Fishery Data Series No. 98-33

Escapements of Chinook Salmon in Southeast Alaska and Transboundary Rivers in 1997

by

Keith A. Pahlke

November 1998

Alaska Department of Fish and Game **Division of Sport Fish**

Symbols and Abbreviations

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Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
metric ton	mt
milliliter	ml
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
ounce	oz
pound	lb
quart	qt
yard	yd

Spell out acre and ton.

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
hour (spell out for 24-hour clock)	h
minute	min
second	s

Spell out year, month, and week.

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

All commonly accepted abbreviations.	e.g., Mr., Mrs., a.m., p.m., etc.
All commonly accepted professional titles.	e.g., Dr., Ph.D., R.N., etc.
and	&
at	@
Compass directions:	
east	E
north	N
south	S
west	W
Copyright	©
Corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
et alii (and other people)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.,
id est (that is)	i.e.,
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
number (before a number)	# (e.g., #10)
pounds (after a number)	# (e.g., 10#)
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S. state and District of Columbia abbreviations	use two-letter abbreviations (e.g., AK, DC)

Mathematics, statistics, fisheries

alternate hypothesis	H_A
base of natural logarithm	e
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	F, t, χ^2, etc.
confidence interval	C.I.
correlation coefficient	R (multiple)
correlation coefficient	r (simple)
covariance	cov
degree (angular or temperature)	°
degrees of freedom	df
divided by	÷ or / (in equations)
equals	=
expected value	E
fork length	FL
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
mideye-to-fork	MEF
minute (angular)	'
multiplied by	x
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
standard length	SL
total length	TL
variance	Var

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ABSTRACT

As part of a continuing stock assessment program in Southeast Alaska, the Division of Sport Fish obtained indices of escapement for chinook salmon *Oncorhynchus tshawytscha* in designated streams and transboundary rivers. The estimated total escapement in 1997 was 108,039 large (age .3 and older) chinook, an 18% decrease from the 131,356 fish estimated in 1996. The 1997 estimate was over twice the 1975–1980 base period average of 42,437 chinook salmon, 172% of the 1981–1985 average of 62,591 and 121% of the 1986–1990 average of 89,249. The estimated total exceeded the goal for the region for the third time in 4 years, primarily due to continued high escapement to the Taku River.

Escapement indices exceeded management goals in the Taku, Stikine, Situk, Chilkat and King Salmon Rivers and were near goal in the Keta River. The Alsek River escapement declined but still exceeded the newly revised goal. Escapements to the Unuk, Chickamin and Blossom Rivers declined from 1996 and remained below goals.

Key words: Chinook, *Oncorhynchus tshawytscha*, escapement, Taku River, Stikine River, Alsek River, Chilkat River, Unuk River, Chickamin River, Blossom River, Keta River, Marten River, Wilson River, King Salmon River, Situk River, Andrew Creek, Behm Canal, Southeast Alaska, U.S./Canada Treaty, transboundary rivers.

INTRODUCTION

Chinook salmon *Oncorhynchus tshawytscha* are known to occur in 34 rivers in, or draining into, the Southeast region of Alaska from British Columbia or Yukon Territory, Canada, (Kissner 1977). In the mid-1970s it became apparent that many of the chinook salmon stocks in this region were depressed relative to historical levels of production (Kissner 1974), and a fisheries management program was implemented to rebuild stocks in Southeast Alaska streams and in transboundary rivers (rivers that originate in Canada and flow into Southeast Alaska coastal waters; ADF&G 1981). Initially, this management program closed commercial and recreational fisheries in terminal and near-terminal areas in U.S. waters.

In 1981, this program was formalized and expanded to a 15-year (roughly 3 life-cycles) rebuilding program for the transboundary Taku, Stikine, Alsek, Unuk, Chickamin, and Chilkat rivers and the non-transboundary Blossom, Keta, Situk, and King Salmon rivers (ADF&G 1981) (Figure 1). The program used region-wide, all-gear catch ceilings for chinook salmon, designed to rebuild spawning escapements by 1995 (ADF&G 1981). Then, in 1985, the Alaskan program was incorporated into a comprehensive coast-wide rebuilding program for all wild stocks of chinook salmon, under the auspices of the U.S./Canada Pacific Salmon Treaty (PST).

To track the rate of rebuilding, the Alaska Department of Fish and Game (ADF&G), the Canadian Department of Fisheries and Oceans (DFO), and the Taku River Tlingit First Nation (TRTFN) count spawning chinook salmon in a designated set of watersheds (Appendix A1). These streams were selected on the basis of their historical importance to fisheries, size of the population, geographic distribution, extent of the historical database, and ease of data collection. Counts from each of these streams are considered to be indicators of relative abundance, based on the assumption that counts are a relatively constant proportion of the annual escapement in an index area or watershed. These data are provided annually to the Joint Chinook Technical Committee (CTC) of the Pacific Salmon Commission (PSC), who use them to evaluate rebuilding progress of escapement indicator stocks (PSC 1996). Judgments as to rebuilding progress provide a basis for regulations to restrict or expand fisheries to achieve rebuilding goals.

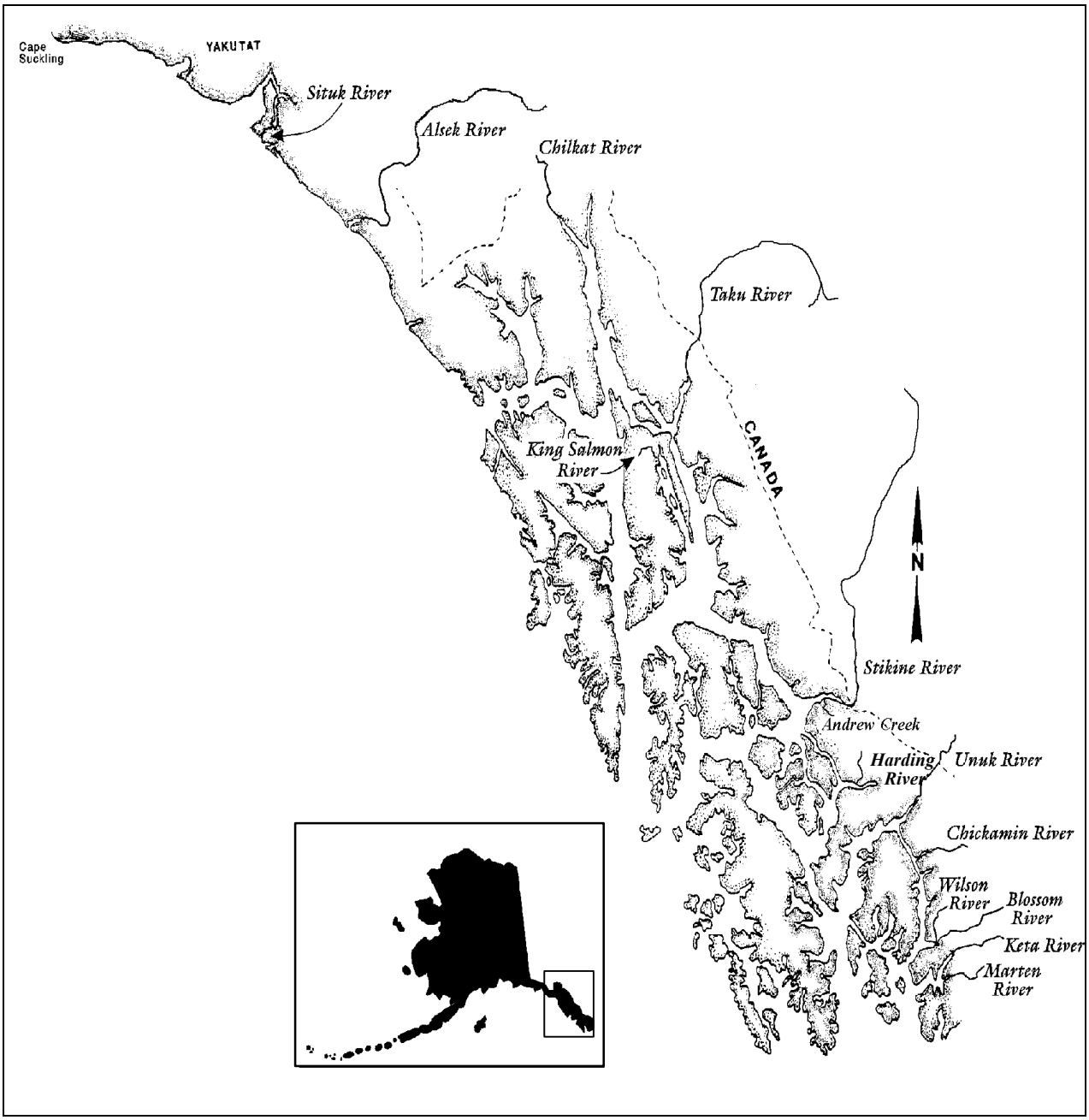

Figure 1.–Location of selected chinook salmon systems in Southeast Alaska, Yakutat, and transboundary rivers.

As part of a continuing program by the Division of Sport Fish to improve wild chinook stocks, this project obtained indices of spawner abundance for major chinook salmon stocks in Southeast Alaska. Objectives for 1997 were to count large (≥660 mm mid-eye to fork length, or ocean-age 3 and older) spawning chinook salmon during the time of peak abundance in tributaries and mainstem areas of the Stikine, Taku, Alsek, Situk, Unuk, Chickamin, Keta, Blossom, King Salmon rivers and in Andrew Creek and to compile and compare the indices to those from past years.

DESCRIPTION OF STUDY SITES

Many individual spawning areas are surveyed annually in a designated set of watersheds. Detailed descriptions and maps of these areas are found in Mecum and Kissner (1989), and general descriptions of the watersheds are below.

The Taku River originates in northern British Columbia and flows into the ocean 48 km east of Juneau, Alaska. The Taku River drainage covers over 17,000 km^2; average monthly flows range from 60 m^3/sec in February to 1,097 m^3/sec in June (Bigelow et al. 1995). Principal tributaries are the Sloko, Nakina, Sheslay, Inklin, and Nahlin rivers. The clearwater Nakina and Nahlin rivers contribute less than 25% of the total drainage discharge; most is from glacier-fed streams on the eastern slope of the Coast Range of British Columbia. Upstream of the abandoned mining community of Tulsequah, British Columbia, the drainage remains in pristine condition, with very few mining, logging, or other development activities. The upper Taku River area is extremely remote, with no road access and few year-round residents. All of the important chinook salmon spawning areas are in tributaries in the upper drainage in British Columbia.

Stock assessment of chinook salmon has been conducted intermittently on the Taku River since the 1950s, and helicopter surveys of the index areas have been conducted annually since 1973. Survey index areas include portions of the Nakina, Nahlin, Dudidontu, Tatsamenie, Hackett, and Kowatua rivers and Tseta Creek. In addition, since 1973 the DFO, TRTFN, and ADF&G have operated a carcass collection weir below the major spawning area on the Nakina river, which provides an estimate of the age composition of the escapement. Annual mark-recapture experiments are providing independent estimates of total escapement (McPherson et al. 1997).

The Stikine River originates in British Columbia and flows to the sea approximately 32 km south of Petersburg, Alaska. Its drainage covers about 52,000 km^2, much of which is inaccessible to anadromous fish because of natural barriers and velocity blocks. The Stikine River's principal tributaries include the Tahltan, Chutine, Scud, Iskut, and Tuya rivers. The lower river and most tributaries are glacially occluded (e.g., Chutine, Scud, and Iskut rivers).

Only 2% of the Stikine River drainage is in Alaska (Beak Consultants Limited 1981), and the majority of the chinook salmon spawning areas in the Stikine River are located in British Columbia, Canada, in the mainstem Tahltan and Little Tahltan rivers (including Beatty Creek). However, Andrew Creek, in the lower Stikine River, supports a significant run of chinook salmon. The upper drainage of the Stikine is accessible via the Telegraph Creek Road. Development includes several active mines in the Canadian portion of the Stikine drainage and proposals for major hydroelectric projects.

Helicopter surveys of the Little Tahltan River index area have been conducted annually since 1975, and the DFO has operated a fish counting weir at the mouth of the Little Tahltan River since 1985. Counts from the weir represent the total escapement to that tributary. Since 1996, mark-recapture experiments have provided independent estimates of total escapement to the Stikine River (Pahlke and Etherton 1997).

Andrew Creek flows into the lower Stikine River in Alaska, not far from the limit of tidal influence. From 1976 to 1984, a weir was operated on Andrew Creek to provide brood stock for hatcheries. Foot, aerial and helicopter surveys to count chinook salmon have been conducted annually since 1985. In 1997, a new weir was installed on Andrew Creek .

The Alsek River originates in Yukon Territory, Canada, and flows in a southerly direction into the Gulf of Alaska approximately 75 km south-east of Yakutat, Alaska. Its largest tributaries are the Dezadeash and Tatshenshini rivers. The Alsek River drainage covers about 28,000 km^2 (Bigelow et al. 1995), but much of it, including the mainstem of the Alsek itself, is inaccessible to anadromous salmonids because of velocity barriers. The significant spawning

areas for chinook salmon are found mostly in tributaries of the Tatshenshini River, including the Klukshu, Blanchard, and Takhanne rivers and in Village and Goat creeks. The Klukshu and upper Tatshenshini rivers are accessible by road near Dalton Post, Yukon Territory.

Counts of chinook salmon have been collected on the Alsek River since 1962. Beginning in 1976, the DFO has operated a weir at the mouth of the Klukshu to count chinook, sockeye *O. nerka*, and coho salmon O. *kisutch*. The count of chinook salmon through the Klukshu River weir is used as the index for the Alsek River. Some aboriginal harvest takes place above the weir. Aerial surveys to count spawning chinook salmon have been conducted by ADF&G with a helicopter since 1981. Prior to 1981, surveys were made from fixed-wing aircraft. The escapement to the Klukshu River is difficult to count by aerial, boat or foot surveys because of deep pools and overhanging vegetation. However, surveys of the Klukshu River are conducted annually to provide some continuity in estimates in case the weir is not funded. The Blanchard and Takhanne Rivers and Goat Creek; three smaller tributaries of the Tatshenshini River, are also surveyed annually, but are not index systems.

The Unuk, Chickamin, Blossom, and Keta river drainages all feed into Behm Canal—a narrow passage of water east of Ketchikan, Alaska. Misty Fiords National Monument/ Wilderness Area surrounds the eastern or "back" Behm Canal and includes the Boca de Quadra fjords. Many of the mainland rivers in the area support chinook salmon; the Unuk, Chickamin, Blossom and Keta rivers are designated chinook salmon escapement index systems.

The Unuk River originates in a glaciated area of British Columbia and flows 129 km to Burroughs Bay, 85 km northeast of Ketchikan, Alaska; only the lower 39 km of the river are in Alaska. The Unuk is a large braided, glacially occluded river with a drainage of approximately 3,885 km^2. Most (~85%) spawning occurs in tributaries of the Alaska portion of the river (Pahlke et al. 1996). The escapement index areas are all small clear-water tributaries: Eulachon River and Cripple, Genes Lake, Clear, Lake, and Kerr creeks. Cripple Creek and Genes Lake Creek cannot be surveyed by air because of heavy vegetation, so fish are counted by foot survey. Chinook salmon have been counted annually by foot or helicopter surveys in these areas since 1977. Total escapement was estimated by a mark-recapture project in 1994 (Pahlke et al. 1996) and repeated in 1997 (Jones and McPherson *In prep*).

The Chickamin River is a large, glacial river that originates in British Columbia, and flows into Behm Canal approximately 32 km southeast of Burroughs Bay and 65 km northeast of Ketchikan. Although it is technically a transboundary river, there are no chinook spawning areas on the Chickamin River upstream from the Canadian border (Pahlke 1997a). Important spawning tributaries are the South Fork of the Chickamin and Barrier, Butler, Indian, Leduc, Humpy, King, and Clear Falls creeks. Chinook salmon have been counted by foot or helicopter surveys in index areas of the Chickamin River each year since 1975. Total escapement was estimated by mark-recapture projects in 1995 and 1996 and spawning distribution was estimated by radio telemetry in 1996 (Pahlke 1996; Pahlke 1997a).

The Blossom, Keta, Wilson, and Marten rivers are non-transboundary rivers that flow into Behm Canal approximately 45 km east of Ketchikan. These rivers lie inside the boundaries of the Misty Fiords National Monument in southern Behm Canal but are within an area that has been specifically excluded from Wilderness designation, because of the potential development of a large-scale molybdenum mine (Quartz Hill) near the divide of the Blossom and Keta rivers. The mine is presently undeveloped, but an access road has been completed; it terminates at salt water near the mouth of the Blossom River.

The Keta River drainage covers about 192 km^2 and the Blossom about 176 km^2 (Bigelow et al. 1995) and have been surveyed by helicopter annually since 1975. Chinook salmon escapements to the Wilson and Marten rivers have been monitored on an intermittent basis in recent years.

