	4.2	4.2	3.6	16.3	16.1	18.1
Johnstone St	0.5	0.1	0.3	0.2	0.1	0.1	3.7	11.4	7.8				4.4	11.6	8.2
Juan de Fuca Strait <sup>4</sup>					0.1	0.1	23.5	11.0	15.0				23.5	11.1	15.1
WCVI Terminal					0.1	0.7	6.2	5.2	47.0		0	3.6	6.2	5.3	51.3
Georgia St/Fraser <sup>5</sup>		1.0	0	4.3	4.3	3.9	38.1	22.0	38.0	29.2	26.0	28.0	71.6	53.3	69.9
<i>Subtotal</i>	<i>91.1</i>	<i>74.3</i>	<i>44.1</i>	<i>31.9</i>	<i>42.3</i>	<i>26.2</i>	<i>154.8</i>	<i>128.6</i>	<i>197.7</i>	<i>61.4</i>	<i>55.0</i>	<i>60.4</i>	<i>339.2</i>	<i>300.2</i>	<i>328.4</i>
<b>WASHINGTON Inside</b> <sup>6</sup>															
Juan de Fuca Strait (marine) <sup>7</sup>	1.6	.2	2.1	0.9	0.6	0.7	NA	1.7	1.4				2.5	2.5	4.2
San Juans (marine) <sup>8</sup>				1.0	1.4	0	NA	4.4	2.2				1.0	5.8	2.2
Other Puget Sound (mar + fw) <sup>9</sup>				49.0	69.0	84.0	NA	29.5	34.0				49.0	98.5	118.0
Coastal (mar + fw) <sup>9</sup>				14.7	15.6	11.4	NA	3.2	2.2	NA	.2	.3	14.7	19.0	13.0
<i>Subtotal</i>	<i>1.6</i>	<i>.2</i>	<i>2.1</i>	<i>65.6</i>	<i>86.6</i>	<i>96.1</i>		<i>38.8</i>	<i>39.8</i>	<i>NA</i>	<i>.2</i>	<i>.3</i>	<i>67.2</i>	<i>125.8</i>	<i>138.3</i>
<b>COLUMBIA RIVER</b> <sup>10,11,12</sup>				140.5	51.4	55.9	57.4	27.2	35.4	57.8	19.6	29.4	255.7	98.3	120.7
<b>WA/OR N OF FALCON</b> <sup>13</sup>	54.4	20.5	45.0				2.2	9.9	10.8				56.6	30.4	55.8
<b>OREGON (Inside)</b> <sup>14</sup>	1.2	1.9	1.2				NA	NA	30.8				1.2	1.9	32.0
<b>GRAND TOTAL</b>	<b>301.3</b>	<b>255.9</b>	<b>238.4</b>	<b>277.0</b>	<b>221.3</b>	<b>211.2</b>	<b>282.4</b>	<b>267.5</b>	<b>386.5</b>	<b>119.2</b>	<b>74.8</b>	<b>90.1</b>	<b>979.9</b>	<b>819.5</b>	<b>926.2</b>

- 1/ Southeast Alaska and all BC troll chinook catches shown are for a 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 catch is estimated through creel surveys and lodge catch records.
- 4/ Juan de Fuca includes area 19B, and since 1999, area 20-1 (Port Renfrew). The Port Renfrew creel survey was initiated in 1997.
- 5/ GS sport catches from areas 13-19A, 28, 29 outside the Fraser River. Juan de Fuca Strait sport catches reported separately.
- 6/ All WA inside sport numbers are adjusted for punch card bias. See "1988 WA State Sport Catch Report" for details.
- 7/ 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).
- 8/ San Juan net catch includes catch in areas 6, 6A, 7, and 7A; sport catch includes area 7.
- 9/ Coastal and Puget Sound sport catches include marine and freshwater, but only adults in freshwater.
- 10/ Columbia River net catches include Oregon, Washington, and both Treaty commercial and bank sale catches.
- 11/ Columbia River sport catches include adults only, for Washington, Oregon, Idaho, and Buoy 10 anglers.
- 12/ Columbia River Indian food includes ceremonial and subsistence.
- 13/ North of Falcon troll catch includes catch in area 4B during the PFMC management period (May-September), and area 2.2 (Grays Harbor) when area 2 is open.
- 14/ Troll = late season troll off Elk River mouth (Cape Blanco); sport = estuary and inland.

The areas of high chinook abundance were closed for the remainder of the summer season after the initial retention period. The total summer harvest was 95,400 of which 5,000 were from Alaska hatcheries. There were a total of 7,354 boat-days of chinook effort and 15,421 boat-days of chinook non-retention effort.

In addition, the 2000 troll effort has been updated. The new statistics are 6,618 boat days of chinook effort and 15,609 boat-days of chinook non-retention effort.

Table 1-3. Catches in the SEAK troll fisheries in 2001.

Troll Fishery	Total Catch	Ak Hatchery Catch	Ak Hatchery Percent
Winter	22,600	2,800	12.4%
Spring	35,300	20,600	58.4%
Summer	95,400	5,000	5.2%
Total	153,200	28,400	18.5%

#### 1.1.1.2 The Net Fisheries

Net harvest of chinook salmon in the purse seine fishery is limited with a 28” (71 cm) size limit and the use of chinook non-retention (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 base-period catch was 2,000. Catch over and above the base period catch is excluded from PSC limits if the agreed escapement goal for the system has been met.

The 2001 total net harvest was 38,900 chinook. There was a total of 631 fish excluded (Table 1-3) and 26,400 chinook were from Alaska hatcheries. The total net harvest minus the terminal exclusion and the Alaska hatchery add-on was 13,500 chinook.

Table 1-4. Base, total, and excluded catch for the SEAK net fisheries on the Stikine, Taku, and Situk Rivers in 2001.

	Base Catch	Total Catch	Exclusion Catch
Stikine	402	0	0
Taku	1,708	1,111	0
Situk	2,000	2,631	631
Total	4,110	3,742	631

A slight correction was made for the 2000 net harvests. The 2000 total net harvest was 41,400. There was a total of 881 fish excluded and 31,200 chinook were from Alaska hatcheries. The total net harvest minus the terminal exclusion and Alaska hatchery add-on harvest was 11,100 chinook.

1.1.1.3 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'd) chinook and coho salmon. In 2001, regulations for the recreational fishery included a one fish daily bag limit and minimum size limit of 28 inches in total length along with a three fish annual limit for non-resident anglers. In “terminal” areas near hatchery release sites, however, bag and size limit regulations were liberalized to provide for increased harvests of returning Alaska hatchery chinook salmon. The total harvest in 2001 was 67,900 chinook of which 500 were wild fish that were excluded (Table 1-4), 19,100 chinook were Alaska hatchery fish taken in mixed stock fisheries, and another 5,000 Alaska hatchery fish were taken in terminal hatchery areas. The preliminary total sport harvest of 67,900, minus 20,900 combined hatchery add-on and wild terminal exclusion fish, resulted in a treaty harvest of 47,000 chinook. Preliminary harvests for 2001 will be updated after mail survey results are obtained, approximately June 2002.

Recreational harvests for SEAK in 2000 have been updated. In 2000, the total recreational harvest was 63,200 chinook of which 1,600 were wild fish that were excluded in terminal areas, 15,300 were Alaska hatchery fish and 7,400 fish were taken in terminal Alaska hatchery areas. The total sport harvest of 63,200, minus 21,300 combined hatchery add-on and wild terminal harvest fish, resulted in a treaty harvest of 41,800.

Table 1-5. Terminal base, total, and exclusion catches for wild stocks of chinook for the SEAK recreational fishery.

	Base Catch	Total Catch			Terminal Exclusion Catch		
		1999	2000	2001 <sup>a</sup>	1999	2000	2001 <sup>a</sup>
Stikine	2,302	3,567	2,605	2,114	0	303	0
Taku	1,857	2,408	1,553	1,301	0	0	0
Situk	200	1,545	1,521	700	1,345	1,321	500
Total	4,359	7,520	5,679	4,115	2,610	1,624	500

<sup>a</sup> 2001 catch data are all preliminary.

While the ADF&G have recorded terminal exclusions of chinook from the Situk, Taku, and Stikine rivers for 1999 through 2001, that agency has not submitted any documentation supporting these exclusions. The CTC notes that provision of terminal exclusions requires documentation of the following conditions, as noted in the 1991 Letter of Transmittal to governments (PSC file):

- i) spawning escapements of stocks targeted in the exclusion area are meeting or exceeding the interim escapement goal;
- ii) the harvest in the exclusion area is comprised of mature chinook returning to local stocks while minimizing the harvest of immature and non-local stocks; and
- iii) management capabilities accurately account for and sample harvest occurring exclusively in the exclusion area.

Further, the catch in any year must be compared against a base catch level that must be defined for each terminal exclusion area.

The CTC has deferred consideration of the terminal exclusions in Alaska until necessary documentation is provided. Alaska will provide documentation by fall of 2002. The CTC also notes that the Taku and Stikine exclusions involve transboundary chinook stocks that may more appropriately be considered within the Transboundary Technical Committee and Panel as part of the development of abundance-based management plans in these rivers.

## **1.1.2 North British Columbia**

### *1.1.2.1 Troll Fisheries*

In 2001, the NBC troll fishery was opened for chinook fishing from March 25 to May 16 to assess stock composition in Areas 1 and 2W. This fishery was conducted under scientific licence with 9 vessels participating. A total of 2,200 chinook were caught. Troll fisheries in these areas were closed for the summer season due to continued conservation concerns for WCVI chinook.

A troll fishery that opened between September 8 and 30th in Areas 2E and 2W caught 8,000 chinook. An average of 30 vessels and a maximum of 52 vessels participated in the 2W fishery. No effort was observed in Area 2E. A test fishery, consisting of three troll vessels, fished during the same period around Langara Island, Area 1. Total catch in the Area 1 test fishery was 600 chinook. Troll fisheries were extensively monitored and sampled for stock composition of catch, encounter rates by size categories, and to maximize recovery of coded-wire tags.

A troll fishery was conducted in Area 4 from June 4 to June 15. A ceiling of 2,000 chinook was placed on this fishery but catches were poor and only 1,000 were caught. Trolling was also permitted in portions of Area 4 during the commercial net fishing period from July 6 to 18. A total of 1,300 chinook were caught in this fishery.

The total 2001 troll catch of chinook to the end of September for NBC was 13,100 fish.

### *1.1.2.2 Recreational Fisheries*

Tidal recreational fisheries in northern and central B.C. (marine statistical Areas 1-11) are 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 also occur in freshwater, with regulations described annually in the Freshwater Salmon Supplement to the BC Tidal Waters Sport Fishing Guide (<http://www-comm.pac.dfo-mpo.gc.ca/english/sfg/>). Catch in these freshwater fisheries is included in the section 1.2 Review of ISBM Fisheries.

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 expanded. Management of these marine recreational fisheries now recognizes two basic regions: QCI, and the coastal mainland and inlets. Only the QCI catch is included in the AABM totals.

Recently, fisheries in the QCI area (Langara Island, the north shore of Graham Island, and areas 2W and 2E) 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 total mortality and priority use of the mortality by the recreational sector (as formalized in the October 1999 CDFO 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 CTC 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 CDFO staff. In 2001, fishery management actions (same as in 2000) were taken to reduce the impact of QCI sport fisheries on WCVI chinook stocks. 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 August 28). Pre-season assessments indicated that this action could reduce the harvest on large chinook by about 30%.

Preliminary reported catch for this fishery in 2001 was 27,500 chinook salmon. Thus, the total AABM catch (troll plus sport) in 2001 was 40,600 fish.

### **1.1.3 West Coast Vancouver Island Troll and Outside Sport**

Under the 1999 PST Agreement, the WCVI AABM fishery is defined to include the WCVI troll and the outside WCVI chinook sport fishery. The definition of “Outside WCVI sport fishery” is contained in the Chinook Annex to the Agreement. It was required to estimate the portion of the WCVI recreational fishery chinook catch in the offshore area (outside sport). This portion includes all the catch in NWVI (areas 25-27) prior to July 1 and the catch outside one nautical mile offshore after July 1, plus all the catch in SWVI (areas 21-24) prior to August 1 and the catch outside one nautical mile (NM) offshore after August 1.

In the 2001 season, the WCVI troll fishing opportunities provided were consistent with a CDFO commitment to evaluate winter fisheries as a means to improve the economic base for the fleet and local communities while increasing flexibility in harvest opportunities and reducing the harvest rates on stocks normally harvested in summer fisheries. Troll fishing opportunities were provided during the following periods and resulted in the following harvests:

October 3 to 13, 2000	27,155 chinook
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November/December 2000	801 chinook
January/March 2001	3,393 chinook
April/May 2001	31,951 chinook. Commercial fisheries were not conducted during the period of late March to late April in order to avoid impacts on early returning upper Fraser River spring run chinook
June 20-21 and July 4-5, 2001	Chinook retention was permitted as incidental catch during a directed sockeye troll fishery within Barkley Sound (Area 23). Incidental chinook catches in this fishery average less than 25 chinook per year. Monitoring during 2001 indicated that 21 chinook were caught, 3 kept and 18 released during this fishery.
July 26 to August 6, 2001	In Areas 123 to 127 (1nm seaward of the surfline) targeting Fraser River sockeye. This fishery encountered 4,112 chinook, all of which were released.
September 2001	14,188 chinook. This fishery was restricted to offshore areas in order to avoid WCVI chinook.

The minimum size limit for troll-caught chinook during these periods was 55cm. Catches during these fisheries were extensively monitored to determine encounter rates of other species and chinook under 55cm, as well as sampling size distributions, and stock compositions (via CWT, DNA and otolith samples). Total catch for the 2001 season troll fisheries was 77,491 chinook.

Examination of CWT recoveries by sport catch locations during 1997 – 1999 indicated that WCVI chinook are vulnerable in near shore waters during their return migration, but not observed outside of a narrow corridor. The 2001 WCVI chinook fisheries faced conservation concerns for WCVI origin chinook stocks and Upper Fraser River coho, which resulted in restrictions in offshore areas and implementation of a chinook ‘conservation corridor’. Directed chinook fisheries were conducted outside the period during early June through mid September and selective fishing practices were mandatory.

During 2001, 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. The conservation corridor extended 1 mile offshore from Bonilla Point (southern limit) to Tatchu Point in the northern part of the WCVI. In areas 21-24, and 121-124 salmon fishing within the corridor was prohibited between August 1 and October 15. Outside of the corridor and in Areas 25 to 27, salmon fishing with non-retention of coho was permitted but restrictions included specific area closures and non-retention of chinook over 77 cm in the near shore areas that were open to salmon fishing. Inside of the surfline, there was generally non-retention of chinook salmon, except in terminal areas of the Conuma and Nitinat Hatcheries. In addition, salmon fishing was prohibited within sections of Nootka Sound (Area 25) in order to protect local wild stocks.

This was a change from 2000 when the “corridor” in this area prohibited any salmon fishing but allowed selective coho fishing inside Nootka Sound. The change was anticipated to provide additional protection to local chinook stocks while providing additional opportunity to access age 3 chinook outside Nootka Sound.

Sport catches outside of the corridor were extensively sampled for by-catch of WCVI chinook stocks using CWT recoveries and sampling for otolith marks.

Since 1997 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 to September 30 but may vary with the run timing in certain areas. The 2001 sport catch of chinook in the outer area of WCVI was as follows:

Outer WCVI sport catches by statistical areas in 2001						
23A	23B	24	25	26	27	Total
0	28,418	5,503	2,757	281	174	37,133

Thus, the total AABM catch (troll plus sport) in 2001 was 114,624 chinook.

## 1.2 REVIEW OF ISBM FISHERIES

### 1.2.1 Canadian Fisheries

#### 1.2.1.1 Transboundary Rivers

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

Year	STIKINE				TAKU			
	Commercial+Test Fish.		Aboriginal		Commercial+Test Fish.		Aboriginal	
	Jacks	Large	Jacks	Large	Jacks	Large	Jacks	Large
1999	898	3,004	463	765	259	1,485	-	50
2000	260	2,684	386	1,109	174	2,888	-	56
2001	162	2,608	44	665	181	2,924	-	125

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

Year	Aboriginal	Recreational
1999	238	192
2000	65	39
2001	120	112



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

#### *1.2.1.2 North Coast*

In 2001, mandatory release of chinook from seine nets was maintained throughout the season. There was no gillnet catch in the Queen Charlotte Islands. However, in the Skeena/Nass (Areas 3, 4, 5), the gillnet catch was 23,051 chinook, including a catch of 17,136 fish in River Gap Slough portion of Area 4.

Recreational fisheries other than those off the Queen Charlotte Islands occur in the north coast (regulations as above). In Areas 3 and 4, a creel survey of marine recreational fishing ran from May to September in 2001. This survey accounted for 10,746 of the total estimated tidal sport catch of 11,000 chinook in these areas. The freshwater recreational fishery harvest for the north coast was not estimated in 2001. However, reports from lodge operators and Fishery Officers indicate that effort and angler success was greater in 2001 than in 2000.

Native food fisheries in the north coast harvested a total of 28,090 chinook (5,873 tidal, 22,217 freshwater).

#### *1.2.1.3 Central Coast*

While trolling was permitted during net fishing periods in Areas 6, 7 and 8, participation was minimal and there were no reported landings of chinook. In 2001, gillnet catch from the central coast (areas 7-10) was 4,388 chinook, including 2,340 fish caught in the Area 8 (Bella Coola) large mesh gillnet fishery.

In 2001, fishery management actions (same as in 2000) were taken in the Rivers Inlet (Area 9) tidal sport fishery to reduce the harvest rate on Wannock River chinook. A terminal area where fishing for Wannock chinook was frequently focused, remained closed to fishing. A creel survey indicated that 2,921 chinook were retained in the Rivers Inlet tidal sport fishery in 2001. The total tidal sport catch for central coast was 6,711 chinook, including Rivers Inlet.

Freshwater recreational fisheries occur annually in a number of central coast rivers. However in 2001, catch estimates were available from the Bella Coola/Atnarko Rivers only. Estimated freshwater sport catch in these systems was 1,024 chinook.

Native food fisheries in the central coast occur primarily in the Bella Coola River. In 2001, an estimated 4,202 chinook were harvested (281 tidal, 3,921 non-tidal).

#### *1.2.1.4 Johnstone Strait*

In 2001, chinook could be retained during troll fisheries for sockeye salmon in areas 11-13. By-catch of chinook in these troll fisheries was estimated to be 500 fish.

Fishing time, location, and gear are regulated in southern BC net fisheries to conserve immature and adult chinook salmon. In Johnstone Strait, areas of high chinook vulnerability are closed to net fisheries.

There were no directed net fisheries for chinook in Johnstone Strait in 2001. 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. All gillnet fisheries were required to release live chinook. Fish revival tanks were required as a condition of license; these tanks were used to revive fish prior to release. Net fisheries in Johnstone Strait targeting Fraser sockeye and southern inside chum stocks resulted in a by-catch of less than 200 chinook in 2001.

In 2001, a creel survey was conducted that encompassed only the Northern Queen Charlotte Strait (Pt. Hardy area) from June to September. Based on this survey, the estimated catch was 3,759 chinook taken during 10,825 boat trips.

#### *1.2.1.5 Georgia Strait / Fraser*

During 2001, use of single barbless hooks was mandatory during all troll fisheries as part of the Salmon Area H (Strait of Georgia) license conditions. There was no directed commercial chinook fishery; however, chinook were retained during directed sockeye, pink, and chum fisheries. The management strategy included a provision for 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 13 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 number of chinook released in 2001 was estimated to be 539 fish.

Fishing time, location, and gear are regulated in southern BC net fisheries to conserve juvenile and adult chinook salmon. Catch by net gears in the Strait of Georgia occur mainly in the Fraser River gillnet sockeye fishery, the Fraser River chinook test fishery, and to a small degree during chum fisheries. In the Fraser River area, net fishing is usually limited to gillnets, where chinook are caught incidentally during sockeye, pink, or chum fisheries. With the exception of a small pilot fishery (see below), there were no directed net fisheries on Fraser River chinook stocks. Also, gillnet fishing in September in the Fraser River has been restricted to limit impacts on natural Harrison River chinook and returning Thompson coho and steelhead salmon. Gillnet fisheries were required to sort and release all coho with the least possible harm. It was illegal to land coho from any areas. Depending on local stock concerns, gillnets were required to release chinook and steelhead as well. 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 were used to revive these fish prior to release.

The Fraser gillnet catch in 2001 was 3,801 chinook (primarily from the Albion test fishery). In addition, catch from a selective fishery pilot project during the sockeye fishery was 500 chinook. Thus, total the Fraser gillnet catch in 2001 was 4,301 fish.

The management objective for the Strait of Georgia (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 2001. This plan consists of the following management actions plus additional actions taken during 2001 (Table 1-6).

Table 1-6. Recreational daily bag limits, annual catch limits, 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

- 2001: 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 was required, size limits were 45 cm westward of Cadboro Point (mid-area 19) and 62 cm eastward of the Point.
- 2001: The spot closure in Area 19 (Coal Island) was eliminated.

In 2001, a creel survey was conducted similar to that in 2000. The Strait of Georgia sport 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. The estimated chinook catch in the Strait of Georgia was 31,259 fish and the effort was 141,978 boat trips.

Sport catches in the lower mainstem of the Fraser river are estimated by creel surveys but the duration of the sampled period varies between years. In 2001 the lower Fraser River sport fishery was monitored from April to early September. Estimated catch for the lower mainstem for the months of April through June 2001 was 2,867 chinook. Analyses of the creel survey data for the remainder of the season are not yet complete.

Recreational fishing occurs in several upper tributaries to the Fraser. Fishery Officers monitor catch, and creel surveys are used in the larger fisheries (particularly those associated with indicator stock programs). Total catch in these up-river sport fisheries was estimated to be approximately 4,000 chinook during 2001. 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. No catch estimates for the 2001 fishery in this river are yet available.

Freshwater recreational fisheries also occur on various streams on the east coast of Vancouver Island. A fishery for jacks only was conducted on the Cowichan and Nanaimo Rivers in 2001. However, less than 100 fish were caught. A total of 22 chinook were caught on the Big Qualicum River.

The major First Nations fishery in southern BC occurs in the Fraser River mainstem. Catches are determined through catch monitoring programs in the lower river and surveys to estimate catch in the upper river fisheries. Native catch in the Fraser River was estimated to be 26,000 chinook in 2000 (not previously reported). The preliminary estimate for the 2001 Native catch is 28,460 chinook.

Native food fisheries also occur in Strait of Georgia rivers. Aboriginal catch of chinook 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. Reported catch for 2001 was 800 adult chinook and 200 jacks.

#### 1.2.1.6 Juan de Fuca Strait

In Juan de Fuca Strait, areas of high chinook vulnerability are closed to net fisheries, and fishing inside of a minimum water depth strata is precluded to reduce the catch of immature chinook and coho. A maximum number of immature chinook caught per set is used to limit total chinook mortality. If encounters exceed this value, then the fishery is moved or closed.

No commercial net fisheries occurred in Juan de Fuca Strait in 2001, although some chinook were caught in gillnet test fisheries (data not available). In 2001 a seine test fishery in Area 20 released 729 chinook.

Sport fishing regulations in effect for 2001 are provided Table 1-6. A creel survey of the Juan de Fuca fishery included areas 19B-E (Sydney to Race Rocks), area 19-F/20-5 (Race Rocks to Sheringham) and Area 20-1 at Port Renfrew. The estimated catch totaled 23,463 chinook including 17,710 fish in the Victoria area (areas 19 and 20-3 to 20-5) and 5,753 fish in area 20-1. Effort in this sport fishery totaled 59,954 boat trips.

#### 1.2.1.7 WCVI Terminal

Terminal WCVI sport catch is from inshore areas of Areas 23A (Alberni Inlet), 23B (Barkley Sound), 24 (Clayoquot Sound), 25 (Nootka Sound), 26 (Kyuquot Sound) and 27 (Quatsino Sound). It includes catch inside Areas 23/24 in August and September and in Areas 25, 26, and 27 in July-September. The 2001 sport catch of chinook from terminal areas of WCVI was as follows:

2001 WCVI terminal sport catches by statistical area.						
23A	23B	24	25	26	27	Total
0	155	4	5,725	43	274	6,198

In recent years, small sport fisheries have occurred in the Stamp River. However, no in-river fishery was allowed during 2001.

No Native fishery occurred in the terminal area of Area 23 in 2001. Data are insufficient to estimate harvests by food fisheries outside of Area 23.

## **1.2.2 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.

### *1.2.2.1 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 in 2001. 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 (77 cm) maximum size limit for chinook during the spring chinook management period and through the use of barbless hooks.

In the Strait of Juan de Fuca, recreational fishing was closed to chinook salmon retention in catch reporting Areas 5 & 6 except from February 16 to April 10 and during the month of November. In addition, for catch Area 5 only, during the month of July, chinook salmon landings were allowed up to a quota of 2,000 fish. From July 1 through September 30, the total harvest of chinook salmon in Area 5 was estimated at 2,510 fish with 71,886 angler trips.

The southern and southeastern (Rosario Strait) portions of the San Juan Islands were again closed to recreational fishing in 2001 to protect migrating, mature Puget Sound chinook salmon. The remaining area was opened for retention of chinook and coho salmon (one fish bag limit) from July 1 to September 30. Chinook retention was also allowed in the entire area from February 16 - April 10 and for the month of November. No estimate of recreational catch is available at this time.

Preliminary estimates of the 2001 catch in Strait of Juan de Fuca tribal net fisheries directed at sockeye salmon total 800 chinook salmon. An additional 50 chinook were taken during the coho management period.

Preliminary estimates of the 2001 catch in the San Juan Islands tribal net fishery directed at sockeye salmon are 900 chinook. Non-treaty landings totaled about 100 chinook.

The preliminary estimate of the 2001 Strait of Juan de Fuca treaty troll fishery is 1,580 chinook through November. The catch estimate does not include catches from Area 4B during the May-September PFMC management period. These are included in the North of Cape Falcon troll summary.

### *1.2.2.2 Puget Sound*

In the Puget Sound area, exclusive of the Straits of Juan de Fuca and the San Juan Islands, chinook salmon are harvested in recreational and in both 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 or 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 put in place to protect depressed stocks. However, harvest opportunities may occur in local terminal areas where hatchery surpluses exist.

Preliminary estimates of the 2001 tribal and non-tribal net fishery harvests in Puget Sound marine areas are 49,000 chinook, mostly taken in terminal areas where harvestable abundance was identified. Additional tribal net harvest occurred in freshwater fisheries, but estimates are not available at this time. Estimates of the sport catch in 2001 are not available.

