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Escapements of Chinook Salmon in Southeast Alaska and Transboundary Rivers in 2002

by

Keith A. Pahlke

September 2004

Alaska Department of Fish and Game Divisions of Sport Fish and Commercial Fisheries

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Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

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

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

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

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
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
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Measures (fisheries)

fork length	FL
mideye-to-fork	MEF
mideye-to-tail-fork	METF
standard length	SL
total length	TL

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
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	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
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.
minute (angular)	'
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
variance	
population	Var
sample	var

FISHERY DATA REPORT NO. 04-13

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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 2002 was 143,673 large (age .3 and older) chinook, an 8% decrease from the escapement of 156,350 fish estimated in 2001. The 2002 estimate was the fifth highest since the start of the escapement index program in 1975.

Six out of 11 escapement indices increased from 2001, and indices were below escapement goal ranges in only the Blossom River. Estimated age and sex composition and mean length at age of all stocks sampled in 2002 are presented.

Key words: chinook, *Oncorhynchus tshawytscha*, escapement, escapement goals, Taku River, Stikine River, Alsek River, Chilkat River, Unuk River, Chickamin River, Blossom River, Keta River, King Salmon River, Situk River, Andrew Creek, 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). 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 spawning escapement, the Alaska Department of Fish and Game (ADF&G), the Canadian Department of Fisheries and Oceans (DFO), the Taku River Tlingit First Nation (TRTFN), and the Tahltan First Nation (TFN) count spawning chinook salmon in a designated set of eleven 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.

Programs to estimate total escapement and survey count-to-escapement expansion factors for index counts have been implemented for all 11 index stocks. Long-term annual programs are in place on the Situk, Alsek, Chilkat, Taku, Stikine and Unuk rivers. Short-term (2–3-year) projects were used to estimate expansion factors for the other 5 systems. Estimates of escapement from these mark-recapture and weir studies are generally superior to expanded survey count estimates, and are preferentially employed whenever they are available.

Escapement data are provided annually to the Joint Chinook Technical Committee (CTC) of the Pacific Salmon Commission (PSC), who use them to evaluate the status of the indicator stocks (PSC 1997). Estimates of the total escapement of

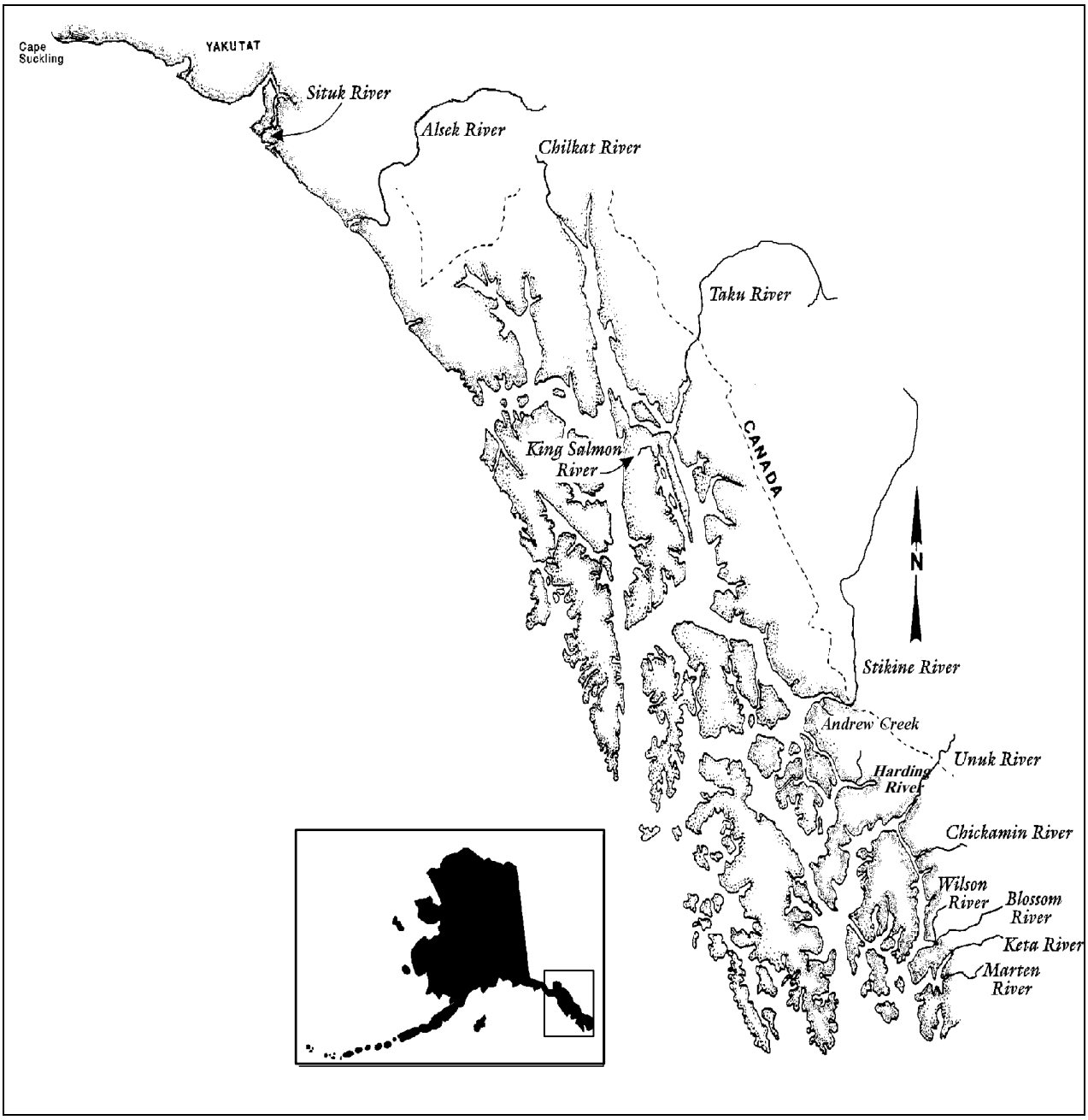

Figure 1.–Location of selected chinook salmon systems in Southeast Alaska, Yakutat, and trans-boundary rivers.

large spawners are provided to the CTC for six stocks (Situk, Chilkat, Taku, Stikine, Andrew and King Salmon rivers) and index counts for the remaining five stocks are used to track trends in escapement.

In addition to these applications, Biological Escapement Goals (BEGs 5AAC 39.222) have been established for all 11 systems, and fisheries are managed to achieve those escapement goal ranges.

This project obtained indices of spawner abundance for major chinook salmon stocks in Southeast Alaska. Objectives for 2002 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 standardized helicopter surveys of the index areas have been conducted annually since 1973. Survey index areas include portions of the Nakina, Nahlin, Dudidontu, Tatsamenie, and Kowatua rivers. 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 and size composition of the escapement. Mark-recapture experiments are providing annual independent estimates of total escapement since 1995 (McPherson et al. 1998a,b, 2001).

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 U.S. portion of the lower Stikine River, supports a significant run of chinook salmon. The upper drainage of the Stikine is accessible via the Telegraph Creek Road.

Helicopter surveys of the Little Tahltan River index area have been conducted annually since 1975, and the DFO and TFN have 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, 1999a,b; Pahlke et al. 2000; Der Hovanisian et al. 2001, 2003,2004).

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. A new weir was operated on Andrew Creek in 1997 and 1998.

The Alsek River originates in Yukon Territory, Canada, and flows in a southerly direction into the Gulf of Alaska approximately 75 km southeast 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 periodically to provide some continuity in estimates in the event that funding for the weir is discontinued. The Blanchard and Takhanne rivers and Goat Creek, three smaller tributaries of the Tatshenshini River, are also surveyed annually, but are not used to index escapements. Mark-recapture studies have been conducted annually since 1998 to estimate the escapement of spawning chinook salmon in the Alsek River, and radiotelemetry studies were conducted in 1998 and 2002 to estimate the distribution of spawning chinook salmon (Pahlke et al. 1999; Pahlke and Etherton 2001a,b, 2002; Pahlke and Waugh 2003).

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. Chinook salmon have been periodically counted in Boundary Creek, but survey conditions there are often poor and the counts are not included in the index. Total escapement was estimated by a mark-recapture project in 1994 (Pahlke et al. 1996) and annually since 1997 (Jones et al. 1998; Jones and McPherson 1999, 2000, 2002; Weller and McPherson 2003a, b).

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 north-east 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, 1996, 2001 and 2002, and spawning distribution was estimated by radiotelemetry in 1996 (Pahlke 1996, 1997a; Freeman and McPherson 2003,2004).

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. Mark-recapture experiments were conducted in 1998 to estimate the escapement of chinook salmon in the Blossom and Keta rivers (Brownlee et al. 1999) and were repeated on the Keta River in 1999 and 2000 (Freeman et al. 2000, 2001).

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. Helicopter surveys have been conducted annually since 1975 and foot surveys since 1992.

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 2002).

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. The proportion of the recreational harvest above the weir varies from year to year (Howe et al. 2001).

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 (Kissner 1974). 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 list 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 A2). Abundance in the Chilkat River is estimated only by a mark-recapture program. These index systems, along with the Chilkat River, are believed to account for about 90% of the total chinook salmon escapement in Southeast Alaska and transboundary rivers (Pahlke 1998).

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 were available to produce such goals. As a result, escapement goals were originally set based on the highest observed escapement count prior to 1981 (Pahlke 1997b). Goals for the Chilkat River and Andrew Creek were added in 1985, bringing the total

number of regularly monitored river systems to eleven. Pahlke (1997b) provides detailed descriptions of the escapement goals and their origins. Escapement goals have been revised when sufficient new information warrants. Most of the revised escapement goals have been developed with spawner-recruit analysis, as ranges of optimum escapement rather than a single point estimate (Appendix A1). Spawner-recruit analysis requires not only a long series of escapement estimates, but also annual age and sex-specific estimates of escapement (McPherson and Carlile 1997). The United States Section of the CTC developed data standards in 1997 for stock specific assessments of escapement, terminal runs, and forecasts of abundance which are used to evaluate existing stock assessment programs (PSC 1997). These data have been collected routinely at weirs and during mark-recapture studies, and recently specific programs have been implemented to collect age, sex and length data from chinook salmon in the Blossom, Keta, and King Salmon rivers and in Andrew Creek.

INDICES OF ESCAPEMENT

Spawning chinook salmon are counted at 26 designated index areas in nine of the systems; total escapement in the other two systems are estimated by complete counts of chinook salmon at the Situk River weir and by annual mark-recapture estimates on the Chilkat River. Counts are made during aerial or foot surveys during periods of peak spawning, or at weirs. 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 since 1976 (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 conditions preclude the second survey. Survey conditions on each index survey are rated as poor, normal or excellent for that particular index area, and coded as to whether that survey is potentially useful for indexing or estimating escapement. Factors that affect the rating include water level, clarity, light conditions, and weather.

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. In some systems age- 1.2 fish may be larger than 660 mm MEF and be difficult to avoid counting.

Aerial surveys are conducted from a Bell 206 or Hughes 500D helicopter. 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.

Weather, distances involved, run timing, etc., can make it difficult for a single surveyor to complete all the index surveys annually under normal or excellent conditions. Thus, alternate surveyors are selected to conduct the counts when the primary surveyor is unavailable. Also, new surveyors take on primary responsibilities at infrequent intervals. Since between-observer variability and bias can be significant (Jones et al. 1998), new surveyors must be trained and calibrated against the primary surveyor to provide consistency and continuity in the data. Alternate observers accompany the primary observer on regularly scheduled surveys to learn survey methods and counting techniques (training flights). Each alternate observer also accompanies the primary observer on additional regularly scheduled surveys to independently count chinook salmon (calibration flights). Each

calibration flight consists of two passes over the index area so the two observers in turn sit in the preferred location in the helicopter during one pass along the river. Counts are not shared during the calibration surveys, but are shared and discussed following the completion of the second pass of each flight. Calibration data will be collected annually for several years. The relationship between observer escapement counts will be determined from accumulated data and applied to counts as appropriate.

Several index areas are routinely surveyed by more than one method; e.g. Andrew Creek is surveyed from airplanes, helicopters and by foot. The various surveys are conducted as close as possible to each other to promote comparison and calibration of the different methods.

Counts and other observations from the 2001 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 (Table 1). An expansion factor is an estimate of the proportion of the season's total escapement counted in a river system during the peak spawning period. Expansion factors are based on comparisons with weir counts, mark-recapture estimates, and spawning distribution studies. They vary among rivers according to how complete the coverage of spawning areas is and 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 5.2 for the Taku River (Table 1).

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, escapement estimates from the 11 index systems are expanded to account for the unsurveyed systems. (Appendix A2). The total estimated escapement in the index areas represents approximately 90% of the region total (Pahlke 1998). 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 spawning 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 and Bernard 1996; Pahlke et al. 1996; McPherson et al. 1998a). 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, 1997a) were used to revise expansion factors for those two rivers in 1996; results were also applied to the nearby Blossom and Keta rivers. More mark-recapture studies were conducted on all four rivers and the expansion factors for the Behm Canal systems were revised again in 2002 (McPherson et al. 2003). On Andrew Creek, a weir was operated over 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 2001). The expansion factors for the Taku River were revised in 1996 and again in 1999 based on the results of mark-recapture studies (Pahlke and Bernard 1996, McPherson et al. 2000).

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

Table 1.–Peak survey counts, survey expansion factors, estimated total escapement from expanded survey counts, mark-recapture projects or weir, for large chinook salmon returning to Southeast Alaska and transboundary rivers in 2002.