The King Salmon River drains an area of approximately 100 km^2 on Admiralty Island, flowing into King Salmon Bay on the eastern side of Stephens Passage about 48 km south of Juneau. The King Salmon River is the only island river system in Southeast Alaska to support more than 100 spawning chinook salmon. ADF&G operated a weir on the King Salmon River from 1983 through 1992 to count chinook salmon and collect broodstock for Snettisham Hatchery.

The Chilkat River is a large glacial river which originates in Yukon Territory, Canada, and flows into Chilkat Inlet at the head of northern Lynn Canal near Haines, Alaska. Helicopter and foot surveys are an ineffective index of abundance for this system (Johnson et al 1992) and were suspended in 1993, in favor of annual estimates of escapement using mark-recapture methods. Total escapement has been estimated annually since 1991 (Ericksen 1997).

The Situk River is located about 16 km east of Yakutat, Alaska. The Situk supports a large run of sockeye salmon which are harvested in commercial and subsistence set gillnet fisheries concentrated at the mouth of the Situk River. Situk River chinook salmon are harvested both incidentally and targeted in the set gillnet fisheries, depending on run strength, and in a recreational fishery in the river. A weir was operated on the Situk River at the upper limit of the intertidal area from 1928 to 1955 to count all five species of Pacific salmon spawning in the river. Since 1976, a weir has been operated primarily to count chinook and sockeye salmon. Approximately 30% of the recreational harvest occurs above the weir (Howe et al. 1997).

METHODS

There are 34 river systems in the region (Figure 1) with populations of wild chinook salmon. Three transboundary rivers, the Taku, Stikine, and Alsek, are classed as major producers—each with potential production (harvest plus escapement) greater than 10,000 fish. Nine rivers are classed as medium producers, each with production of 1,500 to 10,000 fish. The remaining 22 rivers are minor producers, with production less than 1,500 fish. Small numbers of chinook salmon occur in other streams of the region but they are not included in the above because successful spawning has not been documented. Chinook salmon are counted via aerial surveys or at weirs each year in all three major producing systems, in six of the medium producers, and in one minor producer (Appendix A1). These index systems, along with the Chilkat River, are believed to account for up to 90% of the total chinook salmon escapement in Southeast Alaska and transboundary rivers.

ESCAPEMENT GOALS

The initial rebuilding program established interim escapement goals in 1981 for nine systems: the Alsek, Taku, Stikine, Situk, King Salmon, Unuk, Chickamin, Keta and Blossom/Wilson Rivers. Although the aim was to have escapement goals that provided the optimal level of harvest, little data was available to produce such estimates. As a result, escapement goals were originally set based on the highest observed escapement count prior to 1981 (Pahlke 1997). Goals for the Chilkat River and Andrew Creek were added in 1985. Escapement goals have been revised when sufficient new information warrants. Pahlke (1997b) provides detailed descriptions of the escapement goals and their origins.

INDICES OF ESCAPEMENT

Spawning chinook salmon are counted at 26 designated index areas in nine of the systems; complete counts of chinook salmon are obtained at the Situk River weir. Counts are made during aerial or foot surveys or at weirs. Aerial surveys are conducted from a Bell 206 or Hughes 500D helicopter during periods of peak spawning. Peak spawning times, defined as the period when the largest number of adult chinook salmon actively spawn in a particular stream or river, are well-documented from surveys of these index areas conducted over the past 23 years (Kissner 1982; Pahlke 1997b). The proportion of fish in pre-spawning, spawning and post-spawning condition is used

to judge whether the survey timing is correct to encompass peak spawning.

Index areas are surveyed at least twice unless turbid water or unsafe flying conditions preclude the second survey. Pilots are directed to fly the helicopter from 6 to 15 meters above the river bed at a speed of 6–16 km/h. The helicopter door on the side of the observer is removed, and the helicopter is flown sideways while observations of spawning chinook salmon are made from the open space.

Foot surveys are conducted by at least two people walking in the creek bed or on the riverbank. Only large (typically age-.3, -.4, and -.5) chinook salmon, ≥660 mm mideye-to-fork length (MEF), are counted during aerial or foot surveys. No attempt is made to accurately count small (typically age-.1 and -.2) chinook salmon <660 mm (MEF) (Mecum 1990). These small chinook salmon, also called jacks, are early maturing, precocious males considered to be surplus to spawning escapement needs. They are easy to separate visually from their older age counterparts under most conditions, because of their short, compact bodies and lighter color. They are, however, difficult to distinguish from other smaller species such as pink *O. gorbuscha* and sockeye salmon.

Counts and other observations from the 1997 surveys (Appendix A3) are entered into the ADF&G CFMD Integrated Fisheries Database (IFDB) in Juneau for archiving and general distribution.

Estimates of total escapement are needed to model total production, exploitation rates and other population parameters. To estimate escapement (since indices are only a partial count of spawning abundance), counts from index areas are increased by an expansion factor (Appendix A1). An expansion factor is a judgment as to the proportion of the total season's escapement counted in the specific area observed during the peak spawning period and a judgment as to the proportion of spawners observed in index areas relative to the escapement to the entire drainage (i.e., not all tributaries or spawning areas were surveyed). Expansion factors are based on comparisons with weir counts, mark-recapture estimates, and spawning distribution studies or by professional judgment. They vary among index areas according to the difficulties encountered in observing spawners, such as overhanging vegetation, turbid water conditions, presence of other salmon species (i.e., pink and chum *O. keta* salmon), or protraction of run timing. Expansion factors range from 1.5 for the King Salmon River to 4 for most other index areas (Appendix A1).

Escapement counts are obtained from a fish-counting weir on the Situk River and a mark-recapture program on the Chilkat River. Survey expansions are not necessary for those streams where weirs or other estimation programs are used to count all migrating chinook salmon.

Finally, to estimate total regional escapement, counts are additionally expanded to account for the unsurveyed systems. (Appendix A1). Presently, we believe the total estimated escapement in the index areas represent approximately 90% of the region total. Escapement estimates for the Chilkat River are not available prior to 1991. From 1991 to 1997 the estimated escapement to the Chilkat River averaged 6% of the estimated regionwide total. Therefore, prior to 1991 the expanded index counts represent approximately 84% of the estimated Southeast Alaska total escapement.

Expansion factors for individual rivers have been revised, based on results from experiments to estimate total escapement and spawner distribution. For example, estimated total escapement and radio-tracking distribution data were used to revise tributary expansion factors for the Taku and Unuk rivers (Pahlke et al. 1996; McPherson et al. 1996 and McPherson et al. 1997). Mark-recapture studies to estimate spawning abundance on the Unuk River in 1994 (Pahlke et al. 1996) and on the Chickamin River in 1995 and 1996 (Pahlke 1996, Pahlke 1997a) were used to revise expansion factors for those two rivers in 1996; results were also applied to the nearby Blossom and Keta rivers. On Andrew Creek, a weir was operated in four years (1979, 1981, 1982, and 1984), during which index counts were also made, establishing a new expansion

factor for that system in 1995. Also in 1997, ten years (1983–1992) of matched weir and index counts were used to revise the expansion factor for the King Salmon River (McPherson and Clark 1998). The expansion factors for the Taku River were revised in 1996 based on the results of four years of mark-recapture studies (Pahlke and Bernard 1996, McPherson et al. 1997).

These studies have helped to estimate total escapement in the region and have shown that, in most cases, the surveyed index areas provide reasonably accurate trends in escapements. However, Johnson et al. (1992) demonstrated that expansion factors used on the Chilkat River system were highly inaccurate, because the index areas received less than 5% of the escapement. Consequently, since 1991, escapement to the Chilkat River has been estimated annually by mark-recapture experiments (Ericksen, 1997). Studies on the Taku, Unuk, Chickamin, and King Salmon rivers, as well as on Andrew Creek, have shown that the index expansion factors used on those systems were much more accurate than those used on the Chilkat (PSC 1991, Pahlke 1996, Pahlke 1997a). Expansion factors will continue to be revised as additional data become available.

Ongoing research projects should provide more information on the expansion factors for the Taku, Stikine, Chilkat, Unuk, and Alsek rivers, and Andrew Creek. Estimates of escapement from expanded counts are included in this document to provide gross figures of spawner abundance, with the caveat that expansion factors may produce incorrect estimates in some cases.

RESULTS

From 1984 to 1993, the estimated escapement of chinook salmon in Southeast Alaska increased steadily for 10 years and exceeded the sum of escapement goals for all systems for the first time in 1993 (Figure 2). This was due primarily to strong returns to the Taku, Stikine, and Chilkat rivers, which together make up 72% of the regional escapement goal.

In 1997, 43 locations, 26 of which were designated index areas, were surveyed specifically for chinook salmon escapement (Appendix A3). Surveys generally progressed as planned, but poor

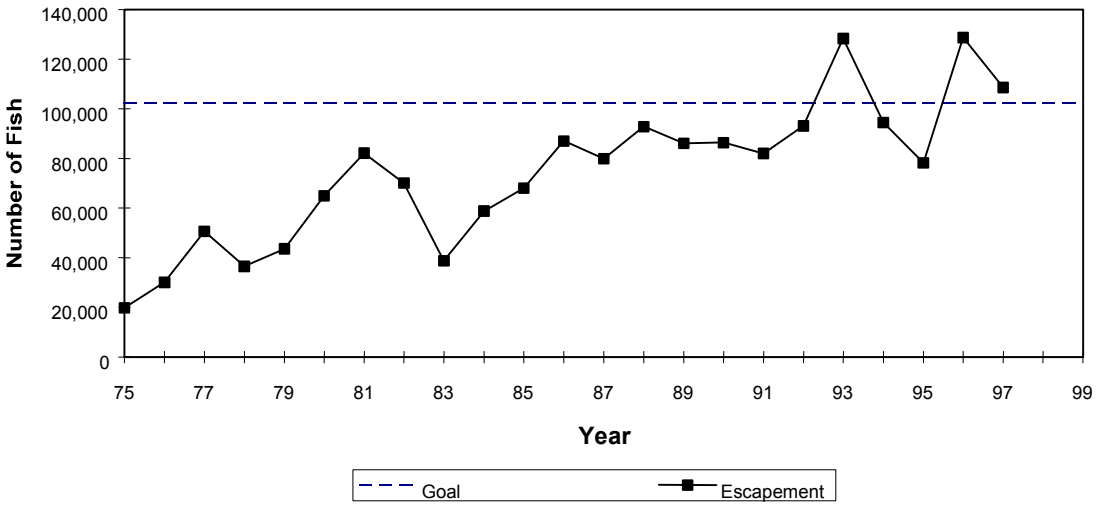

Figure 2.–Estimated total escapement of large chinook salmon to Southeast Alaska and transboundary rivers, 1975–1997. Spawner counts are expanded by survey and regional expansion factors.

water conditions hampered surveys in the Alsek River systems.

The estimated escapement (expanded) of chinook salmon for all Southeast Alaska and transboundary rivers was 108,039 (Table 1), an 18% decrease from the estimated 131,356 fish in 1996. The estimated total exceeded the aggregate goal for the region for the third time in 5 years, primarily due to continued high escapement to the Taku River, and high escapement to the Chilkat River. The 1997 escapement is over 2 times the 1975–1980 base period average of 42,437 chinook salmon, 172% of the 1981–1985 average of 62,591, and 120% of the 1986–1990 average of 89,249 fish (Appendix A2).

TAKU RIVER

The count of 13,849 large chinook salmon in the six index areas of the Taku River was the second highest on record (Table 2) with counts in five of six tributaries above average (Table 3). Counts increased steadily from 1983 to 1993, meeting the revised six-tributary escapement goal (PSC 1991) of 13,210 fish for the first time in 1993 and exceeding the goal in 1996 and again in 1997 (Figure 3).

Counts were expanded by a survey expansion factor of 4.0. The expansion factor was revised in 1996 based on four years of mark-recapture experiments on the Taku River (Table 4) (Pahlke and Bernard 1996; McPherson et al. 1997). Expansion factors for the Taku River were previously modified in 1991 on the basis of results from a 2-year tagging study which produced new information on the distribution of spawners in the drainage (PSC 1991). However, these changes were not adopted by the Transboundary River Technical Committee (TBTC) of the PSC, who revised the index escapement goal to be composed of the sum of

Table 1.–Estimated escapement of chinook salmon to Southeast Alaska and transboundary rivers in 1997.

	Survey area	Number counted	Survey expansion factor	Estimated escapement	Regional expansion factor[f]	Final estimated escapement
Major producers						
Alsek River	Klukshu	2,829[a]	1.5625	4,173[b]		
Taku River	6 tributaries	13,849	4.0[c]	55,396		
Stikine River	Little Tahltan	5,557	4.0	22,228		
Category subtotal				81,797	1	81,797
Medium producers						
Situk River	all	2,690	1.0			
Chilkat River	all	7,728	1.0			
Andrew Cr.	all	293	2.0[e]			
Unuk River	6 tributaries	636	4.0[e]			
Chickamin River	8 tributaries	272	4.0[e]			
Blossom River	all	132	2.5[e]			
Keta River	all	246	2.5[e]			
Category subtotal				15,081	1	15,081
Minor producers						
King Salmon R.	All	238	1.5	357		357
Region total				97,235	90%	108,039

[a] Klukshu weir count of 2,989 minus aboriginal fishery harvest above weir (160).

[b] Estimated escapement reduced by 72 aboriginal fishery and 175 sport fish harvest below weir.

[c] Revised in 1997 (McPherson et al. 1997)

[d] Situk River weir count minus estimated sport harvest above weir (500).

[e] Revised in 1996 (McPherson and Carlile 1997).

[f] Regional expansion factor developed in 1998.

Table 2.–Counts of spawning chinook salmon in index areas of the Taku River, 1951–1997.

Year[a]	Nakina River		Nahlin River		Kowatua River		Tatsamenie River		Dudidontu River		Tseta Creek		Total
1951	5,000	(F) [b]	1,000		–		–		400	(F)	100	(F)	6,500
1952	9,000	(F)	–		–		–		–		–		9,000
1953	7,500	(F)	–		–		–		–		–		7,500
1954	6,000	(F)	–	(F)	–		–		–		–		6,000
1955	3,000	(F)	–		–		–		–		–		3,000
1956	1,380	(F)	–		–		–		–		–		1,380
1957	1,500	(F/W)	–		–		–		–		–		1,500 [c]
1958	2,500	(F/W)	2,500	(A)	–		–		4,500	(A)	–		9,500 [c]
1959	4,000	(F/W)	–		–		–		–		–		4,000 [c]
1962	–		216	(A)	–		–		25	(A)	81	(A)	322
1965	3,050	(H)	35	(A)	200	P(A)	50	P(A)	110	(A)	18	(A)	3,463
1966	3,700	P(A)	300	(A)	14	P(A)	100	P(A)	252	(A)	150	(A)	4,516
1967	700	(A)	300	P(A)	250	P(A)	–		600	(A)	350	(A)	2,200
1968	300	P(A)	450	(A)	1,100	(A)	800	E(A)	590	(A)	230	(A)	3,470
1969	3,500	(A)	–		3,300	(A)	800	E(A)	–		–		7,600
1970	–		26	(A)	1,200	P(A)	530	E(A)	10	(A)	25	(A)	1,791
1971	500	(A)	473	(A)	1,400	E(A)	360	E(A)	165	(A)	–	(A)	2,898
1972	1,000	(F)	280	(A)	170	(A)	132	(A)	102	(A)	80	P(A)	1,764
1973	2,000	N(H)	300	E(H)	100	N(H)	200	E(H)	200	E(H)	4	(A)	2,804
1974	1,800	E(H)	900	E(H)	235	(A)	120	(A)	24	(A)	4	(A)	3,083
1975	1,800	E(H)	274	E(H)	–		–		15	N(H)	–		2,089
1976	3,000	E(H)	725	E(H)	341	P(A)	620	E(H)	40	(H)	–		4,726
1977	3,850	E(H)	650	E(H)	580	E(A)	573	E(H)	18	(H)	–		5,671
1978	1,620	E(H)	624	E(H)	490	N(H)	550	E(H)	–		21	E(H)	3,305
1979	2,110	E(H)	857	E(H)	430	N(H)	750	E(H)	9	E(H)	–		4,156
1980	4,500	E(H)	1,531	E(H)	450	N(H)	905	E(H)	158	E(H)	–		7,544
1981	5,110	E(H)	2,945	E(H)	560	N(H)	839	E(H)	74	N(H)	258	N(H)	9,786
1982	2,533	E(H)	1,246	E(H)	289	N(H)	387	N(H)	130	N(H)	228	N(H)	4,813
1983	968	E(H)	391	N(H)	171	E(H)	236	E(H)	117	E(H)	179	N(H)	2,062
1984	1,887	(H)	951	(H)	279	E(H)	616	E(H)	–		176	(H)	3,909
1985	2,647	N(H)	2,236	E(H)	699	E(H)	848	E(H)	475	(H)	303	E(H)	7,208
1986	3,868	(H)	1,612	E(H)	548	E(H)	886	E(H)	413	E(H)	193	E(H)	7,520 [d]
1987	2,906	E(H)	1,122	E(H)	570	E(H)	678	E(H)	287	E(H)	180	E(H)	5,743
1988	4,500	E(H)	1,535	E(H)	1,010	E(H)	1,272	E(H)	243	E(H)	66	E(H)	8,626
1989	5,141	E(H)	1,812	E(H)	601	(W)	1,228	E(H)	204	E(H)	494	E(H)	9,480
1990	7,917	E(H)	1,658	E(H)	614	(W)	1,068	N(H)	820	E(H)	172	N(H)	12,249
1991	5,610	E(H)	1,781	E(H)	570	N(H)	1,164	E(H)	804	E(H)	224	N(H)	10,153 [e]
1992	5,750	E(H)	1,821	E(H)	782	E(H)	1,624	N(H)	768	N(H)	313	N(H)	11,058 [e]
1993	6,490	E(H)	2,128	N(H)	1,584	E(H)	1,491	E(H)	1,020	E(H)	491	N(H)	13,204
1994	4,792	N(H)	2,418	E(H)	410	P(H)	1,106	N(H)	573	N(H)	614	E(H)	9,913
1995	3,943	E(H)	2,069	E(H)	550	N(H)	678	N(H)	731	E(H)	786	E(H)	8,757
1996	7,720	E(H)	5,415	E(H)	1,620	N(H)	2,011	N(H)	1,810	N(H)	1,201	N(H)	19,777
1997	6,095	E(H)	3,655	E(H)	1,360	N(H)	1,148	N(H)	943	N(H)	648	N(H)	13,849
87-96 Avg	5,477		2,176		831		1,232		726		454		10,896

[a] Counts before 1975 may not be comparable due to changes in survey dates and methods. Early foot surveys may have included jacks.