### *1.2.2.3 Washington Coast*

The annual harvests in Washington coastal fisheries for 2001 are reported in Table 1-1. Chinook salmon are harvested in treaty commercial net fisheries, C&S fisheries, and in recreational fisheries. Estimates include harvests in Grays Harbor, Willapa Bay, and the Quinault, Queets, Hoh and Quillayute Rivers. Harvests impact the spring/summer and fall stocks in Grays Harbor and the Quinault, Queets, Hoh and Quillayute Rivers and the fall stock in Willapa Bay.

The north coastal rivers commercial net harvest (all by tribal fisheries) in 2001 is an estimated 8,300 chinook through November.

Recreational fisheries were implemented based upon pre-season tribal-state agreements and were subject to in-season adjustment. Estimates of sport fishery catches are not available until approximately one year following the calendar year of the fishery.

Harvests of chinook for Grays Harbor includes catch from both the Humptulips and Chehalis rivers. The 2001 tribal net fisheries have harvested an estimated 3,900 chinook through November. The 2001 non-Indian commercial net harvest in Grays Harbor was at least 2,500 chinook. Recreational fishery harvest estimates are not yet available.

#### 1.2.2.4 Ocean Fisheries North of Cape Falcon

The U.S. ocean fisheries north of Cape Falcon, Oregon, are managed through the domestic regulatory process of the PFMC. Management objectives for chinook fisheries include satisfying standards for ESA-listed stocks, providing for viable ocean and terminal area fisheries, protecting depressed wild stocks and meeting hatchery chinook brood stock needs. Lower Columbia River and Bonneville Pool hatchery fall chinook have historically been the major contributors to ocean catches North of Cape Falcon. In 2001, fisheries were structured to reduce impacts on threatened Puget Sound chinook by constraining catches in areas of highest concentration of these stocks (parts of areas 3 and 4). Management objectives for ESA listed stocks, especially Oregon coastal natural coho, and low abundances of lower Columbia River hatchery fall chinook also restricted ocean fisheries in the Southern U.S. Recreational and commercial catches for the region in 2001 are shown in Table 1-1.

Preliminary estimates of chinook catches north of Cape Falcon in 2001 are 54,400 in treaty and non-treaty troll fisheries, and a total recreational catch of 25,400. The troll catch includes catches in Area 4B during the PFMC management period (May 1 – September 30).

#### 1.2.2.5 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 – *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 2001, the total harvest was 244,200 chinook of which the commercial harvest was 185,400, the recreational harvest was 46,800 and the Indian C&S harvest was 12,000 chinook.

In 2001, the winter/spring fisheries were constrained by impacts on ESA listed upper Columbia River and upper Snake River chinook while treaty-Indian fall fisheries were constrained by impacts to ESA-listed Snake River Group B steelhead. This was a year when the Snake River fall chinook were not a direct constrain, as the Group B steelhead impact guideline was reached first.

There were minimal commercial fisheries for the spring run as in past years, and there was a limited fishery for seventeen days in the fall in the latter half of September and early October.

Recreational fisheries saw a large increase in effort due to the large hatchery spring run (the largest in 20 years) accounting for 172,300 angler trips between April and May. This was one of the first years when a major selective fishery was operated on spring-run marked hatchery fish. In the fall, the sport fisheries were curtailed to an early closure due to Snake River steelhead and chinook impacts, and resulted in about 12,000 chinook caught in the Buoy 10 fishery (121,000 estimated angler trips directed mostly at coho) and another 9,100 in the main-stem Columbia River fishery.

#### *1.2.2.6 Ocean Fisheries, Cape Falcon to Humbug Mountain*

Ocean fisheries off Oregon's coast harvested predominately a mixture of southern chinook stocks not involved in the PSC agreement. 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 terminal area troll fishery. The late season catch in the Elk River terminal troll fishery in 2001 was 1,159 chinook.

Recreational catch of these two stock groups (NOC and MOC) occurs primarily in estuary and freshwater areas as mature fish return to spawn and are reported through a "punch card" accounting system. These data are only available two years prior to the current season. Therefore, we can report only the riverine sport catches for 1999 which were 21,390 and 9,390 chinook for the NOC and MOC groups, respectively. The 2000 and 2001 estimates of recreational catch are unavailable at this time.



## 2 ESCAPEMENTS THROUGH 2001

### 2.1 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”*

The intent of this chapter is to compare yearly escapements with MSY or other agreed biologically-based escapement goals established for chinook 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. The CTC has reviewed and accepted escapement goals for 16 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.

### 2.2 FRAMEWORK

#### 2.2.1 Escapement Indicator Stocks

This year's escapement review includes 53 naturally spawning escapement indicator stocks or stock aggregates. 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 <sup>1</sup>					Total
	Spring	Spring/ Summer	Summer	Summer/ Fall	Fall	
Southeast Alaska	8					8
SEAK/Transboundary	3					3
British Columbia	3	3	4	1	3	14
Puget Sound	2			3	2	7
Washington Coastal	1		3		5	9
Columbia River	1		3		3	7
Oregon Coastal					5	5
Total	18	3	8	4	18	53

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

## 2.2.2 Escapement and Terminal Run Data

### 2.2.2.1 Sources of Escapement Data

The escapement and terminal run data used in this report were provided by management agencies in each jurisdiction. Data for each stock are presented in Appendix A. Table 2-2 lists the sources of mortality included in estimates of terminal run size for the 33 stocks or stock aggregates with terminal harvest or broodstock removal.

Table 2-2. Terminal run composition for 33 stocks or stock aggregates with broodstock removal, rack sales or terminal fisheries.

Stock	Brood Stock /Rack Sales	Commercial Net	Ceremonial/ Subsistence	Freshwater Sport
Situk		✓	✓	✓
Alek <sup>1</sup>		NI	NI	NI
Taku <sup>1</sup>		NI	NI	NI
Stikine <sup>1</sup>		NI	NI	NI
Chilkat	✓		NI	
Nass			✓	✓
Skeena <sup>2</sup>		✓	✓	✓
WCVI	NI			
Lower Georgia Strait	✓		✓	NI
Fraser <sup>3</sup>	NI	✓	✓	✓
Harrison	NI	✓	✓	✓
Skagit spring <sup>4</sup>	NI	✓		
Skagit summer/fall <sup>4</sup>		✓		NI
Stillaguamish <sup>4</sup>	✓	✓		NI
Snohomish <sup>4</sup>		✓		NI
Green <sup>4</sup>	✓	✓		NI
Quillayute summer		✓	✓	✓
Quillayute fall		✓	✓	✓
Hoh spring/summer		✓	✓	✓
Hoh fall		✓	✓	✓
Queets spring/summer		✓	✓	✓
Queets fall <sup>5</sup>		✓	✓	✓
Grays Harbor spring		✓	✓	✓
Grays Harbor fall		✓	✓	✓
Col. Upriver spring <sup>6</sup>		✓	✓	✓
Col. Upriver summer <sup>6</sup>		✓	✓	✓
Col. Upriver bright <sup>6</sup>		✓	✓	✓
Deschutes fall <sup>6</sup>		✓	✓	✓
Lewis <sup>6</sup>		✓	✓	✓
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.

<sup>1</sup> Terminal catch estimates can be found in TTC (2002). Sport catch is Canadian only.

<sup>2</sup> Includes catches from River Gap Slough gillnet fishery.

<sup>3</sup> Terminal runs are determined for the aggregate spring/summer Fraser stocks (Appendix A), but terminal runs for the four stocks are not plotted.

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

<sup>5</sup> Escapement estimates include fish taken for broodstock.

<sup>6</sup> Includes inter-dam loss.

### 2.2.2.2 Agency Procedures for Estimating Escapement

Methods of estimating escapement varied depending on river characteristics and agency resources. Some escapement estimates were measures of actual spawner abundance, where available, or estimates (or indices) of abundance measured at a point of migration beyond the effect of major fisheries. Estimates were made using weirs and counting fences, aerial or foot surveys, dam passage counts, electronic counting devices, or mark-recapture studies. Where appropriate, 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 return of naturally spawning fish; 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.

## 2.2.3 MSY or Biologically-based Escapement Goals

### 2.2.3.1 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 1999). 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 (in grey shading) 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	2002
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	Indeterminate
16	Rivers Inlet	BC	CBC-Area 9	Summer	Indeterminate
17	Smith Inlet <sup>1</sup>	BC	CBC-Area 10	Summer	Indeterminate
18	W. Coast Van. Is. <sup>2</sup>	BC	WCVI	Fall	Indeterminate
19	Upper Georgia St.	BC	UGS	Sum/fall	Indeterminate
20	Cowichan/Nanaimo	BC	LGS	Fall	2002
21	Fraser Spring 1.3 <sup>2</sup>	BC	Fraser River	Spring	Indeterminate
22	Fraser Spring 1.2 <sup>2</sup>	BC	Fraser River	Spring	Indeterminate
23	Fraser Summer 1.3 <sup>2</sup>	BC	Fraser River	Summer	Indeterminate
24	Fraser Summer 0.3 <sup>2</sup>	BC	Fraser River	Summer	Indeterminate
25	Harrison	BC	Fraser River	Fall	Done
26	Skagit spring <sup>3</sup>	PS	PS	Spring	Indeterminate
27	Skagit sum/fall <sup>3</sup>	PS	PS	Sum/fall	Indeterminate
28	Stillaguamish <sup>3</sup>	PS	PS	Sum/fall	Indeterminate
29	Snohomish <sup>3</sup>	PS	PS	Sum/fall	Indeterminate
30	Green <sup>3</sup>	PS	PS	Fall	Indeterminate
31	Nooksack <sup>3</sup>	PS	PS	Spring	Indeterminate
32	Lake Washington	PS	PS	Fall	Indeterminate
33	Quillayute sum.	WAC	WAC	Summer	Indeterminate
34	Quillayute fall	WAC	WAC	Fall	2002
35	Queets spr/sum	WAC	WAC	Summer	Indeterminate
36	Queets fall	WAC	WAC	Fall	2002
37	Grays Hbr. Spr.	WAC	WAC	Spring	Indeterminate
38	Grays Hbr. Fall	WAC	WAC	Fall	2002
39	Hoh spr/sum	WAC	WAC	Summer	Indeterminate
40	Hoh Fall	WAC	WAC	Fall	Indeterminate
41	Hoko	WAC	WAC	Fall	Indeterminate
42	Col. Upr. Spring	CR	CR	Spring	Indeterminate
43	Col. Upr. Summer	CR	CR	Summer	Done interim
44	Col. Upriver Bright	CR	CR	Fall	Indeterminate
45	Lewis	CR	CR	Fall	Done
46	Deschutes	CR	CR	Fall	Indeterminate
47	Nehalem	ORC	NOC	Fall	Done
48	Siletz	ORC	NOC	Fall	Done
49	Siuslaw	ORC	NOC	Fall	Done
50	Umpqua	ORC	MOC	Fall	2002
51	Coquille	ORC	MOC	Fall	2002

<sup>1</sup> Data limitations preclude the development of an escapement goal.

<sup>2</sup> Habitat estimates for spawner capacity are being developed for individual populations.

<sup>3</sup> The Puget Sound Technical Recovery Team is gathering and analyzing data necessary to develop interim recovery goals for ESA listed stocks in Puget Sound. The CTC will consider the results of this work in determining biologically based goals.

## 2.3 ESCAPEMENT ASSESSMENTS

The Agreement directs 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 include stock specific graphs of escapements and agency comments, presented to provide a perspective on stock status and escapement trends.

Biologically-based escapement goals have been accepted by the CTC for 16 of the 51 escapement indicator stocks/stock aggregates (Table 2-3). The escapement goals and 2001 escapements for these 16 stocks are listed in Table 2-4. For 11 of these stocks, the agency escapement goal is defined as a range; for the remaining 5 stocks, the escapement goal is the point estimate of  $S_{MSY}$ . In 2001, escapements were within the goal range for 6 stocks, above the range or  $S_{MSY}$  point estimate for 9 stocks, and below the goal range for 1 stock.

Table 2-4. Escapement goals and 2001 escapements for escapement indicator stocks with biologically-based goals accepted by the CTC.

Stock	Region	Stock Group	Escapement Goal	2001 Escapement
Situk	SEAK	Yakutat	500-1,000	672
Alsek	SEAK/TBR	Yakutat	1,100-2,300	1,843
Taku	SEAK/TBR	TBR	30,000-55,000	44,000
Stikine	SEAK/TBR	TBR	14,000-28,000	51,510
King Salmon	SEAK	Northern Inside	120-240	147
Andrew Creek	SEAK	Central Inside	650-1,500	2,260
Unuk	SEAK	Southern Inside	650-1,400	2,019
Chickamin	SEAK	Southern Inside	450-900	1,010
Blossom	SEAK	Southern Inside	250-500	204
Keta	SEAK	Southern Inside	250-500	343
Harrison	BC	Fraser River	75,100-98,500	94,683
Col. Upr. Summer	CR	Columbia River	17,857	50,000+
Lewis	CR	Columbia River	5,700	13,900
Nehalem	ORC	North Ore. Coast	6,989	9,459
Siletz	ORC	North Ore. Coast	2,944	10,582
Siuslaw	ORC	North Ore. Coast	12,925	29,748

Analysis of achieved escapements relative to agreed escapement objectives to determine if additional management actions are required under paragraph 9(b) in Chapter 3 of the Agreement is guided by footnote 3 to the paragraph: “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 the escapement.” The CTC expects to define lower bounds of escapements for this purpose by March of 2002 for those stocks with agreed escapement goals.

## 2.4 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.

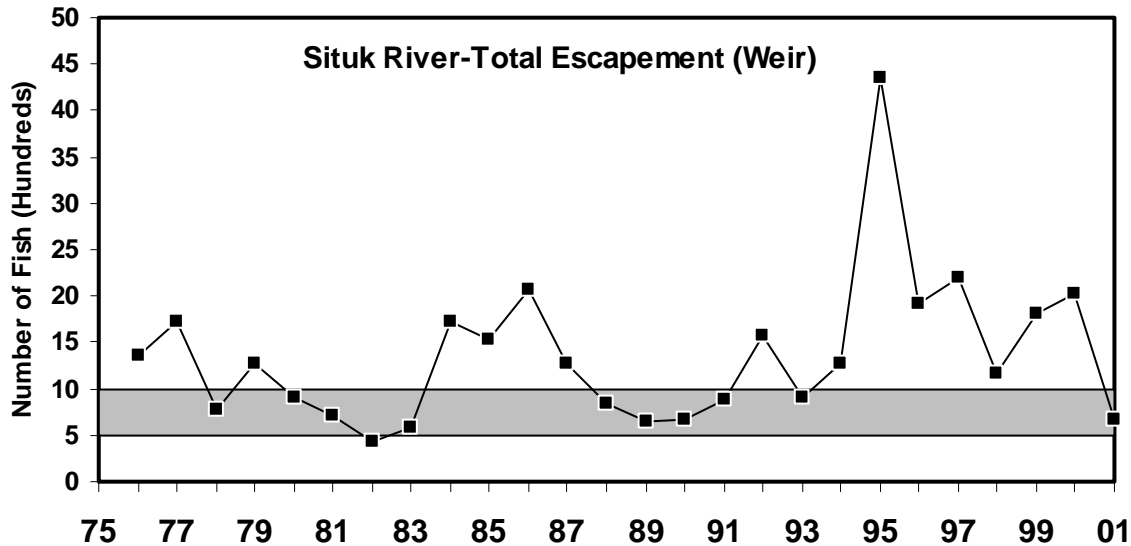
### 2.4.1 SEAK/TBR Stocks

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 (European notation age classes 0.3, 1.3, 2.3) and older chinook salmon or fish 660 mm mid-eye to tail fork (MEF) length; age-.1 and -.2 fish (jack males) are not included in these estimates unless >659 mm MEF. Escapement estimates for the other five systems are index counts of large chinook, 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. Analysis to develop an escapement goal for the Chilkat stock of chinook salmon is still 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 worked to improve the SEAK/TBR chinook stock assessment program. Currently, 91% 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.

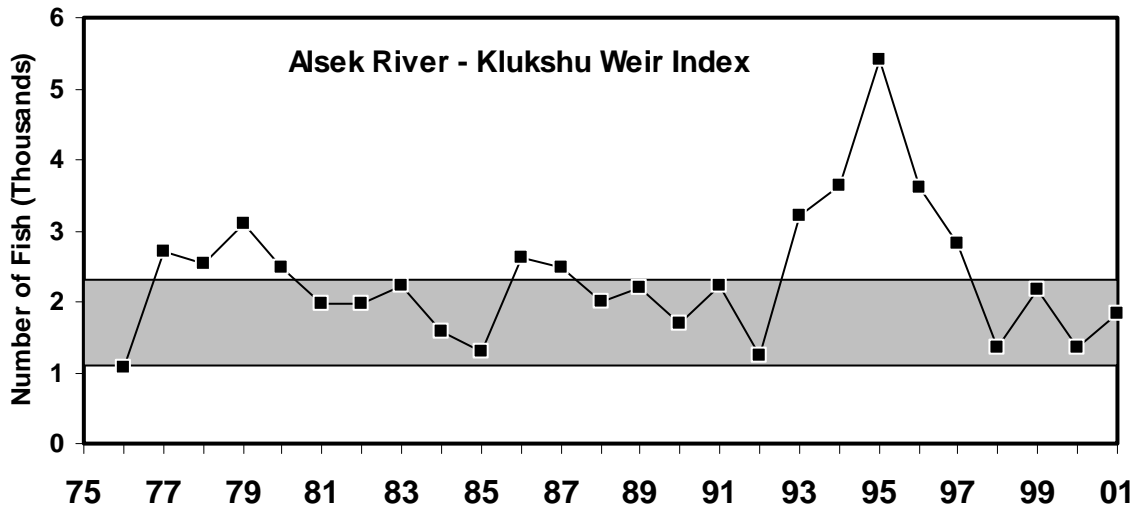


**Escapement Methodology:** The Situk River is a non-glacial system located near Yakutat, Alaska, that supports a moderate-sized, outside-rearing stock of chinook salmon. Escapements are weir counts minus upstream sport fishery harvests, which are estimated from an on-site creel survey and a postseason 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:** 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. 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 26-year period of 1976-2001, 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 from 1996-2001 have averaged about 1,620 chinook salmon, well above the escapement goal range. In 2001 the escapement was 672 large chinook, which is within the escapement goal range. The 2001 run was weak due to poor survival from the 1997 brood year and management actions were taken midseason to achieve the escapement goal. ADF&G considers the Situk stock of chinook salmon to be healthy, but underutilized in some years.

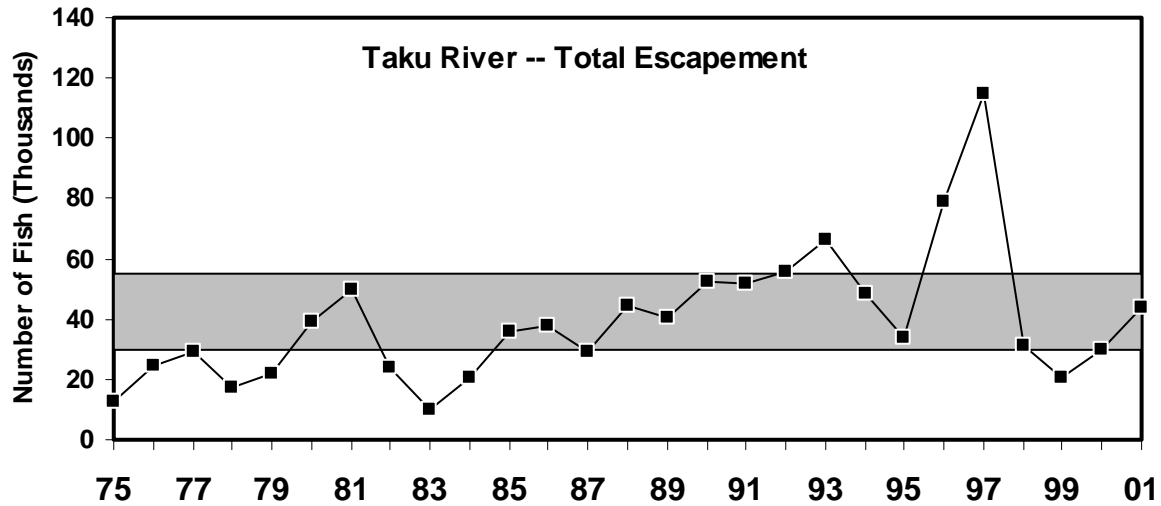




**Escapement Methodology:** The Asek River is a large, glacial, transboundary river, which originates in the SW Yukon and NW British Columbia and flows into the Gulf of Alaska, southeast of Yakutat, Alaska. It supports a moderate-sized, outside-rearing stock of chinook salmon. Since 1976, chinook salmon 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. The weir counts from the Klukshu River represent an index of the overall chinook salmon escapement into the Asek River drainage.

**Escapement Goal Basis:** Several escapement goals were set prior to 1998 by the U.S. and Canada, all without a detailed technical analysis of production data for this stock. In 1998, a joint analysis (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 CDFO (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 Transboundary Technical Committee (TTC) has agreed on a minimum escapement goal of 1,100 at Klukshu weir. The upper end of the range will be re-evaluated by CDFO in the future. The 2001 return data is being compiled, but preliminary data indicate that returns from the large escapement in 1995 are well below replacement.

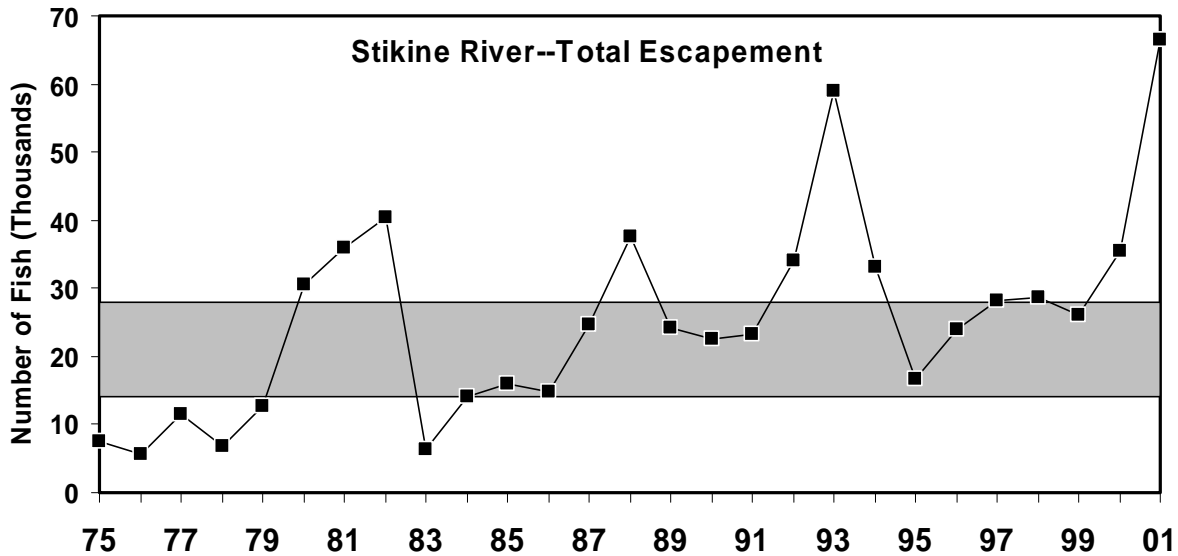
**Joint Agency Comments:** Directed Canadian sport and aboriginal fisheries take place in-river while directed U. S. commercial and subsistence fisheries are located both inside the river and lagoon and in nearby surf waters. Total annual harvest rates have averaged 20% to 25% since 1981 (McPherson, Etherton and Clark 1998). Escapements in the Klukshu River have averaged 2,337 chinook salmon over the 26-year period of 1976-2001. The 2001 escapement of 1,843 was 77% above the lower end of the range. The joint ADF&G-CDFO assessment is that the Asek River system stock of chinook salmon is healthy. An expansion factor is being developed from the joint adult mark-recapture program that has been implemented since 1998. It is hoped that information from this program will form the basis for future evaluation of a system-wide escapement goal. Studies to collect these data have been implemented and must continue in order to develop a new abundance-based management regime for Asek River chinook salmon by 2004 as per the Agreement.



**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 1995-2001. Aerial survey counts in other years were expanded by a factor of 5.2 (McPherson et al. 2000).

**Escapement Goal Basis:** Prior to 1999, several system-wide or index goals were developed by the U.S. and Canada, 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).

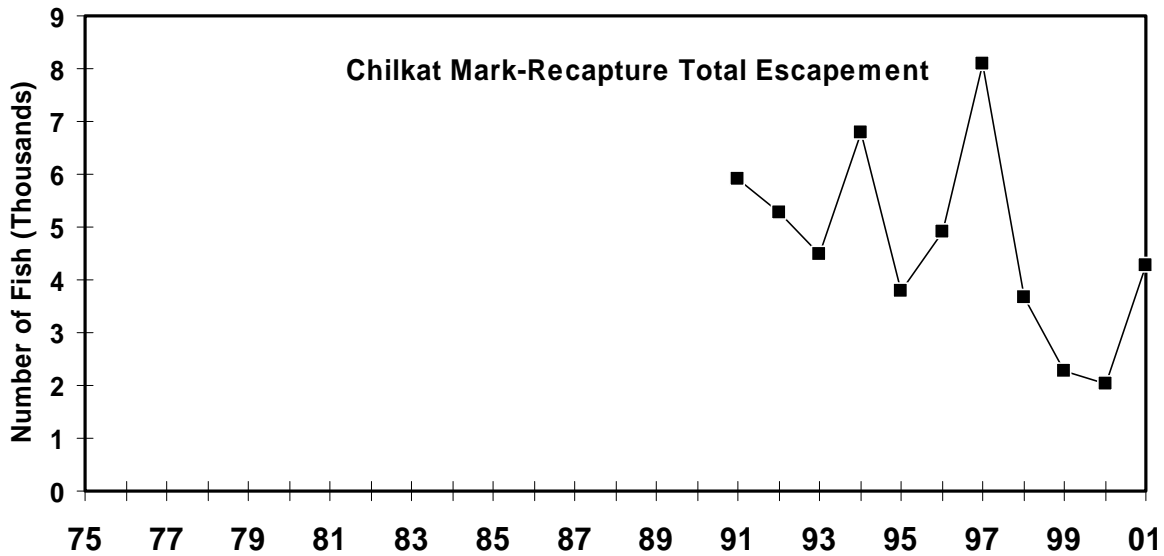
**Joint Agency Comments:** Estimated harvest rates on this stock range from 5% to 17% (estimated average = 10%) under the current management regime (McPherson et al. 2000), though these estimates are based on incomplete troll harvest data. Some smolts in 1976-1981 and 1991-1999 were marked with coded-wire tags, which permitted estimation of marine harvests and smolt production. The precision of harvest rate estimates will continue to improve, 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, as specified in the June 1999 Agreement. Estimated escapements to the Taku River were within or above the escapement goal range from 1988 through 2001, except for 1999. Estimated escapement in 2001 is 41,179 large fish, in the middle of 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:** Prior to 1999, several system-wide or index goals were developed by the U.S. and Canada, 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.