	Survey area	Survey count	Survey expansion factor	Survey expansion estimated escapement [a]	Estimated total escapement (M-R or weir) [b]	Reference [c]
Major producers						
Alsek River	Klukshu	2,241	5.0	11,105 [d]	8,504	Pahlke and Waugh (2003)
Taku River	5 tributaries	8,089	5.2	42,063	48,848	McPherson et al, *in prep.*
Stikine River	Little Tahltan	8,110	5.15	41,767	50,875	Der Hovanisian et al. (2004)
Category subtotal				95,034	108,227	
Medium producers						
Situk River	NA	NA	NA	NA	1,000 [e]	
Chilkat River	NA	NA	NA	NA	4,050 [f]	Ericksen (2003)
Andrew Cr.	All	876	2.0	1,752	NA	
Unuk River	6 tributaries	897	5.0 [g]	4,485	6,988	Weller and McPherson (2003b)
Chickamin River	8 tributaries	1,013	5.17[g]	5,237	5,007	Freeman and McPherson. (2004)
Blossom River	All	224	4.0 [g]	896	NA	
Keta River	All	411	3.0 [g]	1,233	NA	
Category subtotal					20,926	
Minor producers						
King Salmon R.	All	102	1.5	153	NA	
Index system total					129,306	M-R plus survey expansions
Region total			1/0.9		143,673	

[a] Estimated by multiplying survey count by expansion factor.

[b] Estimated from mark-recapture program or weir count. Final numbers used for ADF&G management.

[c] Reference document for mark-recapture estimate.

[d] Klukshu weir count × 5 minus aboriginal fishery harvest above weir (100)

[e] Situk River weir count, minus estimated sport harvest above weir (23)

[f] Mark-recapture estimates used instead of expansion factors.

[g] Unuk, Chickamin, Blossom and Keta River expansion factors revised 2002.

expansion factors used before 1991 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 2002). Studies on the Taku, Stikine, Alsek, Unuk, Chickamin, Blossom, Keta 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, 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, Unuk, Chickamin, and Alsek rivers. Estimates of escapement from expanded counts are included in this document to provide relative estimates of total spawner abundance over time, with the caveat that expan-

sion factors may produce incorrect estimates or be revised in the future.

AGE, SEX, AND LENGTH COMPOSITION OF ESCAPEMENTS

I compiled estimates of escapement by age and sex for all 11 systems having chinook salmon stock assessment projects in Southeast Alaska in 2002 (Appendix A4) to provide a basic statistical summary for managers and researchers. Estimates for the Chickamin, Unuk, Stikine, Taku, Chilkat and Alsek rivers were the results of mark-recapture experiments (Der Hovanisian et al. 2004; Ericksen 2003; Freeman and McPherson 2004; Pahlke and Waugh 2003; Weller and McPherson 2003b; McPherson et al., *in prep-a.*). Results compiled from each of these projects are the reported unbiased estimates of escapement of medium- and large-sized chinook salmon, except for the Stikine River, where the unbiased estimates include small fish. Size classification of small and medium fish varies slightly between projects. Estimates for medium and large fish from the Situk River are based on age sampling and a total census of the escapement at a weir. Age composition estimates for the Blossom, Keta, and King Salmon rivers and Andrew Creek were calculated by dividing the peak survey count by the escapement expansion factor (Table 1), and multiplying the result by the age composition of the escapement sampled on the spawning grounds of each drainage in 2002. Standard errors were estimated for these numbers and were dependent on the variability in the expansion factor and sample sizes in each system. Note that the survey index counts for the Blossom and Keta include many age 1.2 chinook salmon because their rapid growth makes most of them ≥660 mm MEF. For this reason, all fish sampled on the spawning grounds (most are age 1.2 and older) are used in the calculations reported in Appendix A4. Even thought we did not directly test for size or sex selective sampling in these spawning ground samples (Blossom, Keta, King Salmon and Andrew Creek), the various techniques used have been applied in similar quantitative experiments and are expected to provide unbiased and reliable results when sample sizes are adequate.

Estimates of mean length by sex and age and their estimated variances were also calculated for each system (Appendix A5). These estimates are either the unbiased estimates reported in the publications cited above, or made using the spawning ground samples as noted above.

All chinook salmon sampled for age, sex and length data were also examined for missing adipose fins which indicates the presence of a coded-wire tag (CWT). In most cases fish with missing adipose fins were sacrificed to recover the tag. On the Taku, Unuk, Stikine and Chilkat rivers, most of the CWT tagged fish were wild fish tagged earlier in those rivers in ongoing projects. In all other systems any tags recovered were either from the Taku or Unuk rivers or hatchery stocks. We found less than 1% straying; sample sizes and tags recovered are summarized in Appendix A9.

RESULTS

In 2002, 43 locations, 24 of which were designated index areas, were surveyed specifically for chinook salmon escapement (Appendix A3). Surveys generally progressed as planned.

From 1984 to 1993, the estimated escapement of chinook salmon in Southeast Alaska increased steadily for 10 years, peaking in 1993 (Appendix A2). This was due primarily to strong returns to the Taku, Stikine, and Chilkat rivers, which together make up over 75% of the summed escapement goals in the region. Escapements declined in 1994 and 1995 and then peaked again in 1996 and 1997 as a result of record high escapements in the Taku River. In 1998 and 1999 escapements to the Taku River declined dramatically and have remained relatively low, but escapement to the Stikine River has increased greatly, to the highest on record in 2001.

The estimated escapement (expanded) of large chinook salmon for all Southeast Alaska and transboundary rivers in 2002 was 143,673 (Table 1), an 8% decrease from the estimated 156,073 fish in 2001. The estimates for 2001 were revised with updated estimates. The estimated total for the region decreased, primarily due to decreases in escapements to the Stikine and Unuk rivers.

TAKU RIVER

The count of 8,089 large chinook salmon in the five index areas of the Taku River was the highest total since 1997 (Table 2) with counts in four tributaries above 2001 (Table 3). Counts increased steadily from 1983 to 1993, and exceeded the upper limit of the survey goal range five times in the 90s (Figure 2).

The sum of counts from the five index areas was expanded by a survey expansion factor of 5.2. The expansion factor was revised in 1999 based on five years of mark-recapture experiments on the Taku River (Table 4) (McPherson et al. 2000). McPherson et al. (2000) recommend an escapement goal range of 30,000 to 55,000 large spawners. These changes were adopted by the Transboundary River Technical Committee (TBTC) and the Chinook Technical Committee (CTC) of the PSC. The revised PSC goal uses counts in five index areas expanded by 5.2, which corresponds to an index goal range of 5,800 to 10,600 fish. Expansion of the survey counts of 8,089 by 5.2 results in an escapement estimate of 42,063 large chinook salmon in 2002. A mark-recapture experiment conducted in 2002 resulted in a higher escapement estimate (48,848 large; SE = 5,906; McPherson et al., *in prep-a*).

Age, sex and length data were collected from carcasses at the Nakina, Nahlin, and Tatsamenie rivers, and live fish were sampled with angling gear at the Nahlin and Tatsamenie rivers (Appendix A4H; A5H).

STIKINE RIVER

At the Little Tahltan River weir 8,110 large chinook salmon were counted in 2002. The weir count was 83% of the count of 9,729 in 2001 but still well above the 1992–2001 average of 6,386 (Table 5). Aerial surveys of Beatty Creek and the mainstem Tahltan River were discontinued as recommended in Bernard et al. (2000).

A peak aerial survey above the Little Tahltan River weir not obtained in 2002. From 1985 to 1999, the proportion of the total escapement of chinook salmon counted during peak aerial surveys has ranged from 28.4% to 56.6% and averaged 38.6% (Table 5). 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. In 1998 and 1999, survey conditions were not unusual and there is no explanation for the lower than average proportion of escapement observed Age, sex and length data was collected from 1,160 fish sampled at the Little Tahltan River weir and from 216 post-spawning and dead fish sampled at Verrett Creek (Appendix A4E, A5E).

Based on a stock-recruit model, the BEG was revised in 1999 to a range of 14,000 to 28,000 large chinook total in the Stikine River drainage or 2,700 to 5,300 at the Little Tahltan weir (Bernard et al. 2000). The 2002 weir count was above the revised escapement goal range for the Little Tahltan River, which has been met or exceeded every year since the weir was installed in 1985 (Figure 3). Expansion of the 2002 Little Tahltan weir count of 8,110 large chinook salmon by the survey expansion factor (5.15) produced a total Stikine River escapement estimate of 41,767 large chinook salmon. The estimate of total escapement to the Stikine River from a mark-recapture experiment conducted in 2002 is 50,875 large chinook (SE = 5,912; Der Hovanisian et al. (2004) which is well above the upper end of the escapement goal range for the drainage.

ANDREW CREEK

The 2002 survey count of chinook salmon in Andrew Creek was 876 fish, compared to 1,054 in 2001 (Table 6). In 1998, a spawner recruit analysis was completed and a biological escapement goal range of 650 to 1,500 total (~325-750 index count) large spawners was adopted (Clark et al. 1998). Since 1985, Andrew Creek escapements have exceeded the lower limit of the goal in all but two years (Figure 4).

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 during 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). No survey expansion was necessary for the years when the weir provided total escapement counts (Appendix A2).

Table 2.–Counts of spawning chinook salmon in index areas of the Taku River, 1951–2002.

Year[a]	Nakina River		Nahlin River		Kowatua River		Tatsamenie River		Dudidontu River		5 Trib. total	Tseta Creek[f]	
1951	5,000	(F)[b]	1,000	(F)	–		–		400	(F)	6,400	100	(F)
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[c]	(F/W)	–		–		–		–		1,500		
1958	2,500[c]	(F/W)	2,500	(A)	–		–		4,500	(A)	9,500		
1959	4,000[c]	(F/W)	–		–		–		–		4,000		
1962	–		216	(A)	–		–		25	(A)	241	81	(A)
1965	3,050	(H)	35	(A)	200	P(A)	50	P(A)	110	(A)	3,445	18	(A)
1966	3,700	P(A)	300	(A)	14	P(A)	100	P(A)	252	(A)	4,366	151	(A)
1967	700	(A)	300	P(A)	250	P(A)	–		600	(A)	1,850	350	(A)
1968	300	P(A)	450	(A)	1,100	(A)	800	E(A)	590	(A)	3,240	230	(A)
1969	3,500	(A)	–		3,300	(A)	800	E(A)	–		7,600	–	
1970	–		26	(A)	1,200	P(A)	530	E(A)	10	(A)	1,766	25	(A)
1971	500	(A)	473	(A)	1,400	E(A)	360	E(A)	165	(A)	2,898	–	(A)
1972	1,000	(F)	280	(A)	170	(A)	132	(A)	102	(A)	1,684	80	P(A)
1973	2,000	N(H)	300	E(H)	100	N(H)	200	E(H)	200	E(H)	2,800	4	(A)
1974	1,800	E(H)	900	E(H)	235	(A)	120	(A)	24	(A)	3,079	4	(A)
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)	–		3,284	21	E(H)
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)	9,528	258	N(H)
1982	2,533	E(H)	1,246	E(H)	289	N(H)	387	N(H)	130	N(H)	4,585	228	N(H)
1983	968	E(H)	391	N(H)	171	E(H)	236	E(H)	117	E(H)	1,883	179	N(H)
1984[d]	1,887	(H)	951	(H)	279	E(H)	616	E(H)	–		3,733	176	(H)
1985	2,647	N(H)	2,236	E(H)	699	E(H)	848	E(H)	475	(H)	6,905	303	E(H)
1986	3,868	(H)	1,612	E(H)	548	E(H)	886	E(H)	413	E(H)	7,327	193	E(H)
1987	2,906	E(H)	1,122	E(H)	570	E(H)	678	E(H)	287	E(H)	5,563	180	E(H)
1988	4,500	E(H)	1,535	E(H)	1,010	E(H)	1,272	E(H)	243	E(H)	8,560	66	E(H)
1989	5,141	E(H)	1,812	E(H)	601[e]	(W)	1,228	E(H)	204	E(H)	8,986	494	E(H)
1990	7,917	E(H)	1,658	E(H)	614[e]	(W)	1,068	N(H)	820	E(H)	12,077	172	N(H)
1991	5,610	E(H)	1,781	E(H)	570	N(H)	1,164	E(H)	804	E(H)	9,929	224	N(H)
1992	5,750	E(H)	1,821	E(H)	782	E(H)	1,624	N(H)	768	N(H)	10,745	313	N(H)
1993	6,490	E(H)	2,128	N(H)	1,584	E(H)	1,491	E(H)	1,020	E(H)	12,713	491	N(H)
1994	4,792	N(H)	2,418	E(H)	410	P(H)	1,106	N(H)	573	N(H)	9,299	614	E(H)
1995	3,943	E(H)	2,069	E(H)	550	N(H)	678	N(H)	731	E(H)	7,971	786	E(H)
1996	7,720	E(H)	5,415	E(H)	1,620	N(H)	2,011	N(H)	1,810	N(H)	18,576	1,201	N(H)
1997	6,095	E(H)	3,655	E(H)	1,360	N(H)	1,148	N(H)	943	N(H)	13,201	648	N(H)
1998	2,720	E(H)	1,294	N(H)	473	N(H)	675	E(H)	807	E(H)	5,969	360	E(H)
1999	1,900	N(H)	532	N(H)	561	E(H)	431	N(H)	527	E(H)	3,951	221	N(H)
2000	2,907	N(H)	728	P(H)	702	N(H)	953	N(H)	482	N(H)	5,772	160	N(H)
2001	1,552	P(H)	935	N(H)	1,050	N(H)	1,024	N(H)	479	N(H)	5,040	202	N(H)
2002	4,066	E(H)	1,099	N(H)	945	N(H)	1,145	N(H)	834	N(H)	8,089	192	N(H)
92–01 Average	4,387		2,100		909		1,114		814		9,324	500	

[a] Counts before 1975 may not be comparable due to changes in survey dates and methods; foot surveys may include 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 = conditions excellent.