[b] (F) = foot survey, — = no survey conducted, (A) = fixed-wing aircraft, (H) = helicopter, P = survey conditions hampered by glacial or turbid waters, N = normal water flows and turbidity–average survey conditions, E = survey conditions excellent.

[c] Partial survey of Nakina River in 1957–59; comparisons made from carcass weir counts.

[d] Surveys in 1984 conducted by DFO; partial survey of Tseta Creek and Nahlin.

[e] Carcass weir at Kowatua River used to partially count escapement due to unfavorable water conditions.

Table 3.–Distribution of spawning chinook salmon among index areas of the Taku River during years when all index areas were surveyed.

	Nakina	Nahlin	Kowatua	Tatsamenie	Dudidontu	Tseta

Year	River	%	River	%	River	%	River	%	River	%	Creek	%	Total
1981	5,110	52	2,945	30	560	6	839	9	74	1	258	3	9,786
1982	2,533	53	1,246	26	289	6	387	8	130	3	228	5	4,813
1983	968	47	391	19	171	8	236	11	117	6	179	9	2,062
1985	2,647	37	2,236	31	699	10	848	12	475	7	303	4	7,208
1986	3,868	51	1,612	21	548	7	886	12	413	5	193	3	7,520
1987	2,906	51	1,122	20	570	10	678	12	287	5	180	3	5,743
1988	4,500	52	1,535	18	1,010	12	1,272	15	243	3	66	1	8,626
1989	5,141	54	1,812	19	601	6	1,228	13	204	2	494	5	9,480
1990	7,917	65	1,658	14	614	5	1,068	9	820	7	172	1	12,249
1991	5,610	55	1,781	18	570	6	1,164	11	804	8	224	2	10,153
1992	5,750	52	1,821	16	782	7	1,624	15	768	7	313	3	11,058
1993	6,490	49	2,128	16	1,584	12	1,491	11	1,020	8	497	4	13,210
1994	4,792	48	2,418	24	410	4	1,106	11	573	6	614	6	9,913
1995	3,943	45	2,069	24	550	6	678	8	731	8	786	9	8,757
1996	7,720	39	5,415	27	1,620	8	2,011	10	1,810	9	1,201	6	19,777
Avg.	4,660	52	2,013	20	705	8	1,034	11	565	5	380	4	9,357
1997	6,095	44	3,655	26	1,360	10	1,148	8	943	7	648	5	13,849

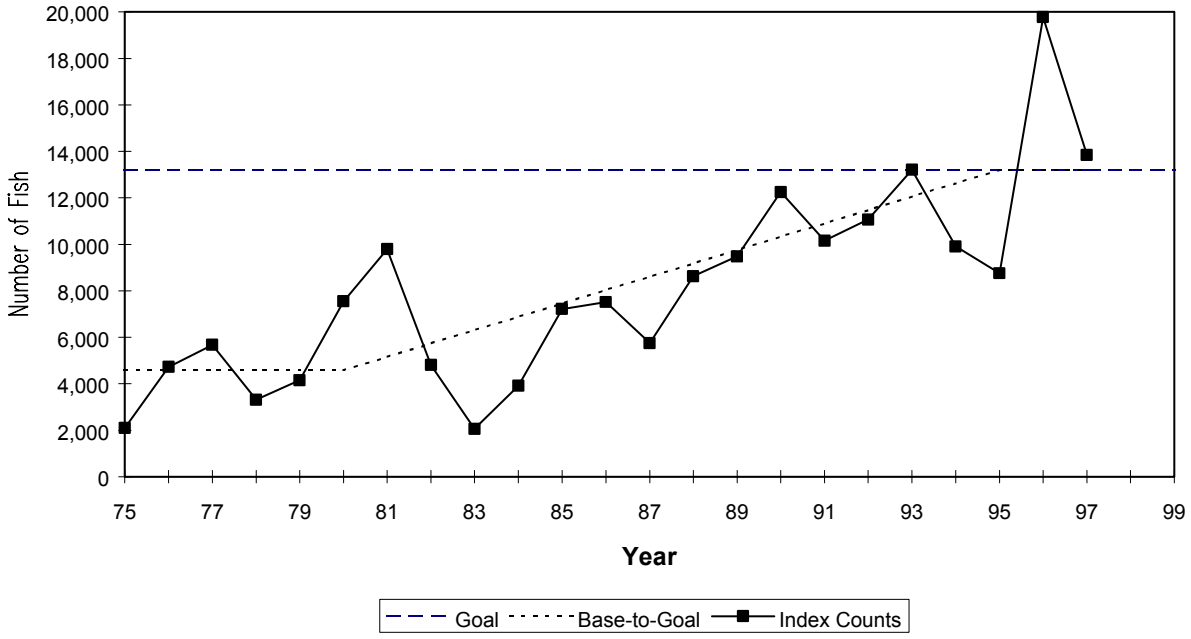

Figure 3.–Counts of chinook salmon in index areas of the Taku River, 1975–1997. Base-to-goal line indicates linear rebuilding schedule, starting in 1981 at average escapement level during the base period (1975–1980) and ending at revised escapement goal of 13,200 large chinook salmon in 1995 (final year of the three-cycle rebuilding program.)

Table 4.–Taku River index counts and mark-recapture estimates of escapement.

Year	Counts	M-R	SE	% Observed
1989	9,480	40,329	5,646	23.5%
1990	12,249	52,142	9,326	23.5%
1995	8,757	33,805	5,060	25.9%
1996	19,777	79,019	9,048	25.0%

Average				24.5%
1997	13,849	114,938	17,888	12.0%

counts from all six index tributaries (PSC 1991). The PSC goal uses no expansion factors but refers to chinook salmon actually counted during surveys. Expansion of the survey counts by 4.0 results in an escapement estimate of 55,396 large chinook salmon, about 48% of a mark-recapture estimate of 114,938 SE = 17,888 (McPherson et al. *In prep*)

STIKINE RIVER

At the Little Tahltan River weir 5,557 chinook salmon were counted in 1997. The weir count was 15% higher than the count of 4,840 in 1996 and below the 1987 - 1996 average of 5,829 (Table 5). An aerial survey of Beatty Creek counted 218 large chinook salmon, identical to the 1996 count (Table 5). Poor conditions in the glacially occluded mainstem Tahltan River resulted in a count of only 260 fish, considerably below the 1987–96 average of 1,995.

Two aerial surveys flown in 1997 obtained counts of 1,512 and 1,907 large chinook salmon above the Little Tahltan River weir. The peak survey count was 34.3% of the total escapement through the weir. From 1985 to 1997, the proportion of the total escapement of chinook salmon counted during peak aerial surveys has ranged from 34.3% to 56.6% and averaged 43.4% (Table 6). The proportion of the total escapement observed in a single survey often declined after the peak of spawning as fish died or were removed by predators.

The escapement goal for the Little Tahltan River weir is 5,300 fish (PSC 1991). The 1997 weir count was above that goal for the fourth year since 1992 (Figure 4). Expansion of the 1997 Little Tahltan weir count of 5,557 large chinook salmon by the survey expansion factor (4.0) produced a total Stikine River escapement estimate of 22,228 large chinook salmon. The preliminary estimate of total escapement to the Stikine River from a mark-recapture experiment conducted in 1997 is about 34,700 (SE = 5,747)(Pahlke and Etherton, *In prep.*).

Table 5.–Counts of spawning chinook salmon in index areas of the Stikine River, 1975–1997.

	Little Tahltan River			Mainstem			
Year[a]	Survey count		Weir count	Tahltan River		Beatty Creek	Total
1975	700 E(H)		–	2,908 E(H)		–	3,608
1976	400 N(H)		–	120 P(H)		–	520[d]
1977	800 P(H)		–	25 (A)		–	825
1978	632 E(H)		–	756 P(H)		–	1,388
1979	1,166 E(H)		–	2,118 N(H)		–	3,284
1980	2,137 N(H)		–	960 P(H)		122 E(H)	3,219
1981	3,334 E(H)		–	1,852 P(H)		558 E(H)	5,744
1982	2,830 N(H)		–	1,690 N(F)		567 E(H)	5,087
1983	594 E(H)		–	453 N(H)		83 E(H)	1,130
1984	1,294 (H)		–	–		126 (H)	1,420[e]
1985	1,598 E(H)		3,114	1,490 N(H)		147 N(H)	4,751[d]
1986	1,201 E(H)		2,891	1,400 P(H)		183 N(H)	4,474
1987	2,706 E(H)		4,783	1,390 P(H)		312 E(H)	6,485
1988	3,796 E(H)		7,292	4,384 N(H)		593 E(H)	12,269
1989	2,527 E(H)		4,715	–		362 E(H)	5,077
1990	1,755 E(H)		4,392	2,134 N(H)		271 E(H)	6,797
1991	1,768 E(H)		4,506	2,445 N(H)		193 N(H)	7,144
1992	3,607 E(H)		6,627	1,891 N(H)		362 N(H)	8,880
1993	4,010 P(H)		11,449	2,249 P(H)		757 E(H)	14,455
1994	2,422 N(H)		6, 450[e]	–		184 N(H)	6,610
1995	1,117 N(H)		3,259	696 E(H)		152 N(H)	4,107
1996	1,920 N(H)		4,840	772 N(H)		218 N(H)	5,830
87-96 Avg	2,563		5,829	1,995		340	8,369
1997	1,907 N(H)		5,557	260 P(H)		218 E(H)	6,035

[a] Counts prior to 1975 may not be comparable because of differences in survey dates and counting methods.

[b] (F) = foot survey; N = normal survey conditions; (A) = survey conducted by fixed-wing aircraft; (H) = helicopter survey; P = survey conditions hampered by glacial or turbid waters; E = excellent survey conditions; — = no survey conducted .

[c] Surveys done by DFO in 1984.

[d] Total = Little Tahltan weir count plus aerial or weir counts on other systems, 1985-present.

[e] Total count of 6,450 was reduced to 6,426 actual spawners by an egg take of 26 fish.

Table 6.–Comparison of peak aerial survey counts of chinook salmon to final counts at the Little Tahltan River weir, 1985–1997

Year	Weir count [a]	Count from aerial survey[b]	Percent counted in survey
1985	3,114	1,598	51.3%
1986	2,891	1,201	41.5%
1987	4,783	2,706	56.6%
1988	7,292	3,796	52.1%
1989	4,715	2,527	53.6%
1990	4,392	1,755	40.0%
1991	4,506	1,768	39.2%
1992	6,627	3,607	54.4%
1993	11,449	4,010	35.0%
1994	6,426	2,422	37.7%
1995	3,259	1,117	34.3%
1996	4,840	1,920	39.7%
1997	5,557	1,907	34.3%
Average	5,373	2,333	43.2%

[a] Weir count minus egg takes.

[b] Final count equals peak survey above weir plus count below weir on that date.

ANDREW CREEK

The 1997 survey count of chinook salmon in Andrew Creek was 293 fish, similar to 335 in 1996 (Table 7). This was the third year in a row that the Andrew Creek escapement did not exceed the index goal of 470 fish (Figure 5). Prior to 1995, Andrew Creek escapements had exceeded the goal 8 of 10 years.

From 1976 to 1984 a weir was operated on Andrew Creek to provide brood stock for hatcheries. Total spawners removed from the creek ranged from 12 in 1978 to 275 in 1982 (Pahlke 1995). Surveys were also conducted on the system four of those years and, on the basis of those paired counts, the survey expansion factor was revised in 1995 from 1.6 (1/.625) to 2.0 (see Table 1). The expanded total or weir escapement goal remains 750 fish. No survey expansion was necessary for the years

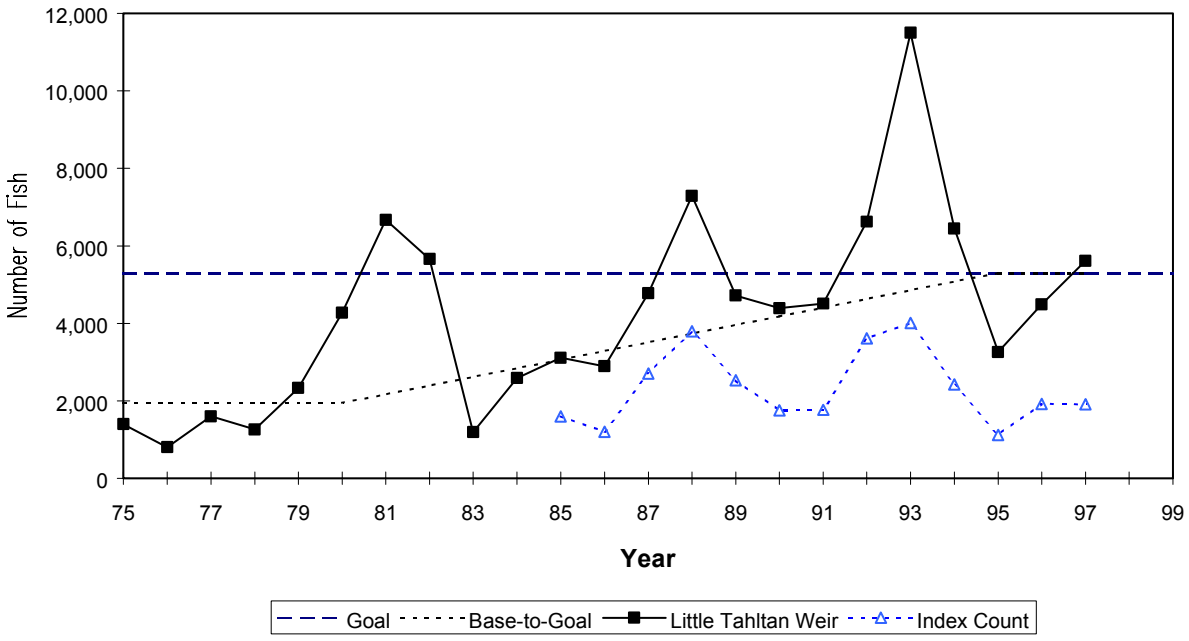

Figure 4.–Counts of chinook salmon at the Little Tahltan River weir, Stikine River, 1975–1997. 1985-1997 weir counts, 1975-1984 Little Tahltan escapement estimated by doubling index count. Base-to-goal line shows linear rebuilding schedule, starting in 1981 at average escapement level during base period (1975–1980) and ending at escapement goal of 5,300 large chinook salmon in 1995 (final year of the three-cycle rebuilding program). 1975-1984 estimates derived by doubling aerial survey counts.

Table 7.–Counts of spawning chinook salmon in selected rivers in central Southeast Alaska, 1956–1997.