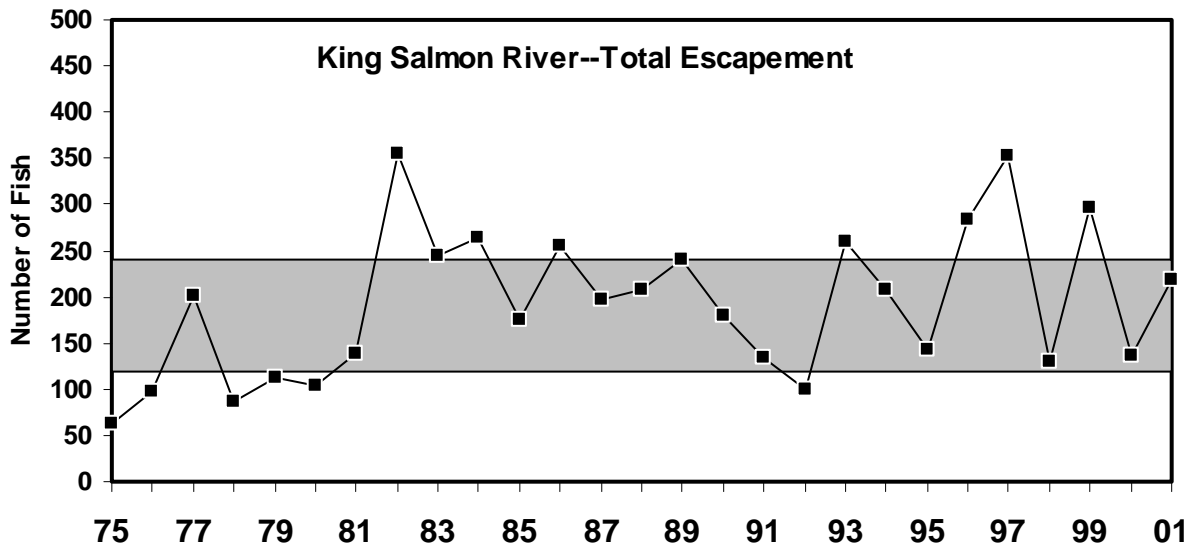
**Joint Agency Comments:** Under the current management regime, total harvest rates are believed to have ranged from 10% to 33% (estimated average = 18%; Bernard et al. 2000), based on limited data. Prior to the early 1980s, a significant terminal U.S. marine gillnet fishery near the river mouth harvested 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. The preliminary escapement estimate for 2001 is 66,515 large spawners, the highest on record and the result of a very good return from the 1996 brood.



**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 an assumed 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 in 2002.

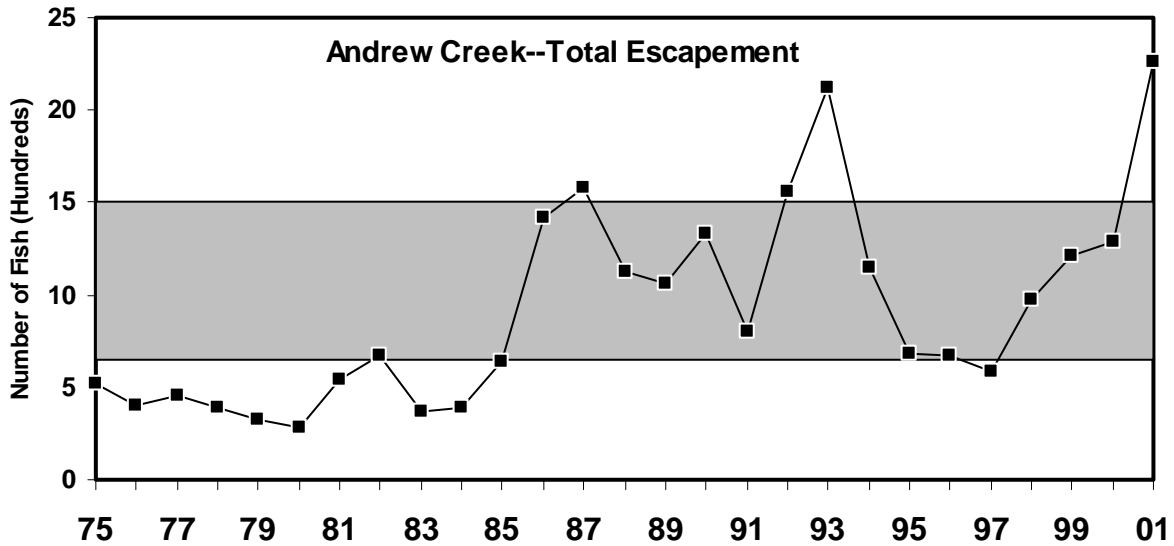
**Agency Comments:** Relatively small directed U. S. marine sport and in-river subsistence fisheries target this stock. This stock is also caught incidentally in SEAK commercial drift gillnet and troll fisheries. Limited coded-wire tag data for this stock indicate that brood-year exploitation rates are between 10% and 30% at present. During the 11-year period of 1991-2001, the Chilkat River chinook salmon escapements have averaged 4,639 large spawners. Escapements from 1997 to 2000 have averaged 3,958 chinook salmon. The escapement in 2001 was an estimated 4,268 large spawners (preliminary). All but one of the escapements since 1991 were above the 1981 agency goal. Further assessment of this stock is dependent upon development of a biologically based escapement goal range. 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 U.S. CTC 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 clear-water 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 1993-2001). 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 2001). 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 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 2001). 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.

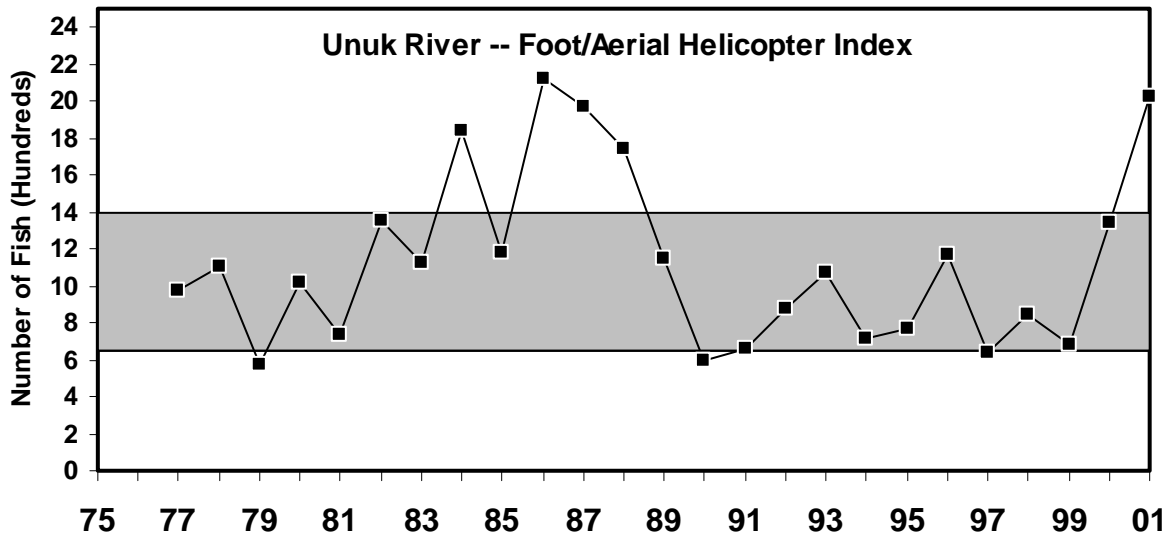
**Agency Comments:** There is no terminal fishery targeting this stock, though harvests of immature and mature fish occur in SEAK. During the 27 year-period 1975-2001, 13 of the annual escapements were within the 1997 management range, six were below the range and eight exceeded the range. Since 1990, one escapement was below the 1997 range by 17% (1992) and the remaining 11 have been within or exceeded the range. The 2001 escapement was 147 large spawners, which is within the escapement goal range. Survey conditions in 2001 were normal. The ADF&G considers the King Salmon River stock of chinook salmon to be healthy.



**Escapement Methodology:** Andrew Creek, near Petersburg, Alaska, is a clear-water 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 1985-2001 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.

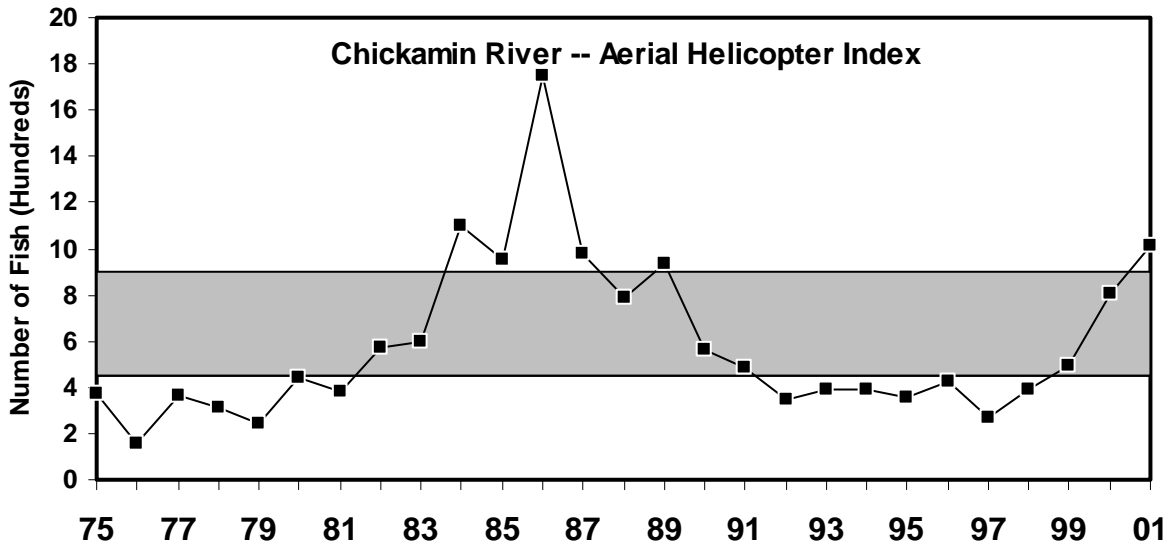
**Agency Comments:** Historically, a significant, terminal, marine gillnet fishery occurred in the spring, targeting Stikine River and other nearby chinook salmon stocks. Currently, there is no terminal fishery targeting this stock. Harvests of immature and mature fish occur primarily in SEAK and to a small extent in NBC 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 2001 escapement of 2,260 chinook salmon was 51% above the upper end of the escapement goal range and was due to a very good return from the 1996 brood. The 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 1997-2000 found that, on average, 19% of the total escapement is counted during peak surveys (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 (Pahlke et al. 1996). These mark-recapture studies and associated expansion factors will allow conversion of this entire database to total escapement estimates in 2002.

**Escapement Goal Basis:** In 1994, ADF&G revised the Unuk escapement 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 NBC fisheries. Estimated total exploitation rates average about 20% to 30% 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 25 years since 1977, the index counts been within the escapement goal range, except for five which were above and three which were slightly below the range. The 2001 survey count was 2,019 large spawners, 44% above the upper end of the range and near the record high count in 1986. Survey conditions were normal in 2001. The preliminary mark-recapture estimate for 2001 is about 11,000 large spawners. The 1995 and 1996 broods contributed most of the fish to the 2001 escapement. ADF&G judges the Unuk stock of chinook salmon to be healthy.

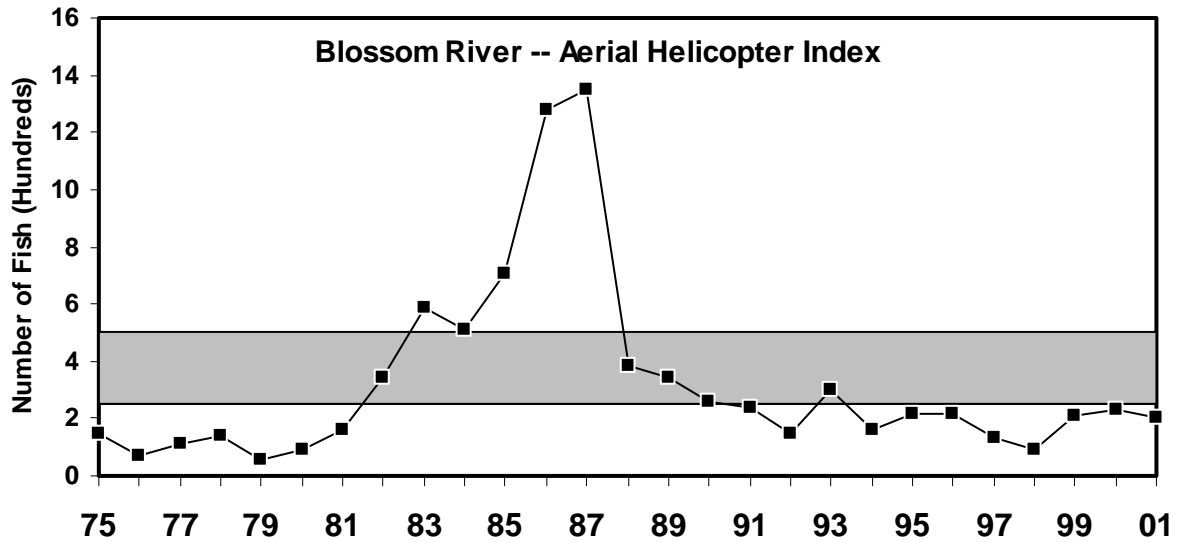


**Escapement Methodology:** The Chickamin River drains into Behm Canal near Ketchikan, Alaska, and is a glacial system with non-glacial spawning tributaries which support a moderate-sized, inside-rearing stock of chinook salmon. Reported escapements are survey counts of large fish in eight tributaries 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. Mark-recapture experiments to estimate total escapement were again implemented in 2001.

**Escapement Goal Basis:** 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 NBC 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 of those years. The 1992-1998 index counts were all below the lower end of the escapement goal range by an average of 15%. Survey counts in 1999 and 2000 were within the range. The survey count in 2001 was 1,010, above the escapement goal range. Survey conditions were normal. The preliminary mark-recapture estimate was 5,139 large spawners, which represents an expansion factor of 5.1. Like the Unuk River, the relatively large 2001 escapement was comprised of fish primarily from the 1995 and 1996 broods. The ADF&G considers the Chickamin River stock of chinook salmon healthy.

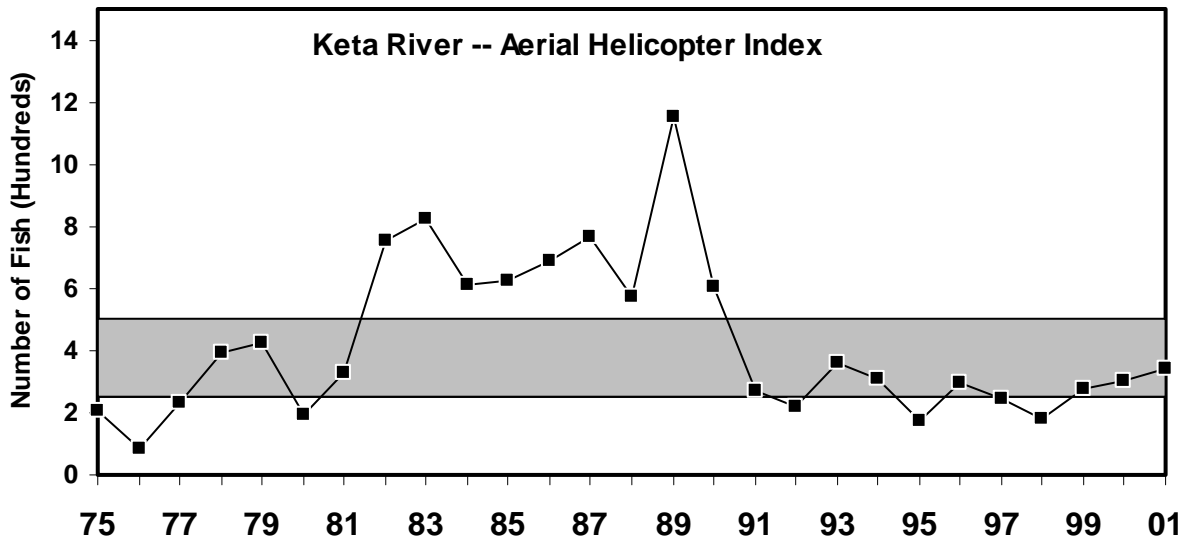




**Escapement Methodology:** The Blossom River empties into Behm Canal near Ketchikan, Alaska, and is a clear-water river that supports a small, inside-rearing stock of chinook salmon. Recent studies indicate that about 10% of the annual run is comprised of progeny from under-yearling smolt. Escapements are indices (peak counts) of large fish made by helicopter surveys conducted using standardized methodology since 1975 (Pahlke 2000). Only in 1998 has the total escapement been estimated with mark-recapture methodology.

**Escapement Goal Basis:** 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 NBC 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 14-year period (1988-2001) of reduced, but relatively stable, run abundance. Counts since 1995 have averaged 187 large spawners. The 2001 survey count was 204 large spawners, which is 18% below the lower end of the MSY escapement goal range. Only one survey was completed on the Blossom in 2001 due to poor weather conditions and the Sept. 11<sup>th</sup> incident in New York City. Based on the Unuk and Chickamin data, we expected the Blossom count to increase in 2001, and abundance may have, but was not detected due to poor survey conditions. However, ADF&G considers the Blossom River stock of chinook salmon to be a management concern. All waters of Behm Canal are closed for king salmon fishing year round.



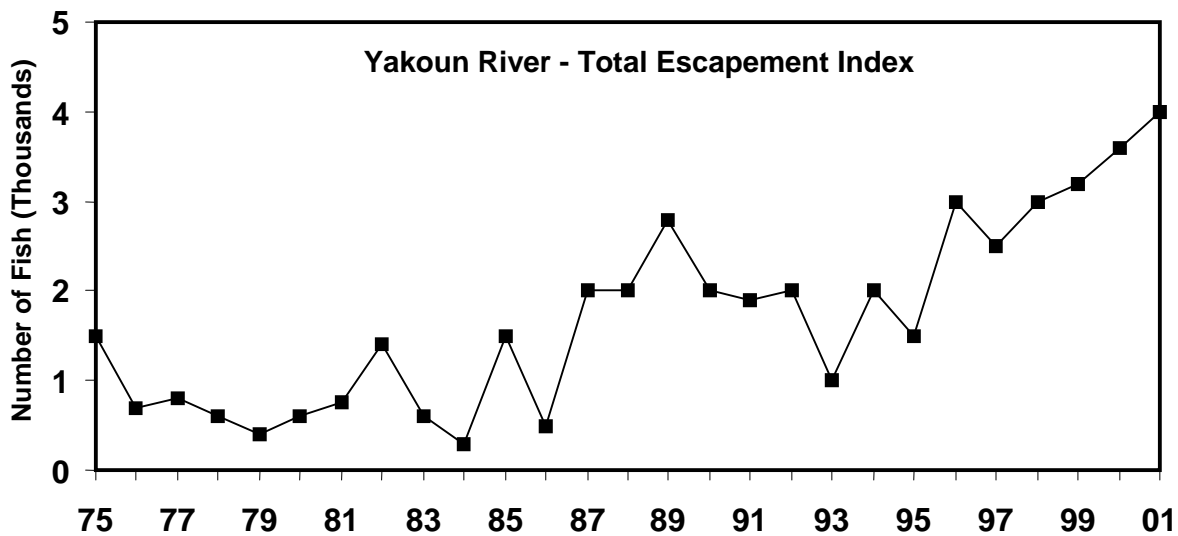
**Escapement Methodology:** The Keta River is located near Ketchikan, Alaska, and is a clear-water system which supports a small, inside-rearing stock. Recent studies indicate that about 10% of the annual run originates from under-yearling smolt. The escapements are indices (peak counts) of large fish made by helicopter survey that have been conducted using standardized methodology since 1975 (Pahlke 1997a). Total escapement was estimated with mark-recapture methodology in 1998, 1999 and 2000 (Freeman et al. 2001).

**Escapement Goal Basis:** 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 NBC fisheries. Between 1975 and 1981, annual survey counts were within or below the goal of 250-500, averaging 265 large spawners. Production from the 1975-1981 escapements was high and survey counts from 1982 to 1990 averaged 734 large fish. This was followed by a 11-year period (1991-2001) of smaller survey counts, averaging 270 large fish. ADF&G believes the reduction was due to reduced marine survival coupled with density dependent mortality (McPherson and Carlile 1997). The survey count in 2001 was 343 large spawners, which is near the middle of the MSY escapement goal range. ADF&G estimated total escapements of 446 (1998), 968 (1999) and 943 (2000) large spawners in mark-recapture projects funded with chinook LOA funds, which were used to estimate an expansion factor of 3.0 (SE = 0.52) for this stock (Freeman et al. 2001). This expansion factor was used to develop total estimates of large spawners for survey counts prior to 1998, which appear in Freeman et al. (2001), along with associated estimates of precision. The expanded estimate for 2001 is 1,029 large spawners. ADF&G judges this stock to be healthy.

## 2.4.2 Canadian Stocks

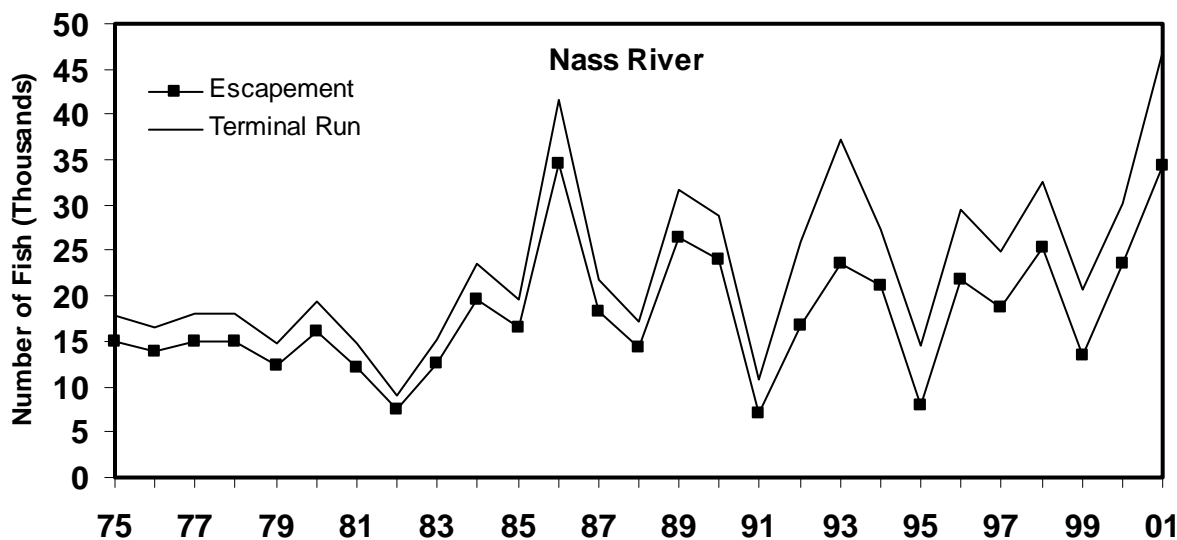
Since the beginning of the chinook rebuilding program of the 1985 PST, escapement goals for Canadian chinook stocks were generally based on doubling the average escapements recorded between 1979-1982. The doubling was based on the premise that Canadian chinook stocks were over-fished and that doubling the escapement would still be less than the optimal escapement estimated for the aggregate of all Canadian chinook populations (see stock-recruitment curve in “Technical Basis of PSC Catch Ceilings,” Figure 1, Attachment 4, PSC file 72006). Doubling was also 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 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. The CTC recently accepted a revised goal for the Harrison River stock of chinook.



**Escapement Methodology:** The Yakoun River is 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 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. Prior to 1992, CDFO observations of escapement were based on visual counts, vary considerably between streams and were 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.

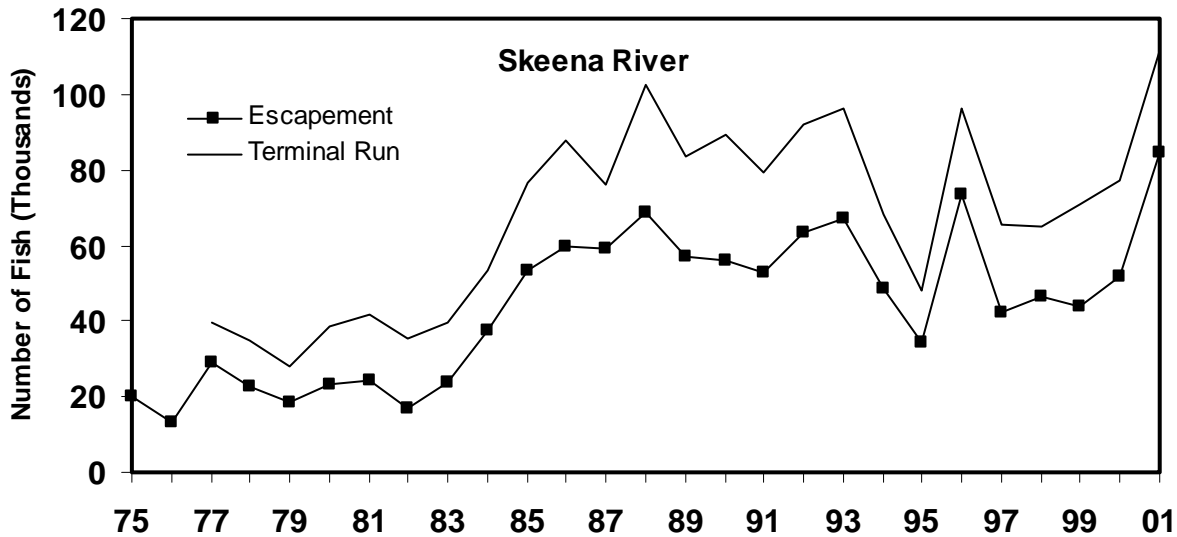
The Nass mark-recapture program uses two fish wheels in the lower Nass canyon to apply tags and two wheels in the upper canyon for recovery. Tags are also recovered in up-river fisheries and on the spawning grounds. A modified Petersen mark-recapture estimator, stratified by size category (500-730 cm nose-fork length (NF),  $\geq 731$  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.