[c] Partial survey of Nakina River in 1957–59; comparisons made from carcass weir (W) 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, 1989, 1990.

[f] Tseta Creek removed from index areas in 1999.

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

Year	Nakina River	%	Nahlin River	%	Kowatua River	%	Tatsamenie River	%	Dudidontu River	%	Tseta 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
1997	6,095	44	3,655	26	1,360	10	1,148	8	943	7	648	5	13,849
1998	2,720	43	1,294	20	473	7	675	11	807	13	360	6	6,329
1999	1,900	46	532	13	561	13	431	10	527	13	221	5	4,172
2000	2,907	49	728	12	702	12	953	16	482	8	160	3	5,932
2001	1,552	30	935	18	1,050	20	1,024	20	479	9	202	4	5,242
Average	4, 245	48	1,830	20	746	9	995	11	597	7	357	4	8,770
2002	4,066	49	1,099	13	945	11	1,145	14	834	10	192	2	8,281

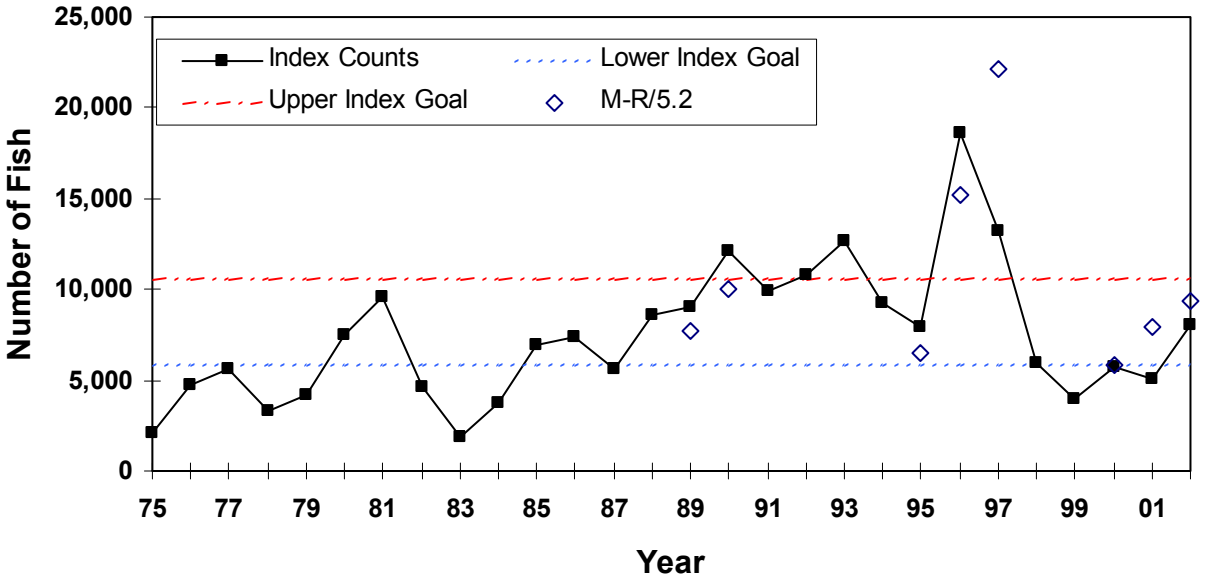

Figure 2.–Counts of chinook salmon in index areas of the Taku River, 1975–2002 and mark-recapture estimates divided by expansion factor of 5.2. Lines show upper and lower limits of index escapement goal range.

Table 4.–Index counts of Taku River chinook salmon, mark-recapture estimates of escapement, percent of escapement observed, and expansion factor (π).

Year	Counts[a]	M-R	SE	% Observed	π
1989	8,986	40,329	5,646	22.3	4.5
1990	12,077	52,142	9,326	23.2	4.3
1995	7,971	33,805	5,060	23.6	4.2
1996	18,576	79,019	9,048	23.5	4.2
1997	13,201	114,938	17,888	11.5	8.7
Avg.	12,162	64,047		19.0	5.2
1998	5,969	not available			
1999	3,951	not available			
2000	5,772	not available			
2001	5,040	41,179	6,236	15.1	6.6
2002	8,089	48,848	5,906	16.6	6.0

[a] Sum of five tributaries, not 6 as prior to 1999.

One aerial, one helicopter, and one foot survey were conducted of Andrew Creek over a 3 day period in August, 2002 with 735, 852, and 876 chinook salmon counted respectively (Appendix A3). The foot count was used as the peak count based on experience from years when the weir was operated and surveys were conducted, and on timing of the surveys.

Age, sex, and length data were collected from 174 pre-spawning fish in Andrew Creek, using angling gear and dip nets (Appendix A4F, A5F).

ALSEK RIVER

The count of large chinook salmon through the Klukshu River weir in 2002 was 2,241 fish, a 23% increase from the count of 1,825 in 2001 (Table 7; Figure 5). The escapement to the Klukshu, estimated by subtracting the Aboriginal Fishery (AF) harvest (100) and sport harvest (0) above the weir from the weir count, was 2,141 fish, within the escapement goal range of 1,100 to 2,300, adopted in 1998 (McPherson et al. 1998b). All of the sport and some of the AF harvest was below the weir.

Table 5.–Counts of spawning chinook salmon in the Little Tahltan River, Stikine River, 1975–2002.

Year	Weir count	Above-weir catch [b]	Escape-ment	Aerial survey Peak count [a, c]		Aerial survey % counted
1975	-			700	E(H)	
1976	-			400	N(H)	
1977	-			800	P(H)	
1978	-			632	E(H)	
1979	-			1,166	E(H)	
1980	-			2,137	N(H)	
1981	-			3,334	E(H)	
1982	-			2,830	N(H)	
1983	-			594	E(H)	
1984	-			1,294	(H)	
1985	3,114	0	3,114	1,598	E(H)	51.3
1986	2,891	0	2,891	1,201	E(H)	41.5
1987	4,783	0	4,783	2,706	E(H)	56.6
1988	7,292	0	7,292	3,796	E(H)	52.1
1989	4,715	0	4,715	2,527	E(H)	53.6
1990	4,392	0	4,392	1,755	E(H)	40.0
1991	4,506	0	4,506	1,768	E(H)	39.2
1992	6,627	0	6,627	3,607	E(H)	54.4
1993	11,449	12	11,437	4,010	P(H)	35.1
1994	6,387	14	6,373	2,422	N(H)	38.0
1995	3,072	0	3,072	1,117	N(H)	36.4
1996	4,821	0	4,821	1,920	N(H)	39.8
1997	5,557	10	5,547	1,907	N(H)	34.4
1998	4,879	6	4,873	1,385	N(H)	28.4
1999	4,738	0	4,738	1,379	N(H)	29.1
2000	6,640	9	6,631	2,720	N(H)	41.0
2001	9,730	0	9,730	4,158	N(H)	42.7
92-01 Avg.	6,386	5	6,381	2,463		38.6
2002	8,110	0	8,110	no survey		

[a] (F) = foot survey; N = normal survey conditions; (H) = helicopter survey; P = survey conditions hampered by glacial or turbid waters; E = excellent survey conditions; — = no survey conducted .

[b] Above-weir harvest includes broodstock collection and Aboriginal fishery catch.

[c] Peak count equals peak survey above weir plus count below weir on that date.

No aerial survey of the Klukshu River was conducted in 2002. However, in helicopter surveys we counted 220 large chinook salmon in the Takhanne River, 351 in the Blanchard River, and 86 in Goat Creek.

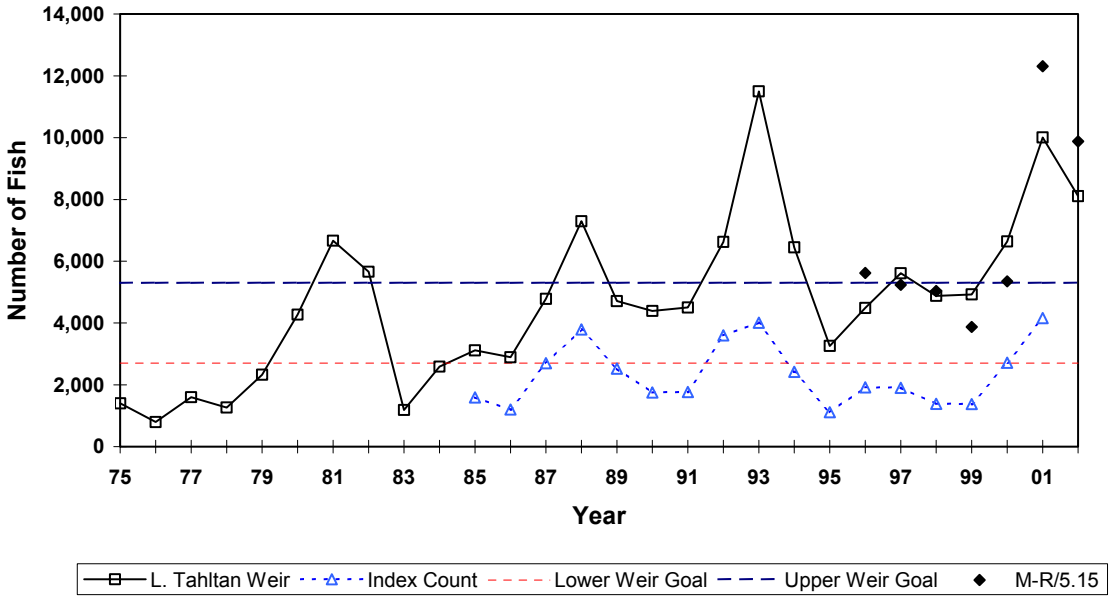

Figure 3.–Counts of chinook salmon at the Little Tahltan River weir, Stikine River, 1975–2002. Mark-recapture estimates divided by expansion factor of 5.15. Data for 1985–2000 from weir counts, 1975–1984 estimated by doubling index count. Lines show upper and lower limits of escapement goal range.

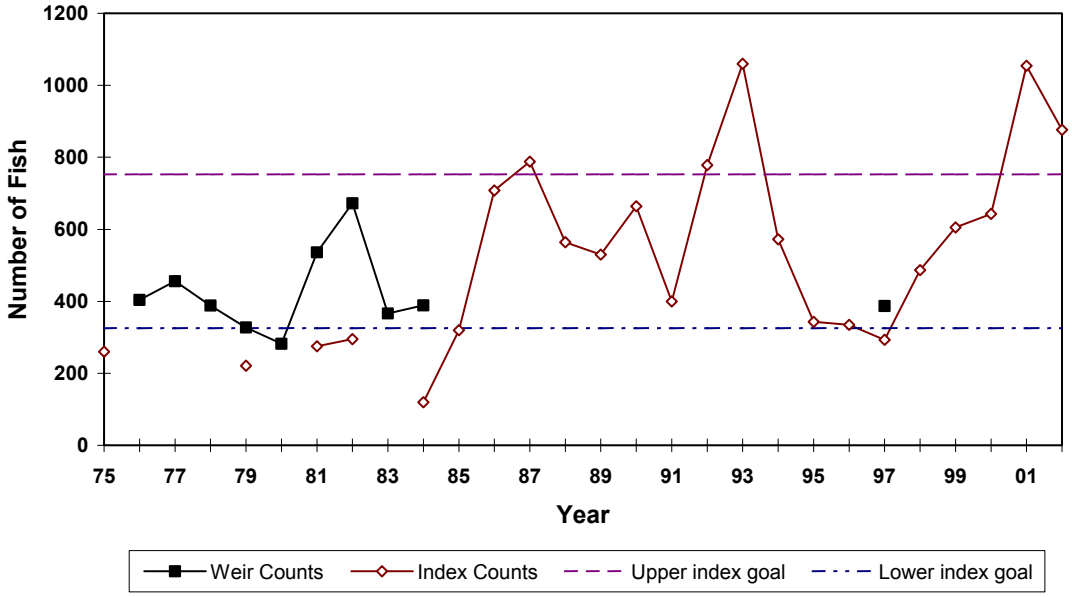

Figure 4.–Counts of chinook salmon at the Andrew Creek Weir, 1976–1984, 1997 and in aerial/foot surveys, 1975, 1985–2002 Lines show upper and lower bounds of index escapement goal range.

Table 6.–Counts of spawning chinook salmon in selected rivers in central Southeast Alaska, 1956–2002 (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 conditions; E = excellent conditions; P = poor conditions; (B) = escapement surveyed from boat.