Year	Andrew Cr.[a]		North Arm		Clear Creek		Harding River		Aaron Creek		Bradfield River N. Fork		Bradfield River E. Fork	
1956	4,500	(A)[b]	–		–		–		–		–		–	
1957	3,000	(F/A)	–		–		–		–		–		–	
1958	2,500	(F/A)	–		–		–		–		–		–	
1959	150	(F/A)	–		–		–		–		–		–	
1960	287	(F)	200	(F)N	–		–		–		–		–	
1961	103	(F)	138	(F)	–		–		–		–		–	
1962	300	(A)	80	(A)N	–		–		–		–		–	
1963	500	(A/H	187	(F)	–		–		–		–		–	
1964	400	(H)	–		–				–		–		–	
1965	100	(A)	–		–		25		–		–		–	
1966	75	(A)	–		–		–		–		–		–	
1967	30	(A)	–		–		–		–		–		–	
1968	15	–	–		–		–		–		–		–	
1969	12	(A)	–		–		–		–		–		–	
1970	0	–	–		–		–		–		–		–	
1971	305	(A)	–		–		–		–		–		–	
1972	0	–	–		–		–		–		–		–	
1973	40	(A)	–		–		10		–		–		–	
1974	129	(A)	–		–		35		–		–		–	
1975	260	(F)	–		–		–		–		–		–	P(A)
1976	404	(W/F	–		–		12	(A)N	24		–		13	
1977	456	(W/F	–		–		410	(A)E			–			
1978	388	(W/F	24	(F)E	–		12	(H)N	–		–		63	P(A)
1979	327	(W/F	16	(F)E	–		–		–		–		10	P(A)
1980	282	(W/F	68	(F)N	–		–		–		30	P(H)	–	
1981	536	(W/F	84	(F)E	4	(F)P	28	(H)P	12		84	P(H)	–	
1982	672	(W/F	138	(F)N	188	(F)N	8	(A)E	–				–	
1983	366	(W/F	15	(F)N	–		15	(A)P	–		55	N(H)	–	
1984	389	(W/F	31	(F)N	–		35	(B)N	–		–		–	
1985	320	E(F)	44	(F)E	–		243	(F)N	179		58	N(A)	85	N(A)
1986	708	N(F)	73	(F)N	45	(A)E	240	(B)N	178		104	E(A)	215	E(A)
1987	788	E(H)	71	(F)E	122	(F)N	40	(A)E	51		186	P(A)	175	P(A)
1988	564	N(F)	125	(F)N	167	(F)N	70	(A)P	325		680	N(A)	410	N(A)
1989	530	E(F)	150	(A)N	49	(H)N	80	(A)P	135		193	P(A)	132	P(A)
1990	664	E(F)	83	(F)N	33	(H)P	24	(A)P	–		–		–	
1991	400	N(A)	38	(A)N	46	(A)N	42	(F)N	–		81	P(A)	320	P(A)
1992	778	E(H)	40	(F)E	31	(A)N	48	(A)P	30	P(A)	–		–	
1993	1,060	E(F)	53	(F)E	–		40	(A)N	–		33	P(A)	118	P(A)
1994	572	E(H)	58	(F)E	10	(A)N	87	(H)N	27	P(H)	15	P(H)	–	
1995	343	P(A)	28	(A)P	1	(A)E	38	(H)N	65	N(H)	16	P(A)	43	P(A)
1996	335	N(F)	35	F(N)	21	A(N)	75	(A)N	15	N(H)	78	N(A)	48	P(A)
1997	293	N(F)	–		–		–		55	N(H)	-		30	A(P)

[a] Andrew Creek total return equals sum of weir count, counts below weir, and on North Fork, minus egg take, 1976–1984.

[b] (A) = survey conducted by fixed -wing aircraft; — = no survey conducted or data not comparable; (F/A) = combined foot and aerial count; (F) = survey conducted by walking; (H) = survey conducted by helicopter; (W/F) = weir and foot count; N = normal survey conditions; E = excellent survey conditions; P = poor survey conditions; (B) = escapement surveyed from boat.

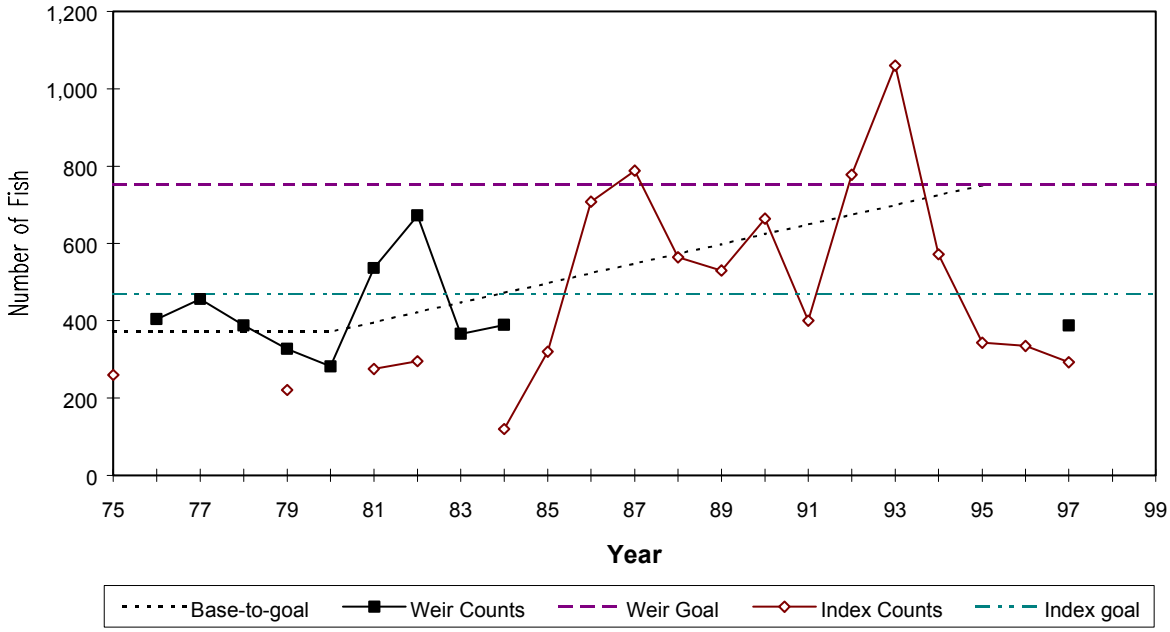

Figure 5.–Counts of chinook salmon at the Andrew Creek weir (1976–1984) and in aerial/foot surveys, 1975, 1985–1997. Base-to-goal line shows linear rebuilding schedule, starting in 1981 at average escapement level during base period (1975–1980) and ending at escapement goal of 750 large chinook salmon in 1995 (final year of the three-cycle rebuilding program).

when the weir provided total escapement counts (Appendix A2). The new weir installed in 1997 passed 284 large fish which, combined with foot surveys of 103 below the weir, resulted in an escapement estimate of only 387 chinook salmon.

ALSEK RIVER

The count of large chinook salmon through the Klukshu River weir in 1997 was 2,989 fish, 83% of the escapement of 3,599 in 1996 (Table 8). The escapement to the Klukshu, estimated by subtracting the Aboriginal Fishery (AF) harvest above the weir (160) from the weir count, was 2,829 fish, exceeding the newly recommended escapement goal range of 1,100 to 2,300. All of the sport harvest (175 fish) was below the weir.

The 1997 aerial counts were conducted under poor survey conditions and only 718 fish were counted in the Klukshu. In the Takhanne River 190 large chinook salmon were counted and 109 in the Blanchard River while no survey was conducted on Goat Creek, because of poor conditions.

The estimated escapement for the entire Alsek River drainage, calculated by multiplying the count from the Klukshu River weir (minus the aboriginal fishery harvest above the weir) by 1.5625 (expansion factor) and then subtracting recreational harvest (175) and AF harvest (72) below the weir, was 4,173 large chinook salmon. There is no agreement in the PSC on use of new expansion factors; therefore the total escapement was estimated using the above methods.

Average escapements of chinook salmon to the Alsek River during the first two cycles of the re-building program (1981–1985 and 1986–1990) actually declined, relative to the 1975–1980 base period (Figure 6). In 1991, the TBTC revised the Alsek River chinook escapement goal to 4,700 fish through the Klukshu River weir (PSC 1991). In 1997, a revised stock-recruitment analysis by

Table 8.–Escapement of chinook salmon to the Klukshu River and counts of spawning adults in other tributaries of the Alsek River, 1962–1997.

	Klukshu River												
	Aerial		Weir	Above-weir harvest			Escape-	Blanchard		Takhanne		Goat		
Year[a]	count		count	AF	Sport	Brood	ment[b]	River		River		Creek		Total[c]
1962	86	A	–	–	–		86	–		–		–		86
1963	–		–	–	–		–	–		–		–		0
1964	20	A	–	–	–		20	–		–		–		20
1965	100		–	–	–		100	100		250		–		450
1966	1,000		–	–	–		1,000	100		200		–		1,300
1967	1,500		–	–	–		1,500	200		275		–		1,975
1968	1,700		–	–	–		1,700	425		225		–		2,350
1969	700		–	–	–		700	250		250		–		1,200
1970	500		–	–	–		500	100		100		–		700
1971	300	A	–	–	–		300	–		–		–		300
1972	1,100		–	–	–		1,100	12	(A)	250		–		1,362
1973	–		–	–	–		–	–		49	(A)	–		49
1974	62		–	–	–		62	52	(A)	132		–		246
1975	58		–	–	–		58	81	(A)	177	(A)	–		316
1976	–		1,278	150	64		1,064	–		–		–		1,064
1977	–		3,144	350	96		2,698	–		–		–		2,698
1978	–		2,976	350	96		2,530	–		–		–		2,530
1979	–		4,404	1,300	0		3,104	–		–		–		3,104
1980	–		2,673	150	0		2,487	–		–		–		2,487
1981	–		2,113	150	0		1,963	35	(H)	11	(H)	–		2,009
1982	633	N(H)	2,369	400	0		1,969	59	(H)	241	(H)	13	(H)	2,282
1983	917	N(H)	2,537	300	0		2,237	108	(H)	185	(H)	–		2,530
1984	–		1,672	100	0		1,572	304	(H)	158	(H)	28	(H)	2,062
1985	–		1,458	175	0		1,283	232	(H)	184	(H)	–		1,699
1986	738	P(H)	2,709	102	0		2,607	556	(H)	358	(H)	142	(H)	3,663
1987	933	E(H)	2,616	125	0		2,491	624	(H)	395	(H)	85	(H)	3,595
1988	–		2,037	43	0		1,994	437	E(H)	169	E(H)	54	E(H)	2,654
1989	893	E(H)	2,456	234	0	20	2,202	–		158	E(H)	34	E(H)	2,394
1990	1,381	E(H)	1,915	202	0	15	1,698	–		325	E(H)	32	E(H)	2,055
1991	–		2,489	241	0	25	2,223	121	N(H)	86	E(H)	63	E(H)	2,493
1992	261	P(H)	1,367	88	0	36	1,243	86	P(H)	77	N(H)	16	N(H)	1,422
1993	1,058	N(H)	3,303	64	0	18	3,221	326	N(H)	351	E(H)	50	N(H)	3,948
1994	1,558	N(H)	3,727	99	0	8	3,620	349	N(H)	342	E(H)	67	N(H)	4,378
1995	1,053	E(H)	5,678	260	0	21	5,397	338	P(H)	260	P(H)	–		5,995
1996	788	N(H)	3,599	215	0	2	3,382	132	N(H)	230	N(H)	12	N(H	3,756
86–95 average	984		2,830	146	0	20	2,670	355		252		60		3,337
1997	718	P(H)	2,989	160	0	0	2,829	109	P(H)	190	P(H)	–		3,128

[a] Escapement counts prior to 1975 may not be comparable due to differences in survey dates and counting methods.

[b] Klukshu River escapement = weir count minus Aboriginal Fishery (AF) and broodstock.

[c] Total = Klukshu escapement plus aerial counts of other systems.

— = no survey; (A) = aerial survey from fixed wing aircraft; (H) = helicopter survey; E = excellent survey conditions; N = normal conditions; P = poor conditions.

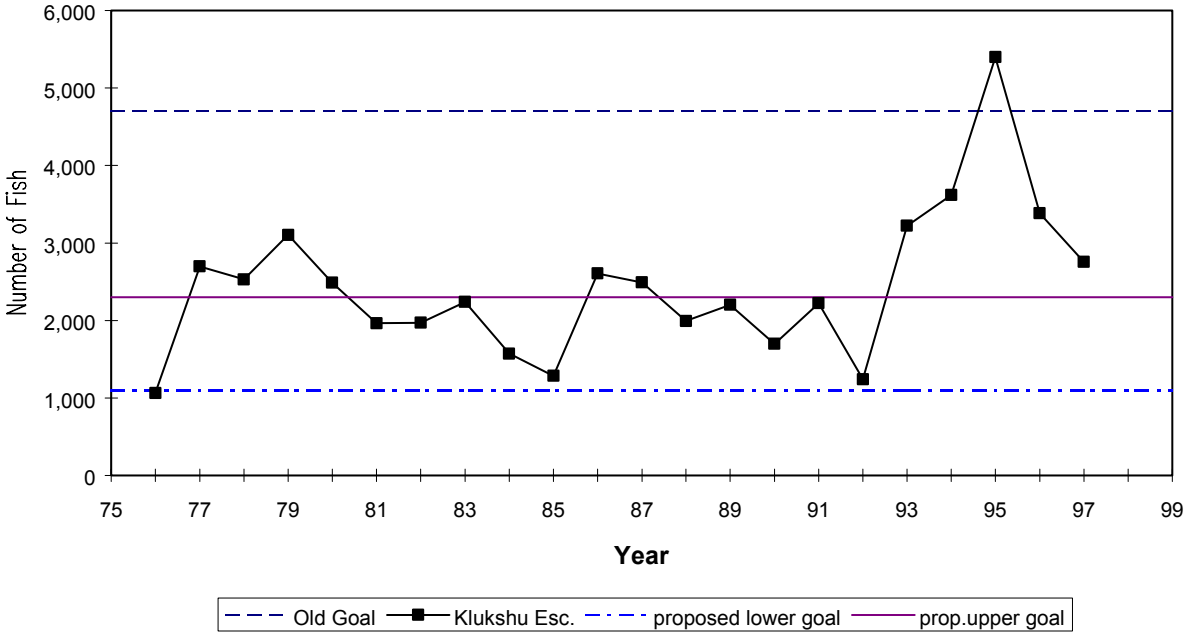

Figure 6.–Escapement of chinook salmon to the Klukshu River tributary of the Alsek River, 1975–1997. Showing old goal of 4,700 and upper and lower limits of proposed new escapement goal range (McPherson et al. *In prep*).

ADF&G and DFO staff recommended that the Klukshu stock should be managed for an escapement goal range of 1,100 to 2,300 spawners (McPherson et al. *In prep*); this report is currently under review.

UNUK RIVER

In 1997, 636 large chinook salmon were counted in all index areas of the Unuk River (Table 9), a count that was below average in 5 out of 6 index areas (Table 10). The total count was 27% below the survey goal, revised in 1996, of 875 fish, (range 650 to 1,400; McPherson and Carlile 1997). It was only the third time that counts fell below the lower end of the escapement goal range since the start of the rebuilding program (Figure 7).

Boundary Creek was not surveyed in 1997, a change in the river between 1991 and 1994, which had revealed more spawning than previously observed area in that tributary, has again changed, resulting in lower counts. Boundary Creek is not part of the Unuk River index area and was not included in summed counts for the watershed nor in the expanded count.

Based on results of mark-recapture and radio-tracking studies, the expansion factors were revised in 1996 from 1.6 to 4.0 times the summed tributary counts on the Unuk and Chickamin, and 2.5 for the Blossom and Keta rivers (Pahlke et al. 1996, Pahlke 1997b). The new expansion factor produced an estimated escapement of 2,544 large chinook salmon to the Unuk River in 1997, a decrease of 46% from 1996. A mark-recapture program estimated an escapement of 2,970 large chinook salmon (SE = 277) in 1997 (Jones et al. 1998). The average escapement over the base period of 1976–1980 is above the revised escapement goal for the Unuk River; therefore, a base-to-goal rebuilding line is not appropriate.

CHICKAMIN RIVER

In 1997, 272 large chinook salmon were counted in index areas on eight tributaries of the

Table 9.–Peak escapement counts of chinook salmon to index areas of the Unuk River, 1960–1997.