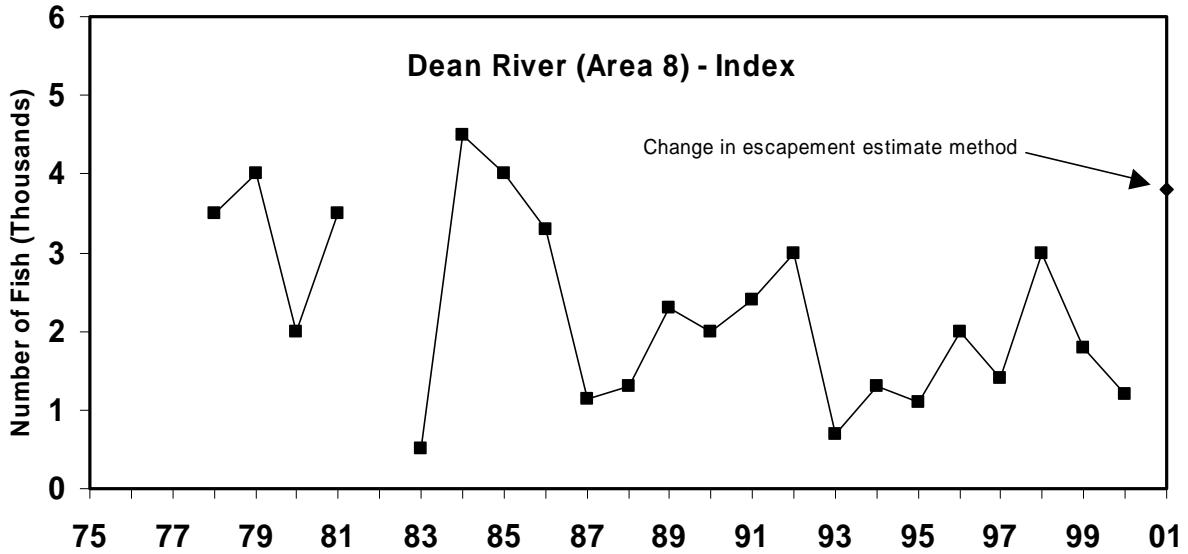
**Agency Comments:** The Nisga'a Fisheries Working group, including CDFO, has accepted the revised historical escapement and terminal run values for Nass River chinook. **These values have been applied in this report** and will differ from past CTC reports. The data presented only represents escapements and terminal runs into the Nass River and does include the other smaller streams in Area 3 outside of the Nass basin. The terminal harvest rate for 2001 was 27%, which is similar to the five-year (1996-2000) average of 26%.



**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.

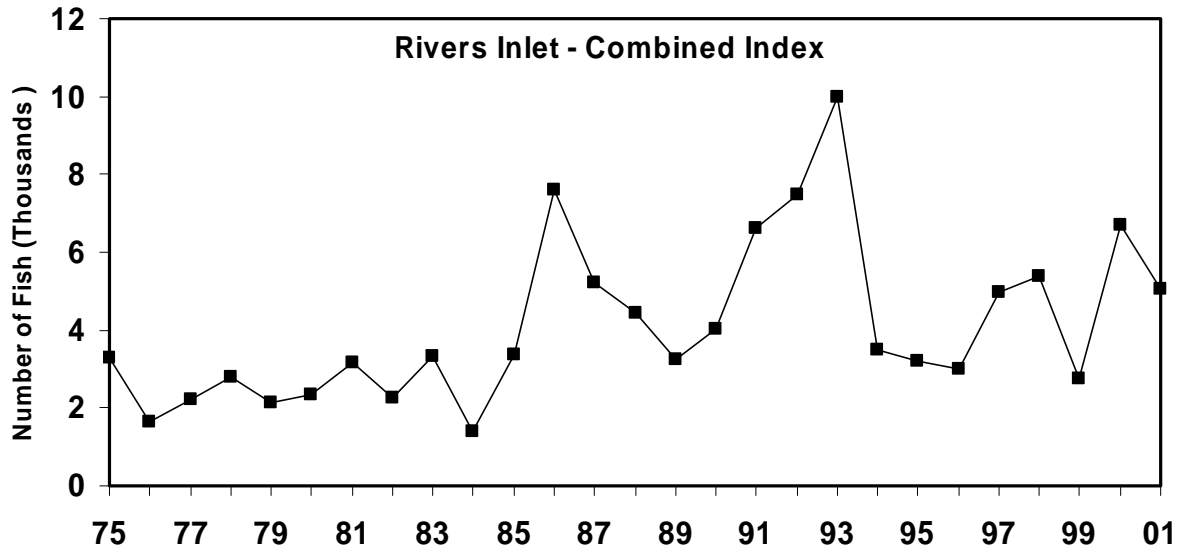
**Agency Comments:** The Skeena test fishery index value in 2001 reached a record level, reflecting the historically high escapement of 84,642. Terminal catch in the Skeena River includes commercial gillnet catch in the terminal exclusion area (River Gap Slough, Area 4), in-river sport catch, and Native catch. In-river sport creel surveys were conducted too late in the 2001 season to provide accurate catch estimates. Consequently, no sport catch was included in the 2001 total terminal run estimate. The terminal harvest rate in 2001 was 24%, which is below the five year (1996-2000) average of 32%.



**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. Up until 2000, counts of spawning chinook were made during 1-3 surveys and the peak count used as the escapement index. Survey counts were sometimes expanded to account for sections of the river that could not be surveyed in any year, but the counts were not extrapolated to total escapement of chinook to the river. In 2001, a total of six aerial or stream walk counts were conducted, and an area-under-the curve estimate derived. The resulting escapement estimate of 3,795 fish was considerably higher than the previous year. However, much of this increase reflects the change in estimation methodology. Nevertheless, the peak count was over twice that of year 2000.

**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. Funds allocated for implementation of the 1999 PST Agreement have been allocated to improve 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.

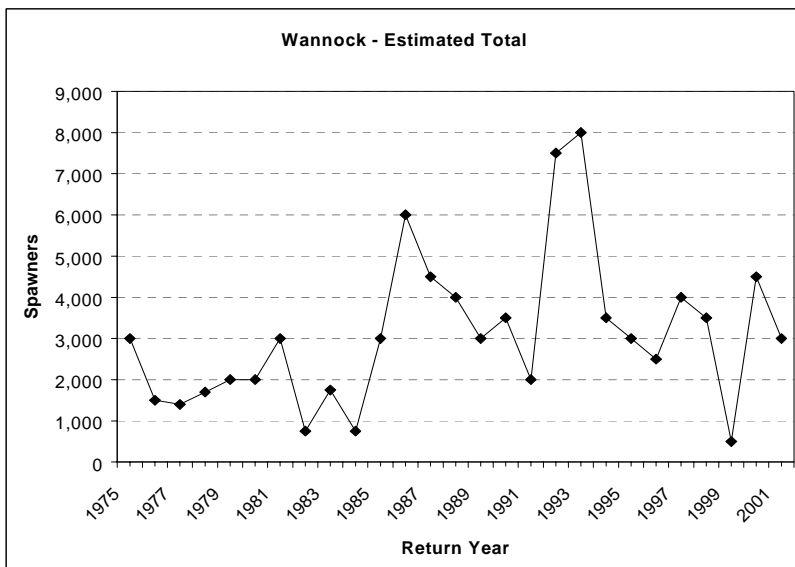
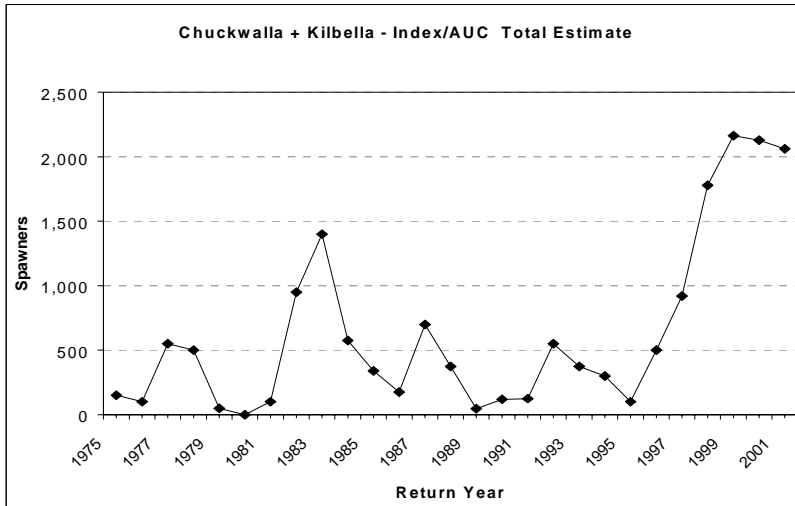
Escapement estimates in the Chuckwalla and Kilbella rivers are derived from aerial surveys and brood stock collection programs, whereas Wannock escapement is derived from sampling of carcasses along the spawning area. The number of carcasses sampled is expanded to estimate total spawning escapement. 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 1991-1993, 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 1991-1993, it is possible that the greater effort and increased financial support for escapement surveys may have increased the escapement estimate that was based on carcass numbers.

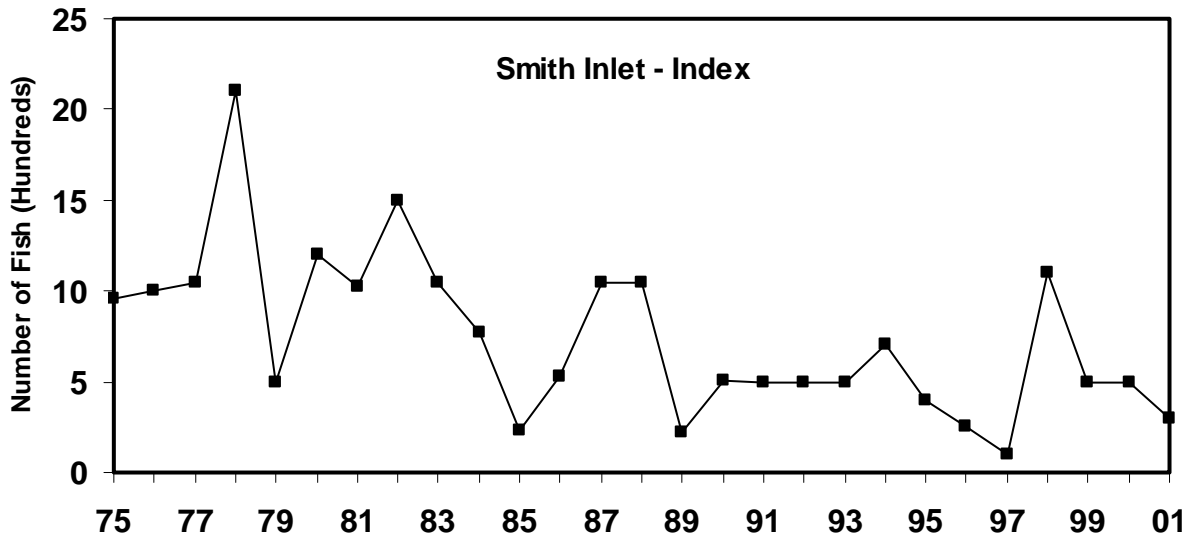
**Escapement Goal Basis:** There are currently no CTC agreed escapement goals for any of these stocks.

**Agency Comments:** Since summer (Chuckwalla and Kilbella) and fall (Wannock) chinook are likely to have different ocean exploitation and productivity, separate assessments may be more accurate than a combined assessment. For example, the increase in recent escapement of Kilbella and Chuckwalla chinook is dramatic when compared to that of the Wannock (see graphs below). These increases are due to improved returns of hatchery fish and reductions to ocean fisheries. Escapements to these two systems in 2001 remained above average.



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 final mark-recapture estimate of 7,443 chinook. Escapement to the Wannock in 2001 declined to 3,000 fish.

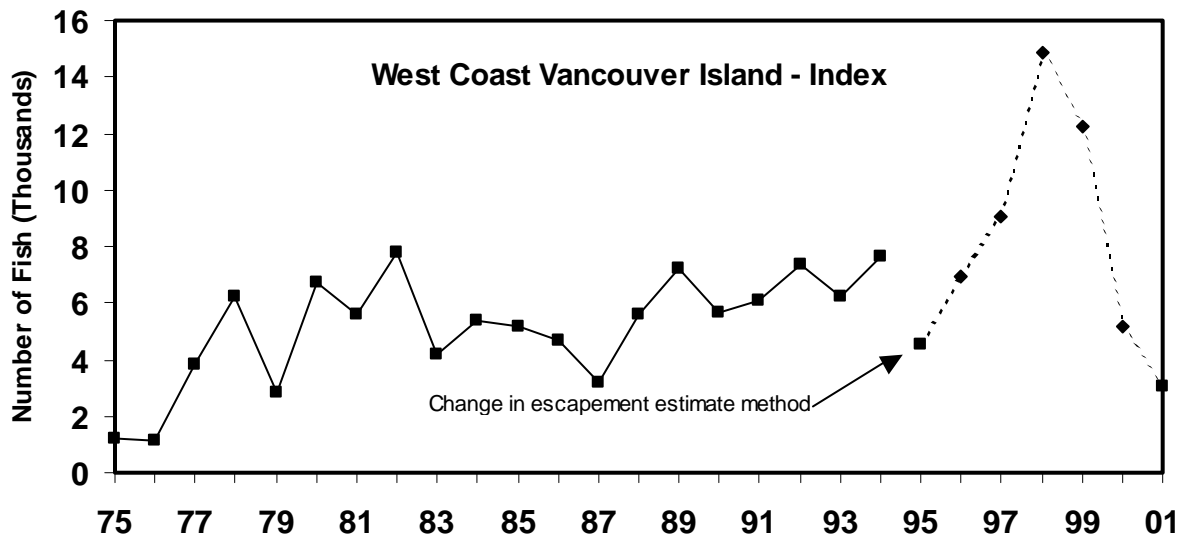




**Escapement Methodology:** The Docee River is the indicator stock for Area 10 (Smith Inlet) chinook. The river is very short (0.8 km) draining Long Lake into an arm of Smith Inlet. A sockeye salmon counting fence is located at the outlet of the lake but chinook primarily spawn below the fence and their 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. The 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 CDFO 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.

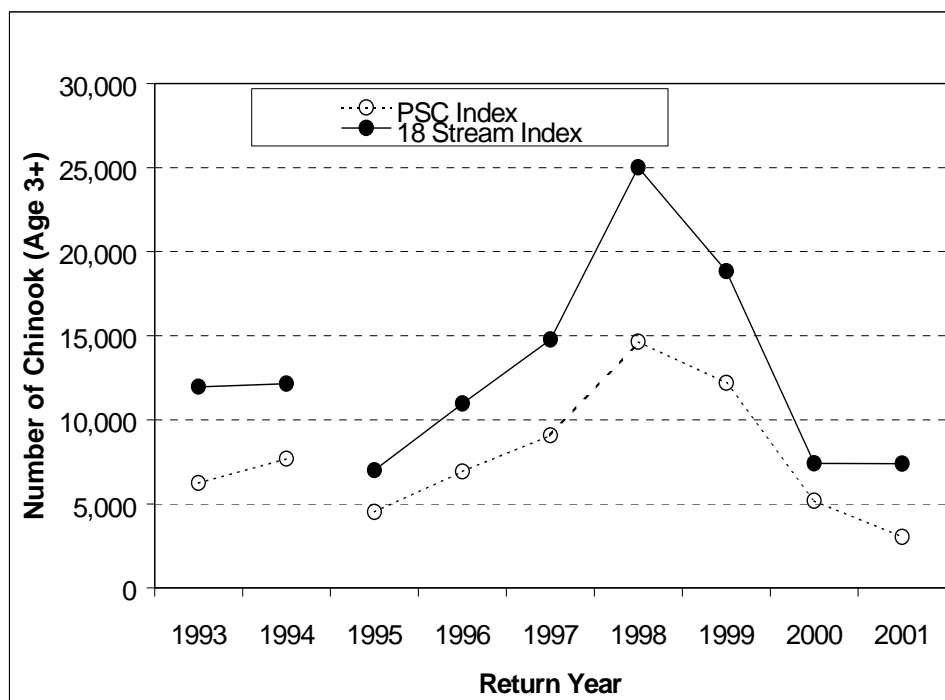


**Escapement Methodology:** The WCVI indicator stock is an aggregate of seven rivers (Marble, Tahsis, Gold, Burman, Artlish, Kaouk, and Tahsish) chosen by assessing historic data for consistency of surveys. The assessment also showed increased reliability of surveys through time (a combination of more surveys and better timing and methods). 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.

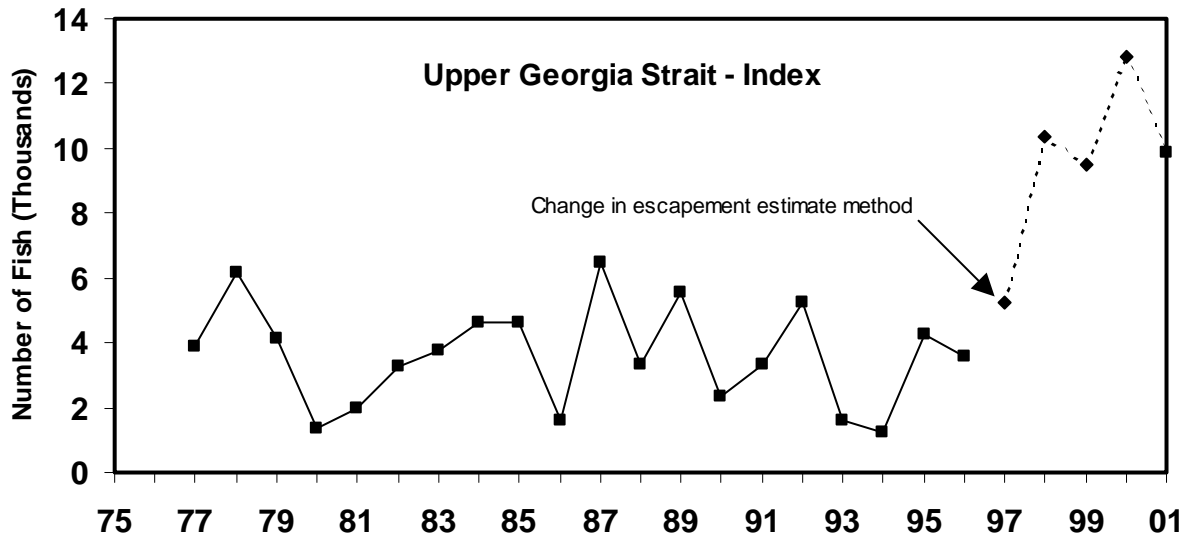
**Escapement Goal Basis:** There is currently no CTC agreed escapement goal for this stock group.

**Agency Comments:** The CDFO notes the need for biologically based escapement goals for individual populations in this stock group. The 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 figure below compares the 7-stream PSC index with an expanded set of streams (18) that include the PSC streams. Relative to 1999, the estimated escapements for the natural populations declined 60% in 2000. This overall decline continued among the 7-stream index stocks into 2001. However the 18-stream index value was similar to that of last year, reflecting increased escapements to seven of the additional 11 stocks.



The returns to WCVI hatcheries in 2001 were substantially better than in 2000. The spawning escapement to the RCH/Somass stock in 2001 was estimated (preliminary) at 37,000 adults, well above the preseason forecast of 14,000, but with fewer females than in 2000. The return of age-2 males (jack chinook; 1999 brood) was similar to that in 2000, while the 3-year old component (1998 brood) was substantially better than predicted. However, the proportion of females was very low (<10%).



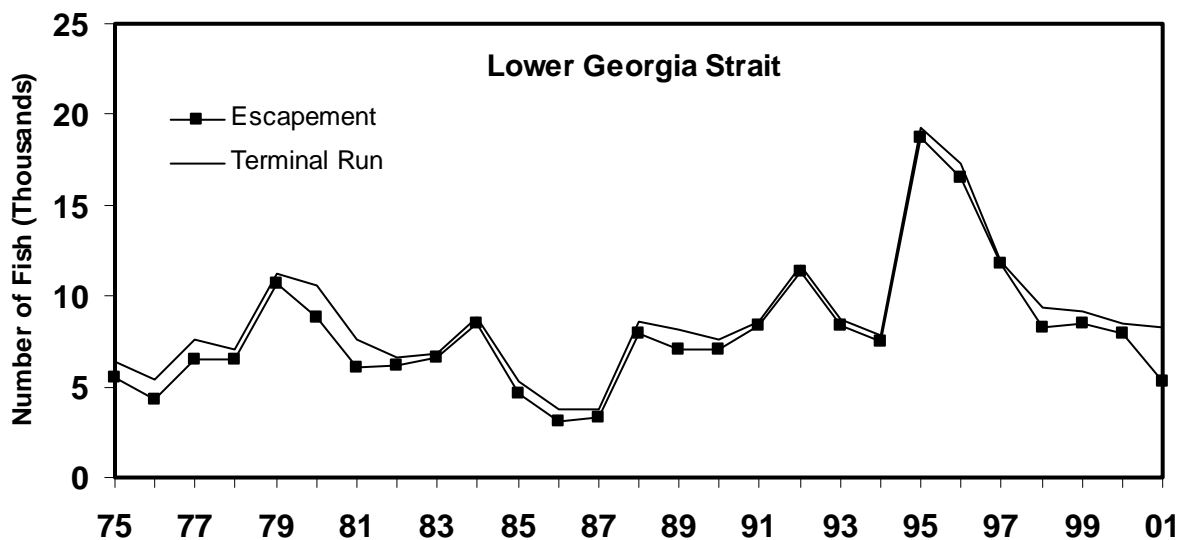
**Escapement Methodology:** The UGS stock index consists of four river systems (Klinaklini, Kakweiken, Wakeman, Kingcome) in Johnstone Strait mainland inlets and the Nimpkish River on northeast Vancouver Island. The accuracy of escapement estimates in the mainland inlet systems is likely poor due to 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 fish wheel on the mainstem and a fence on Devereux Creek. Fish captured at the fish wheel are tagged and released to estimate efficiency of the wheel and total escapement. Escapement estimates for the system are based on expanded fish wheel 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 experience on these flights, observers could only see a limited amount of spawners that typically hold in clear pools early in the season. The apparent increase in escapements since 1997 reflect the more accurate estimates provided by the new methodology, rather than real increases in abundance.

**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 spring and early summer, followed by 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 proposed goal for both the Cowichan and Nanaimo chinook tentatively in 2002 to PSARC and the CTC for review.

**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.

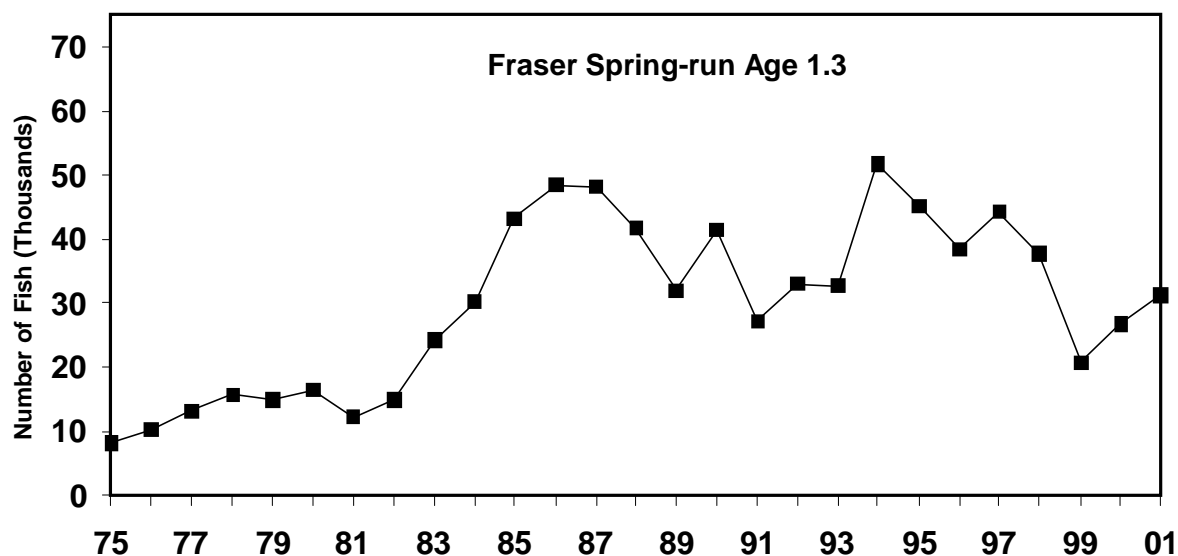
Recent reductions in the LGS chinook escapements likely result from reduced marine survival noted since the 1991 brood year on Cowichan hatchery chinook. However, reduced exploitation rates on this stock (by approximately 50%) are compensating for this reduced survival (Riddell et al. 2000). Escapement to the Cowichan declined 50% from that in 2000, while escapement to the Nanaimo River increased. While unusually low water flows in the Cowichan may have exacerbated this low escapement, they are not believed to have significantly impeded returns.

### **2.4.3 Fraser River Stocks (2.4.3)**

The Fraser River watershed is the largest Canadian producer of chinook salmon. Fraser chinook are comprised of a large number of local populations. In previous reports, a total of 44 Fraser stocks were divided into four major geographical stock aggregates: 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. A recent review of these stock groupings resulted in a re-arrangement of the same stocks into aggregates reflecting similarity in run-timing, life history type and age at return. These new groupings are: Fraser Spring-run Age 1.3, Fraser Spring-run Age 1.2, Fraser Summer-run Age 1.3, Fraser Summer-run Age 0.3, and Fraser Late-run Harrison (Table 2-5). The early or spring stocks migrate through the lower Fraser River before July 15 while summer stocks migrate through the lower Fraser between July 15 and September 1. The Fraser Late-run Harrison stock is comprised of white-fleshed chinook which enter the Fraser 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 CDFO continues to evaluate the appropriateness of this expansion factor and area-under-the-curve methodology through calibration studies. Counting fences and mark-recapture projects exist for some systems, although most of these time series of escapement data are relatively short.

During the fall of 2001, a revised escapement goal for the Harrison stock was presented to the CTC and accepted. 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 incorporate juvenile rearing habitat will also be considered.