											Bradfield River			
Year	Andrew Cr.[a]		North Arm		Clear Creek		Harding River		Aaron Creek		N. Fork		E. Fork	
1956	4,500	(A)	–		–		–		–		–		–	
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		–	–		–		–		–		–		–	
1971	305	(A)	–		–		–		–		–		–	
1972		–	–		–		–		–		–		–	
1973	40	(A)	–		–		10		–		–		–	
1974	129	(A)	–		–		35		–		–		–	
1975	260	(F)	–		–		–		–		–		–	
1976	404	(W/F)	–		–		12	N(A)	24		–		13	P(A)
1977	456	(W/F)	–		–		410	E(A)			–			
1978	388	(W/F)	24	E(F)	–		12	N(H)	–		–		63	P(A)
1979	327	(W/F)	16	E(F)	–		–		–		–		10	P(A)
1980	282	(W/F)	68	F(N)	–		–		–		30	P(H)	–	
1981	536	(W/F)	84	E(F)	4	P(F)	28	P(H)	12		84	P(H)	–	
1982	672	(W/F)	138	F(N)	188	N(F)	8	E(A)	–				–	
1983	366	(W/F)	15	F(N)	–		15	P(A)	–		55	N(H)	–	
1984	389	(W/F)	31	F(N)	–		35	N(B)	–		–		–	
1985	320	E(F)	44	E(F)	–		243	N(F)	179		58	N(A)	85	N(A)
1986	708	N(F)	73	F(N)	45	E(A)	240	N(B)	178		104	E(A)	215	E(A)
1987	788	E(H)	71	E(F)	122	N(F)	40	E(A)	51		186	P(A)	175	P(A)
1988	564	N(F)	125	F(N)	167	N(F)	70	P(A)	325		680	N(A)	410	N(A)
1989	530	E(F)	150	A(N)	49	N(H)	80	P(A)	135		193	P(A)	132	P(A)
1990	664	E(F)	83	F(N)	33	P(H)	24	P(A)	–		–		–	
1991	400	N(A)	38	A(N)	46	N(A)	42	N(F)	–		81	P(A)	320	P(A)
1992	778	E(H)	40	E(F)	31	N(A)	48	P(A)	30	P(A)	–		–	
1993	1,060	E(F)	53	E(F)	–		40	N(A)	–		33	P(A)	118	P(A)
1994	572	E(H)	58	E(F)	10	N(A)	87	N(H)	27	P(H)	15	P(H)	–	
1995	343	P(A)	28	A(P)	1	E(A)	38	N(H)	65	N(H)	16	P(A)	43	P(A)
1996	335	N(F)	35	F(N)	21	N(A)	75	N(A)	15	N(H)	78	N(A)	48	P(A)
1997	293	N(F)	–		–		–		55	N(H)	-		30	A(P)
1998	487	E(F)	35	N(A)	28	N(A)	75	N(A)	69	P(A)	-		66	P(A)
1999	605	E(A)	22	N(A)	–		–		550	N(A)	–		5	P(A)
2000	690	N(A)	35	N(A)	–		–		16	P(A)	–		33	N(A)
2001	1,054	N(F)	28	N(F0			150	N(H)	130	N(A)	248	E(A)	115	E(A)
92–01	622		37		18		73		106		78		57	
2002	876	N(F)	34	N(F)	8	N(A)	33	A	15	A				

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

Table 7.–Escapement of chinook salmon to the Klukshu River and counts of spawning adults in other tributaries of the Alsek River, 1965–2002. (A) = aerial survey from fixed wing aircraft; (H) = helicopter survey; E = excellent survey conditions; N = normal conditions; P = poor conditions; – = no survey.

	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]
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
1997	718	P(H)	2,989	160	0	0	2,829	109	P(H)	190	P(H)	–		3,128
1998	–		1,364	17	0	0	1,347	71	P(H)	136	N(H)	39	N(H)	1,593
1999	500	P(H)	2,193	27	0	0	2,166	371	N(H)	194	N(H)	51	N(H)	2,782
2000	–		1,365	44	0	0	1,321	168	N(H)	152	N(H)	33	N(H)	1,698
2001	–		1,825	87	0	0	1,738	543	N(H)	287	N(H)	21	N(H)	2,589
92–01 avg.	848		2,741	106	0	9	2,626	249		222		36		3,126
2002	–		2,241	100	0	0	2,141	351	N(H)	220	N(H)	86	E(H)	2,798

[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 above weir Aboriginal Fishery (AF) catch and broodstock.

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

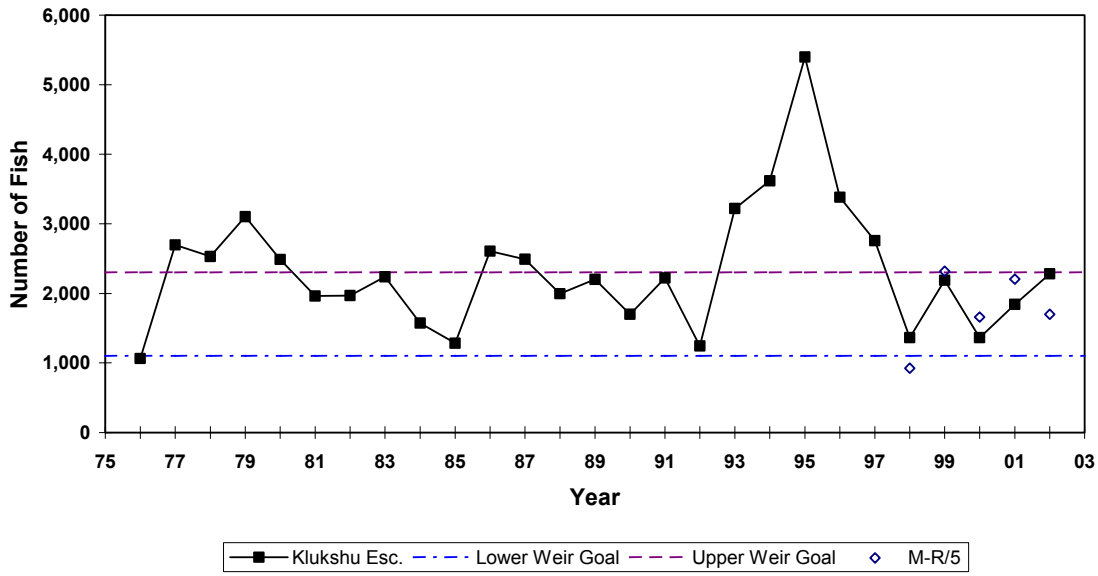

Figure 5. –Weir count of chinook salmon to the Klukshu River tributary of the Alsek River, 1976–2002. Mark-recapture estimates divided by expansion factor of 5.0. Lines show upper and lower limits of revised escapement goal range.

There is no agreement in the PSC on use of expansion factors for the Alsek River; those used in the past have ranged from 1.56 to 2.5, based on assumptions that the Klukshu River represented 40–64% of the escapement to the entire drainage (Pahlke 1997b). Results from the 1998 tagging study to estimate distribution and escapement of Alsek River chinook salmon indicated that the Klukshu River accounts for about 16–25% of the escapement to the Alsek River drainage (Pahlke et al. 1999). Results from the 1999 and 2000 studies indicate less than 20% of the escapement to the Alsek drainage is accounted for in the Klukshu River (Pahlke and Etherton 2001b, 2002). On the basis of results in those two studies, the expansion factor was revised to 5.0 (Table 8). The escapement to the entire drainage was then estimated by expanding the weir count by 5.0 and subtracting the above-weir (100) harvest, leaving an estimated escapement of 11,105 fish. Results of a mark-recapture experiment indicate a total escapement of 9,510 chinook salmon (SE = 623; 8,807 large; Pahlke and Waugh 2003).

Age, sex and length data were collected from 636 live fish sampled at the Klukshu River weir, other spawning areas and at a lower river tagging project (Appendix A4J; A5J).

Table 8.–Klukshu River weir counts of large chinook salmon, mark-recapture estimates of escapement to Alsek River, percent of escapement observed at weir, and expansion factor (π). From Pahlke and Waugh (2003)**.**

Year	Counts	M-R	SE	% Observed	π
1998	1,184	4,621	1,430	25.6	3.9
1999	1,663	11,597	2,886	14.3	7.0
2000	1,218	8,295	1,597	14.7	6.8
2001	1,538	11,022	1,336	14.0	7.2
2002	2,067	8,504	623	24.3	4.1
Avg.	1,534	9,382	1,615	16.6	6.2

UNUK RIVER

In 2002, 897 large chinook salmon were counted in all index areas of the Unuk River (Table 9), less than half the count in 2001 and below the recent 10-year average of 1,011 (Table 10). The total count was within the index goal range of 650 to 1,400 (McPherson and Carlile 1997). Index counts have been below the lower end of the escapement goal range only three times since 1981 (Figure 6).

Table 9.–Peak escapement counts of chinook salmon to index areas of the Unuk River, 1960–2002.

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 [d]
1993	448	N(F)	330	N(F)	132	E(F)	137	N(F)	8	N(F)	13	P(H)	1,068
1994	161	P(F)	300	N(F)	52	N(H)	128	E(F)	18	N(F)	52	N(F)	711
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
1997	244	P(F)	154	N(F/H)	53	N(F)	113	N(F)	13	N(H)	59	E(F)	636
1998	311	N(F)	283	N(F)	39	N(H)	81	N(F)	22	N(F)	104	N(F)	840
1999	202	N(F)	307	N(F)	54	N(H)	67	N(F)	9	N(F)	41	N(F)	680
2000	450	N(F)	565	N(F)	116	N(H)	86	N(H)	56	E(H)	68	N(H)	1,341
2001	701	N(F)	806	N(F/H)	217	E(H)	167	N(H)	84	N(H)	44	P(H)	2,019
92-01 Avg	347		385		87		106		30		55		1,011
2002	156	P(F)	455	N(F/H)	78	N(H)	87	N(H)	61	N(H)	60	E(F)	897

[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] Cripple Creek weir count reduced by /0.625 to be comparable with foot surveys.

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
1997	244	38	154	24	53	8	113	18	13	2	59	9	636
1998	311	37	283	34	39	5	81	10	22	3	104	12	840
1999	202	30	307	45	54	8	67	10	9	1	41	6	680
2000	450	34	565	42	116	9	86	6	56	4	68	5	1,341
2001	701	35	806	40	217	11	167	8	84	4	44	2	2,019
Avg.	434	38	355	32	179	15	98	9	29	3	39	4	1,134
2002	156	17	455	51	78	9	87	10	61	7	60	7	897

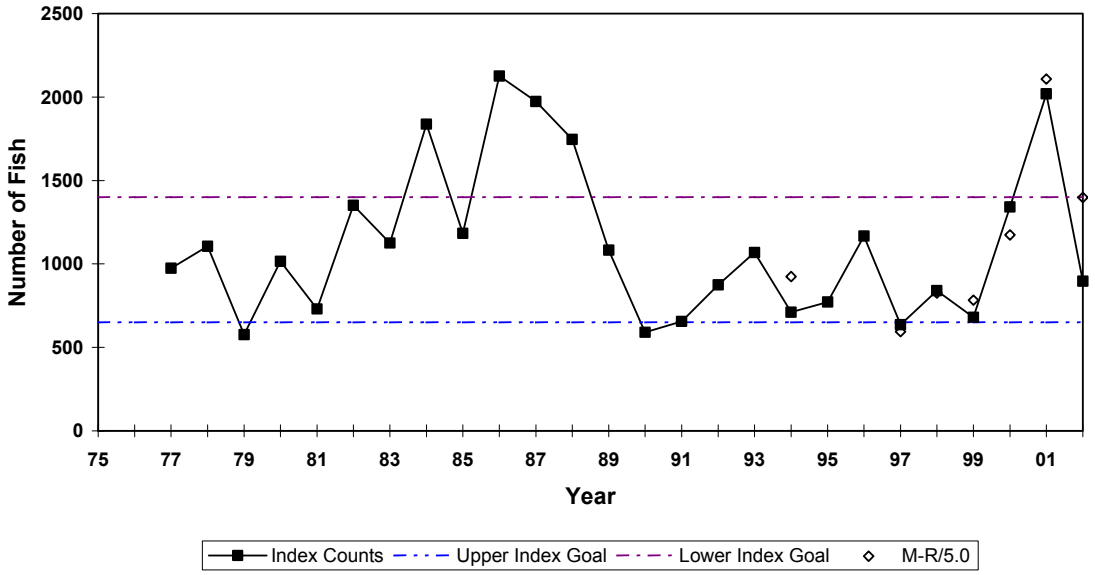

Figure 6.–Counts of large chinook salmon in index areas of the Unuk River, 1975–2002, and mark-recapture estimates divided by expansion factor (5.0). Lines show upper and lower limits of index escapement goal range.

Table 11.–Index counts of Unuk River chinook salmon, mark-recapture estimates of escapement, percent of escapement observed, and expansion factor (π). From Weller and McPherson (2003a,).

Year	Counts	M-R	SE	% Observed	π
1997	636	2,970	277	21.4	4.7
1998	840	4,132	413	20.3	4.9
1999	680	3,914	490	17.4	5.8
2000	1,341	5,872	644	22.8	4.4
2001	2,019	10,541	1,181	19.1	5.2
Avg.	1,069	5,736	635	18.5	5.0

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 rivers (Pahlke et al. 1996; Pahlke 1997a,b). After 5 more years of mark-recapture estimates, the expansion factors were revised in 2002 to 5.0 on the Unuk and 5.17 on the Chickamin River (Table 11, above; McPherson et al. 2003). The expansion factor produced an estimated escapement of 4,485 large chinook salmon to the Unuk River in 2002, a decrease of 66% from 2001. The ongoing mark-recapture program estimated an escapement of 6,988 (SE = 805) large chinook salmon in 2002 (Weller and McPherson 2003b). As part of that project, 746 fish were sampled for age, sex and size data (Appendix A4D, A5D). Live fish were sampled with angling gear and carcasses were collected by spear.