Year[a]	Cripple Creek		Genes Lake Creek		Eulachon Creek		Clear Creek		Lake Creek		Kerr Creek		Total
1960	–[b]		–		250	(A)	–		–		–		250
1961	3	(F)	200	(F)	270	(F)	65	(F)	–		53	(F)	591
1962	–		150	(A)	145	(A)	100	(A)	30	(A)	–		425
1963	100	(A)	750	(A)	150	(A)	25	(A)	–		–		1,025
1964	–		–		25	(A)	–		–		–		25
1965	–		–		–		–		–		–		0
1966	–		–		–		–		–		–		0
1967	–		–		60	(H)	–		–		–		60
1968	–		–		75	(H)	–		–		–		75
1969	–		–		150	(H)	–		–		–		150
1970	–		–		–		–		–		–		0
1971	–		–		30	(A)	–		–		–		30
1972	95	(A)	35	(A)	450	(A)	90	(A)	55	(A)	–		725
1973	–		–		64	(H)	–		–		–		64
1974	–		–		68	(H)	–		–		–		68
1975	–		–		17	(H)	–		–		–		17
1976	–[c]		–		3	(A)	–		–		–		3
1977	529[c]	(F)	339	(F)	57	(H)	34	(H)			15	(H)	974
1978	394[c]	(F)	374	(F)	218	(H)	85	(H)	20	(H)	15	(H)	1,106
1979	363	(F)	101	(F)	48	(H)	14	(H)	30	(H)	20	(H)	576
1980	748	(F)	122	(F)	95	(H)	28	(H)	5	(H)	18	(H)	1,016
1981	324	(F)	112	(F)	196	(H)	54	(H)	20	(H)	25	(H)	731
1982	538	(F)	329	(F)	384	(H)	24	(H)	48	(H)	28	(H)	1,351
1983	459	(F)	338	(F)	288	(H)	24	(H)	12	(H)	4	(H)	1,125
1984	644	(F)	647	(F)	350	(H)	113	(H)	32	(H)	51	(H)	1,837
1985	284	(F)	553	(F)	275	(H)	37	(H)	22	(H)	13	(H)	1,184
1986	532	(F)	838	(F)	486	(H)	183	(F)	25	(H)	62	(H)	2,126
1987	860	(F)	398	(F)	520	(H)	107	(H)	37	(H)	51	(H)	1,973
1988	1,068	(F)	154	(F)	146	(F)	292	(H)	60	(H)	26	(H)	1,746
1989	351	(F)	302	(F)	298	(H)	128	(H)	27	(F)	43	(H)	1,149
1990	86	(F)	284	(F)	81	(H)	103	(F)	26	(F)	11	(H)	591
1991	358	(W/F)	123	(F)	43	(H)	96	(F)	23	(F)	12	(H)	655[d]
1992	327	(W/F)	360	(F)	57	(F)	69	(F)	31	(H)	30	(H)	874[e]
1993	448	N(F)	330	N(F)	132	E(F)	137	N(F)	8	N(F)	13	P(H)	1,068[f]
1994	161	P(F)	300	N(F)	52	N(H)	128	E(F)	18	N(F)	52	N(F)	711[g,h]
1995	211	N(F)	347	N(F)	74	N(H)	66	E(H)	35	E(H)	39	N(H)	772
1996	417	N(F)	400	N(F)	79	N(F)	148	E(F)	25	E(H)	98	E(F)	1,167
87–96 Average	429		300	N(F)	148		127		29		38		1,071
1997	244	P(F)	154	N(F/H)	53	N(F)	113	N(F)	13	N(H)	59	E(F)	636 i

[a] Counts prior to 1975 may not be comparable due to differences in survey dates and counting methods.

[b] — = no survey conducted or data not comparable; (F) = escapement survey conducted by walking river; (A) = escapement survey conducted from fixed-wing aircraft; (H) = escapement survey conducted from helicopter; (W/F) = weir and foot count; N = survey conditions normal; E = excellent; P = poor.

[c] Not including 35 fish for egg take in 1976; 132 in 1977; 85 in 1978.

[d] Total does not include 108 from Boundary Cr., Cripple Cr. weir count reduced by /0.625 to be comparable with foot surveys.

[e] Total does not include 123 from Boundary Cr., Cripple Cr. weir count reduced by /0.625 to be comparable with foot surveys.

[f] 1993 total does not include 143 from Boundary Creek.

[g] 1994 total does not include 42 fish from Boundary Creek.

h Mark-recapture estimate of escapement 4,623 (SE 1,266; Pahlke et al. 1996). i Mark-recapture estimate of escapement 2,970 (SE 277; Jones et al, 1998).

Table 10.–Distribution of spawning chinook salmon among index areas of the Unuk River for years when all index areas were surveyed.

Year	Cripple Creek	%	Genes Lake Creek	%	Eulachon Creek	%	Clear Creek	%	Lake Creek	%	Kerr Creek	%	Total
1978	394	36	374	34	218	20	85	8	20	2	15	1	1,106
1979	363	63	101	18	48	8	14	2	30	5	20	3	576
1980	748	74	122	12	95	9	28	3	5	0	18	2	1,016
1981	324	44	112	15	196	27	54	7	20	3	25	3	731
1982	538	40	329	24	384	28	24	2	48	4	28	2	1,351
1983	459	41	338	30	288	26	24	2	12	1	4	0	1,125
1984	644	35	647	35	350	19	113	6	32	2	51	3	1,837
1985	284	24	553	47	275	23	37	3	22	2	13	1	1,184
1986	532	25	838	39	486	23	183	9	25	1	62	3	2,126
1987	860	44	398	20	520	26	107	5	37	2	51	3	1,973
1988	1,068	61	154	9	146	8	292	17	60	3	26	1	1,746
1989	351	31	302	26	298	26	128	11	27	2	43	4	1,149
1990	86	15	284	48	81	14	103	17	26	4	11	2	591
1991	358	55	123	19	43	7	96	15	23	4	12	2	655
1992	327	37	360	41	57	7	69	8	31	4	30	3	874
1993	448	42	330	31	132	12	137	13	8	0	13	1	1,068
1994	161	23	300	42	52	7	128	18	18	3	52	7	711
1995	211	27	347	45	74	10	66	9	35	5	39	5	772
1996	417	36	400	34	79	7	148	13	25	2	98	8	1,167
Avg.	451	39	337	29	201	18	97	8	27	2	32	3	1,144
1997	244	38	154	24	53	8	113	18	13	2	59	9	636

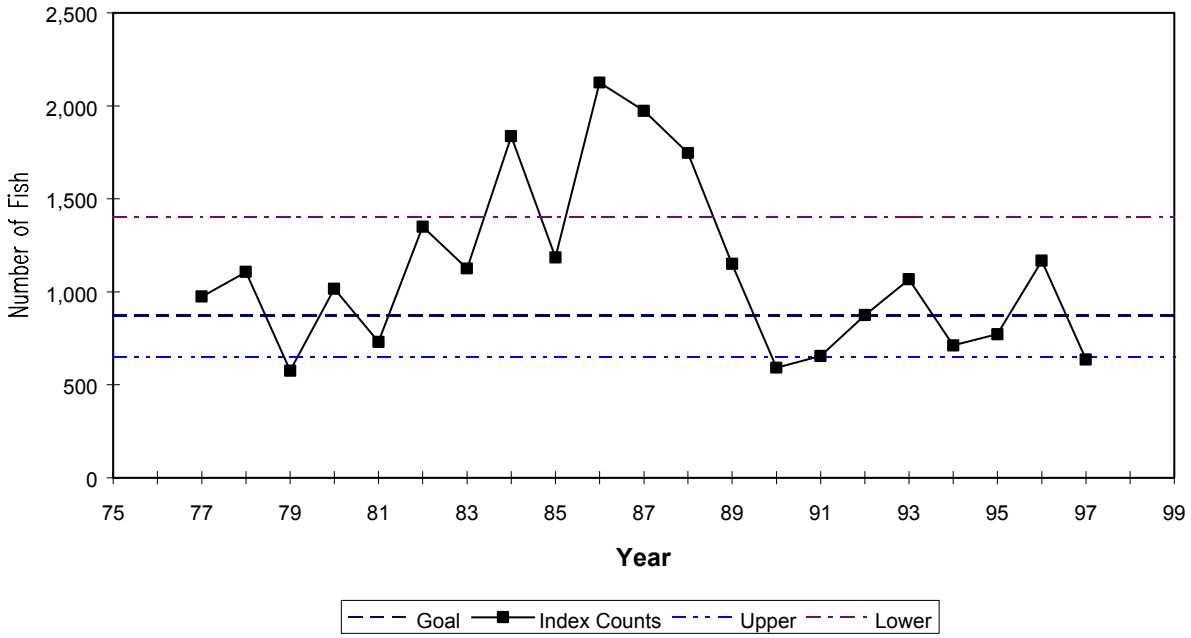

Figure 7.–Counts of large chinook salmon in index areas of the Unuk River, 1975–1997. No rebuilding line is shown because the base period (1975-1980) average escapement was above the escapement goal (revised 1996). Middle line is goal, dot-dashed lines are upper and lower ranges for goal.

the Chickamin River, compared to 422 in 1996 (Table 11). Counts in 1997 were below average in all but one Chickamin River tributary (Table 12). The 1997 count was 48% below the revised survey escapement goal of 525, (range 450 to 900 fish; McPherson and Carlile 1997).

The summed counts for 1997 were multiplied by a survey expansion factor of 4.0 to produce a total escapement estimate of 1,088 fish to the system. The 1997 escapement was the lowest observed since 1979 and below both the escapement goal range and the rebuilding schedule. Total escapements had been above the linear rebuilding schedule from 1980 to 1991 and below the schedule since 1992 (Figure 8).

BLOSSOM RIVER

One hundred thirty-two (132) large chinook salmon were counted in index areas of the Blossom River in 1997, down from 220 fish counted in 1996 (Table 13). The 1997 count was approximately 44% of the revised survey goal of 300 (range 250 to 500; McPherson and Carlile 1997). Counts had exceeded the goal from 1982–1989, but since 1991, they have generally fallen below the linear rebuilding schedule (Figure 9). The summed counts for 1997 were multiplied by a survey expansion factor of 2.5 to produce a total escapement estimate of 330 fish.

KETA RIVER

In 1997, 246 chinook salmon were counted in the Keta River, down from 297 counted in 1996 (Table 13) and 28% below the 1996 revised goal of 300 (range 250 to 500) large fish (McPherson and Carlile 1997). Prior to 1990, counts of chinook salmon in the Keta River increased steadily since implementation of the 1980 rebuilding program, and had exceeded the rebuilding schedule every year since 1981 (Figure 10). The summed counts for 1997 were multiplied by a survey expansion factor of 2.5 to produce a total escapement estimate of 615 fish.

KING SALMON RIVER

Two helicopter surveys and a foot survey were conducted on King Salmon River in 1997. The peak count during the helicopter surveys was 158 large chinook salmon and 238 were counted during the foot survey. This was the highest count since 1982 and exceeded the revised goal of 100 fish for the fifth year in a row (Table 14; Figure 11). The escapement goal was revised in 1997 to a range of 120 to 240 total large fish, point estimate 150 (McPherson and Clark, *In prep*). The resulting index goal is 100 fish observed, with a range of 80-160.

The peak count of 238 was multiplied by the revised survey expansion factor of 1.5 to produce a total escapement estimate of 357 large fish to the system

SITUK RIVER

The count of large chinook salmon through the Situk River weir in 1997 was 2,690 fish. Subtracting the preliminary estimate of sport harvest above the weir of 500 large fish results in an escapement estimate of 2,190 fish, an increase of 18% from the 1996 escapement of 1,913 fish, and above the escapement goal of 600 large spawners (Table 15). On the basis of spawner-recruit analysis, ADF&G in 1991 revised the management escapement goal from 2,000 chinook salmon in the Situk River to 600 large fish, with a range of 500–1,000 (ADF&G 1991). This revised goal has been adopted by the PSC and the Alaska Board of Fisheries as part of a management plan for the Situk River. Escapements have exceeded the revised escapement goal each year since 1984 (Figure 12). The proportion of the recreational harvest that is caught above the weir varies from year to year and is estimated by the local management biologists and from the statewide harvest survey (Howe et al. 1998). The escapement counts from the base period all exceeded the revised escapement goal, indicating the Situk chinook salmon stock was not depressed and never needed rebuilding.

CHILKAT RIVER

The 1997 escapement to the Chilkat River was estimated by mark-recapture experiment to be 7,728 large chinook salmon, the largest estimate since the start of the mark-recapture program in

Table 11.–Counts of chinook salmon in index areas of the Chickamin River, 1960–1997.

Year[a]	South Fork Creek	Barrier Creek	Butler Creek	Leduc Creek	Indian Creek	Humpy Creek	King Creek	Clear Falls Creek	Total[c]
1960	–[b]	–	–	–	–	3 (A)	–	–	3
1961	–	36 (A)	77 (A)	42 (A)	5 (A)	120 (A)	48 (A)	–	328
1962	400 (A)	35 (A)	–	–	–	150 (A)	–	–	585
1963	350 (A)	115 (A)	–	–	–	3 (A)	200 (A)	–	668
1964	–	–	–	–	–	–	–	–	–
1965	–	–	–	–	–	–	75 (A)	–	75
1966	–	–	–	–	–	50 (F)	–	–	50
1967	–	–	–	–	–	-	45 (H)	–	45
1968	–	–	–	–	–	30 (H)	20 (H)	–	50
1969	–	–	–	–	–	10 (H)	45 (H)	–	55
1970	–	–	–	–	–	–	–	–	–
1971	–	–	–	–	–	–	–	–	–
1972	350 (A)	25 (A)	–	85 (A)	–	65 (A)	510 (A)	–	1,035
1973	–	–	–	–	–	14 (A)	65 (A)	–	79
1974	144 (H)	–	–	–	–	–	11 (H)	–	155
1975	141 (H)	9 (H)	66 (H)	6 (H)	90 (H)	7 (H)	30 (H)	–	370
1976	46 (H)	10 (H)	15 (H)	12 (H)	9 (H)	–	–	–	157
1977	52 (H)	66 (H)	30 (H)	26 (H)	53 (H)	0 (H)	–	–	363
1978	21 (H)	94 (H)	4 (H)	42 (H)	20 (H)	–	–	–	308
1979	63 (H)	17 (H)	29 (H)	0 (H)	31 (H)	–	–	–	239
1980	56 (H)	62 (H)	104 (H)	17 (H)	22 (H)	–	–	–	445
1981	51 (H)	105 (H)	51 (H)	25 (H)	12 (H)	4 (F)	105 (F)	31 (H)	384
1982	84 (H)	149 (H)	37 (H)	36 (H)	30 (F)	37 (F)	165 (F)	33 (H)	571
1983	28 (H)	138 (H)	91 (H)	30 (H)	47 (H)	–	212 (F)	30 (H)	599
1984	185 (H)	171 (H)	124 (H)	15 (H)	103 (H)	88 (F)	388 (F)	28 (H)	1,102
1985	163 (H)	129 (H)	92 (H)	8 (H)	125 (H)	50 (H)	377 (H)	12 (H)	956
1986	562 (H)	168 (H)	203 (H)	20 (H)	120 (H)	–	564 (H)	40 (H)	1,745
1987	261 (H)	76 (H)	120 (H)	19 (H)	115 (H)	26 (H)	310 (H)	48 (H)	975
1988	280 (H/F)	82 (H/F)	159 (H)	25 (H/F)	32 (H)	19 (H/F)	164 (H)	25 (H/F)	786
1989	226 (H/F)	90 (H)	137 (H)	57 (H)	84 (H)	22 (H/F)	224 (H)	94 (H)	934
1990	135 (F)	107 (H)	27 (H)	20 (H)	24 (H)	35 (H)	163 (H)	53 (H)	564
1991	125 (H)	18 (H)	49 (H)	14 (H)	38 (H)	13 (H)	185 (H)	45 (H)	487
1992	87 (H)	4 (H)	68 (H)	4 (H)	20 (H)	8 (H)	131 (H)	24 (H)	346
1993	67 N(H)	46 E(H)	68 N(H)	11 N(H)	29 N(H)	13 N(H)	80 N(H)	75 N(H)	389
1994	31 N(H)	29 E(H)	64 E(H)	18 E(H)	16 N(H)	44 N(H)	129 E(H)	57 E(H)	388
1995	87 E(H)	12 E(F)	59 E(F)	60 E(H)	36 N(F)	13 N(F)	62 N(H)	27 E(H)	356 d
1996	72 N(H)	13 N(F)	74 E(H)	23 E(H)	48 N(F)	30 N(F)	106 E(F)	56 E(H)	422 d
1987-1996 Avg.	137	48	83	25	44	22	155	50	564
1997	28 P(H)	10 N(H)	43 N(H)	7 N(H)	24 N(H)	15 N(H)	95 N(H)	50 N(H)	272

[a] Escapement counts conducted prior to 1975 may not be comparable due to differences in survey dates and counting methods.

[b] — = no survey conducted or data not comparable; (A) = escapement surveyed by fixed-wing aircraft; (F) = escapement surveyed by walking stream; (H) = escapement surveyed by helicopter; (H/F) = escapement surveyed by combination of walking and helicopter; N = survey conditions normal; E = excellent.

[c] Totals for 1975–1980, 1983 and 1986 expanded for unsurveyed index areas by 1981–1992 average % observed to those indices.

d Mark-recapture estimates of escapement 1995: 2,309 large fish (SE 723); 1996 1,587 (SE 199).