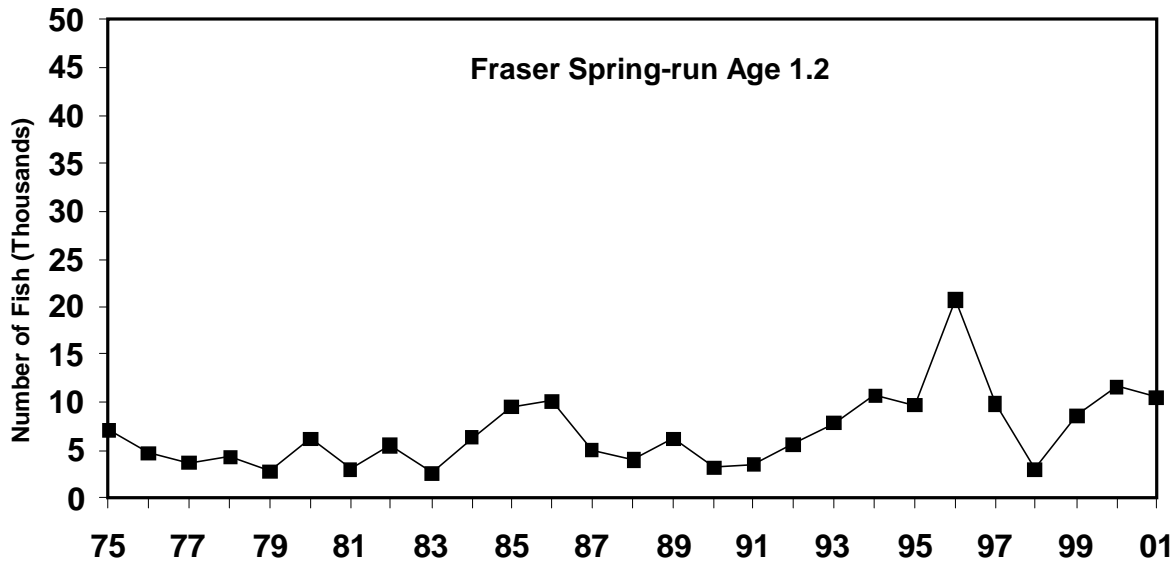


**Escapement Methodology:** The Fraser Spring-Run Age 1.3 aggregate includes 31 populations that spawn in the Fraser River and its tributaries. Chinook in the Fraser Spring-Run Age 1.3 aggregate are stream-type, spending one year in freshwater before migrating to the sea. Most chinook broods in this aggregate return at total age 5, although a portion (<10%) return at age 4 or 6. These stocks have a predominantly spring run-timing, returning to the Lower Fraser between late-March and mid-July, with the peak of migration occurring in June. The aggregate includes the Upper Pitt River and Birkenhead River stocks in the Lower Fraser, and the spring-run chinook of the Mid and Upper Fraser, North Thompson, and South Thompson, but excluding those of the Lower Thompson. Stocks upstream of Prince George include the McGregor, and Torpy River systems (Table 2-5). In recent years, fence counts have been employed at the Chilako River and Dome Creek in the Upper Fraser and at the Salmon River in Salmon Arm (South Thompson). Fence counts were discontinued at the Salmon River (Prince George) in 1998. Estimates for all other systems were generated from aerial over-flight data, typically, by dividing the peak count by 0.65.

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

**Agency Comments:** Work is currently underway to evaluate habitat-based escapement goal methodology, and to calibrate aerial over-flight counts with area-under-the-curve methodology and intensive Petersen mark-recaptures. Total aggregate escapement increased modestly in 2001.

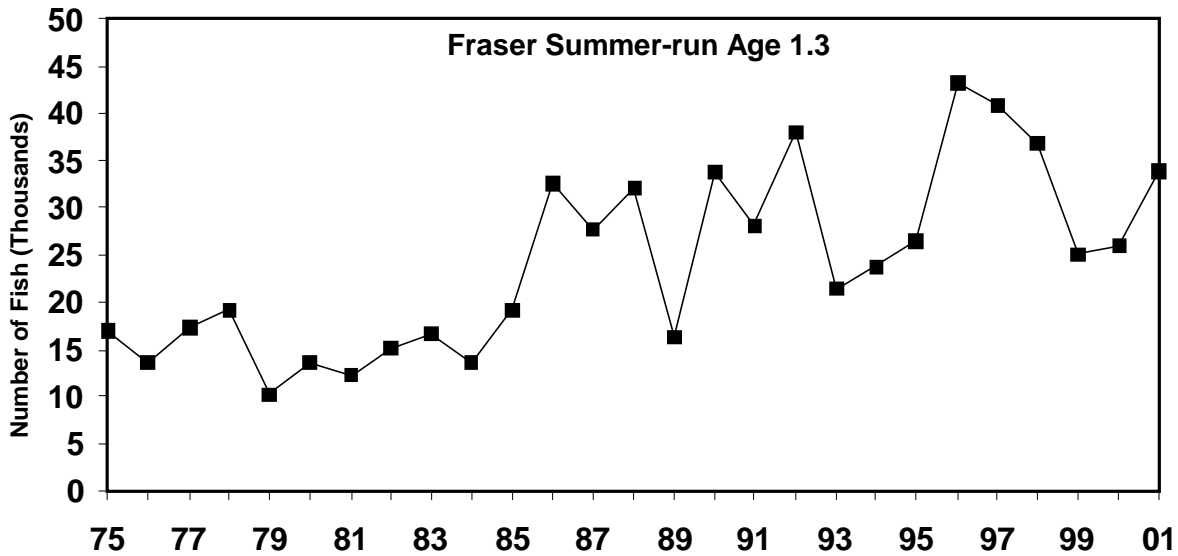




**Escapement Methodology:** The Fraser Spring-Run Age 1.2 aggregate includes six smaller body size populations that spawn in the Lower Thompson River tributaries, Louis Creek of the North Thompson and the spring-run fish of Bessette Creek in the South Thompson (Table 2-5). Chinook in this aggregate are stream-type, spending one year in freshwater before migrating to the sea. Broods return predominately as total age 4 adults, although a portion (<10%) return at age 3 or 5. Chinook in the Fraser Spring-Run Age 1.2 aggregate return to the Lower Fraser between March and early July. Escapement estimates for each system are generated from visual surveys, either from aerial over-flights or stream walks and by dividing the peak counts by 0.65. The Nicola watershed is a site for calibrating peak count expansion, area-under-the curve, and mark-recapture methods.

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

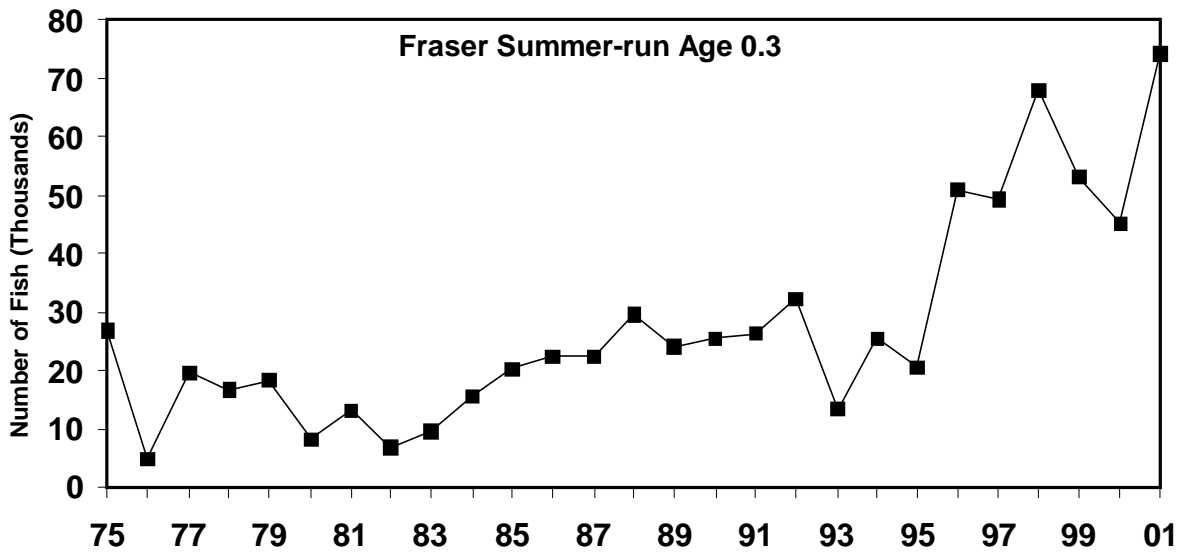
**Agency Comments:** Work is currently underway to evaluate habitat-based escapement goal methodology, and to calibrate aerial over-flight counts with area-under-the-curve methodology and intensive Petersen mark-recaptures. Overall escapement of this aggregate declined slightly in 2001.



**Escapement Methodology:** The Fraser Summer-Run Age 1.3 stock complex includes 11 populations, spawning in large rivers, mostly below the outlets of large lakes. These include the Stuart and Nechako rivers upstream of Prince George, Chilko and Quesnel rivers in the mid Fraser and the Clearwater and North Thompson rivers in the North Thompson watershed (Table 2-5). Chinook in this aggregate return to the Lower Fraser between mid July and early September. These stocks are dominated by yearling smolt production. Most broods return at total age 5 although a portion (~20%) return at age 4 or 6. Escapement estimates are generated from aerial over-flight data by dividing the peak count by 0.65, except for the Stuart system where a mark-recapture estimate is generated, and for the Nechako River where multiple aerial counts are analysed using area-under-the-curve methodology.

**Escapement Goal Basis:** There is currently no CTC agreed escapement goal for the aggregate.

**Agency Comments:** Work is currently underway to evaluate habitat-based escapement goal methodology, and to calibrate aerial over-flight counts with area-under-the-curve methodology and intensive Petersen mark-recaptures. Aggregate escapement has been increasing over the past 15 years. The 2001 escapement increased significantly compared to that of 2000.



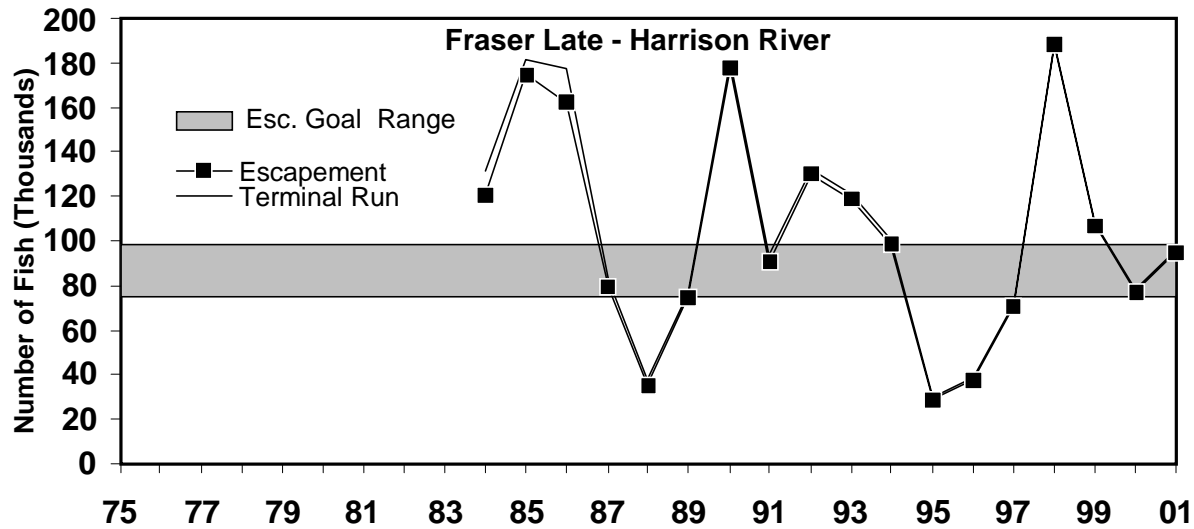
**Escapement Methodology:** The Fraser Summer-Run Age 0.3 aggregate includes 5 populations of chinook spawning in the South Thompson watershed upstream of Kamloops and 1 in the lower Fraser. These include the Lower Shuswap, Lower Adams, Little River and the South Thompson River mainstem (Table 2-5). Chinook in this aggregate return to the Lower Fraser between mid July and early September. These stocks are dominated by under-yearling smolt (ocean-type: entering the ocean during their first fall). Most broods return at total age 4 although significant numbers (~35%) return at age 2 (jacks), 3 or 5. Most escapements are estimated by expanding peak visual survey counts (as in previous three Fraser aggregates). Further, the lower Shuswap River is a site for calibrating peak count expansion, area-under-the curve, and mark-recapture methods.

**Escapement Goal Basis:** There is currently no CTC agreed escapement goal for the aggregate.

**Agency Comments:** Work is currently underway to evaluate habitat-based escapement goal methodology, and to calibrate aerial over-flight counts with area-under-the-curve methodology and intensive Petersen mark-recaptures. Recent fishery reductions, designed in part to conserve interior Fraser watershed coho, sockeye and steelhead salmon, have resulted in dramatic increases in escapement since 1995, including a large increase in 2001.

Table 2-5. Stocks comprising new CDFO Fraser River chinook escapement indicator aggregates.

CTC Indicator Stream	Location	New Fraser River Aggregate	Old Fraser River Aggregate
Upper Pitt River	Lower Fraser	Spring-Run Age 1.3	Mid Fraser
Birkenhead River	Lower Fraser	Spring-Run Age 1.3	Mid Fraser
Bridge River	Hope to Lillooet	Spring-Run Age 1.3	Mid Fraser
Chilcotin River	Lillooet to Prince George	Spring-Run Age 1.3	Mid Fraser
Cottonwood River	Lillooet to Prince George	Spring-Run Age 1.3	Mid Fraser
Horsefly River	Quesnel River system	Spring-Run Age 1.3	Mid Fraser
Westroad River	Lillooet to Prince George	Spring-Run Age 1.3	Mid Fraser
Bowron River	Upstream of Prince George	Spring-Run Age 1.3	Upper Fraser
Fraser R. (Tete Jaune)	Upstream of Prince George	Spring-Run Age 1.3	Upper Fraser
Goat River	Upstream of Prince George	Spring-Run Age 1.3	Upper Fraser
Holmes River	Upstream of Prince George	Spring-Run Age 1.3	Upper Fraser
Horsey River	Upstream of Prince George	Spring-Run Age 1.3	Upper Fraser
McKale River	Upstream of Prince George	Spring-Run Age 1.3	Upper Fraser
Fontiniko Creek	McGregor River system	Spring-Run Age 1.3	Upper Fraser
Herrick Creek	McGregor River system	Spring-Run Age 1.3	Upper Fraser
James Creek	McGregor River system	Spring-Run Age 1.3	Upper Fraser
Seebach Creek	McGregor River system	Spring-Run Age 1.3	Upper Fraser
Chilako River	Nechako River system	Spring-Run Age 1.3	Upper Fraser
Endako River	Nechako River system	Spring-Run Age 1.3	Upper Fraser
Ormond Creek	Nechako River system	Spring-Run Age 1.3	Upper Fraser
Nevin Creek	Upstream of Prince George	Spring-Run Age 1.3	Upper Fraser
Salmon River (PG)	Upstream of Prince George	Spring-Run Age 1.3	Upper Fraser
Slim Creek	Upstream of Prince George	Spring-Run Age 1.3	Upper Fraser
Swift Creek	Upstream of Prince George	Spring-Run Age 1.3	Upper Fraser
Walker Creek	Torpy River system	Spring-Run Age 1.3	Upper Fraser
Torpy River	Torpy River system	Spring-Run Age 1.3	Upper Fraser
Willow River	Upstream of Prince George	Spring-Run Age 1.3	Upper Fraser
Barriere River	North Thompson	Spring-Run Age 1.3	Thompson
Finn Creek	North Thompson	Spring-Run Age 1.3	Thompson
Eagle River	South Thompson	Spring-Run Age 1.3	Thompson
Salmon River (SA)	South Thompson	Spring-Run Age 1.3	Thompson
Deadman River	Lower Thompson	Spring-Run Age 1.2	Thompson
Spilus Creek	Nicola River system	Spring-Run Age 1.2	Thompson
Coldwater River	Nicola River system	Spring-Run Age 1.2	Thompson
Nicola River	Nicola River system	Spring-Run Age 1.2	Thompson
Louis Creek	North Thompson	Spring-Run Age 1.2	Thompson
Bessette Creek	South Thompson	Spring-Run Age 1.2	Thompson
Portage Creek	Hope to Lillooet	Summer-Run Age 1.3	Mid Fraser
Seton River	Hope to Lillooet	Summer-Run Age 1.3	Mid Fraser
Chilko River	Lillooet to Prince George	Summer-Run Age 1.3	Mid Fraser
Quesnel River	Quesnel River system	Summer-Run Age 1.3	Mid Fraser
Cariboo River	Quesnel River system	Summer-Run Age 1.3	Mid Fraser
Stuart River	Nechako River system	Summer-Run Age 1.3	Upper Fraser
Nechako River	Nechako River system	Summer-Run Age 1.3	Upper Fraser
Stellako River	Nechako River system	Summer-Run Age 1.3	Upper Fraser
Clearwater River	North Thompson system	Summer-Run Age 1.3	Thompson
Raft River	North Thompson system	Summer-Run Age 1.3	Thompson
North Thompson River	North Thompson system	Summer-Run Age 1.3	Thompson
Maria Slough	Lower Fraser	Summer-Run Age 0.3	Mid Fraser
Adams River	South Thompson River system	Summer-Run Age 0.3	Thompson
Little River	South Thompson River system	Summer-Run Age 0.3	Thompson
Lower Shuswap River	South Thompson River system	Summer-Run Age 0.3	Thompson
Middle Shuswap River	South Thompson River system	Summer-Run Age 0.3	Thompson
South Thompson River	South Thompson River system	Summer-Run Age 0.3	Thompson
Harrison River, Falls	Harrison River	unchanged	Fraser Late-Harrison



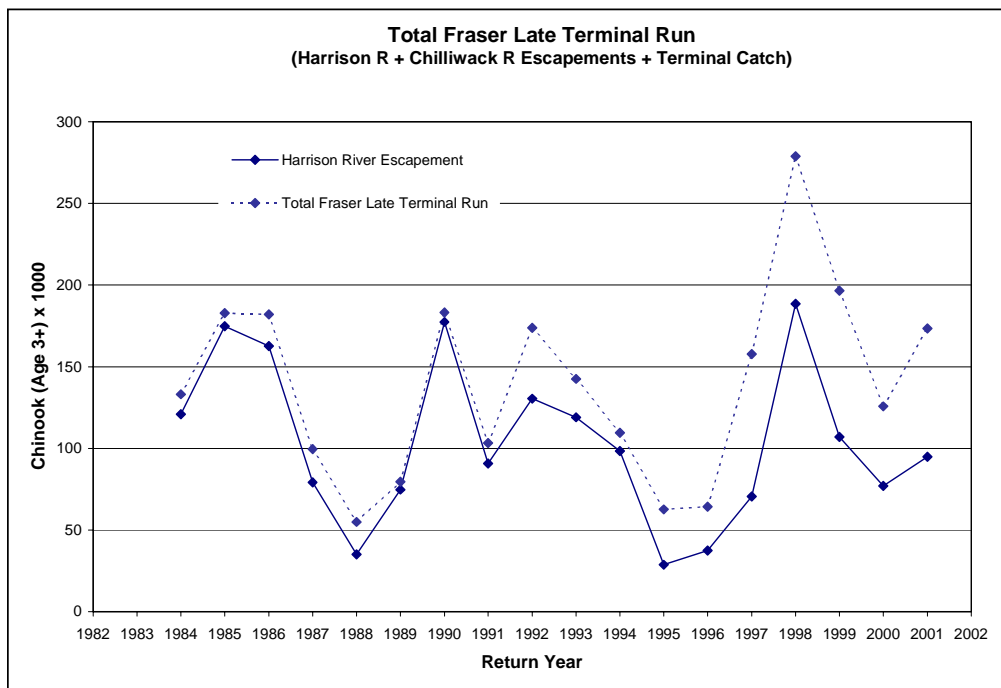
**Escapement Methodology:** The lower Fraser stock is dominated by fall returning Harrison-origin chinook that includes natural spawners in the Harrison River and Harrison-origin fish that were introduced to the Chilliwack River. In 1984, the Harrison River population was selected as an escapement indicator 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 may be 4-8 times larger than the visual estimates.

**Escapement Goal Basis:** Due to their natural abundance and importance in numerous British Columbia and Washington State fisheries, Harrison River chinook were designated as an escapement indicator stock (i.e. 'key stream' indicator) to aid in fulfilling commitments under the 1985 Pacific Salmon Treaty. In 1986, an interim escapement goal for Harrison River chinook was established at 241,700 fish, based on doubling of the escapement estimate obtained from a mark-recapture program in 1984. In 2001, an escapement goal range was developed for Harrison chinook using a Ricker stock-recruit approach. The analysis was based on a time series beginning in 1984 (i.e., when the mark-recapture program was initiated) and extending to 1996 (N = 13 brood years). Recruitment estimates were obtained by applying exploitation rates, maturation rates and AEQ rates obtained from cohort analysis of Chilliwack Hatchery coded-wire tag recoveries to the Harrison River return-at-age. The Ricker function, which also included Chilliwack Hatchery age 2 cohort survival rate as a co-variate, resulted in an estimate of the optimal abundance of spawners ( $S_{MSY}$ ) of 75,100 age 3 and older chinook. Although the Ricker function was highly significant, a number of uncertainties contributing to the outcome and interpretation of the analysis (e.g. the relatively short time series) suggested that an escapement range was appropriate for this population. The escapement goal range that was proposed was 75,100-98,500 with the upper bound equal to the upper 75% confidence limit derived from a bootstrap procedure. This range was reviewed and accepted by the CTC. Estimated spawning escapements in the Harrison have exceeded this escapement goal range in

eight years from 1984 to the present. They have fluctuated substantially with no apparent increasing trend within the time series.

**Agency Comments:** Harrison River chinook are white fleshed fish that return to spawn during the 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.

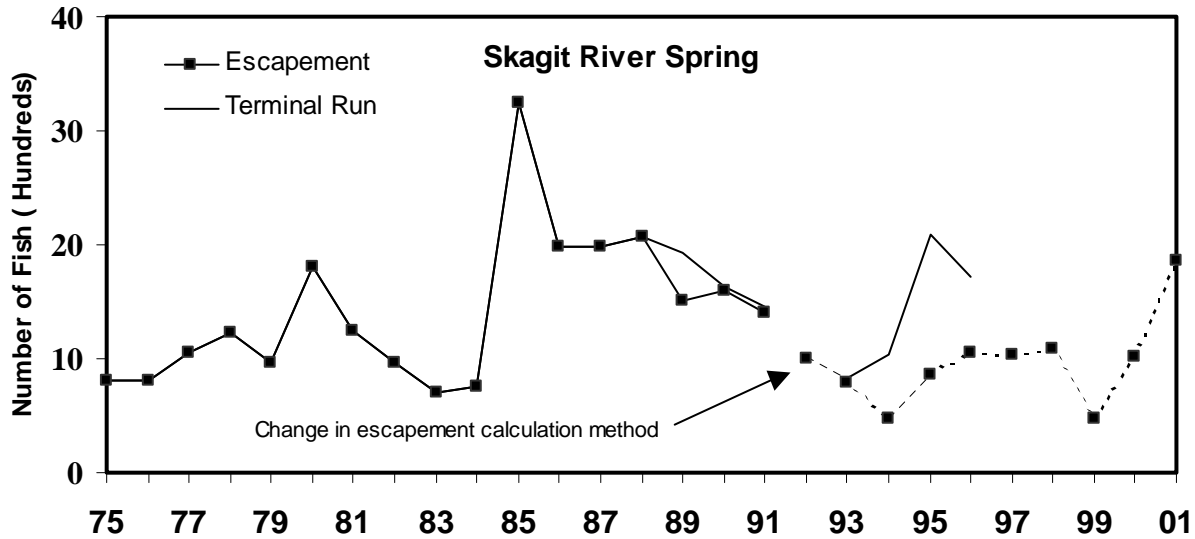
The preliminary estimate of the 2001 Harrison River escapement is 94,683 age 3 and older chinook and 20,943 age 2 male chinook. The preliminary estimate of the 2001 Chilliwack return of fall chinook is 68,247 age 3 and older chinook and 18,994 age 2 male chinook based on a procedure long established by the Chilliwack Hatchery staff for expanding the number of carcasses counted in standardized reaches of the river. Heavy rains and high flows created poor recovery conditions during 2001 resulting in too few recoveries to produce a reliable escapement estimate. This year marks the second for a mark-recapture program in the Chilliwack River. The finalized mark-recapture estimate for 2000 was 70,058 age 3 and older fish and 23,313 age 2 males. This estimate for the larger adults exceeded the standard hatchery estimate by 1.5 times although conditions for recovering carcasses were exceptionally good. The figure below shows the increasing contribution of the return to Chilliwack River and hatchery to the total terminal run of fall white chinook. The Chilliwack River spawning estimates used in the total terminal run series are all based on those produced by the Chilliwack hatchery staff (i.e. mark-recapture estimates have not yet been incorporated).



#### **2.4.4 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, the Strait of Georgia, and the West Coast of Vancouver Island. The marine harvest of Washington Coastal and Columbia River summer and fall stocks 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. Very few Columbia Upriver Spring CWT recoveries have been recovered in ocean fisheries; Washington Coastal spring stocks have been infrequently tagged. Both Oregon groups are fall stocks, with the Northern group migrating to far northern fisheries, while the Middle group migration has a more southerly distribution.

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).

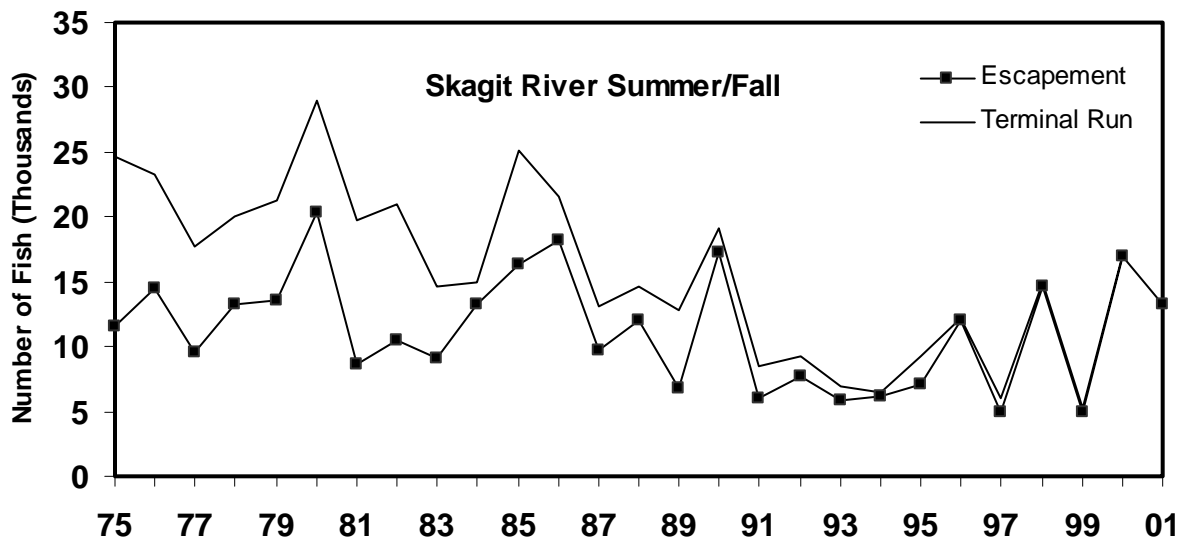


**Escapement Methodology:** The Skagit River drains into northern Puget Sound near Mount Vernon, and is the largest drainage basin in Puget Sound. It supports three stocks of spring chinook, which utilize the upper Sauk, Suiattle, and upper Cascade rivers. Spring chinook total escapements are estimated 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 Sauk and Suiattle stocks, escapements are 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 approximately 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). In 2001, the preliminary escapement estimate is 1,856. Terminal run estimates are not yet available for 2001.