CHICKAMIN RIVER

In index areas on 8 tributaries of the Chickamin River, 1,013 large chinook salmon were counted in 2002, nearly identical to the count of 1,010 in 2001 (Table 12). Counts in 2002 were above the 10-year average in 4 out of 8 Chickamin River tributaries (Table 13). The 2002 count was above the upper end of the index survey escapement goal range of 450 to 900 fish (Figure 7) (McPherson and Carlile 1997). The summed counts for 2002 were multiplied by a survey expansion factor of 5.17 to produce a total escapement estimate of 5,237 fish to the system. A mark-recapture program conducted in 2002 estimated a total escapement of 5,654 (SE = 780) chinook salmon, including 5,007 large chinook salmon (Freeman and McPherson 2004). Angling and spears were used to collect age, sex and length data from 677 fish in 2002 (Appendix A4C, A5C).

BLOSSOM RIVER

In index areas of the Blossom River, 224 large chinook salmon were counted in 2002, up from 204 fish counted in 2001 (Table 14). The 2002 count was 10% below the lower limit of the index survey goal range of 250 to 500 (McPherson and Carlile 1997). Counts had exceeded the goal from 1982 to 1989, but since 1991 they have frequently been below the escapement goal range (Figure 8). Based on results of mark-recapture studies, the expansion factors for the Blossom and Keta rivers were revised in 1996 from 1.6 to 2.5 (Pahlke 1997b) and again in 2002 to 4.0 (McPherson et al. 2003). The count for 2002 was multiplied by the expansion factor of 4.0 to produce a total escapement estimate of large 896 fish.

Angling was used to sample age, sex and length data and 85 samples were collected in 2002 (Appendix A4B, A5B).

KETA RIVER

In 2002, 411 chinook salmon were counted in the Keta River, up from 343 counted in 2001 (Table 12) and within the 1996 revised index goal range of 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 escapement goal range every year since 1981 (Figure 9). Based on results of mark-recapture studies in 1998–2000, the expansion factor for the Keta River was revised in 2001 from 2.5 to 3.0 (Freeman et al. 2001). The peak count for 2002 was multiplied by a survey expansion factor of 3 to produce a total escapement estimate of 1,233 large fish.

Angling was used to collect 311 age, sex and length samples from live fish (Appendix A4A, A5A).

Table 12.–Counts of chinook salmon in index areas of the Chickamin River, 1960–2002.

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]
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
1998	46 N(H)	0 N(H)	124 E(H)	16 P(H)	46 N(H)	28 N(H)	123 N(H)	8 P(H)	391
1999	54 N(H)	18 N(H)	106 N(H)	33 N(H)	52 N(F)	16 N(F)	200 N(H)	22 N(H)	501
2000	109 N(H)	27 N(H)	230 E(H)	61 N(H)	63 N(H)	20 N(H)	251 N(H)	40 P(H)	801
2001	264 E(H)	27 N(H)	270 E(H)	59 N(H)	61 N(H)	78 N(F)	221 N(H)	30 N(H)	1,010[d]
92-01 Avg.	85	19	111	29	40	27	140	39	488
2002	329 N(H)	20 N(H)	102 N(H)	23 N(H)	146 E(H)	9 P(H)	361 E(H)	23 N(H)	1,013

[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 %.

[d] Mark-recapture estimates of escapement: 1995 = 2,309 large fish (SE 723); 1996 = 1,587 (SE 199); 2001= 5,177 (SE 1,025).

Table 13.–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
1997	28	10	10	4	43	16	7	3	24	9	15	6	95	35	50	18	272
1998	46	12	0	0	124	32	16	4	46	12	28	7	123	31	8	2	391
1999	54	11	18	4	106	21	33	7	52	10	16	3	200	40	22	4	501
2000	109	14	27	3	230	29	61	8	63	8	20	2	251	31	40	5	801
2001	264	26	27	3	270	27	59	6	61	6	78	8	221	22	30	3	1,010
Avg.	139	21	69	10	105	16	27	4	54	8	29	4	203	30	39	6	666
2002	329	32	20	2	102	10	23	2	146	14	9	1	361	36	23	2	1,013

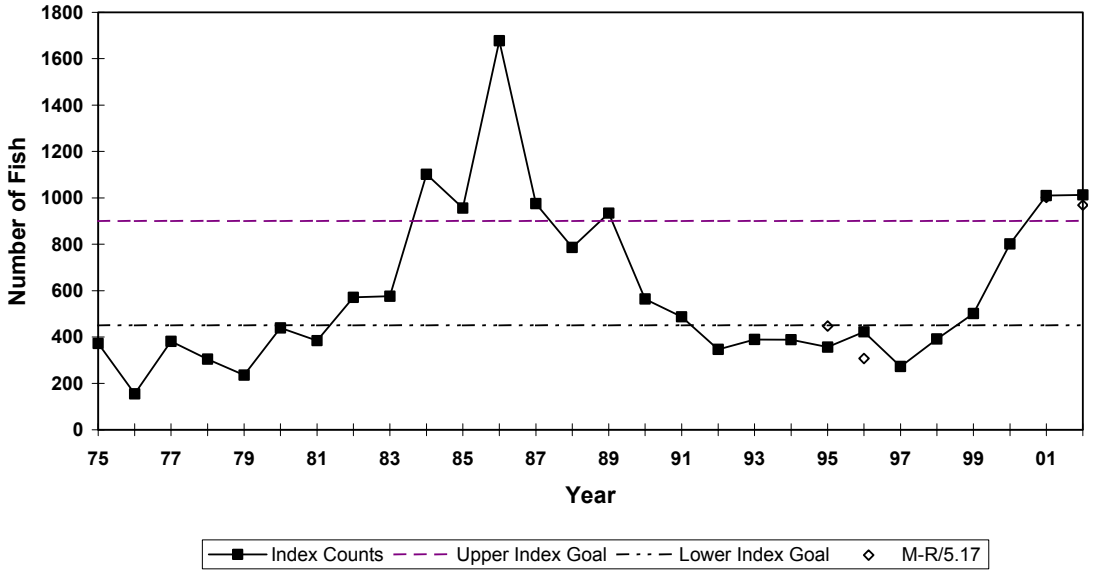

Figure 7.–Counts of chinook salmon in index areas of the Chickamin River, 1975–2002 and mark-recapture estimates divided by expansion factor (5.17). Lines show upper and lower limits of index escapement goal range.

Table 14.–Counts of chinook salmon for selected rivers in Behm Canal, 1961–2002. Survey types: F = foot, A = airplane, H = helicopter, – = no survey. Conditions: P = poor, N = normal, E = excellent.

Year[a]	Keta River		Blossom River		Wilson River		Marten River		Grant River		Klahini River		Total
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	N(H)	239	N(H)	–		135	N(H)	–		–		646
1992	217	N(H)	150	N(H)	109	E(H)	76	(H)	25	N(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
1997	246	N(H)	132	N(H)	16	N(H)	56	N(H)	9	N(H)	–		459
1998	180	N(H)	91	N(H)	–		–		–		–		271
1999	276	E(H)	212	N(H)	–		–		–		–		488
2000	300	N(H)	231	N(H)	–		–		–		–		531
2001	343	E(H)	204	N(H)	79	E(H)	–		–		83	E(H)	626
1992-01 avg.	270		192		58		129		17		51		580
2002	411	E(H)	224	E(H)	–		–		–		–		635

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

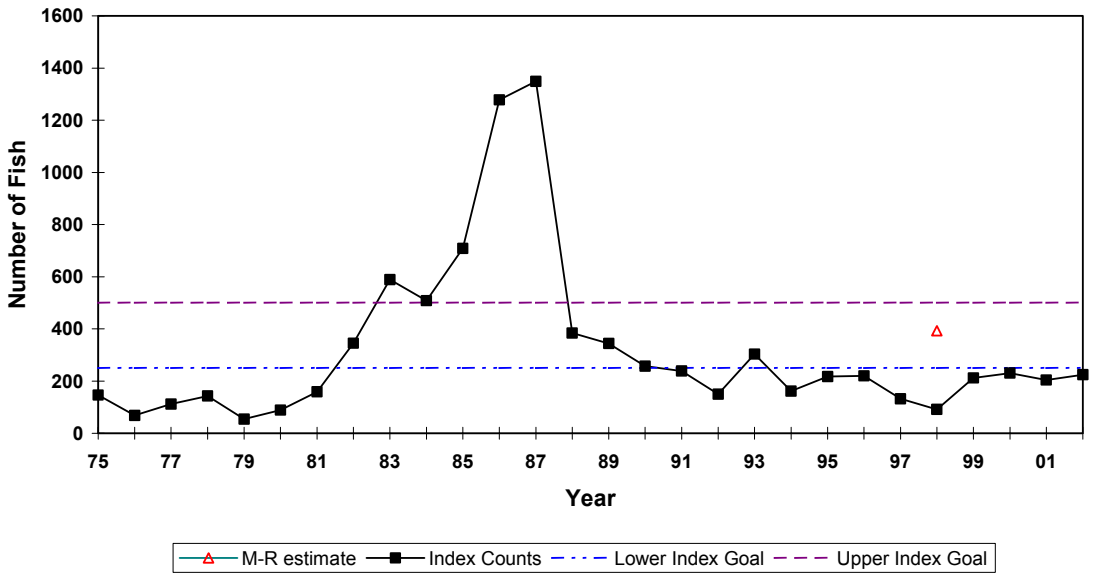

Figure 8.–Counts of chinook salmon into the Blossom River, 1975–2002. Lines show upper and lower limits of index escapement goal range.

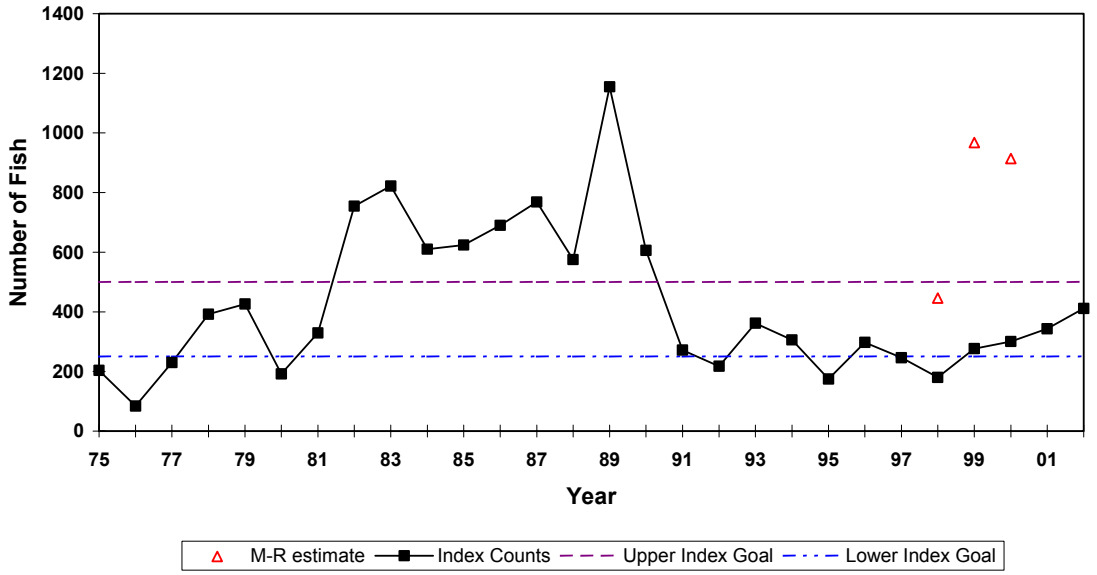

Figure 9.–Counts of chinook salmon to the Keta River, 1975–2002 and mark-recapture estimates for 1998–2000. Lines show upper and lower limits of index escapement goal range.

KING SALMON RIVER

Two helicopter surveys and a foot survey were conducted on King Salmon River in 2002. The peak count during the helicopter surveys by the primary observer was 45 large chinook salmon while 102 were counted during the foot survey. This was similar to the 98 fish counted in 2001. (Table 15; Figure 10). The escapement goal was revised in 1997 to a range of 120 to 240 total large fish, (McPherson and Clark 2001). The resulting index goal range is 80–160 large fish observed. Counts exceeded the lower bound of the index goal range since 1993, and the 2001 count continued that trend. The peak count of 102 was multiplied by the survey expansion factor of 1.5 to produce a total escapement estimate of 153 large fish to the system. Angling gear was used to collect age, sex and length data from 74 chinook salmon in 2002 (Appendix A4G, A5G).

SITUK RIVER

The count of all chinook salmon through the Situk River weir in 2002 was 1,772 fish. The estimate of sport harvest above the weir is 66 fish. The escapement estimate of large fish (3-5 ocean age) as determined by analysis of length and age samples was 1,000 (Table 16; McPherson et al. 2003). Escapements have met or exceeded the escapement goal range of 450–1,050 large spawners (730 point) each year since 1984 (Figure 11). 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. 2001). 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.

Age, sex and length data was collected from 119 live fish sampled at the weir (Appendix A4K, A5K).

CHILKAT RIVER

The 2002 escapement to the Chilkat River was estimated by mark-recapture experiment to be 4,051 large chinook salmon (SE = 433), similar to the escapement estimated in 2001 and close to the 10-year average of 4,724 (Ericksen 2002; Appendix A2). The escapement goal was reviewed in 2002 and revised slightly to a range of 1,750 to 3,500 large fish (Ericksen and McPherson, *in prep.*). The mark-recapture experiment also provided age, sex, and size data from 624 fish captured with nets and spears on the spawning grounds (Appendix A4I, A5I).