Table 12.–Distribution of spawning chinook salmon among index areas of the Chickamin River for years when all index areas were surveyed.

Year	South Fork Creek	%	Barrier Creek	%	Butler Creek	%	Leduc Creek	%	Indian Creek	%	Humpy Creek	%	King Creek	%	Clear Falls Creek	%	Total
1981	51	13	105	27	51	13	25	7	12	3	4	1	105	27	31	8	384
1982	84	15	149	26	37	6	36	6	30	5	37	6	165	29	33	6	571
1984	185	17	171	16	124	11	15	1	103	9	88	8	388	35	28	3	1,102
1985	136	14	156	16	93	10	8	0	125	13	50	5	377	39	12	1	957
1987	261	27	76	8	120	12	19	2	115	12	26	3	310	32	48	5	975
1988	280	36	82	10	159	20	25	3	32	4	19	2	164	21	25	3	786
1989	226	24	90	10	137	15	57	6	84	9	22	2	224	24	94	10	934
1990	135	24	107	19	27	5	20	4	24	4	35	6	163	29	53	9	564
1991	125	26	18	4	49	10	14	3	38	8	13	3	185	38	45	9	487
1992	87	25	4	1	68	20	4	1	20	6	8	2	131	38	24	7	346
1993	67	17	46	12	68	17	11	3	29	7	13	3	80	21	75	19	389
1994	31	8	29	7	64	16	18	5	16	4	44	11	129	33	57	15	388
1995	87	24	12	3	59	17	60	17	36	10	13	4	62	17	27	8	356
1996	72	17	13	3	74	18	23	5	48	11	30	7	106	25	56	13	422
Avg.	151	22	85	12	89	13	24	4	55	8	29	4	210	31	42	6	686
1997	28	10	10	4	43	16	7	3	24	9	15	6	95	35	50	18	272

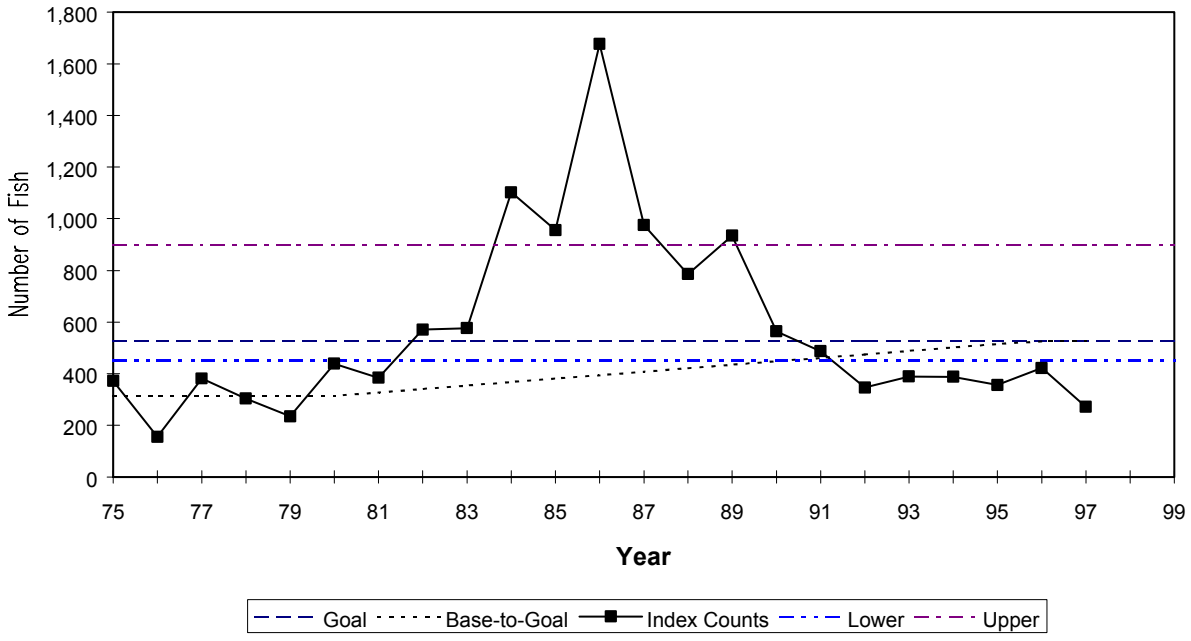

Figure 8.–Counts of chinook salmon in index areas of the Chickamin River, 1975–1997. Base-to-goal line indicates linear rebuilding schedule, starting in 1981 at average escapement level during the base period (1975–1980) and ending at index escapement goal of 525 large chinook salmon in 1995 (final year of the three-cycle rebuilding program).

Table 13.–Counts of chinook salmon for selected rivers in Behm Canal, 1948–1997.

Year[a]	Keta River		Blossom River		Wilson River		Marten River		Grant River		Klahini River		Total
1948	500	(F)[b]	–		–		–		–		–		500
1949	–		–		–		–		–		–		–
1950	210	(F)	–		–		–		–		–		210
1951	120	(F)	–		–		–		–		–		120
1952	462	(F)	–		–		–		–		–		462
1953	156	(F)	–		–		–		–		–		156
1954	300	(A)	–		–		–		–		–		300
1955	1,000	(A)	–		–		–		–		–		1,000
1956	1,500	(A)	–		–		–		–		–		1,500
1957	500	(A)	–		–		–		–		–		500
1958	–		–		–		–		–		–		–
1959	–		–		–		–		–		–		–
1960	–		–		–		–		–		–		–
1961	44	(F)	68	(F)	–		22	(F)	40	(A)	-		174
1962	–		–		–		–		6	(A)	100	(A)	106
1963	–		450	(A)	375	(A)	–		15	(A)	–		840
1964	–		–		–		–		–		–		–
1965	–		–		50	(A)	43	(H)	–		–		93
1966	75	(A)	200	(A)	60	(A)	10	(A)	100	(A)	3	(A)	448
1967	86	(H)	–		8	(H)	7	(H)	15	(H)	–		116
1968	–		–		–		–		4	(H)	–		4
1969	200	(A)	–		10	(A)	10	(A)	69	(H)	3	(H)	292
1970	–		100	(H)	–		–		–		–		100
1971	–				–		–		–		–		–
1972	255	(A)	225	(A)	275	(A)	–		25	(A)	150	(A)	930
1973	–		–		30	(A)	–		38	(A)	7	(H)	75
1974	25	(H)	166	(H)	–		–		–		–		191
1975	203	(H)	146	(H)	7	(H)	15	(H)	–		–		371
1976	84	(H)	68	(H)	–		–		–		–		152
1977	230	(H)	112	(H)	–		–		–		–		342
1978	392	(H)	143	(H)	–		2	(A)	–		–		537
1979	426	(H)	54	(H)	36	(H)	–		–		–		516
1980	192	(H)	89	(H)	–		–		–		–		281
1981	329	(H)	159	(H)	76	(F)	–		25	(H)	42	(F)	631
1982	754	(H)	345	(H)	300	(B)	75	(F)	33	(F)	79	(F)	1,586
1983	822	(H)	589	(H)	178	(B)	138	(B)	8	(A)	10	(H)	1,745
1984	610	(H)	508	(H)	133	(F)	12	(B)	124	(F)	54	(F)	1,441
1985	624	(H)	709	(H)	420	(H)	69	(F)	55	(F)	20	(F)	1,897
1986	690	(H)	1,278	(H)	–		–		–		–		1,968
1987	768	(H)	1,349	(H)	–		270	(H)	33	(A)			2,420
1988	575	(H)	384	(H)	–		543	(H)	–		40	(H)	1,542
1989	1,155	(H)	344	(H)	–		133	(H)	–		–		1,632
1990	606	(H)	257	(H)	–		283	(H)	–		–		1,146
1991	272	(H)	239	(H)	–		135	(H)	–		–		646
1992	217	(H)	150	(H)	109	(H)	76	(H)	25	(H)	19	(H)	596
1993	362	E(H)	303	N(H)	63	P(H)	229	E(H)	–		–		957
1994	306	E(H)	161	N(H)	–		178	E(H)	–		–		645
1995	175	E(H)	217	N(H)	58	N(H)	171	E(H)	–		–		621
1996	297	N(H)	220	E(H)	23	P(H)	62	N(H)	–		–		602
1987-96 Avg.	473		362		63		208		29		30		1,081
1997	246	N(H)	132	N(H)	16	N(H)	56	N(H)	9	N(H)	–		459

[a] Escapement counts prior to 1975 may not be comparable due to differences in survey dates or methods.

[b] (F) = escapement surveyed by walking stream; — = no survey conducted or data not comparable; (A) = escapement surveyed from fixed-wing aircraft; (H) = escapement surveyed from helicopter; (B) = escapement surveyed from boat; N = survey conditions normal; E = excellent.

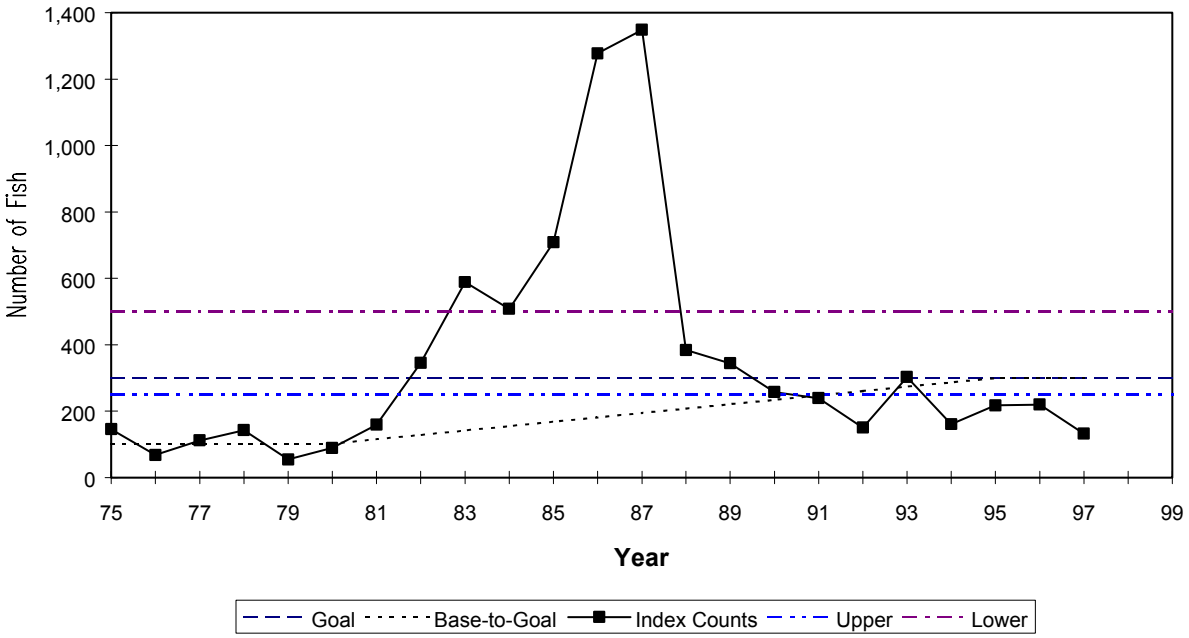

Figure 9.–Counts of chinook salmon into the Blossom River, 1975–1997. Base-to-goal line shows linear rebuilding schedule, starting in 1981 at average escapement level during base period (1975–1980) and ending at escapement goal of 300 large chinook salmon in 1995 (final year of the three-cycle rebuilding program.

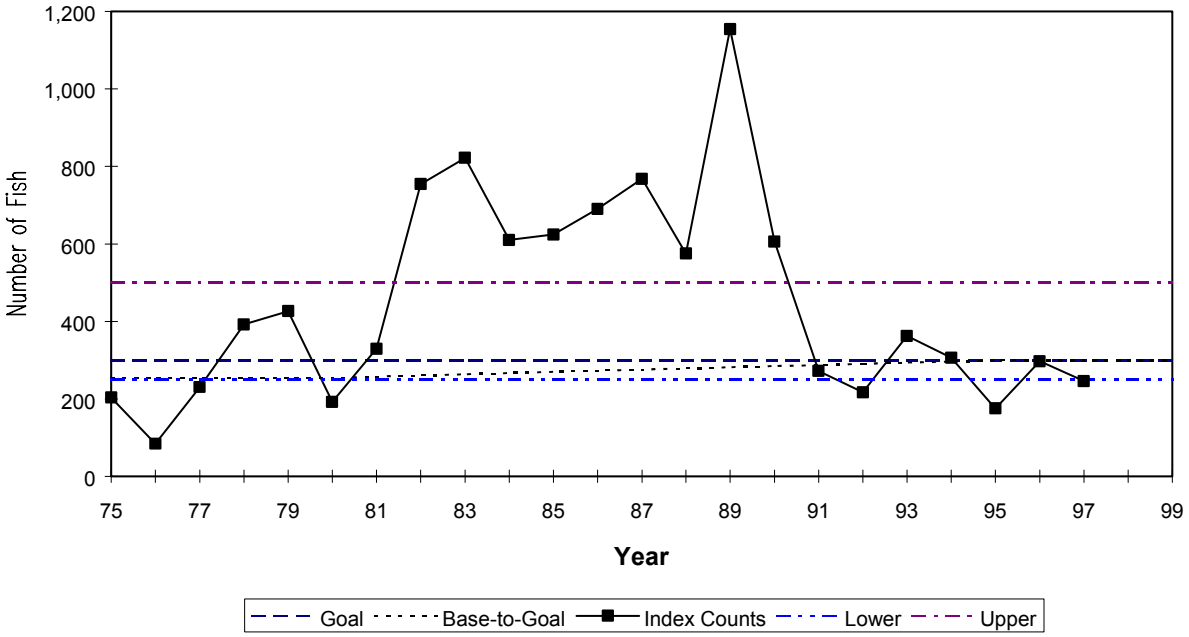

Figure 10.–Counts of chinook salmon to the Keta River, 1975–1997. Base-to-goal line shows linear rebuilding schedule, starting in 1981 at average escapement level during base period (1975–1980) and ending at escapement goal of 300 large chinook salmon in 1995 (final year of the three-cycle rebuilding program).

Table 14.–Peak escapement counts and weir counts of spawning chinook salmon in the King Salmon River, 1957–1997.

	Survey count		Survey as percent	Total	Total weir	Total weir	Adults below	Total	Total
	Below Weir	Above weir	of weir count	egg take (adults)	count (adults)	count (jacks)[b]	weir (foot ct)	inriver (adults)	Natural Spawning
Year	A	B	B/(D-C)	C	D	E	F	D+F	D+F-C
1957	–[a]	200 (F)	–	–	–	–	–	–	200
1960	–	20 (F)	–	–	–	–	–	–	20
1961	–	117 (F)	–	–	–	–	–	–	117
1971	–	94 (F)	–	–	–	–	–	–	94
1972	–	90 (F)	–	–	–	–	–	–	90
1973	–	211 (F)	–	–	–	–	–	–	211
1974	–	104 (F)	–	–	–	–	–	–	104
1975	–	42 (H)	–	–	–	–	–	–	42
1976	–	65 (H)	–	–	–	–	–	–	65
1977	–	134 (H)	–	–	–	–	–	–	134
1978	–	57 (H)	–	–	–	–	–	–	57
1979	–	88 (H)	–	17	–	–	–	–	71
1980	–	70 (H)	–	–	–	–	–	–	70
1981	–	101 (H)	–	11	–	–	–	101	90
1982	–	259 (H)	–	30	–	–	–	259	229
1983	25	183 (H)	85%	37	252	20	30	282	245[c]
1984	14	184 (H)	71%	46	299	82	12	311	265[c]
1985	12	105 (H)	64%	29	194	45	10	204	175[c]
1986	9	190 (H)	80%	26	264	72	17	281	255[c]
1987	19	128 (H)	73%	31	207	62	20	227	196[c]
1988	5	94 (H)	50%[d]	35	231	54	12	243	208[c]
1989	34	133 (H)	63%	38[e]	249	71	29	278	240[c]
1990	34	98 (H)	57%	29	190	32	8	198	179[c]
1991	6	91 (H)	72%	20	146	89	8	154	134[c]
1992	–	58 (H)	59%[f]	18	47	16	70	117	99[c]
1993	–	175 E(H)	----------no weir or egg take----------						175
1994	–	140 N(F)	----------no weir or egg take----------						140
1995	–	97 P(H)	----------no weir or egg take----------						97
1996	–	192 E(F)	----------no weir or egg take----------						192
1983–92 Avg.	17	126	67%	31	209	56	22	231	188
1997		238 N(F)	----------no weir or egg take----------						238

[a] — = no survey conducted or data not comparable; (F) = escapement surveyed by walking stream; (H) = escapement surveyed from helicopter; N = survey conditions normal; E = excellent; P = poor.
[b] Minimum count as jacks could pass through weir.
[c] Natural spawning (adults) = (total inriver - egg take; 1983-1992).
[d] Four females and two males were held but not spawned for egg take; % = 94/(231-37-6) = 50%.
[e] Includes holding mortality of 4 males and 6 females for egg take.
[f] Peak survey was after weir was removed 58/99 = 59%.