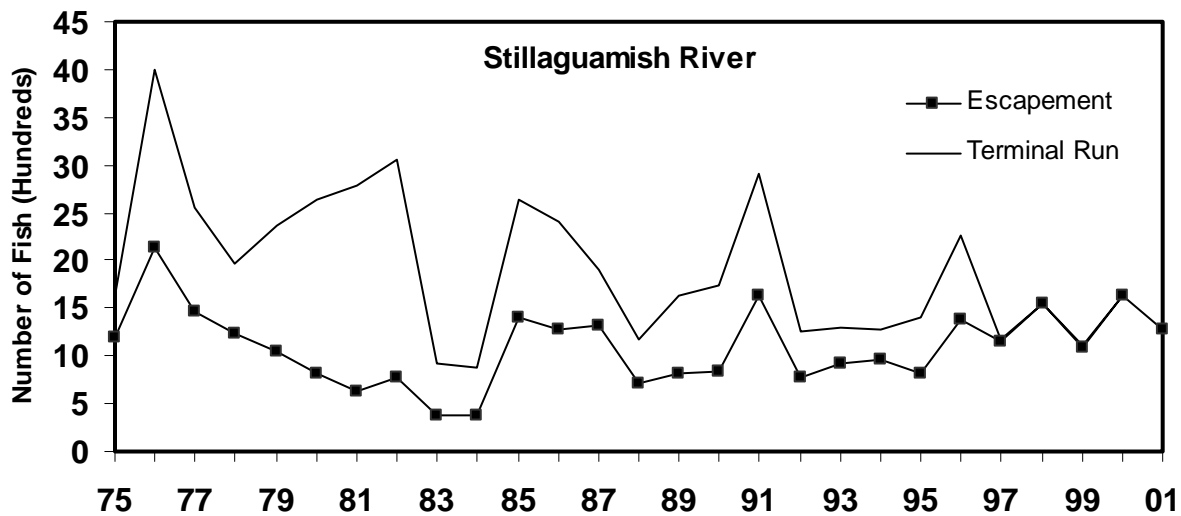




**Escapement Methodology:** The Skagit River drains into northern Puget Sound near Mount Vernon, and is the largest drainage basin in Puget Sound. It supports two stocks of summer chinook (Upper Skagit and Lower Sauk rivers) and one stock of fall chinook (Lower Skagit). The summer/fall chinook total 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.

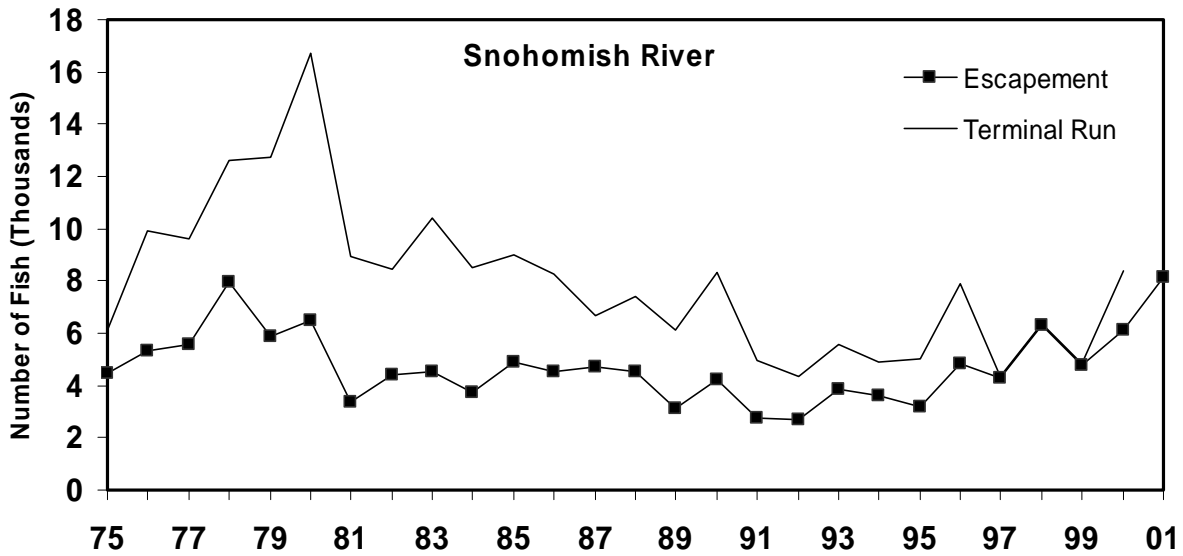
**Agency Comments:** Efforts are currently being funded through the U.S. CTC to improve escapement estimates of Skagit summer/fall chinook. They include: development of variance estimates, determination of age and sex composition of the escapement, and evaluation of the 21-day redd life assumption and 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). In 2001, the preliminary escapement estimate is 13,233 chinook. Terminal run estimates are not yet available for 2001.



**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 main-stem, and several tributaries. Total escapements in the main-stem 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.

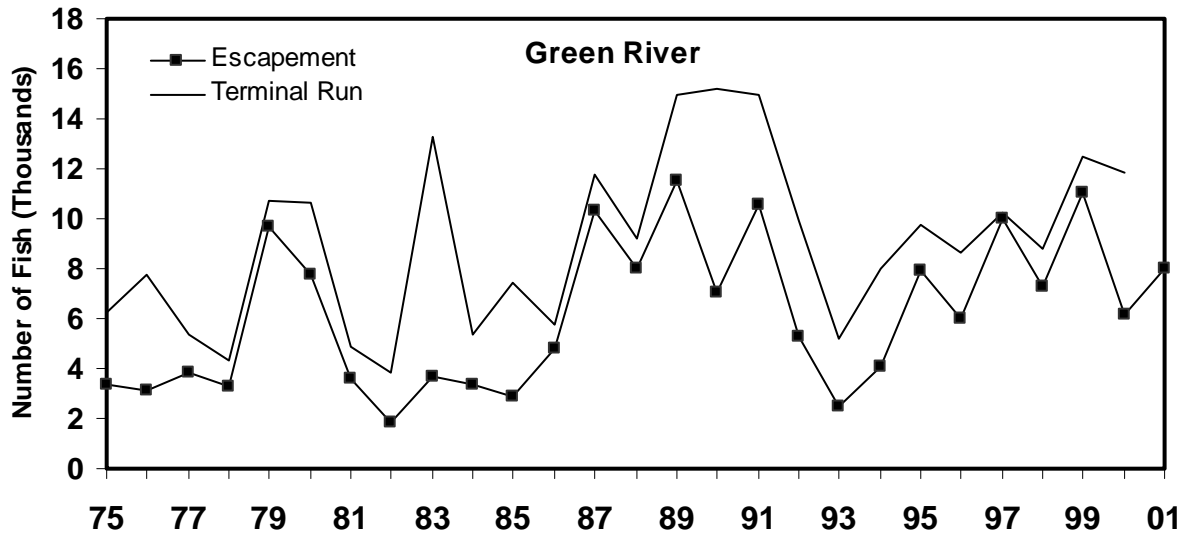
**Agency Comments:** Broodstock are collected annually in the river to maintain a coded-wire tag indicator stock program and to augment natural production. From 1989 to 1996, approximately 35% of the escapement was comprised of returns from this program. Efforts are currently underway with funding provided by the U.S. CTC 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). In 2001, the preliminary escapement estimate is 1,269 chinook. There have been no terminal harvests since 1996.



**Escapement Methodology:** The Snohomish River is located in northern Puget Sound near Everett. It produces two stocks of summer/ fall chinook, the Skykomish River stock and the Snoqualmie River stock. 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.

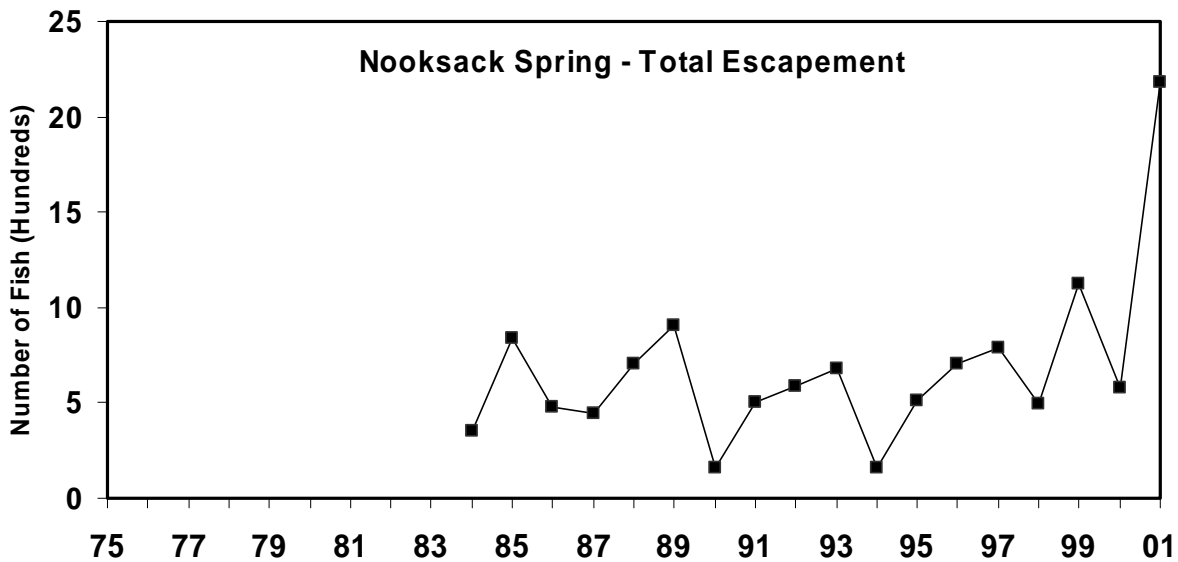
**Agency Comments:** Some terminal area harvest of Snohomish River chinook occurs in Area 8 incidental to net and sport fisheries targeting Tulalip Hatchery chinook salmon. Historic terminal run size and catch estimates derived from run reconstruction are being revised to reflect the results of otolith marking studies. Efforts are underway to improve escapement estimates including the validity of the 21-day redd life assumption and the 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). In 2001, the preliminary escapement estimate is 8,164 chinook. Terminal run estimates are not available for 2001.



**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 main-stem, 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 main-stem. 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.

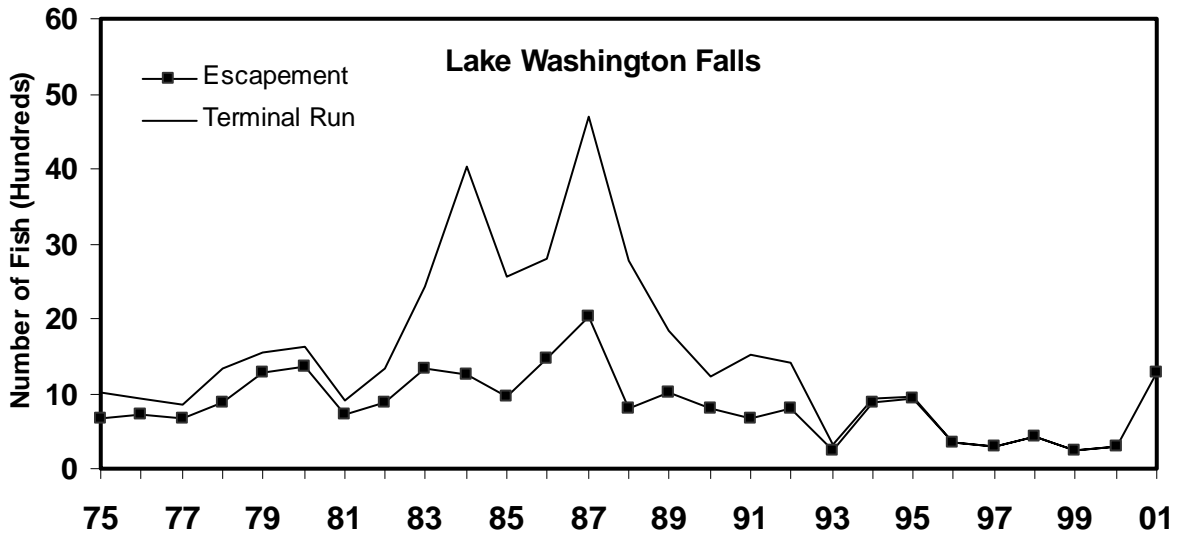
**Agency Comments:** There is a large hatchery program in this basin and these fish comprise a large portion of the return. Tagging studies were conducted in 1975 and 1976 to estimate numbers of returning adults; results were in close agreement with estimates made from aerial surveys. No attempt is made 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). In 2001, the preliminary escapement estimate is 7,975 chinook. Terminal run estimates are not available for 2001.



**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. In 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.

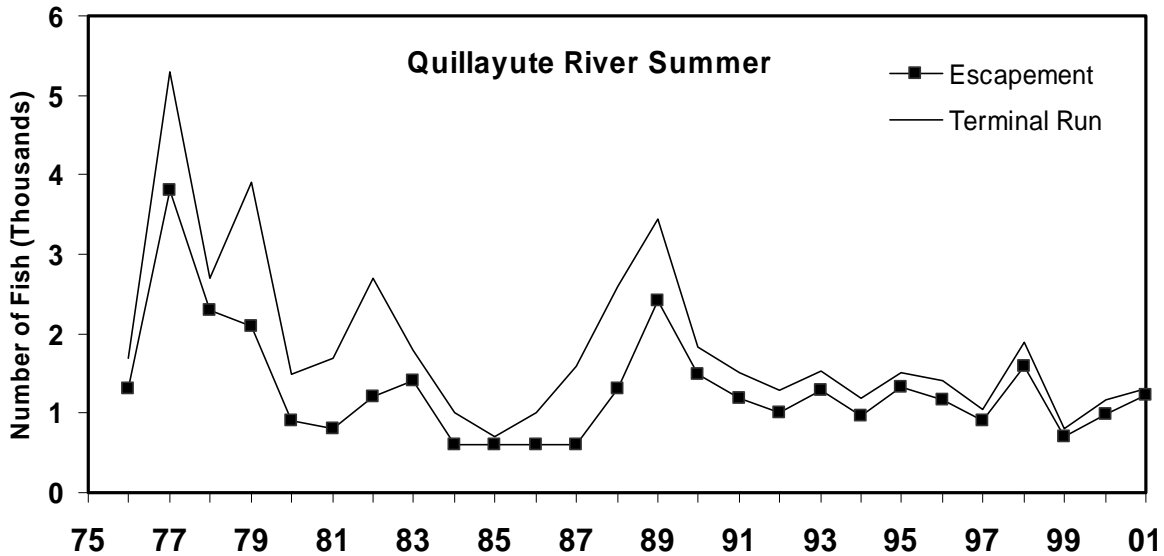
**Agency Comments:** The Kendall Creek Hatchery, located on the North Fork, is the site of recovery efforts directed at the North Fork chinook. The recovery program involves several strategies, including on-station and off-station releases, with the latter comprised of both acclimated and unacclimated releases. All fish are marked to estimate survival rates for the various release methods. Although recovery programs on the South Fork were 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 2,000 spawners (PFMC Salmon Framework Plan Amendment 14). In 2001, the preliminary escapement estimate for the North Fork is 2,185 chinook. This increase from previous years is primarily due to supplemental hatchery releases. There are no freshwater terminal fisheries on these stocks.



**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.

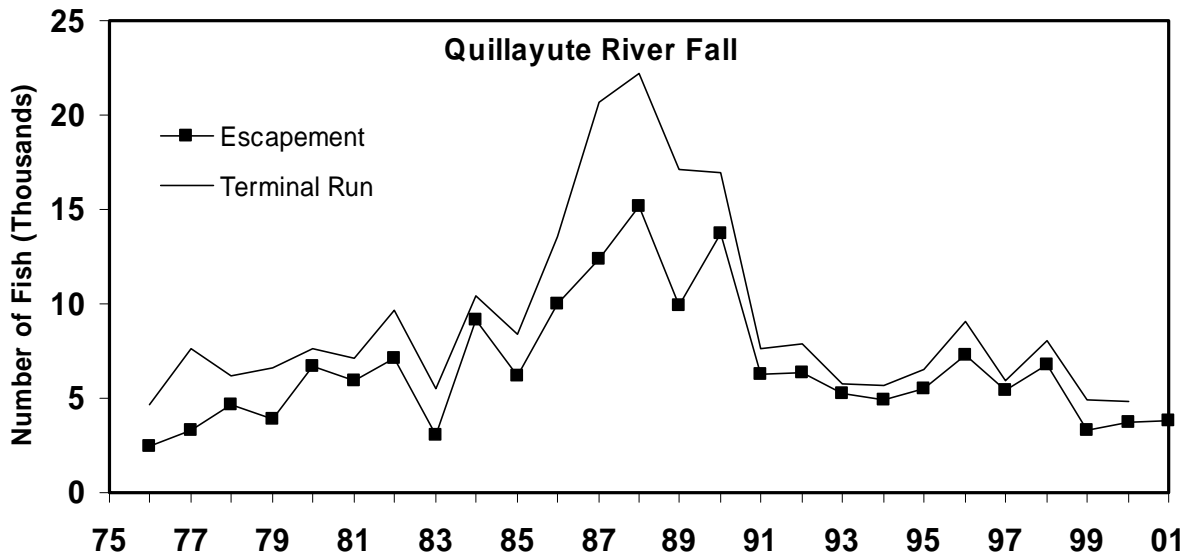
**Agency Comments:** Substantial artificial production occurs in Issaquah Creek and at the University of Washington. In 1994, spawning estimates were reviewed, and an attempt was made to find a consistent method to estimate escapement. A state-tribal escapement goal of 1,200 has been established for the Cedar River spawners (PFMC Salmon Framework Plan Amendment 14). The single targeted goal is an MSY proxy and represents an index count for the Cedar River. This objective reflects the average of observed spawning escapements from 1965-1969. In 2001, the preliminary escapement estimate is 1,269 chinook. There have not been freshwater terminal fisheries on this stock since 1995.



**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 from 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). Preliminary estimates of the terminal run size and escapement for 2001 are 1,305 adult chinook and 1,225 adult chinook, respectively. This continues a trend of stable returns near the management goal for this stock.

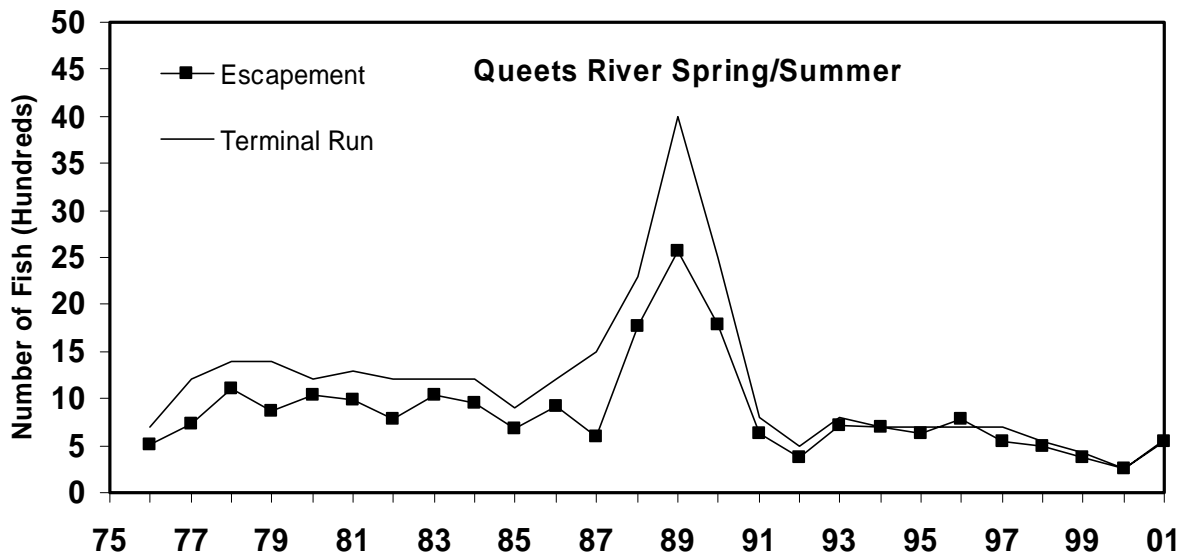


**Escapement Methodology:** The Quillayute River is located on the northwestern Washington coast near the town of La Push. The river supports a stock of naturally spawning fall chinook. Since the early 1980s, annual escapement has been estimated by redd count surveys conducted by foot, boat, and helicopter. 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 hatchery production of fall chinook currently occurs in the Quillayute River basin; the program was discontinued in the late 1980s. Since 1991, the returning run size has fluctuated within a range comparable to run sizes observed prior to 1984. The preliminary estimate of the escapement of this stock in 2001 is 3,800 adults. An estimate of the terminal run is not available at this time. Terminal fisheries are managed for a harvest rate of 40%, with an escapement floor of 3,000 fish (PFMC Salmon Framework Plan Amendment 14). This objective is designed to actively probe at and above estimates of escapements that produce maximum sustained harvest (MSH), while minimizing potential detrimental effects of existing fisheries. Stock production analyses of spawning escapements from 1968-1982 were used to determine the initial escapement floor.

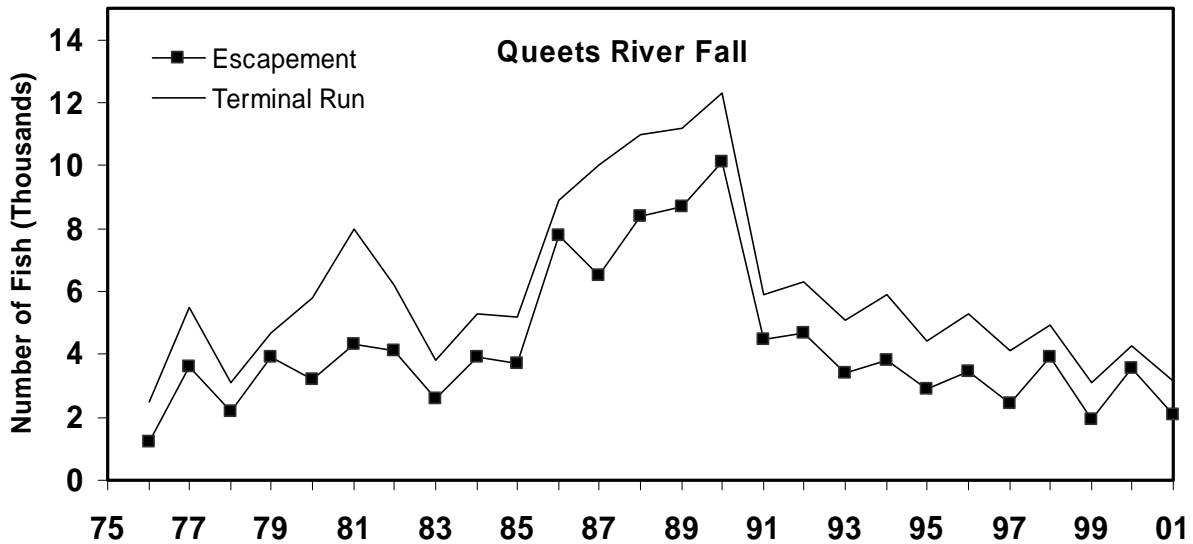




**Escapement Methodology:** The Queets River is located on the northwestern coast of Washington, entering the Pacific Ocean near the village of Queets. Major tributaries to the Queets include the Clearwater and Salmon Rivers. The river supports a naturally spawning stock of spring/summer chinook that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

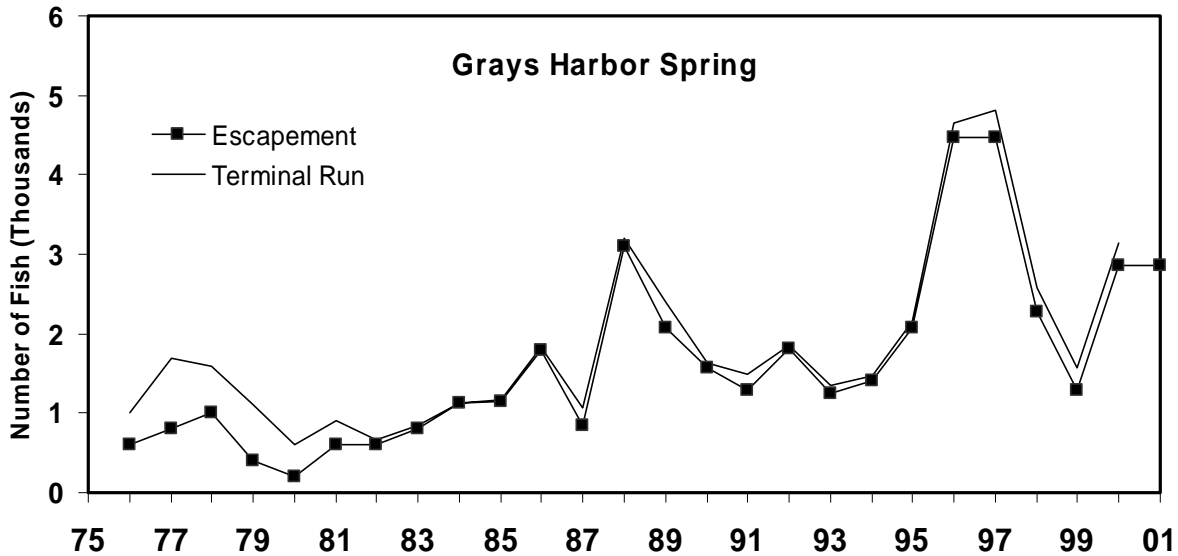
**Agency Comments:** The escapements between 1976 and 1987 were relatively stable, ranging from 500 to 1,100 fish. The escapements and terminal returns in 1988, 1989, and 1990 were almost double the previous period. Escapements and terminal run sizes have been declining since 1996. In 2001, the preliminary terminal run size is estimated to be 556 adult chinook and the preliminary escapement estimate is 545 adult chinook. Terminal fisheries are managed to harvest 30% of the river run size, with an escapement floor of 700 fish (PFMC Salmon Framework Plan Amendment 14). This objective is designed to actively probe at and above the estimates of escapement that produce MSH, while minimizing potential detrimental effects of existing fisheries. Stock production analysis of spawning escapement for brood years 1969-1976 were used to determine the initial 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 exploitation rate 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.