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, periodic counts have been made in the two rivers since 1982 because of their proximity to other surveyed systems. Grant and Klahini rivers are small chinook systems near the Unuk River in Behm Canal which have been surveyed sporadically. Since 1995, occasional surveys were flown on the Harding River and Aaron Creek to determine the feasibility of adding these medium and small systems to the program. No surveys were conducted in 2002 on any of these systems. (Tables 7, 14). The remaining systems are too remote, and no funds are presently available for such surveys. However, several are routinely surveyed by local management biologists and in 2002, 80 chinook were counted in the Farragut River.

OBSERVER TRAINING

No training or calibration surveys were conducted in 2002.

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 is assumed to cause a proportional change in the index count. Consequently, if this assumption holds, even though index counts are not estimates of total escapement, multi-year trends in escapement are correct. Two types of error affect the accuracy of the survey counts.

First, factors intrinsic to each area interfere with the ability to count fish. Examples include heavily shaded areas or topography that prevents close approach with a helicopter, presence of other species that could be confused with chinook

Table 15.–Peak escapement counts and weir counts of spawning chinook salmon in the King Salmon River, 1971–2002.

	Survey count		Survey as percent of weir count	Total egg take (adults)	Total weir count (adults)	Total weir count (jacks)[b]	Adults below weir (foot ct)	Total inriver (adults)	Total natural spawning
	Below weir	Above weir							
Year	A	B	B/(D-C)	C	D	E	F	D+F	D+F-C
1971	–	94 (F)	–	–	–	–	–	–	
1972	–	90 (F)	–	–	–	–	–	–	
1973	–	211 (F)	–	–	–	–	–	–	
1974	–	104 (F)	–	–	–	–	–	–	
1975	–	42 (H)	–	–	–	–	–	–	
1976	–	65 (H)	–	–	–	–	–	–	
1977	–	134 (H)	–	–	–	–	–	–	
1978	–	57 (H)	–	–	–	–	–	–	
1979	–	88 (H)	–	17	–	–	–	–	
1980	–	70 (H)	–	–	–	–	–	–	
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----------						
1994	–	140 N(F)	----------no weir or egg take----------						
1995	–	97 P(H)	----------no weir or egg take----------						
1996	–	192 E(F)	----------no weir or egg take----------						
1997		238 N(F)	----------no weir or egg take----------						
1998		88 E(F)	----------no weir or egg take----------						
1999		200 E(F)	----------no weir or egg take----------						
2000		91 N(F)	----------no weir or egg take----------						
2001		98 N(F)	----------no weir or egg take----------						
1983–92 Avg.	17	126	67%	31	209	56	22	231	188
2002		102 N(F)	----------no weir or egg take----------						

[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%.

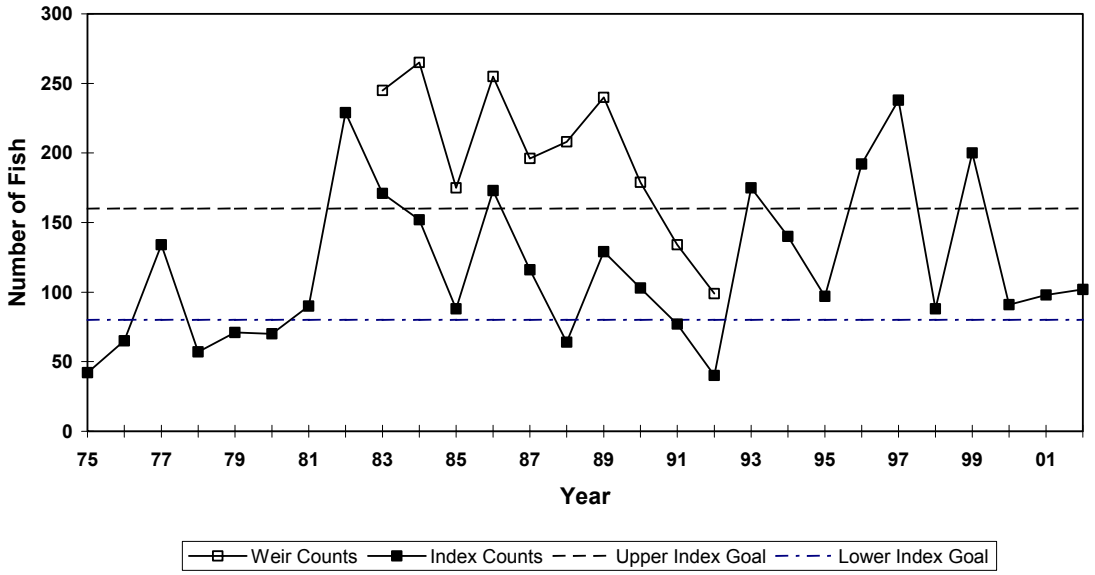

Figure 10.–Counts of chinook salmon at a weir and in survey counts in the index area of the King Salmon River, 1975–2002. Lines show upper and lower limits of index escapement goal range.

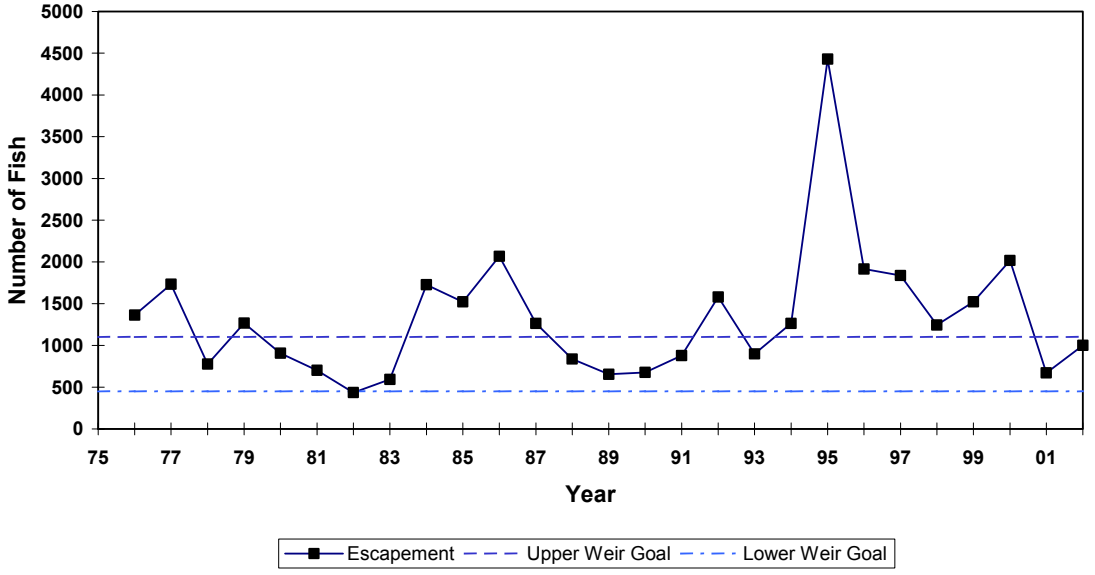

Figure 11.–Counts of large chinook salmon at the Situk River weir, 1975–2002. Lines show upper and lower limits of escapement goal range.

Table 16.–Harvest, escapement, and minimum total run of Situk River chinook salmon, 1976–2002.

	Harvests below weir				Abundance above weir									
					Total weir count	Harvest above weir	Estimated escapement [a]				Estimated total run inriver[b]			
Year	182-70 gillnet	Subsis-tence	Sport	Total			Large	Medium	Small[c]	Total	Large	Medium	Small	Total
1976	1,002	41	200	1,243	1,941	0	1,421	520		1,941				3,184
1977	833	24	244	1,101	1,880	0	1,732	148		1,880				2,981
1978	382	50	210	642	1,103	0	808	295		1,103				1,745
1979	1,028	25	282	1,335	1,800	0	1,284	470		1,800				3,135
1980	969	57	233	1,259	1,125	0	905	220		1,125				2,384
1981	858	62	130	1,050	807	0	702	105		807	1,270	543	44	1,857
1982	248	27	63	338	611	0	434	177		611	672	261	16	949
1983	349	50	52	451	849	0	592	257		849	866	406	28	1,300
1984	512	89	151	752	2,201	0	1,726	475		2,201	2,427	521	5	2,953
1985	484	156	511	1,151	1,982	0	1,521	461		1,982	2,233	683	217	3,133
1986	202	99	37	338	2,572	0	2,067	505		2,572	2,290	583	37	2,910
1987	891	24	395	1,310	1,799	0	1,379	505		1,799	2,215	575	319	3,109
1988	299	90	132	521	1,078	56	868	154		1,022	1,337	259	3	1,599
1989	1	496[d]	0	497	1,871	0	637	243	991	1,871	1,073	198	1,096	2,367
1990	0	516[d]	0	516	1,363	0	628	499	236	1,363	969	755	155	1,879
1991	786	220[d]	67	1,073	1,613	29	889	114	582	1,585	1,678	413	595	2,686
1992	1,504	341	127	1,972	1,985	54	1,595	207	129	1,931	3,103	699	155	3,957
1993	790	202	50	1,042	4,200	202	952	477	2,569	3,998	1,718	753	2,772	5,243
1994	2,656	367	397	3,420	4,416	170	1,271	1,391	1,584	4,246	3,040	3,161	1,764	7,965
1995	8,106	528	1,180	9,814	8,231	506	4,330	565	2,830	7,725	13,439	1,608	3,131	18,177
1996	3,717	478	1,270	5,465	4,151	795	1,800	495	1,061	3,356	6,521	1,509	1,678	9,708
1997	2,339	352	802	3,493	5,001	1,168	1,878	434	1,521	3,834	5,424	1,266	1,923	8,612
1998	2,101	594	494	3,189	5,329	857	924	645	2,902	4,472	3,340	1,924	3,308	8,572
1999	3,810	510	605	4,925	2,786	740	1,461	189	396	2,046	5,453	1,614	644	7,711
2000	1,318	594	352	2,237	3,092	825	1,888	101	278	2,267	4,481	392	455	5,328
2001	1,087	402	45	1,534	1,261	45	656	97	463	1,216	1,809	481	493	2,783
92-01	2,743	437	532	3,712	4,045	536	1,676	460	1,343	3,479	4,818	1,303	1,632	7,753
2002	1,078	416	63	1,557	1,772	66	1,000	424	282	1,706	*pending*			3,329

[a] Escapement from McPherson et al. (2003), based on age composition.

[b] Total run inriver = chinook escapement + Situk commercial, sport, and subsistence harvests. Commercial and subsistence catches include some small chinook .

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

[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.

salmon, and overhanging brush or deep or occluded water. Also, not all spawning areas in a tributary or drainage are surveyed. These factors are accounted for by survey expansion factors.

Second, factors that affect counting efficiency may vary greatly from year to year and survey to survey. These include annual changes in migratory timing; changes in the distribution of spawners among the tributaries of a watershed among years; and inclement weather, turbidity events, or changes in pilot and/or observer experience. Also, the proportion of fish counted in an index area may vary with the number of fish in the index area; e.g., a lower proportion of fish may be counted when abundance is extremely high.

Weather, logistics, run timing, etc., can make it difficult for a single surveyor to complete all the index surveys annually under good or excellent

conditions. Alternate surveyors are thus selected to conduct counts when the primary surveyor cannot; new surveyors also take on primary responsibilities at infrequent intervals. Between-observer variability and bias can be significant (Jones et al. 1998), so new surveyors must be trained and calibrated against the primary surveyor to provide consistency and continuity in data.

Estimates of total escapement (direct estimates or expanded counts) are needed when comparing escapements 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 can be large. Johnson et al. (1992) showed that expansion factors for the Chilkat River, for example, greatly underestimated escapement to that watershed. ADF&G recognized the need to develop better expansions throughout the region, and has independently estimated distribution and escapement for chinook salmon in the Unuk (Pahlke et al. 1996; Jones and McPherson 1999, 2000), Chickamin (Pahlke 1996, 1997a), Stikine (Pahlke and Etherton 1999a; Bernard et al. 2000), Taku (Pahlke and Bernard 1996; McPherson et al. 1998a, 2001), Keta (Brownlee et al. 1999) and Alsek rivers (Pahlke et al. 1999). Total escapement projects are continuing on many of those rivers.

On the basis of information collected on the Unuk and Chickamin rivers, expansion factors for the four Behm Canal systems were revised in 1996 and again in 2002. After three mark-recapture experiments the expansion factor for the Keta River was revised again in 2001. 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 1999 after 5 years of mark-recapture data (McPherson et al. 2000). The expansion factor for the Alsek River was revised in 2002 based on 4 years of mark-recapture studies.

Changing 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 Andrew Creek escapement goal was also revised in 1998 to a range of 650–1,500 total large spawners (Clark et al. 1998). The Canadian Department of Fisheries and Oceans and the Transboundary Technical Committee are included in any review of Taku, Stikine or Alsek River goals. In 1998, a revised stock-recruitment analysis by ADF&G and DFO staff estimated that the escapement goal for the Klukshu River should range between 1,100 and 2,300 spawners (McPherson et al. 1998b). Escapement goals for the Taku and Stikine rivers were approved in 1999 (Bernard et al. 2000; McPherson et al. 2000) and in 2003 for the Chilkat River (McPherson et al. 2003).

Expansion factors and escapement goals will continue to be revised as we complete more studies which include both index counts and estimates of 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 6 of 9 medium (7 with Chilkat) producing watersheds are included in the index survey program. Prior to 1997, counts from these streams were expanded to represent 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 on the basis of over 20 years of systematic escapement surveys in Southeast Alaska and the transboundary rivers (Pahlke 1998). 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%. We think this method more accurately reflects the contribution to regionwide escapement of the unsurveyed systems.