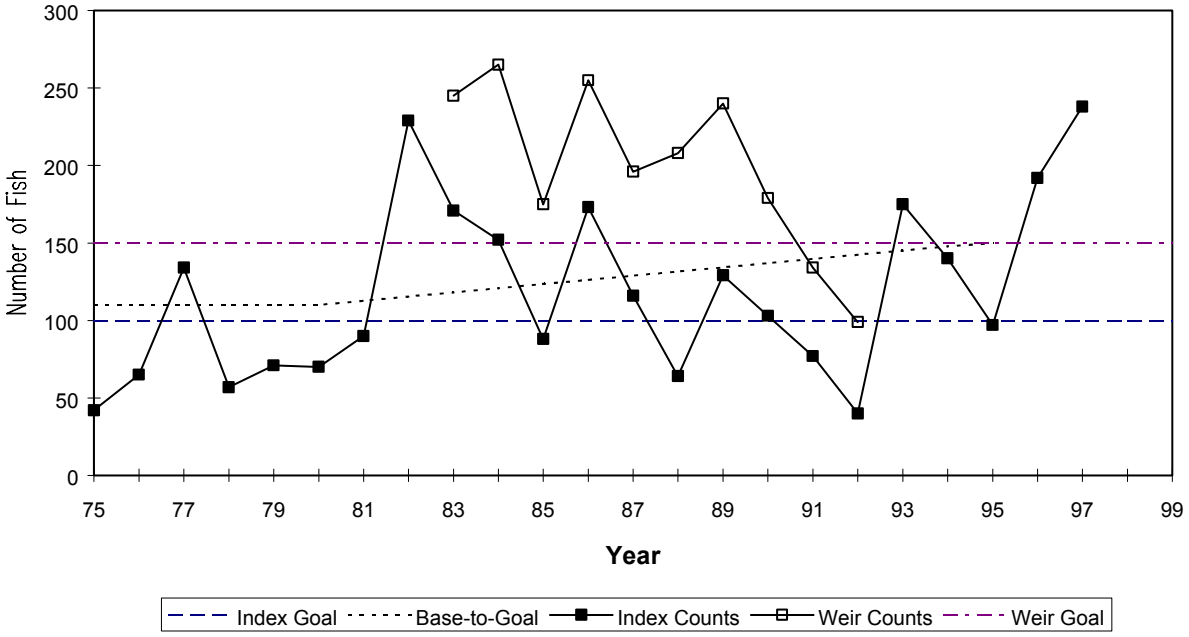

Figure 11.–Counts of chinook salmon at a weir and in the index area of the King Salmon River, 1975-1997. Base-to-goal line shows linear rebuilding schedule, starting in 1981 at average escapement level during base period (1975–1980) and ending at weir escapement goal of 150 (revised 1997) large chinook salmon in 1995 (final year of the three-cycle rebuilding program. Fish removed for broodstock are subtracted from counts.

1991 (Ericksen 1998*;* Appendix A2). Since Johnson et al. (1992) demonstrated that expansion factors used on the Chilkat River system were inaccurate, the management escapement goal of 2,000 large fish needs to be assessed. Assessment of the present goal is scheduled to be completed in 1998.

OTHER SYSTEMS

Counts of chinook salmon in the Marten and Wilson Rivers are not included in the regional index program, and no official escapement goals have been set for these systems. However, regular counts have been made in the Marten River since 1982 because of its proximity to other surveyed systems.

In 1997, 56 large chinook salmon were counted during aerial surveys of the Marten River, similar to the count of 62 in 1996 (Table 13). In 1988, the U.S. Forest Service modified a barrier on Dicks Creek, a major tributary of the Marten River, with the objective of opening access to new spawning areas. Since then, aerial surveys have documented chinook salmon above the barrier site indicating some success.

Sixteen (16) large chinook salmon were counted in the Wilson River in 1997, down from 23 in 1996. Nine chinook salmon were counted in the Grant River, a small chinook system in Behm Canal. The Klahini River, which has been surveyed sporadically, was not surveyed in 1997. In 1995 and again in 1996, surveys were flown on the Harding River and Aaron Creek to determine the feasibility of adding these medium and small systems to the program (Table 7). The remaining systems are too remote, and funds are not currently available for these surveys.

Table 15.–Harvest, escapement, and minimum total run of Situk River chinook salmon, 1976–1997.

	Commercial chinook harvests			Recreational harvests		Escapement			Total run size[a]	
	Yakutat	Situk River				Large	Small		Large	All
Year	Bay	Commercial	Subsistence	Large	Small	chinook	chinook	Total	only	Chinook
1976	69	1,002	41	200	–	1,365	576	1,941	2,318	3,185
1977	53	833	24	244	–	1,732	148	1,880	2,595	2,981
1978	108	382	50	210	–	776	327	1,103	1,298	1,745
1979	51	1,028	25	282	–	1,266	534	1,800	2,308	3,135
1980	164	969	57	233	120	905	220	1,125	1,879	2,504
1981	151	858	62	49	81	702	105	807	1,270	1,857
1982	419	248	27	35	28	434	177	611	672	949
1983	371	349	50	11	41	592	257	849	866	1,300
1984	145	512	89	137	14	1,726	475	2,201	2,427	2,953
1985	240	484	156	224	287	1,521	461	1,982	2,233	3,133
1986	211	202	99	0	37	2,067	505	2,572	2,290	2,910
1987	329	891	24	73	322	1,265	534	1,799	2,215	3,109
1988	196	299	90	161	27	837	185	1,022	1,337	1,599
1989	297	1	496	0	0	653	1,218	1,871	1,073	2,368
1990	304	0[b]	516	0	0	676	687 [c]	1,363	969	1,879
1991	392	786	220	65	31	878	707 [c]	1,585	1,679	2,687
1992	147	1,504	341	131	50	1,579	352 [c]	1,931	3,103	3,957
1993	148	790	202	101	151	899	3,099	3,998	1,717	5,242
1994	258	2,656	367	160	407	1,263	2,983	4,246	2,974	7,836
1995	264	8,106	594	1,007	679	4,355	3,293	7,648	13,335	18,034
1996	185	3,717	564	1,183	892	1,913[e]	1,433	3,346	6,633	9,702
1987–96 Avg.	241	1,810	234	365	179	1,431	1,445	2,876	3,840	5,464
1997	236	2,339	174	500 [d]	na	2,190	1,862	4,052	5,203	na

[a] Total run = chinook escapement + Situk commercial, sport, and subsistence harvests. An unknown portion of the Yakutat Bay catch is Situk fish. Large chinook are 3 to 5-ocean-age and small are 1 and 2-ocean age. Commercial and subsistence catches include some small chinook (Scott McPherson, unpublished report).

[b] Non-retention regulation in effect for commercial fisheries in 1989 and 1990; estimated personal use harvest of 400 large chinook in 1990, 415 in 1990, and 109 in 1991.

[c] Small chinook escapement includes 1 and 2-ocean jacks from 1990 to 1996, prior to 1990 1-ocean fish were not counted.

[d] Preliminary estimate of recreational harvest above weir.

[e] Escapement from Scott McPherson, ADF&G Sport Fish, Douglas, personal communication.

na = not available yet.

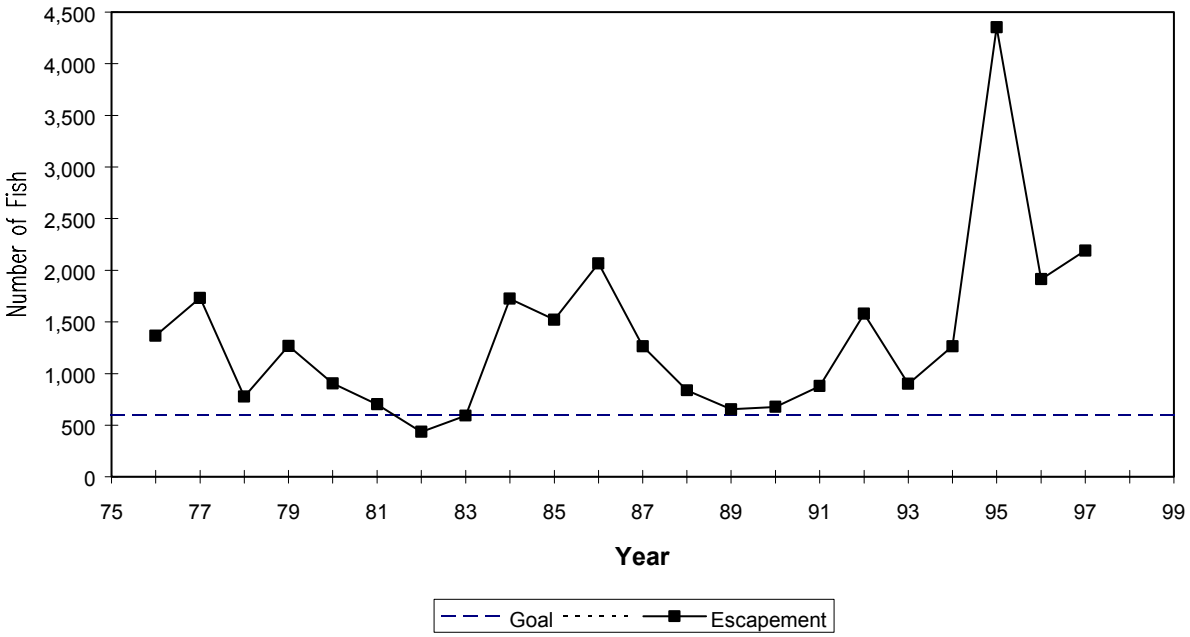

Figure 12.–Counts of chinook salmon at the Situk River weir, 1975–1997.

DISCUSSION

The utility of the index method as a measure of escapement is based on the assumption that the number of fish counted in an index area is a constant proportion of the escapement in the index area or watershed. Therefore, a change in the escapement causes a proportional change in the index count. Consequently, even though estimates of total escapement may be incorrect, multi-year trends in escapement are correct. Implicit in this method are sources of error that fall into two categories:

Factors that are constant sources of error: (1) interference with the ability to count fish; conditions such as heavily shaded areas or topography that prevents close approach with a helicopter, presence of other species that could be confused with chinook salmon, overhanging brush, or deep or occluded water (accounted for by a survey expansion factor); and (2) estimates of distribution among tributaries (accounted for by tributary expansion factors).

Factors that are not constants: (1) changes in migratory timing will produce a reduced count; (2) a very large number of spawners may cause reduced counts relative to the number of fish in the index area; (3) changes in the distribution of spawners among the tributaries of a watershed among years; and (4) inclement weather, turbidity events, or changes in pilot and/or observer experience.

To judge rebuilding progress, the Pacific Salmon Commission focuses on whether trends in counts are above or below a linear rebuilding schedule (see Figures 2-11). This method will correctly reflect the rate of rebuilding, provided the ratio of the count to escapement and the effect of "constant factors" do not change among years and that "non-constant factors" are infrequent events.

Expanded counts are needed when comparing indices among watersheds or for estimating exploitation rates and spawner/recruit relationships. Though survey and tributary expansion factors have been endorsed by the Pacific Salmon Commission (PSC) since 1981, the original expansion factors were developed on the basis of judgment rather than on empirical data (Appendix B *in* Pahlke 1997b), and error associated with these expansions could be large. Johnson et al. (1992) showed that

expansion factors for the Chilkat River greatly underestimated escapement to that watershed. ADF&G recognized the need to develop better expansions throughout the region, and has estimated distribution and escapement for chinook salmon in the Unuk (Pahlke et al. 1996; Jones and McPherson *in prep*), Chickamin (Pahlke 1996; 1997a) and Taku rivers (Pahlke and Bernard 1996, McPherson et al. 1997). Projects are continuing on those rivers, along with the Stikine and Alsek rivers and Andrew Creek. On the basis of information collected on the Unuk and Chickamin rivers, expansion factors for the four Behm Canal systems were revised in 1996. The expansion factor for the King Salmon River was based on 10 years of weir counts compared with aerial surveys, and the expansion factor for Andrew Creek was based on 4 years of paired weir and survey counts.

The expansion factor for the Taku River was revised in 1996 after 4 years of mark-recapture data indicated that the sum of the six tributaries counted was consistently close to 25% of the total escapement to the drainage (McPherson et al. 1997). In 1997 the proportion of the mark-recapture estimate observed in the index counts dropped to 12%. Survey conditions, escapement magnitude, and pilot and surveyor experience levels in 1997 were all similar to previous years with no remarkable changes to explain the large change in observed proportions.

Changing the escapement goals, however, requires a formal review by ADF&G, and the Chinook Technical Committee of the PSC, as was done for the Situk River in 1991, the Behm Canal systems in 1994, and King Salmon River in 1997. The Canadian Department of Fisheries and Oceans and the Transboundary Technical Committees are included in any review of Taku, Stikine or Alsek River goals. In 1997, a revised stock-recruitment analysis by ADF&G and DFO staff estimated that the escapement goal for the Klukshu should range between 1,100-2,300 spawners (McPherson et al. *In prep*); this report is currently under review.

Expansion factors and escapement goals will continue to be revised as we learn more about the actual relationships between index counts and total escapement. Any change in survey methods or observers must take into account the comparability of historical data with new data. Year-to-year consistency and repeatability of index counts may be more important than their absolute accuracy to agencies that compare escapement estimates between years.

Currently, only one of the 22 minor producers in the region and six of nine medium (seven with Chilkat) producing watersheds are included in the index survey program. Prior to 1997, counts from these streams were expanded to represent the escapement of all streams in minor and medium producing categories. The King Salmon River is unique among Southeast Alaska chinook populations as the only island system, and using it to represent the other 21 small systems most likely produced inaccurate estimates of total escapement. However, because escapement to small and medium systems are a small proportion of the total region escapement, errors in those estimates would have little effect on estimates of regional escapement. In 1997, the method used to expand the index counts to a total region escapement estimate was revised based on over 20 years of systematic escapement surveys in Southeast Alaska and the transboundary rivers. The revised method assumes the sum of the expanded indices accounts for approximately 90% of the total escapement and that number is expanded to account for the remaining 10%. This method more accurately reflects the geographic distribution of the unsurveyed systems and does not put so much weight on the King Salmon River counts.

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and provided design and layout; Phil Doherty, Brian Lynch and Will Bergmann provided logistics help and advice. Pat Milligan and Pete Etherton of DFO provided weir counts from transboundary systems.

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APPENDIX A

Appendix A1.–Management escapement goals and survey and tributary expansion factors for Southeast Alaska and transboundary rivers. Regional escapement goal times survey and tributary expansion factors (Table 1) times the regional expansion factor of 90%.

River system	Index tributaries surveyed	Survey escapement goal [a]	Lower Range of Escapement Goal	Upper Range Escapement Goal	System escapement goal	Regional expansion factor	Regional escapement goal
Major Production Systems (Total = 3)							
Alsek	Klukshu	4,700 (W)[b]	c	c	7,344[f]		
Taku	6 tributaries	13,210 (A)[b]	c	c	52,840[f]		
Stikine	Little Tahltan	5,300 (W)[b]	c	c	21,200[f]		
Major category subtotal		23,210			81,384	1	81,384
Medium Production Systems (Total = 9)							
Situk	All	600 (W)[g]	500[i]	1,000[i]	600[g]		
Chilkat	All	2,000 (M)	c	c	2,000 C		
Andrew Cr.	All	470 (A)	c	c	750 [h]		
Unuk	6 tributaries	875 (A)[g]	650[i]	1,400[i]	3,500 F		
Chickamin	8 tributaries	525 (A)[g]	450[i]	900[i]	2,100 F		
Blossom	All	300 (A)[g]	250[i]	500[i]	750 F		
Keta	All	300 (A)[g]	250[i]	500[i]	750 F		
Medium category subtotal		5,070			10,450	1	10,450
Minor Production Systems (Total = 22)							
King Salmon	All	100 (F/H)	80[j]	161[j]	150 G		
Minor category subtotal		100			150	1	150
All systems total		28,447			91,984	/90%	102,204

[a] (W) = weir count; (A) = aerial survey peak escapement estimate; (M) = mark/recapture estimate. Survey escapement goal = number of fish actually counted on survey, or through weir.

[b] Index goals jointly agreed between U.S. and Canada and presently used by Chinook Technical Committee (CTC) of Pacific Salmon Commission (PSC), but which have not been scientifically reviewed.

[c] Under review.

[d] Taku and King Salmon rivers expansion factors revised in 1996.

[f] Expanded estimates from index goals which have not been scientifically reviewed or agreed to by U.S. and Canada and are not used by CTC .

[g] Escapement goals which have been scientifically analyzed through spawner-recruit analysis and are used by the CTC .