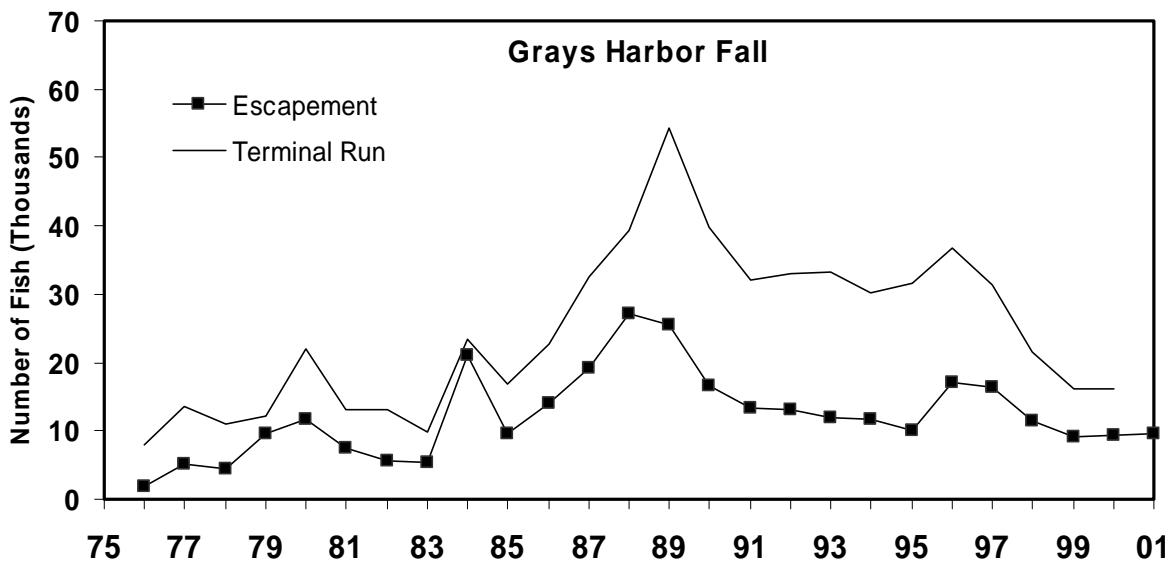
**Agency Comments:** Between 1975 and 1985, the escapement was relatively stable between 1,500 and 4,000 chinook. The 1986–1990 escapements were double the levels estimated for 1975-1985. Escapements since 1991 have been comparable to the 1975-1985 levels. In 2001, the preliminary terminal run size is estimated to be 3,153 adult chinook and the preliminary escapement estimate is 2,106 adult chinook. Terminal fisheries are managed to harvest 40% of the river return, with an escapement floor of 2,500 spawners (PFMC Salmon Framework Plan Amendment 14). This objective is designed to actively probe at and above estimates of the escapements that produce MSH, while minimizing potential detrimental effects of existing fisheries. Stock production analyses of spawning escapements from 1967-1982 were used to determine the initial escapement floor.



**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.

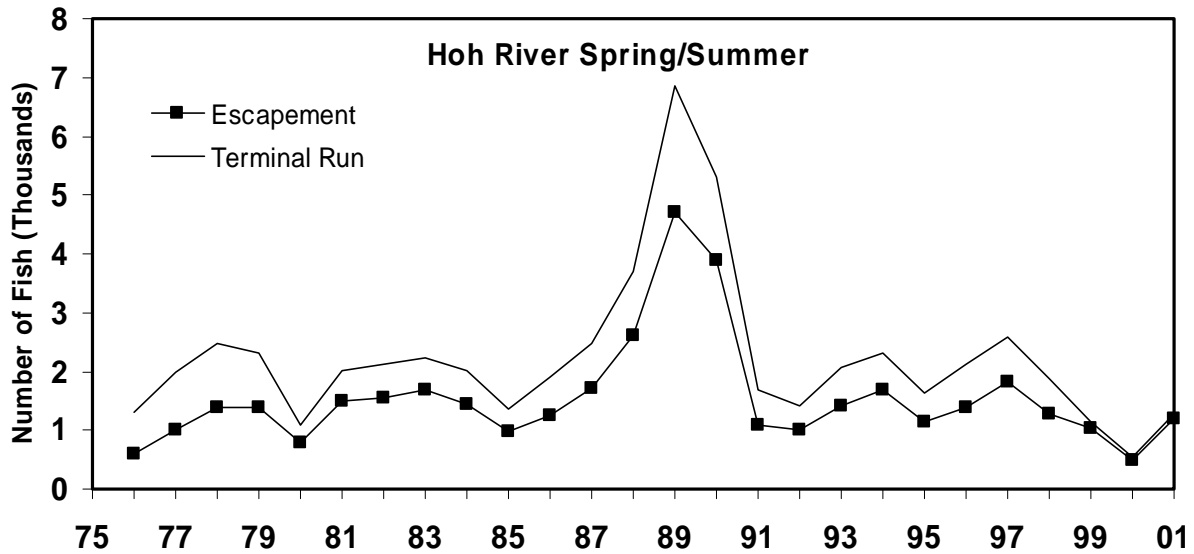
**Agency Comments:** There are some tribal net fisheries and a very small recreational fishery on the Chehalis River (harvest is typically less than 25 spring chinook) (PFMC 1997b). Broodstock programs in Grays Harbor produce hatchery chinook, which return and spawn naturally because there are no adult 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 preliminary estimate of the escapement of this stock is 2,860 adults. An estimate of the terminal return is not available at this time. The Grays Harbor spring chinook stock is managed for a fixed natural spawning escapement goal of 1,400 fish (PFMC 1997b). This single targeted goal was developed as a MSY proxy. This objective is derived from actual spawning data from the mid- to late 1970's, expanded to include additional habitat not covered by spawner surveys.



**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.

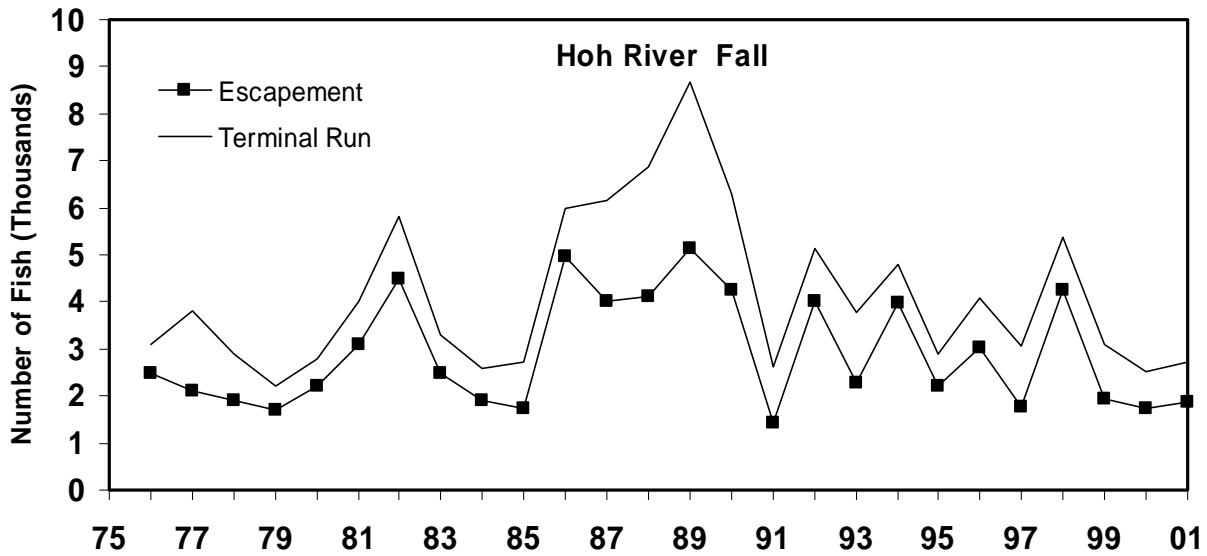
**Agency Comments:** Terminal fisheries include both directed commercial and recreational harvests. Broodstock programs in Grays Harbor produce hatchery chinook, which return and spawn naturally because there are no adult collection facilities. Hatchery-origin chinook that spawn naturally are included 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). The preliminary escapement estimate for 2001 is 9,483; an estimate of the terminal run is not currently available. This single targeted goal was developed as an MSY proxy. The objective represents assumed optimal spawner density based on estimated available habitat. Escapements have been below agency goals since 1998.



**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 which 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 stock.

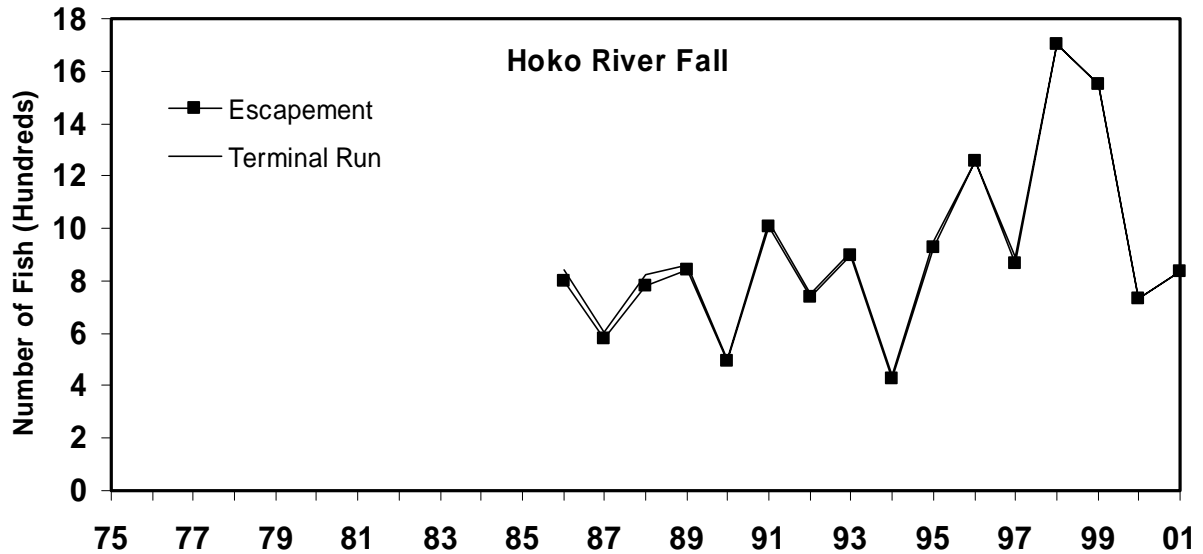
**Agency Comments:** Like many of the other Washington coastal stocks, the escapements have been relatively stable except for much larger returns in 1988, 1989, and 1990; however, the terminal return for this stock has declined since 1997. In 2001, the preliminary estimates of terminal run size and escapement improved to 1,272 adult chinook and 1,200 adult chinook, respectively. The escapement in 2001 is above the escapement floor. Terminal fisheries are managed to harvest 31% of the river run, with an escapement floor of 900 fish (PFMC Salmon Framework Plan Amendment 14). This objective is designed to allow a wide range of spawner escapements from which to eventually develop an MSY objective or proxy while protecting the long-term productivity of the stock. Stock production analysis of spawning escapement for brood years 1969-1976 were utilized to determine the initial escapement 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 stock.

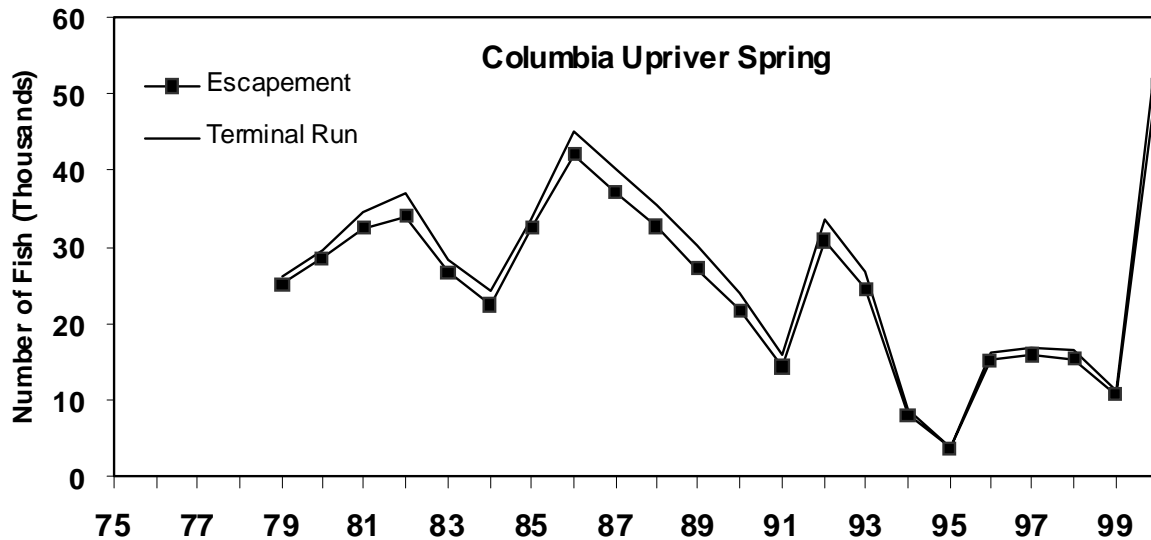
**Agency Comments:** The natural escapement estimates include fish taken for broodstock in some years. The returns of fall chinook to the Hoh have been much more variable, particularly in recent years, than is the case of chinook returning to other Washington coastal rivers. This stock is managed to harvest 40% of the terminal run, with an escapement floor of 1,200 spawners (PFMC Salmon Framework Plan Amendment 14). This objective is designed to actively probe at and above estimates of the escapements that produce MSH, while minimizing potential detrimental effects of existing fisheries. Stock production analyses of spawning escapements from 1968-1982 were utilized to determine the initial escapement floor. In 2001, improvements in recruitment resulted in preliminary estimates of a terminal run size of 2,736 adult chinook and an escapement of 1,870 adult chinook.



**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 main-stem and tributaries, added to the expanded number of redds in the lower main-stem. Expansions are used only in the lower main-stem because a 10-year data series is only available for the lower main-stem; better visibility in the upper main-stem allows for direct counts in high-flow periods. Limiting the expansions to the lower main-stem 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 stock.

**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). This single targeted goal was developed as a MSY proxy. The escapement goal was calculated by estimating the amount of available spawning habitat, then expanded utilizing assumed optimal redds per mile and fish per redd values (Ames and Phinney 1977). The escapements for 2000 and 2001 were 730 and 838 adults, respectively.



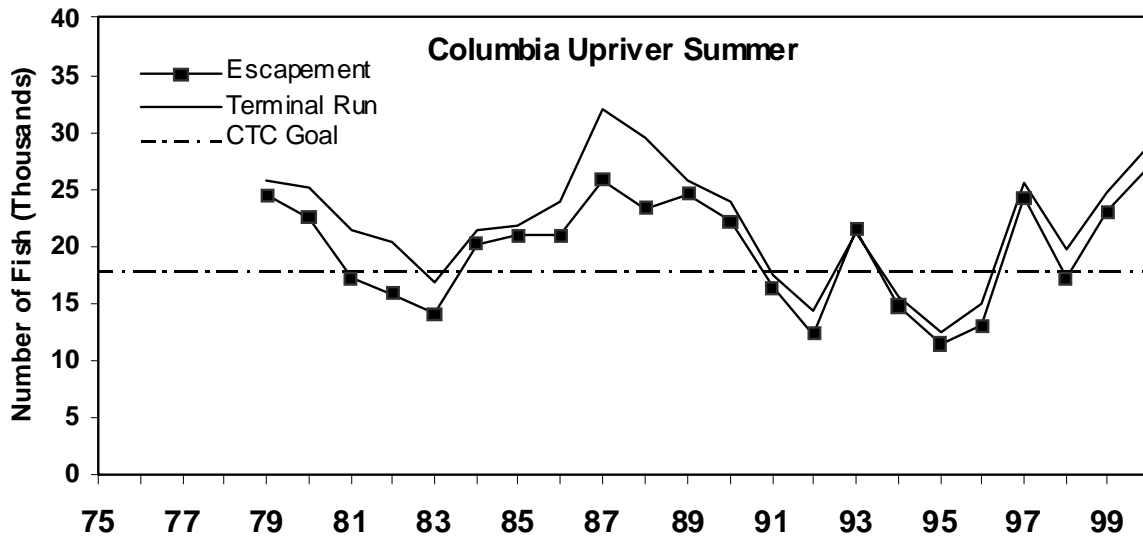
**Escapement Methodology:** Spring chinook escapement past Bonneville Dam is the dam count from March 15 through May 31 multiplied by the proportion of wild spawners estimated from run reconstruction, minus an estimate of wild harvest above Bonneville Dam. The majority of production above McNary Dam is now from Columbia River hatcheries.

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

**Agency Comments:** Historically, the Snake River produced most of this stock. In 1992, Snake River spring/summer naturally spawning chinook were listed under the U.S. Endangered Species Act. In past escapement assessments, the CTC used the goal of 84,000 natural spawners passing Bonneville Dam. This was the estimated wild portion (70%) of the 120,000 total spring chinook specified in the original 5-year plan for U.S. v Oregon. The interim management goal for 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. Terminal harvests have been severely constrained since 1977, with incidental harvests in lower river fisheries averaging 2% and total harvest in treaty Indian fisheries averaging 6% (TAC 1999). Juvenile mortality and habitat loss are the major sources of mortality.

There were record low returns of Columbia Upriver Springs in 1994 and 1995. The 2001 return is the largest since Bonneville Dam was completed in 1938. Bonneville sampling indicated an age composition of 9% brood year (BY) 1996 (age 1.3), 88% BY 1997 (age 1.2), and 2.7% BY 1998 (age 1.1). Water run-off levels in 1996 and 1997 were 2 of the largest in 70 years, resulting in good spill and favorable in-river conditions. In 1998, there was again good spill. Cooler temperatures also improved in-river conditions. In addition to good conditions for out-migrants, the index for the Pacific Decadal Oscillation during the winter of 1999 was lower than normal, indicating good upwelling. This likely improved the early ocean survival of 1997 brood yearling migrants. The final 2001 spring chinook numbers are not available at this time; the US v Oregon Technical Advisory Committee is reviewing the proportions of spring and summer chinook and the proportion of wild fish. Preliminary estimates for spring and summer chinook combined are a run of 493,000 and an escapement of 366,000.

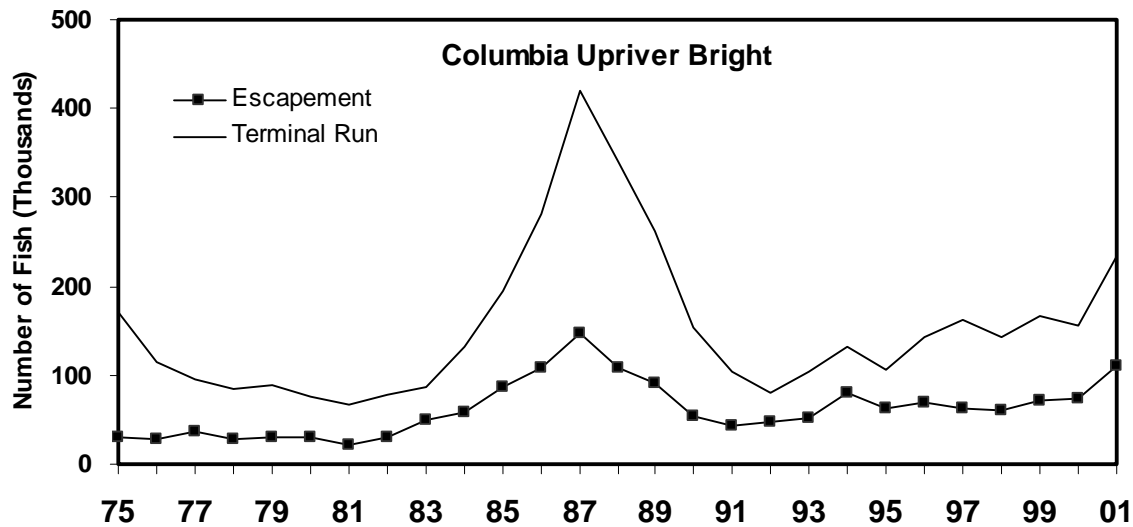




**Escapement Methodology:** Estimates of naturally spawning summer chinook escapement past Bonneville Dam (between June 1 to July 31) are based on the dam count, Zone 6 harvests, and the reconstructed proportion of upper Columbia River naturally spawning fish. Production is primarily from natural spawning 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 PSC chinook model data. The CTC will use this goal until a better analysis of stock-production information is available.

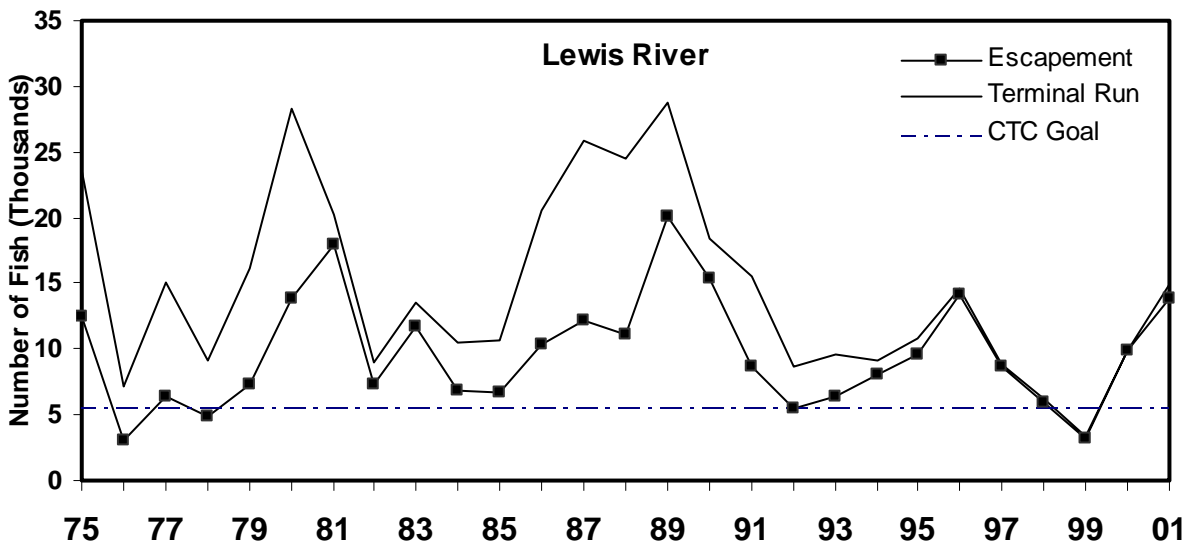
**Agency Comments:** Most Columbia upriver summer chinook migrate to sea as sub-yearlings, but some migrate in late fall or as yearlings the following spring. Productivity is limited primarily by loss of downstream migrants and habitat degradation related to timber harvests, lack of screens on water diversions, high water temperatures, low flows, and sediment-laden irrigation water returns (CBFWA 1990). Most harvest impacts occur in ocean fisheries. Escapements have exceeded 92% of the terminal run since 1974. Incidental harvest in non-Indian fisheries has been under 1% of the run since 1995. Treaty Indian C&S harvest rates have averaged less than 3% since 1986 (TAC 1999). Bonneville sampling in 2001 indicated an age composition of 14.3% BY 1996 (12.9% age 1.3), 67.1% BY 1997 (58.6% age 1.2), 15.4% BY 1998 (13.5% age 1.1). The preponderance of yearlings may point to an increase in in-river rearing and yearling out-migration or may be due to sampling late spring chinook during the summer chinook run timing period. Water run-off levels in 1996 and 1997 were 2 of the largest in 70 years, resulting in good spill and in-river conditions. In 1998, good spill and cooler temperatures improved in-river conditions. The index for the Pacific Decadal Oscillation during the winter of 1999 was lower than normal, indicating good upwelling. This likely improved the early ocean survival of 1997 brood yearling migrants. The final 2001 summer chinook numbers are not available at this time; the US v Oregon Technical Advisory Committee is reviewing the proportions of spring and summer chinook and the proportion of wild fish. Preliminary estimates for spring and summer chinook combined are a run of 493,000 and an escapement of 366,000.



**Escapement Methodology:** Columbia Upriver Bright escapement numbers are the McNary Dam count minus the sport catch in the Hanford Reach. Fall chinook at McNary Dam are those counted after August 9. Bright fall chinook are mostly natural production from the Hanford Reach. Returns of adult Upriver Bright chinook to Priest Rapids, Ringold, and Lyons Ferry hatcheries averaged 13% of the McNary Dam count from 1986 to 1995 (range 8-18%). Naturally spawning hatchery fish are included in the escapement, as well as Snake River fall chinook. Fish past McNary Dam were undercounted from winter 1999 to October 2000 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 to McNary conversion rate to the 2000 John Day Dam count (Rick Watson –WDFW, pers. comm.).

**Escapement Goal Basis:** There is no CTC agreed upon escapement goal. The definition of the Upriver Bright spawning population and methods of calculating spawning ground escapement are being re-evaluated.