Observer training and calibration flights conducted in 2000 and 2001 indicated fairly consistent undercounting by the alternate observer when compared to the primary observer counts. These flights will be continued in the future and reanalyzed as more calibration surveys are completed.

Escapement goal revisions based on spawner-recruit analysis require a long time series of age and sex composition data along with total escapement estimates. Age, sex, and length composition estimates for all sampled chinook stocks in Southeast Alaska and transboundary rivers are presented in Appendix tables A4-A5. An interesting trend became apparent in 1999, with the largest fish occurring in the southern systems and average size decreasing towards the north. In 2000 and 2001, the largest fish were again seen in the southern systems, but fish in two of the northern systems—Chilkat and Alsek rivers—were larger than those in the central systems. The trend was similar in 2002; however, fish returning to the Taku River and Andrew Creek were the smallest in the region. Many (up to 75%) of the 2-ocean fish sampled on the Blossom, Keta and Chickamin rivers were of legal size (28" total length, ~625 mm MEF), which is uncommon in other systems. When mean lengths at age were tested for differences, lengths from the Keta and Blossom rivers were not different from each other but were statistically larger than those of other systems in almost every case (Appendix A6).

The age-.2 (2-ocean-age jack) component was higher than in 2001, which indicates average survival rates for the 1998 brood year. The return of age-0.2 (1999 brood) to the Situk River was very high, indicating high survival rates for that brood. The 3-ocean-age (1997 brood) class was dominant in most systems in 2002, but less so than in 2001, and age-.4 fish constituted over 60% of the return to the Stikine River and Andrew Creek.

Sampling strategies were designed to make he estimated age and sex distributions relatively unbiased for age-.2 to age-.5 fish. A weir was used to sample the Situk River; stratified mark-recapture studies were used on the Alsek, Chilkat, Taku, Stikine, Unuk and Chickamin rivers; and non-selective rod and reel and/or carcass sampling was used on the Blossom, Keta, Andrew Creek and King Salmon systems. Therefore, comparisons of length or age compositions between stocks within the age-.2. to age-.5 should be relatively unbiased. The Situk River is the only chinook system in Southeast Alaska where the escapement of age-.1 jacks are estimated annually. The mean length at age data is unbiased for all stocks.

Five of the chinook salmon marked with coded-wire tags that were recovered in Southeast Alaska rivers were from systems other than the river where they were recovered (Appendix Table A9). Four tags were from 4 different hatcheries and 1 tag was from a fish tagged in the Unuk River and recovered in the Chickamin River.

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APPENDIX A

Appendix A1.–Survey escapement goals and system goals for large chinook salmon, Southeast Alaska and transboundary rivers, as accepted by ADF&G, DFO, CTC and TTC, 2002.

		Index survey goal[a]			System goal[b]		
			Range			Range	
River	**Index areas**	**Point est.**	**Lower**	**Upper**	**Point est.**	**Lower**	**Upper**
Alsek[c]	Klukshu		1,100	2,300			
Taku[d]	5 tributaries	7,000	5,800	10,600	36,000	30,000	55,000
Stikine[e]	Little Tahltan	3,300	2,700	5,300	17,500	14,000	28,000
Situk[f]	All				730	450	1,050
Chilkat	All				2,200	1,750	3,500
Andrew Cr.[g]	All	400	325	750	800	650	1,500
Unuk[h]	6 tributaries	800	650	1,400			
Chickamin[h]	8 tributaries	525	450	900			
Blossom[h]	All	300	250	500			
Keta[h]	All	300	250	500			
King Salmon R. [i]	All	100	80	160	150	120	240

[a] Index survey goal corresponds to the peak or highest single day count of large spawners in annual survey counts.

[b] System goal corresponds to the estimated total escapement of large spawners in the river system, estimated from mark-recapture studies, weir counts or expanded survey counts.

[c] McPherson et al. (1998b).

[d] McPherson et al. (2000).

[e] Bernard et al. (2000).

[f] McPherson et al. (2003).

[g] Clark et al. (1998).

[h] McPherson and Carlile (1997).

[i] McPherson and Clark (2003).

Appendix A2.–Estimated total escapements of large chinook salmon to escapement indicator systems and to Southeast Alaska and transboundary rivers, 1975–2002. Numbers may be revised annually as data are collected. Index escapements are expanded for survey counting rates and unsurveyed tributaries, numbers in **bold type** are weir counts or mark-recapture estimates and are not expanded [region total expanded for 84% w/o Chilkat River, 90% with Chilkat escapement included].

	MAJOR SYSTEMS				MEDIUM SYSTEMS										
Year	Alsek	Taku	Stikine	Major subt.	Situk	Chilkat	Andrew	Unuk	Chick-amin	Blos-som	Keta	Med subt.	King Salmon	Total all systems	Expanded region total
1975		12,920	7,571				520		1,914	584	609		63		
1976	5,320	24,582	5,723	35,625	**1,421**		**404**		810	272	252		98		
1977	13,490	29,496	11,445	54,431	**1,732**		**456**	4,870	1,875	448	690	10,071	201	64,703	77,027
1978	12,650	17,124	6,835	36,609	**808**		**388**	5,530	1,594	572	1,176	10,068	86	46,763	55,670
1979	15,520	21,617	12,610	49,747	**1,284**		**327**	2,880	1,233	216	1,278	7,218	113	57,078	67,950
77-79 Avg.	13,887	22,746	10,297	46,929	1,275		390	4,427	1,567	412	1,048	9,119	133	56,181	66,883
1980	12,435	39,239	30,573	82,247	**905**		**282**	5,080	2,299	356	576	9,498	104	91,849	109,344
1981	9,815	49,559	36,057	95,431	**702**		**536**	3,655	1,985	636	987	8,501	139	104,071	123,894
1982	9,845	23,847	40,488	74,180	**434**		**672**	6,755	2,952	1,380	2,262	14,455	**354**	88,989	105,939
1983	11,185	9,795	6,424	27,404	**592**		**366**	5,625	3,099	2,356	2,466	14,504	**245**	42,153	50,182
1984	7,860	20,778	13,995	42,633	**1,726**		**389**	9,185	5,697	2,032	1,830	20,859	**265**	63,757	75,901
1985	6,415	35,916	16,037	58,368	**1,521**		640	5,920	4,943	2,836	1,872	17,732	**175**	76,275	90,804
1986	13,035	38,110	14,889	66,034	**2,067**		1,414	10,630	9,022	5,112	2,070	30,315	**255**	96,604	115,004
1987	12,455	28,935	24,632	66,022	**1,379**		1,576	9,865	5,041	5,396	2,304	25,561	**196**	91,779	109,261
1988	9,970	44,524	37,554	92,048	**868**		1,128	8,730	4,064	1,536	1,725	18,051	**208**	110,307	131,318
1989	11,010	**40,329**	24,282	75,621	**637**		1,060	5,745	4,829	1,376	3,465	17,112	**240**	92,973	110,682
Avg.	10,403	33,103	24,493	67,999	1,083		806	7,119	4,393	2,302	1,956	17,659	218	85,876	102,233
1990	8,490	**52,142**	22,619	83,251	**628**		1,328	2,955	2,916	1,028	1,818	10,673	**179**	94,103	112,027
1991	11,115	51,645	23,206	85,966	**889**	**5,897**	800	3,275	2,518	956	816	15,151	**134**	101,251	112,501
1992	6,215	55,889	34,129	96,233	**1,595**	**5,284**	1,556	4,370	1,789	600	651	15,845	**99**	112,177	124,641
1993	16,105	66,125	58,962	141,192	**952**	**4,472**	2,120	5,340	2,011	1,212	1,086	17,193	263	158,648	176,276
1994	18,100	48,368	33,094	99,562	**1,271**	**6,795**	1,144	**4,623**	2,006	644	918	17,401	210	117,173	130,192
1995	26,985	**33,805**	16,784	77,574	**4,330**	**3,790**	686	3,860	**2,309**	868	525	16,368	146	94,088	104,542
1996	17,995	**79,019**	**28,949**	125,963	**1,800**	**4,920**	670	5,835	**1,587**	880	891	16,583	288	142,834	158,704
1997	14,145	**114,938**	**26,996**	156,079	**1,878**	**8,100**	586	**2,970**	1,406	528	738	16,206	357	172,642	191,824
1998	**4,621**	31,039	**25,968**	61,628	**924**	**3,675**	974	**4,132**	2,021	**364**	**446**	12,536	132	74,296	82,551
1999	**11,597**	**20,545**	**19,947**	52,089	**1,461**	**2,271**	1,210	**3,914**	2,544	848	**968**	13,216	300	65,605	72,894
Avg.	13,537	55,352	29,065	97,954	1,573	5,023	1,107	4,127	2,111	793	886	15,117	211	113,282	126,615
2000	**8,295**	30,014	**27,531**	65,840	**1,785**	**2,035**	1,380	**5,872**	4,141	924	**913**	17,050	137	83,027	92,252
2001	**11,022**	**41,179**	**63,523**	115,724	**656**	**4,517**	2,108	**10,541**	**5,177**	816	1,029	24,844	147	140,715	156,350
2002	**8,504**	**48,848**	**50,875**	108,227	**1,000**	**4,050**	1,752	**6,988**	**5,007**	896	1,233	20,926	153	129,306	143,673
CHANGE FROM 2001 to 2002:															
Number	(2,518)	7,669	(12,648)	(7,497)	344	(467)	(356)	(3,553)	(170)	80	204	(3,918)	6	(11,409)	(12,677)
Percent	-23%	19%	-20%	-6%	52%	-10%	-17%	-34%	-3%	10%	20%	-16%	4%	-8%	-8%
Escapement goals:															
Lower	5,500	30,000	14,000	49,400	450	1,750	650	3,250	2,325	1,000	750	10,175	120	59,696	66,329
Point	8,500	36,000	17,500	62,000	730	2,200	800	4,000	2,700	1,200	900	14,920	150	75,370	83,744
Upper	11,500	55,000	28,000	92,200	1,050	3,500	1,500	7,000	4,650	2,000	1,500	21,250	240	111,693	124,103
Average percent of goal:															
77-79	163%	63%	59%	76%	175%		52%	111%	45%	27%	93%	66%	89%	74%	
80-89	122%	92%	140%	110%	148%		108%	178%	126%	153%	174%	128%	145%	113%	
90-99	159%	154%	166%	158%	215%	228%	148%	103%	60%	53%	79%	110%	141%	149%	
00-02	109%	111%	270%	156%	157%	157%	233%	195%	137%	59%	94%	151%	97%	155%	

Appendix A3.–Detailed 2002 Southeast Alaska chinook salmon escapement surveys as entered into Commercial Fisheries Division Integrated Fisheries Database (IFDB/ALEX). Includes all surveys where chinook salmon were observed, many are not used to estimate escapement.

Stream no.	Stream	Date	Tidal	Mouth	Live	Dead	Total	Survey	Obs[a]	Use[b]	Comment
10130030	Keta River	8/16/02	0	0	411	0	411	H	KAP	3	
10130030	Keta River	8/29/02	0	0	343	2	345	H	JAD	2	
10155040	Blossom River	8/16/02	0	0	186	0	186	H	KAP	2	
10155040	Blossom River	8/17/02	0	0	223	1	224	H	KAP	3	
10155040	Blossom River	8/29/02	0	0	160	0	160	H	JAD	2	
1017104A	Barrier Creek	8/6/02	0	0	3	0	3	H	JAD	2	
1017104A	Barrier Creek	8/15/02	0	0	16	0	16	H	KAP	2	
1017104A	Barrier Creek	8/16/02	0	0	20	0	20	H	KAP	3	
1017104B	Butler Creek	8/6/02	0	0	102	0	102	H	JAD	2	
1017104B	Butler Creek	8/15/02	0	0	96	0	96	H	KAP	2	
1017104C	Clear Creek	7/27/02	0	0	36	0	36	F	NLZ	2	
1017104C	Clear Creek	8/6/02	0	0	23	0	23	H	JAD	2	
1017104C	Clear Creek	8/6/02	0	0	15	0	15	F	GMF	2	
1017104C	Clear Creek	8/15/02	0	0	12	0	12	H	KAP	2	
1017104H	Humpy Creek	8/15/02	0	0	0	0	0	H	KAP	1	poor vis
1017104H	Humpy Creek	8/30/02	0	0	54	0	54	F	GMF	2	Jason Leavit
1017104H	Humpy Creek	8/29/02	0	0	9	0	9	H	JAD	3	
1017104I	Indian Creek	8/15/02	0	0	11	0	11	H	KAP	1	late?
1017104I	Indian Creek	8/6/02	0	0	146	0	146	H	JAD	2	
1017104I	Indian Creek	8/7/02	0	0	15	0	15	F	GMF	2	
1017104K	King Creek	8/15/02	0	0	218	0	218	H	KAP	2	
1017104K	King Creek	8/16/02	0	0	361	0	361	H	KAP	3	
1017104K	King Creek	8/29/02	0	0	242	2	244	H	JAD	2	
1017104L	Leduc River	8/6/02	0	0	23	0	23	H	JAD	2	
1017104L	Leduc River	8/6/02	0	0	23	0	23	F	DLM	2	
1017104L	Leduc River	8/15/02	0	0	20	0	20	H	KAP	2	
1017104S	South Fork Chickamin	8/6/02	0	0	329	0	329	H	JAD	2	
1017104S	South Fork Chickamin	8/15/02	0	0	51	0	51	H	KAP	1	
1017104S	South Fork Chickamin	8/16/02	0	0	284	0	284	H	KAP	3	
1017503B	Boundary Cr Unuk R	8/15/02	0	0	90	2	92	F	NLZ	2	18 jacks
1017530C	Clear Creek-Unuk R	8/7/02	0	0	35	0	35	H	JAD	2	
1017530C	Clear Creek-Unuk R	8/15/02	0	0	86	1	87	H	KAP	3	
1017530G	Genes Lake Creek-Unuk	8/19/02	0	200	0	0	200	B	SAM	2	in lake
1017530G	Genes Lake Creek-Unuk	8/19/02	0	200	255	0	455	F	NLZ	2	foot/boat combined peak survey