[h] Expanded estimates which have not been scientifically reviewed, but are presently used by CTC and ADF&G.

[i] Biological escapement goal ranges used by ADF&G management.

[j] Biological escapement goal ranges used by ADF&G management, new in 1998.

Appendix A2.–Estimated total escapements of chinook salmon to escapement indicator systems and to Southeast Alaska and transboundary rivers, 1975–1997. Index escapements are expanded for survey counting rates and unsurveyed tributaries, region total expanded for 84% w/o Chilkat River, 90% with Chilkat escapement included.

	MAJOR SYSTEMS				MEDIUM SYSTEMS										
Year	Alsek[a]	Taku[b]	Stikine	Major Subt.	Situk	Chilkat	Andrew	Unuk	Chick-amin	Blos-som	Keta	Med Subt.	King Salmon	Total all systems	Expanded region total
1975		8,356	5,800	14,156			520		1,481	365	508	2,873	62	17,091	20,346
1976	1,672	18,904	3,300	23,876	1,365		404		627	170	210	2,776	96	26,748	31,843
1977	4,363	22,684	6,600	33,647	1,732		456	3,896	1,450	280	575	8,389	199	42,235	50,280
1978	4,050	13,220	5,200	22,470	776		388	4,424	1,234	358	980	8,159	84	30,713	36,563
1979	6,101	16,624	9,328	32,053	1,266		327	2,304	954	135	1,065	6,051	113	38,217	45,497
1980	3,770	30,176	17,096	51,042	905		282	4,064	1,779	223	480	7,732	104	58,878	70,093
Average	3,991	18,327	7,887	29,541	1,209		396	3,672	1,254	255	636	5,997	110	35,647	42,437
1981	2,837	39,144	26,672	68,653	702		536	2,924	1,536	398	823	6,918	139	75,710	90,131
1982	3,078	19,252	22,640	44,970	434		672	5,404	2,284	863	1,885	11,542	354	56,866	67,697
1983	3,352	8,248	4,752	16,352	592		366	4,500	2,398	1,473	2,055	11,383	245	27,980	33,310
1984	2,038	15,636	10,352	28,026	1,726		389	7,348	4,408	1,270	1,525	16,666	265	44,957	53,520
1985	1,853	28,832	12,456	43,141	1,521		640	4,736	3,824	1,773	1,560	14,054	175	57,370	68,297
Average	2,632	22,222	15,374	40,228	995		521	4,982	2,890	1,155	1,570	12,112	236	52,576	62,591
1986	3,966	30,080	11,564	45,610	2,067		1,414	8,504	6,980	3,195	1,725	23,885	255	69,750	83,036
1987	3,598	22,972	19,132	45,702	1,265		1,576	7,892	3,900	3,373	1,920	19,926	196	65,824	78,362
1988	2,891	34,504	29,168	66,563	837		1,128	6,984	3,144	960	1,438	14,491	208	81,262	96,740
1989	3,399	40,329	18,860	62,588	653		1,060	4,596	3,736	860	2,888	13,793	240	76,621	91,215
1990	2,722	52,142	17,568	72,432	676		1,328	2,364	2,256	643	1,515	8,781	179	81,392	96,895
Average	3,315	36,005	19,258	58,579	1,100		1,301	6,068	4,003	1,806	1,897	16,175	216	74,970	89,249
1991	3,165	40,612	18,024	61,801	878	5,897	800	2,620	1,948	598	680	13,421	134	75,356	83,728
1992	1,950	44,232	26,508	72,690	1,579	5,284	1,556	3,496	1,384	375	543	14,217	99	87,006	96,673
1993	4,811	52,816	45,796	103,423	899	4,472	2,120	4,272	1,556	758	905	14,982	259	118,664	131,848
1994	5,532	39,652	25,800	70,984	1,263	6,795	1,144	2,844	1,552	403	765	14,766	207	85,957	95,507
1995	8,579	33,805	13,036	55,420	4,355	3,790	686	3,088	1,424	543	438	14,323	144	69,887	77,652
Average	4,807	42,223	25,833	72,864	1,795	5,248	1,261	3,264	1,573	535	666	14,341	169	87,374	97,082
1996	4,401	79,019	19,360	102,780	1,913	4,920	670	4,668	1,688	550	743	15,152	288	118,220	131,356
1997	**4,173**	**55,396**	**22,228**	**81,797**	**2,190**	**7,728**	**586**	**2,544**	**1,088**	**330**	**615**	**15,081**	**357**	**97,235**	**108,039**
1997 CHANGE FROM 1996															
Number	(228)	(23,623)	2,868	(20,983)	277	2,808	(84)	(2,124)	(600)	(220)	(128)	(71)	69	(20,985)	(23,317)
Percent	-5%	-30%	15%	-20%	14%	57%	-13%	-46%	-36%	-40%	-17%	0%	24%	-18%	-18%
Goals															
Lower	Under review	Under review	Under review		500	Under review	Under review	2,800	1,680	600	600		120		
Point	7,344	52,840	21,200	81,384	600	2,000	750	3,500	2,100	750	750	10,450	150	91,984	102,204
Upper					1000			5,600	3,360	1,200	1,200		240		
Average percent of goal															
75-80	54%	35%	37%	36%	201%		53%	105%	60%	34%	85%	57%	73%	39%	
81-85	36%	42%	73%	49%	166%		69%	142%	138%	154%	209%	116%	157%	57%	
86-90	45%	68%	91%	72%	183%		173%	173%	191%	241%	253%	155%	144%	82%	
91-95	65%	80%	122%	90%	299%	262%	168%	93%	75%	71%	89%	137%	112%	95%	
96-97	58%	127%	98%	113%	342%	316%	84%	103%	66%	59%	91%	145%	215%	117%	

a Alsek Escapement = (weir count/0.64)-sport and aboriginal fishery harvest.
b Using M-R estimates for Taku River when available (1989,1990, 1995, 1996).

Appendix A3.–Detailed 1997 Southeast Alaska chinook salmon escapement surveys as entered into Commercial Fisheries Division Integrated Fisheries Database (IFDB). Includes all surveys where chinook salmon were observed, many are not used to estimate escapement.

Stream number	Stream name	Date	Survey type	Species	Mouth	Live	Dead	Total count	Obs.	Comments[a]			Other observations
101-30-030	Keta River	28-Jun	A	chinook	2			2	EDH	22	32	43	2 kings intertidal
		18-Aug	H	chinook		246		246	KAP	22	32		fish up high
		26-Aug	H	chinook		148		148	SBW	22	32		
		29-Aug	H	chinook		144		144	SBW	22	32		some cohos
101-30-060	Marten River	26-Aug	H	chinook		56		56	SBW	22	32		
101-45-081	Falls Creek	11-Jul	A	chinook	15			15	PSD	22	32	43	
101-55-020	Wilson River	18-Aug	H	chinook		16		16	KAP	22	32		lots humpies
101-55-040	Blossom River	18-Aug	H	chinook		130	2	132	KAP	22	32		
		26-Aug	H	chinook		93		93	SBW	22	32		
		29-Aug	H	chinook		87	1	88	SBW	22	32		
101-71-004	Chickamin River	30-Sep	H	chinook		2		2	GMF	23	32		
101-71-04A	Barrier Creek	7-Aug	H	chinook		9	1	10	KAP	22	32		
		12-Aug	H	chinook		6		6	KAP	22	32		
101-71-04B	Butler Creek	7-Aug	H	chinook		37		37	KAP	22	32		
		12-Aug	H	chinook		42	1	43	KAP	22	32		
		19-Aug	F	chinook		38		38	KAP	21	32		
101-71-04C	Clear Creek	7-Aug	H	chinook		50		50	KAP	22	31		
		12-Aug	H	chinook		22	1	23	KAP	22	32		
101-71-04H	Humpy Creek	19-Aug	H	chinook		15		15	KAP	22	33		dozen at mouth
		29-Aug	H	chinook		8		8	SBW	22	32		
101-71-04I	Indian Creek	7-Aug	H	chinook		19		19	KAP	22	32		
		12-Aug	H	chinook		24		24	KAP	22	32		
101-71-04K	King Creek	19-Aug	H	chinook		95		95	KAP	22	33		
		21-Aug	F	chinook		66		66	DWD	22	32		
		29-Aug	H	chinook		71		71	SBW	22	32		
101-71-04L	Leduc River	7-Aug	H	chinook		7		7	KAP	23	32		
		12-Aug	H	chinook		4		4	KAP	22	32		

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Stream number	Stream name	Date	Survey type	Species	Mouth	Live	Dead	Total count	Obs.	Comments[a]			Other observations
101-71-04S	South Fork Chickamin	7-Aug	H	chinook		28		28	KAP	23	31		
		12-Aug	H	chinook		25	2	27	KAP	22	32		
101-75-010	Grant Creek	12-Aug	H	chinook		9		9	KAP	22	32		between waterfalls
101-75-015	Eulachon River	12-Aug	H	chinook		30		30	KAP	22	32		
		19-Aug	F	chinook		53		53	DLM	22			
101-75-30C	Clear Creek-Unuk R	21-Jul	F	chinook		26		26	DWD	22	32		
		4-Aug	F	chinook		64		64	DWD	22	32		
		7-Aug	H	chinook		48	2	50	KAP	23	32		
		8-Aug	F	chinook		113		113	DWD	22	32		
		12-Aug	H	chinook		79		79	KAP	21	32		20 schooled @ mouth
101-75-30G	Genes Lake Cr. Unuk	7-Aug	F	chinook		94		94	DWD	22	31		creek count
		7-Aug	H	chinook	60			60	KAP	23	31		in lake, dark, lots sockeye
		12-Aug	H	chinook	120			120	KAP	22	32		100 in lake
101-75-30K	Kerr Creek-Unuk R	22-Jul	F	chinook		8		8	DWD	23	32		
		27-Jul	F	chinook		23		23	DWD	22	33		
		3-Aug	F	chinook		59		59	DWD	21	33		
		7-Aug	H	chinook		32		32	KAP	23	32		
		12-Aug	H	chinook		12		12	KAP	23	32		lower end murky
101-75-30L	Lake Creek-Unuk R	7-Aug	H	chinook		13		13	KAP	22	32		
		12-Aug	H	chinook		7		7	KAP	23	31		
101-75-30Q	Cripple Ck-Unuk R	7-Aug	F	chinook		220	24	244	DLM	23	32		
101-80-070	Hatchery Ck-Yes Bay	6-Aug	F	chinook		1		1	TPZ	21	32		
		11-Sep	F	chinook			2	2	TPZ	21	32		
102-60-089	McGillvery Creek	5-Sep	F	chinook		1		1	TPZ	22	32		
103-60-047	Klawock River	24-Oct	W	chinook		3		3	SBW	99			Klawock Weir - Mark Jaqua
106-44-031	Crystal Creek	24-Jun	A	chinook	15	2		17	WRB	22	32	43	15 above rapids
		4-Jul	A	chinook	15	200		215	BLL	22	32	43	200 above rapids none at floating RC
		29-Jul	A	chinook	350	150		500	WRB	23	32	41	200 above rapids, 150 ABV
		31-Jul	A	chinook	400	50		450	WRB	22	32	43	200 above rapids, 200 below Crystal
		31-Jul	A	chinook	650	40		690	WRB	22	32	41	200 above rapids, 450 below hatchery
		2-Aug	A	chinook	500	70		570	WRB	22	32	41	IT= BELOW CRYSTAL CR.
		5-Aug	A	chinook		160		160	BLL	22	32	43	52 100 ABV RAPIDS, 60+ @ CR.

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Stream number	Stream name	Date	Survey type	Species	Mouth	Live	Dead	Total count	Obs.	Comments[a]				Other observations
107-40-024	Aaron Creek	11-Aug	H	chinook		55		55	KAP	22	32			37 in small trib
107-40-053	Bradfield River E Fk	14-Aug	A	chinook		30		30	WRB	23	31	41		TO GLACIAL TO COUNT
108-40-020	Andrews Creek	11-Aug	H	chinook		162		162	KAP	21	33			60 in north fork
		14-Aug	F	chinook	61	230	2	293	TWR	22	31			
108-80-100	Tahltan River	30-Jul	H	chinook		260		260	KAP	23	32			poor survey
108-80-115	Beatty Ck Tahltan R	30-Jul	H	chinook		218		218	KAP	21	32			
		5-Aug	H	chinook		138	59	197	KAP	22	32			
108-80-120	Little Tahltan River	29-Jul	H	chinook		1,717	190	1,907	KAP	22	33			poor light
		5-Aug	H	chinook		812	700	1,512	KAP	22	33			late
109-10-006	Sashin Ck P Walter N	28-Jul	A	chinook	500			500	WMD	99				Hatchery chinook, no pinks
110-32-009	Chuck R Windham	27-Jul	A	chinook		7		7	WRB	22	32	42		ABV GORGE
111-17-010	King Salmon River	22-Jul	H	chinook		140		140	KAP	23	33			
		28-Jul	H	chinook		158		158	KAP	22	32			
		28-Jul	F	chinook		238		238	KAP	22	32			plus 11 jacks
111-32-220	Nakina River	29-Jul	H	chinook		1,240		1,240	KAP	22	32	61		IA1
		29-Jul	H	chinook		1,970		1,970	KAP	23	31	62	63	IA2&3
		4-Aug	H	chinook		1,560	50	1,610	KAP	22	32	61		IA1
		4-Aug	H	chinook		850		850	KAP	22	32	62		IA2
		4-Aug	H	chinook		3,060		3,060	KAP	22	32	63		IA3
		4-Aug	H	chinook		575		575	KAP	22	32	64		IA4
		4-Aug	H	chinook		6,095		6,095	KAP	22	32			peak total
111-32-240	Kowatua Creek	11-Aug	H	chinook		835		835	KAP	22	32			
		20-Aug	H	chinook		1,292	68	1,360	KAP	22	32			
111-32-255	Tatsamenie River	20-Aug	H	chinook		1,148		1,148	KAP	22	32			720 in lower area
111-32-270	Nahlin River	21-Jul	H	chinook		1,021	20	1,041	KAP	22	32	61		1030 below weir, IA1
		21-Jul	H	chinook		334		334	KAP	22	32	62		IA2
		21-Jul	H	chinook		2,280		2,280	KAP	22	32	63		IA3
		21-Jul	H	chinook		3,635	20	3,655	KAP	21	32			peak total
		29-Jul	H	chinook		1,890		1,890	KAP	21	32	63		IA3
		29-Jul	H	chinook		302		302	KAP	21	32	62		IA2
		29-Jul	H	chinook		1,340		1,340	KAP	21	32	61		IA1

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Stream number	Stream name	Date	Survey type	Species	Mouth	Live	Dead	Total count	Obs.	Comments[a]			Other observations
111-32-275	Tseta Creek	29-Jul	H	chinook		638	10	648	KAP	22	32		
		4-Aug	H	chinook		435	48	483	KAP	23	32		
111-32-280	Dudidontu River	4-Aug	H	chinook		809	134	943	KAP	22	32		lots above beaver dams
111-50-052	Montana Creek	5-Aug	F	chinook		10		10	LED	21	33		
111-50-069	Fish Creek-Douglas I	5-Aug	F	chinook		7		7	WSL	21	42		numerous kings in pond not counted
		21-Aug	F	chinook	1	4	1	6	AJM	21	32	42	didn't count in pond
		4-Sep	F	chinook		1	61	62	WSL	33			
115-32-054	Big Boulder Creek	7-Aug	F	chinook		116		116	RPE	22	33		8 jacks
		12-Aug	F	chinook		63	4	67	RPE	22	33		2 jacks
115-32-055	Little Boulder Creek	12-Aug	F	chinook		2		2	RPE	23	33		upstream to highway bridge
182-30-020	Klukshu River (CAN)	1-Aug	H	chinook		668	50	718	KAP	23	32		25 below weir
182-30-043	Takhanni River (CAN)	1-Aug	H	chinook		171	19	190	KAP	23	32		
182-30-050	Blanchard Ck (CAN)	1-Aug	H	chinook		79	30	109	KAP	23	32		12 above bridge
182-40-010	Akwe River	27-Jun	A	chinook		15		15	GFW	23	32	42	
		3-Jul	A	chinook		4		4	GFW	23	32	42	
182-60-010	Dangerous River	6-Aug	F	chinook		162		162	VLH	21	32		USFS survey, fish seen in trib feeding NE corner of Harlequin

[a] Comment codes: 21= visibility excellent, 22 = normal, 23 = poor; 31 = water high, 32 = water normal, 33 = water low.

Appendix A4.–Computer files used to complete this report.

File Name	Description
TAKUCHT.XLW	Excel workbook with tables and charts with annual counts for each index area.
SUMVER97.XLS	Appendix table A2, with expanded escapement totals for Southeast Alaska
ESC97.XLS	Table 1. Estimated chinook escapement in 1997.
GOALS.XLS	Appendix Table A1. Expanded goals for Southeast Alaska.