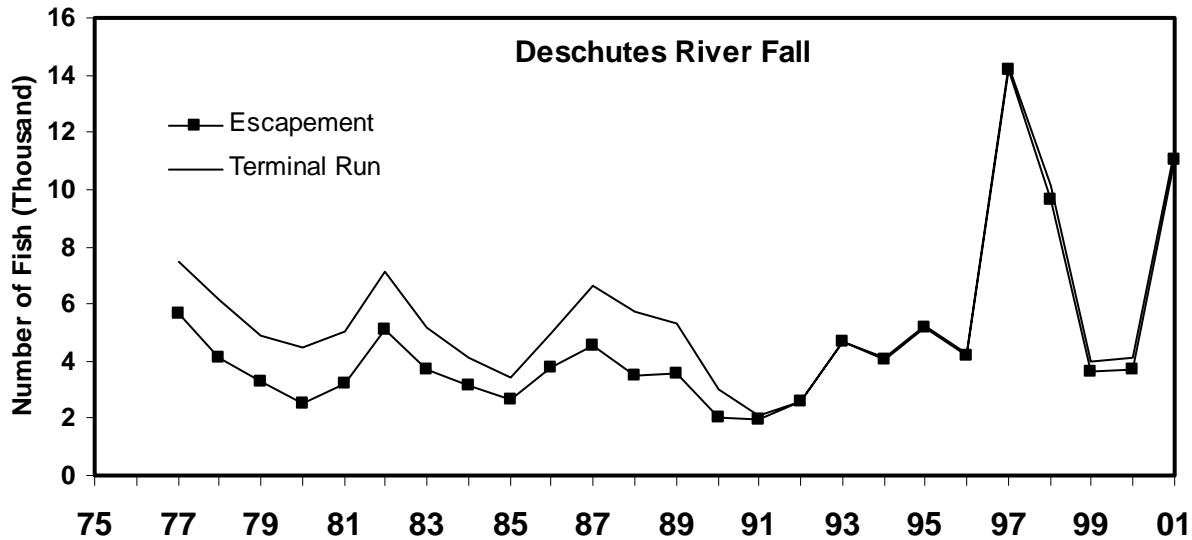
**Agency Comments:** The CRFMP interim escapement goal for Columbia Upriver Brights is 40,000 naturally spawning adults above McNary Dam, and is based on a Ricker stock-recruitment function. In 1990, a CRFMP escapement goal of 45,000 was established to provide increased brood stock. In 1994, a CRFMP 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 brood stock needs were re-evaluated and the CRFMP spawning escapement goal was reduced to 43,500 adults at McNary Dam. Runs above Priest Rapids Dam have been substantial since 1999. The 2001 Columbia River terminal run of 232,800 was the largest since 1989 and the escapement of 104,946 was the largest since 1988.



**Escapement Methodology:** Most natural bright fall chinook production below Bonneville Dam occurs in the North Fork Lewis River. The Lewis River Wild stock is the main component of the Lower River Wild management unit for fall chinook, which also includes small amounts of wild production from the Cowlitz and Sandy River basins. In this report, the escapements and goal are for the Lewis River component. Annual escapement estimates 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). From 1999-2001, LOA funds were used to conduct a study to estimate and verify the expansion factor. 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 adult fish, both from hatchery and natural production, are included in the escapement. The terminal run is escapement plus the adult sport catch in the Lewis River.

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

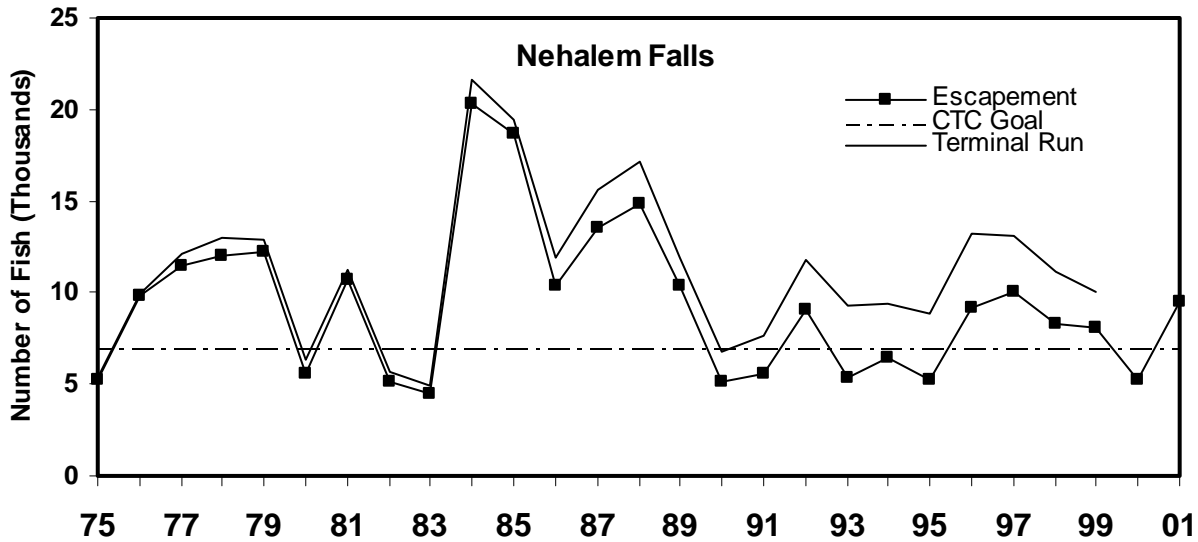
**Agency Comments:** The Lewis River escapements have been above their escapement goal during the PST except in 1999. The PFMC "Review of 1999 Ocean Salmon fisheries" states "The ocean escapement of Lewis River Wild stock in 1999 was the lowest on record and due, in part, to flooding in 1995 and 1996." The 2001 return of 14,900 Lewis River fall chinook was good, but not to the extent of other Columbia River stocks.



**Escapement Methodology:** Fall chinook are found throughout the Deschutes River below the Pelton Re-regulating Dam (rkm 161). From 1975 through 2000, escapement estimates were based on a mark-recapture project above Sherars Falls and a helicopter survey of redds below the falls. Marked fish were recaptured during carcass surveys and the population above Sherars falls was estimated using Chapman’s modification of the Peterson mark-recapture estimate. The proportion of redds below the falls was then used to expand the mark-recapture estimate for spawning in the entire river. In 1989, redd surveys were expanded from a standardized set of “random” survey areas to the total river. From 1989 on, the agency estimates of spawning were expanded by the proportion of redds below the falls based on the census of total redds. 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. Starting in 2001, the escapement shown is from a PSC funded mark-recapture project that provides an estimate for the entire river.

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

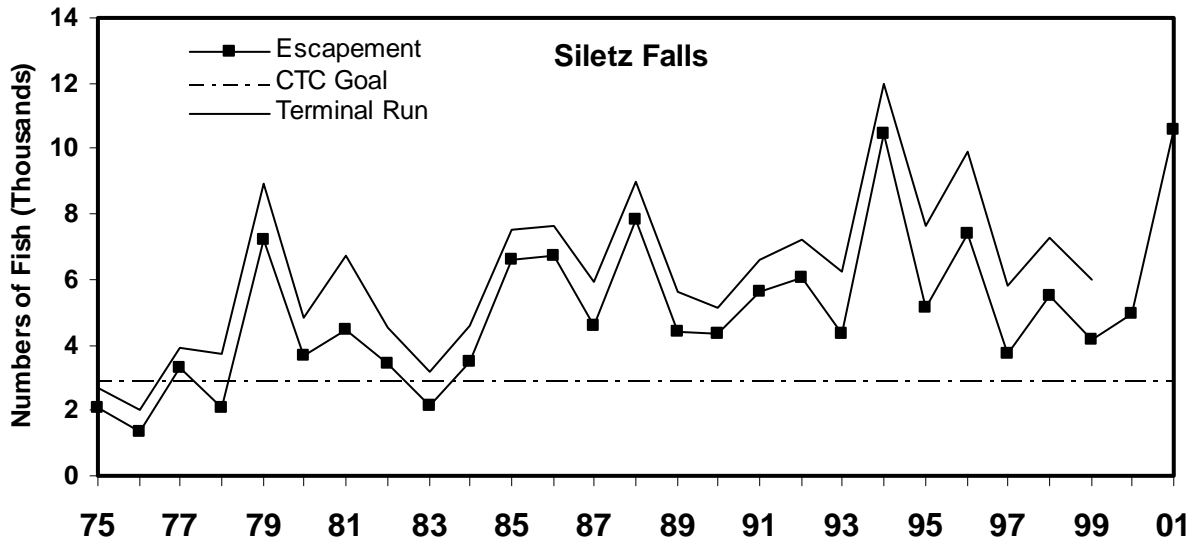
**Agency Comments:** Local management agencies use a management goal of 4,000 adult chinook, which includes an escapement goal of 2,000 fish above Sherars Falls. This goal is based on average spawning escapement. As with most other Columbia River stocks, the 2001 return of 11,391 Deschutes fall chinook was improved compared to recent years.



**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 in length 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 U.S. 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 1999).

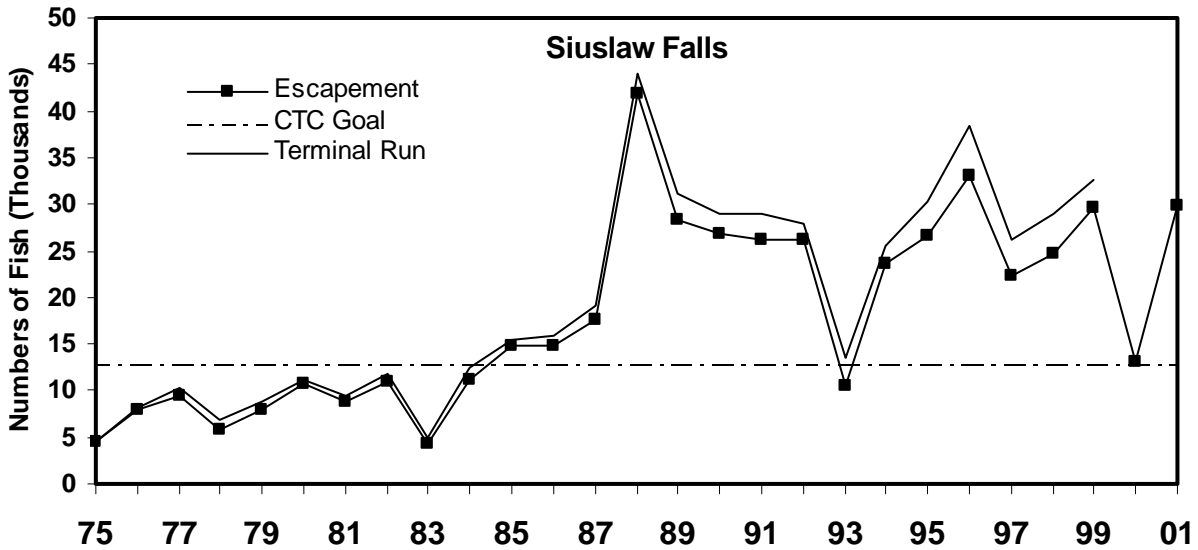
**Agency Comments:** Following a general trend for Oregon Coastal stocks, the Nehalem escapement in 2001 increased over the escapement in 2000. We estimated the spawner abundance as 9,459 large (adult) chinook, well in excess of the MSY escapement goal. Punch card data used to estimate the recreational sport catch are unavailable for 2000 and 2001, 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 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 and 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 then divided by the sum of the miles in the survey sections to derive a density index (fish/mile). The density estimate 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 adopted 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 1999).

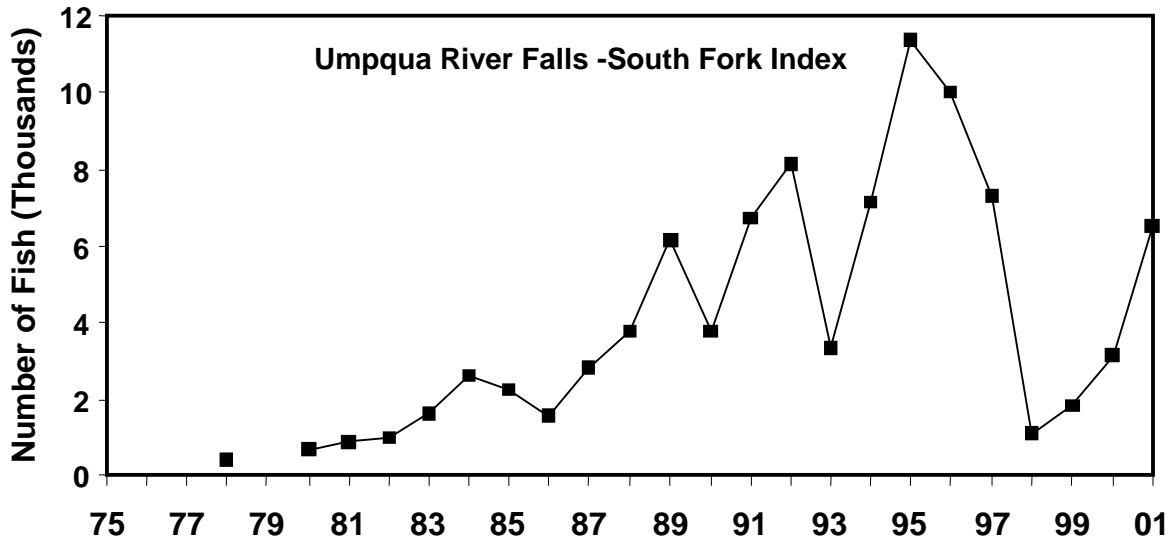
**Agency Comments:** Only 3 instead of the usual 4 standard sites were surveyed in 2001. Consequently the value for the fourth site was estimated by regression with a nearby site that was surveyed. We feel that this may have biased the estimate somewhat high. The estimated spawner abundance for 2001 was 10,582, a record high for this stock. Punch card data to estimate the recreational sport catch are unavailable for 2000 and 2001, 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 in length 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 Siuslaw 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 1999).

**Agency Comments:** Following the general trend in 2001 for other coastal fall chinook stocks the escapement in the Siuslaw was very large. The estimated spawner abundance was 29,748 adult chinook, and is well above that needed to achieve MSY. Punch card data to estimate the recreational sport catch are unavailable for 2000 and 2001, hence terminal run sizes are not available for those years.

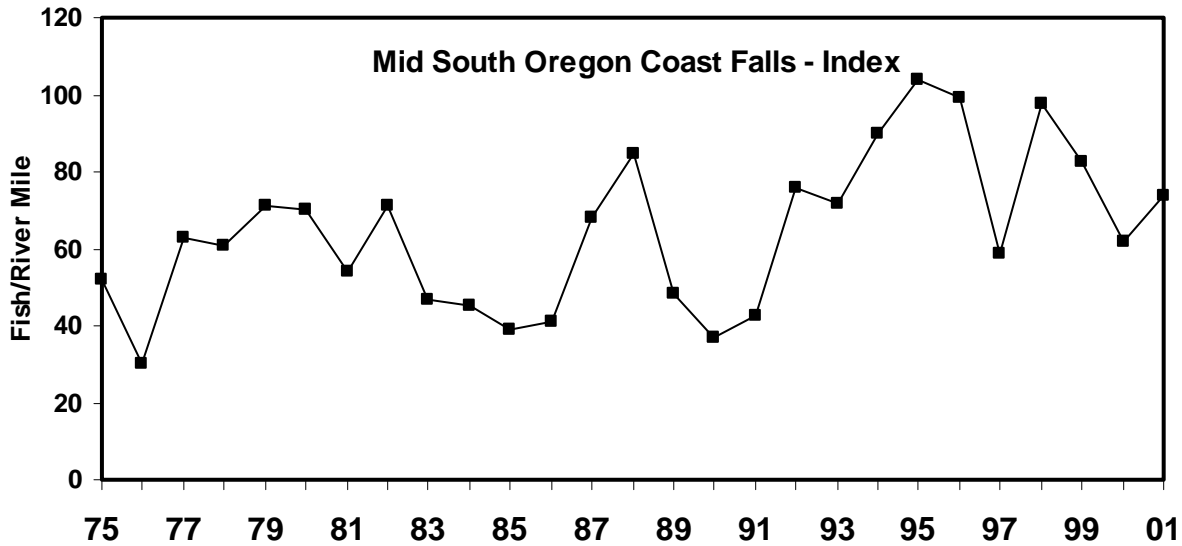


**Escapement Methodology:** The Umpqua River system is an extensive and diverse watershed that includes both coastal Douglas fir rainforest as well as an interior valley, oak savanna, environment. There are at least five distinct chinook populations in this watershed with both spring (river) and fall (ocean) run types that together comprise the Umpqua GCG. The Smith River fall population returns to 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 sufficient data available to evaluate stock status for the 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 annual index is the cumulative total number of fresh redds counted during these aerial flights. The annual index is then expanded by 3.45 fish per redd to derive the estimated spawning escapement for this tributary of the Umpqua River.

**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 should be evaluated by the CTC. Four years of USCTC funded research has allowed the calibration of the redd counts to derive a fish per redd expansion factor so that annual escapements estimates can be made. The average expansion factor from these studies is 3.45 fish per redd. The coefficient of variation of the expansion factor was found to be 14%, which shows that the average expansion factor is a reliable statistic to use for annual estimates of escapement.





**Escapement Methodology:** This composite index represents populations classified as the Mid-South Coast 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 long 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 funded by the CTC is underway that will provide information to designate the Coquille chinook production river system as the escapement indicator stock for this stock aggregate. ODFW will complete a biologically based escapement goal analysis and submit the analysis to the CTC in 2002.

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## APPENDICES

Appendix A.1. Southeast Alaska and Transboundary river escapements and terminal runs of PSC Chinook Technical Committee natural chinook escapement indicator stocks, 1975-2001.

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	4,481	137	1,286	231	300
2001	672		147	2,260	204	343
Goal LL <sup>a</sup>	500		120	650	250	250
Goal UL <sup>a</sup>	1,000		240	1,500	500	500

(continued)

Appendix A.1. Southeast Alaska and Transboundary river escapements and terminal runs of PSC Chinook Technical Committee natural chinook escapement indicator stocks, 1975-2001.

Year	Transboundary Rivers					
	Alsek (Klukshu) Index 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
2001	1,843	41,179	66,515	2,019	1,010	4,268
Goal LL <sup>a</sup>	1,100	30,000	14,000	650	450	
Goal UL <sup>a</sup>	2,300	55,000	28,000	1,400	900	

<sup>a</sup> Goal LL is the lower end of the agreed escapement goal range and Goal UL is the upper end of the agreed escapement goal range.

Appendix A.2. Canadian escapements and terminal runs of PSC Chinook Technical Committee natural chinook escapement indicator stocks, 1975-2001.

Year	Northern B.C.							
	Area 1 Yakoun esc.	Area 3 <sup>1</sup> 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	11,538	20,603	43,775	70,993	1,800	2,739	500
2000	3,600	20,406	30,133	51,720	77,320	1,200	6,700	500
2001	4,000	34,315	46,911	84,642	111,778	3,795	5,062	300

<sup>1</sup> Escapement and terminal run sizes are currently under review.

(continued)



Appendix A.2. Canadian escapements and terminal runs of PSC Chinook Technical Committee natural chinook escapement indicator stocks, 1975-2001.

Year	Southern B.C.				Fraser River						
	W. Coast Vancouver Island esc.	Lower Georgia Strait esc.	t. run	Upper Georgia Strait esc.	Fraser Spring Age 1.2 esc.	Fraser Spring Age 1.3 esc.	Fraser Summer Age 0.3 esc.	Fraser Summer Age 1.3	Fraser Spr/sum t. run	Harrison esc.	t. run
1975	1,200	5,475	6,390		7,179	8,184	26,875	16,875	119,081		
1976	1,100	4,340	5,390		4,600	10,307	4,925	13,630	98,691		
1977	3,835	6,530	7,590	3,880	3,675	13,261	19,600	17,240	132,553		
1978	6,250	6,495	7,035	6,150	4,305	15,725	16,700	19,200	109,119		
1979	2,848	10,686	11,209	4,127	2,770	14,985	18,275	10,205	101,252		
1980	6,724	8,819	10,519	1,367	6,255	16,521	8,350	13,625	71,504		
1981	5,610	6,007	7,607	1,945	2,975	12,274	13,120	12,202	62,668		
1982	7,813	6,186	6,657	3,260	5,510	15,010	6,850	15,088	85,140		
1983	4,200	6,582	6,862	3,770	2,641	24,225	9,500	16,604	72,526		
1984	5,362	8,456	8,861	4,600	6,380	30,370	15,522	13,595	95,681	120,837	131,740
1985	5,200	4,589	5,242	4,600	9,477	43,168	20,375	19,099	121,941	174,778	181,367
1986	4,660	3,105	3,776	1,630	10,275	48,446	22,460	32,505	144,617	162,596	177,662
1987	3,170	3,276	3,781	6,450	5,049	48,271	22,404	27,646	128,699	79,038	81,799
1988	5,560	7,957	8,638	3,300	4,003	41,783	29,567	32,066	129,587	35,116	38,285
1989	7,220	7,087	8,142	5,550	6,126	31,994	24,200	16,200	106,843	74,685	76,294
1990	5,660	7,023	7,627	2,320	3,225	41,560	25,425	33,747	135,124	177,375	180,837
1991	6,060	8,343	8,613	3,340	3,495	27,296	26,250	28,097	116,555	90,638	93,363
1992	7,330	11,377	11,637	5,268	5,687	33,038	32,200	38,011	130,249	130,411	132,042
1993	6,230	8,418	8,713	1,574	7,870	32,796	13,300	21,385	110,237	118,998	120,600
1994	7,680	7,463	7,808	1,237	10,696	51,655	25,350	23,657	145,303	98,334	100,839
1995	4,515	18,732	19,265	4,227	9,670	45,237	20,550	26,371	134,478	28,616	29,840
1996	6,928	16,465	17,275	3,600	20,726	38,398	50,900	43,142	185,559	37,394	38,568
1997	9,071	11,742	11,933	5,266	9,878	44,373	49,250	40,882	202,795	70,514	72,061
1998	14,872	8,246	9,319	10,350	3,003	37,862	68,033	36,750	169,333	188,425	189,103
1999	12,256	8,481	9,181	9,500	8,751	20,740	53,204	25,138	140,939	107,016	107,884
2000	5,175	7,933	8,500	12,850	11,731	26,773	45,161	25,869	155,209	77,035	78,098
2001	3,041	5,315	8,280	9,885	10,607	31,269	74,132	33,980	177,008	94,683	96,012

Appendix A.3. Puget Sound and Washington Coast escapements and terminal runs of PSC Chinook Technical Committee natural chinook escapement indicator stocks, 1975-2001.

Year	Puget Sound													
	Skagit Spring		Skagit Sum/fall		Stillaguamish		Snohomish		Green		Nooksak Spring esc.		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	1,004
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	1,341
1979	968	968	13,605	21,243	1,042	2,366	5,903	12,706	9,704	10,730			1,289	1,542
1980	1,803	1,803	20,345	28,938	821	2,647	6,460	16,688	7,743	10,608			1,360	1,617
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	1,340
1983	710	710	9,080	14,671	387	925	4,549	10,386	3,679	13,290			1,332	2,432
1984	747	747	13,239	15,005	374	883	3,762	8,480	3,353	5,381	309	44	1,252	4,030
1985	3,249	3,249	16,298	25,075	1,409	2,641	4,873	9,005	2,908	7,444	585	252	949	2,552
1986	1,978	1,978	18,127	21,585	1,277	2,416	4,534	8,267	4,792	5,784	257	221	1,470	2,807
1987	1,979	1,979	9,647	13,037	1,321	1,906	4,689	6,670	10,338	11,724	266	177	2,038	4,695
1988	2,064	2,064	11,954	14,647	717	1,176	4,513	7,389	7,994	9,207	263	445	792	2,769
1989	1,515	1,924	6,776	12,787	811	1,642	3,138	6,142	11,512	15,000	608	296	1,011	1,832
1990	1,592	1,627	17,206	19,172	842	1,739	4,209	8,345	7,035	15,200	152	10	787	1,214
1991	1,411	1,448	6,014	8,425	1,632	2,913	2,783	4,964	10,548	14,967	379	123	661	1,517
1992	1,001	1,025	7,671	9,201	780	1,254	2,708	4,319	5,267	9,941	122	468	790	1,407
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	1,622	1,622	6,092	8,400	6,170	11,866	432	150	300	300
2001	1,856		13,233		1,269		8,164		7,975		2,185		1,269	

(continued)

Appendix A.3. Puget Sound and Washington Coast escapements and terminal runs of PSC Chinook Technical Committee natural chinook escapement indicator stocks, 1975-2001.

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	992	1,167	3,730	4,797	492	531	1,748	2,514	730	730	248	250	3,572	4,267	2,867	3,140	9,260	16,050
2001	1,225	1,305	3,800	N/A	1,200	1,272	1,870	2,736	838	838	545	556	2,106	3,153	2,860	N/A	9,483	N/A

Appendix A.4. Columbia River and Oregon Coastal escapements and terminal runs of PSC Chinook Technical Committee natural chinook escapement indicator stocks, 1975-2001.

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	9,820	9,820	3,728	4,135
2001	*	*	*	*	*	*	*	*	104,946	232,800	13,900	14,900	11,057	11,391
Goal							17,857				5,700			

\* A breakdown by stock was not available at this time; the combined terminal run of spring and summer run fish was 493,000 with an escapement of 366,000.

(continued)

Appendix A.4. Columbia River and Oregon Coastal escapements and terminal runs of PSC Chinook Technical Committee natural chinook escapement indicator stocks, 1975-2001.

Year	Oregon							
	Nehalem		Siletz		Siuslaw		Umpqua River Redd Count Index	Mid-Oregon Coast Density Index
	esc.	t. run	esc.	t. run	esc.	t. run		
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	400	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	697	70
1981	10,752	11,272	4,435	6,755	8,724	9,342	890	54
1982	5,085	5,675	3,415	4,514	10,870	11,774	1,011	71
1983	4,431	4,892	2,136	3,152	4,186	4,885	1,628	47
1984	20,341	21,623	3,461	4,571	11,168	12,437	2,594	45
1985	18,670	19,432	6,628	7,531	14,822	15,553	2,246	39
1986	10,389	11,873	6,748	7,639	14,844	15,775	1,573	41
1987	13,560	15,654	4,577	5,906	17,603	19,031	2,795	68
1988	14,889	17,138	7,805	8,992	41,746	43,975	3,778	85
1989	10,389	11,903	4,401	5,644	28,279	31,065	6,162	48
1990	5,104	6,726	4,313	5,148	26,799	28,893	3,761	37
1991	5,557	7,649	5,633	6,597	26,100	29,011	6,717	43
1992	9,060	11,780	6,044	7,217	26,090	27,958	8,149	76
1993	5,345	9,309	4,342	6,244	10,446	13,567	3,364	72
1994	6,486	9,400	10,475	11,990	23,570	25,584	7,128	90
1995	5,194	8,797	5,164	7,626	26,715	30,216	11,388	104
1996	9,211	13,241	7,394	9,917	33,051	38,485	10,019	99
1997	10,026	13,053	3,726	5,814	22,305	26,195	7,286	59
1998	8,245	11,134	5,516	7,247	24,708	28,907	1,104	98
1999	8,063	10,008	4,166	6,002	29,610	32,556	1,804	83
2000	5,257		4,982		12,999		3,140	62
2001	9,459		10,582		29,748		6,510	74
Goal	6,989		2,944		12,925			