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Stream no.	Stream	Date	Tidal	Mouth	Live	Dead	Total	Survey	Obs[a]	Use[b]	Comment
1017530G	Genes Lake Creek-Unuk	8/15/02	0	109	0	0	109	H	KAP	2	creek mouth only
1017530G	Genes Lake Creek-Unuk	8/19/02	0	0	255	0	255	F	NLZ	2	
1017530K	Kerr Creek-Unuk R	8/15/02	0	0	11	0	11	H	KAP	2	murky
1017530K	Kerr Creek-Unuk R	8/7/02	0	0	22	0	22	H	JAD	2	
1017530K	Kerr Creek-Unuk R	8/19/02	0	0	59	1	60	F	NLZ	2	
1017530L	Lake Creek-Unuk R	8/15/02	0	0	49	0	49	H	KAP	3	28 at riffles
1017530L	Lake Creek-Unuk R	8/7/02	0	0	59	0	59	H	JAD	2	
1017530L	Lake Creek-Unuk R	8/7/02	0	0	61	0	61	F	SAM	2	
1017530Q	Cripple Ck-Unuk R	8/16/02	0	0	125	31	156	F	NLZ	2	35 jacks
10175015	Eulachon River	7/29/02	0	0	50	0	50	A	PSD	2	
10175015	Eulachon River	8/7/02	0	0	47	1	48	F	DLM	2	
10175015	Eulachon River	8/15/02	0	0	75	3	78	H	KAP	2	
10180070	Hatchery Ck-Yes Bay	9/12/02	0	0	1	0	1	F	AWP	2	
10190050	Naha River	9/9/02	0	0	1	0	1	F	GJH	2	Heckman Lake
10644029	Blind River	6/10/02	750	0	0	0	750	A	TST	2	
10644031	Crystal Creek	8/10/02	700	0	200	0	900	A	WRB	2	IT all below Crystal Cr., PENS FULL
10644031	Crystal Creek	6/21/02	600	50	0	0	650	A	WRB	2	21 BOATS, 450 ABV RAPIDS 150 BLW
10644031	Crystal Creek	7/14/02	650	0	0	0	650	A	WRB	2	100 BLW RAPIDS 300 ABV, 250 FLOATING ROCKS
10740024	Aaron Creek	8/15/02	0	0	15	0	15	A	WRB	1	ONLY CLEAR TRIB 5 MILES UPSTREAM SURVEYED
10740024	Aaron Creek	9/6/02	0	0	0	0	0	A	WRB	2	NO SIGN OF FISH
10740038	Marten Ck Bradfield	8/6/02	0	0	15	0	15	F	TWR	2	DIFFICULT TO VERIFY DEEP POOLS
10740049	Harding River	7/29/02	0	0	33	0	33	A	WRB	2	
10740049	Harding River	8/15/02	0	0	10	0	10	A	WRB	2	
10740053	Bradfield River E Fork	8/15/02	0	0	16	0	16	A	WRB	1	STOPPED SURVEY - TO GLACIAL
10840017	Goat Ck Stikine R	7/31/02	0	22	27	0	49	F	TWR	2	GOT TO NARROW FAST WATER
10840017	Goat Ck Stikine R	8/15/02	0	0	16	0	16	F	TST	2	1 JACK
10840020	Andrews Creek	8/14/02	0	0	851	1	852	H	KAP	3	includes 132 in E. fork
10840020	Andrews Creek	8/8/02	0	0	3	0	3	H	JAD	1	flood
10840020	Andrews Creek	8/15/02	0	20	710	5	735	A	WRB	2	160 E. FRK, 550 S. FRK
10840020	Andrews Creek	8/16/02	0	5	838	33	876	F	TST	2	+ 99 JACKS, 163 IN E. FRK, 1 TAGGED
10840020	Andrews Creek	7/17/02	0	0	0	0	0	A	WRB	2	
10840020	Andrews Creek	9/4/02	0	0	5	0	5	A	WRB	2	
10841010	North Arm Creek	7/31/02	0	0	16	0	16	F	TWR	2	WENT .75 MILE PAST LAST FISH

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Stream no.	Stream	Date	Tidal	Mouth	Live	Dead	Total	Survey	Obs[a]	Use[b]	Comment
10841010	North Arm Creek	8/15/02	0	2	32	0	34	F	TST	2	4 JACKS
10841010	North Arm Creek	7/17/02	0	0	0	0	0	A	WRB	2	
1084013A	W of Hot Springs	9/4/02	0	0	0	0	0	A	WRB	2	PAST PEAK
1084013A	W of Hot Springs	8/1/02	0	0	0	0	0	B	TWR	2	NO FISH IN POOLS
1084013A	W of Hot Springs	7/23/02	0	0	8	0	8	A	TST	2	
1084013A	W of Hot Springs	8/15/02	0	0	0	0	0	B	TST	2	
10880120	Little Tahltan River	8/14/02	0	0	60	1,131	1,191	H	KAP	1	too late
11014007	Farragut River	7/30/02	0	0	0	0	0	A	WRB	2	NO SIGN OF FISH
11014007	Farragut River	8/14/02	0	0	0	0	0	A	WRB	1	FLOODING & GLACIAL
11014007	Farragut River	9/4/02	0	0	80	0	80	A	WRB	2	40 ABV 1ST FALLS, OTHERS ABV FRK
11032009	Chuck R Windham Bay	8/1/02	0	0	10	0	10	A	WRB	2	ALL ABV GORGE
11032009	Chuck R Windham Bay	7/21/02	0	0	3	0	3	A	TST	2	
11032009	Chuck R Windham Bay	8/5/02	0	0	8	0	8	A	WRB	2	
11117010	King Salmon River	7/23/02	0	0	51	0	51	H	JAD	2	tannic
11117010	King Salmon River	7/23/02	0	0	24	0	24	H	KAP	1	poor vis
11117010	King Salmon River	7/26/02	0	0	102	0	102	F	KAP	3	plus 5 jacks
11117010	King Salmon River	7/26/02	0	0	45	0	45	H	KAP	2	
11132220	Nakina River	8/3/02	0	0	2,661	40	2,701	H	KAP	2	total
11132220	Nakina River	8/7/02	0	0	3,946	120	4,066	H	KAP	3	peak total
11132220	Nakina River	8/3/02	0	0	192	0	192	H	KAP	2	IA4
11132220	Nakina River	8/7/02	0	0	641	0	641	H	KAP	3	IA4
11132220	Nakina River	8/3/02	0	0	1,329	0	1,329	H	KAP	2	IA3
11132220	Nakina River	8/7/02	0	0	2,028	100	2,128	H	KAP	3	IA3
11132220	Nakina River	8/3/02	0	0	250	40	290	H	KAP	2	IA2
11132220	Nakina River	8/7/02	0	0	300	0	300	H	KAP	3	IA2
11132220	Nakina River	8/3/02	0	0	890	0	890	H	KAP	2	IA1
11132220	Nakina River	8/7/02	0	0	977	20	997	H	KAP	3	IA1
11132240	Kowatua Creek	8/27/02	0	0	149	3	152	H	JAD	2	vis fair to poor
11132240	Kowatua Creek	8/20/02	0	0	941	4	945	H	KAP	3	
11132255	Tatsamenie River	8/20/02	0	0	1,145	0	1,145	H	KAP	3	peak total
11132255	Tatsamenie River	8/20/02	0	0	507	0	507	H	KAP	3	IA2, above L.Tats
11132255	Tatsamenie River	8/20/02	0	0	638	0	638	H	KAP	3	IA1, below l. Tats
11132255	Tatsamenie River	8/27/02	0	0	329	0	329	H	JAD	2	A2, above l. Tats; vis fair to poor
11132255	Tatsamenie River	8/27/02	0	0	232	0	232	H	JAD	2	A1, below l. Tats; vis fair to poor
11132270	Nahlin River	7/19/02	0	0	1,098	1	1,099	H	KAP	3	total peak survey

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Stream no.	Stream	Date	Tidal	Mouth	Live	Dead	Total	Survey	Obs[a]	Use[b]	Comment
11132270	Nahlin River	8/2/02	0	0	484	121	605	H	KAP	2	IA3 only
11132270	Nahlin River	7/19/02	0	0	801	1	802	H	KAP	2	IA3
11132270	Nahlin River	7/19/02	0	0	101	0	101	H	KAP	2	IA2
11132270	Nahlin River	7/19/02	0	0	196	0	196	H	KAP	2	IA1
11132275	Tseta Creek	8/3/02	0	0	192	0	192	H	KAP	2	
11132280	Dudidontu River	8/2/02	0	0	824	10	834	H	KAP	3	99 in Matatsu
11132280	Dudidontu River	8/7/02	0	0	763	45	808	H	KAP	3	120 in Matatsu
11150069	Fish Creek-Douglas I	8/16/02	177	0	168	21	366	F	RLT	2	
11150069	Fish Creek-Douglas I	8/22/02	0	0	0	13	13	F	GFT	1	
11341032	Salmon Lake Stream	7/3/02	0	50	0	0	50	B	EVP	1	
11532054	Big Boulder Creek	8/15/02	0	0	109	2	111	F	RPE	3	+8 jacks
11532055	Little Boulder Creek	8/13/02	0	0	12	0	12	F	RPE	3	sampled below bridge
18230043	Takhanni River (CAN)	7/29/02	0	0	220	0	220	H	KAP	3	
18230045	Goat Creek	7/30/02	0	0	86	0	86	H	KAP	3	
18230050	Blanchard Ck (CAN)	7/29/02	0	0	338	13	351	H	KAP	3	186 below bridge
18260020	Harlequin Lake Ponds	7/19/02	0	0	0	0	0	F	MWF	0	survey with USFS staff

[a] Observer initials on file in Commercial Fisheries IFDB/ALEX database.

[b] IFDB Standard Usage Codes: 1 = not useful for indexing or estimating escapement; 2 = potentially useful for indexing or estimating escapement; 3 = potentially useful as the "peak" survey count for this species.

Appendix A4.–Estimated abundance and composition by age and sex of the escapement of chinook salmon to select systems in Southeast Alaska and transboundary rivers, 2002.

		Brood year and age class														
		2000	1999	1998	1999	1998	1997	1998	1997	1996	1997	1996	1995	1996	1995	
		0.1	1.1	2.1	0.2	1.2	2.2	0.3	1.3	2.3	0.4	1.4	2.4	0.5	1.5	Total
Panel A. Age composition of medium and large chinook salmon in the Keta River in 2002																
Males	n		4		3	86		8	52		5	24				182
	%		1.5		1.1	32.6		3.1	20.0		1.9	9.3				69.5
	SE of %		0.8		0.7	3.7		1.1	2.6		0.9	1.9				3.2
	Escapement		23		17	497		47	305		29	141				1,059
	SE of esc.		12		10	79		18	63		14	36				153
Females	n							3	27		6	43				79
	%							1.3	10.4		2.3	16.6				30.5
	SE of %							0.7	2.0		0.9	2.4				3.2
	Escapement							18	159		35	252				464
	SE of esc.							10	39		15	55				90
Combined	n		4		3	86		11	79		11	67				261
	%		1.5		1.1	32.6		4.2	30.5		4.2	25.8				100.0
	SE of %		0.8		0.7	3.7		1.3	3.1		1.3	3.0				0.0
	Escapement		23		17	497		65	464		65	393				1,523
	SE of esc.		12		10	79		22	89		22	78				222
Abundance of medium fish Keta and Blossom rivers, from Scott McPherson, ADF&G, Douglas, personal communication.																
Panel B. Age composition of medium and large chinook salmon in the Blossom River in 2002																
Males	n		1		2	15		3	13		1	7				42
	%		2.4		4.8	22.5		3.1	13.6		1.0	7.3				54.9
	SE of %		2.5		3.5	5.6		1.8	3.6		1.1	2.7				5.7
	Escapement		27		54	250		35	151		12	81				610
	SE of esc.		27		37	71		21	50		12	34				121
Females	n								18		9	16				43
	%								18.9		9.4	16.8				45.1
	SE of %								4.2		3.1	4.0				5.7
	Escapement								209		105	186				500
	SE of esc.								63		40	58				121
Combined	n		1		2	15		3	31		10	23				85
	%		2.4		4.8	22.5		3.1	32.5		10.5	24.1				100.0
	SE of %		2.5		3.5	5.6		1.8	5.1		3.2	4.6				0.0
	Escapement		27		54	250		35	361		116	268				1,110
	SE of esc.		27		37	71		21	93		42	75				208
Panel C. Age composition of medium and large chinook salmon in the Chickamin River in 2002[a]																
Males	n					200			143			60			1	404
	%								21.4			9.0			0.1	59.3
	SE of %					3.3			1.8			1.2			0.1	2.6
	Escapement					1,615			1,198			504			8	3,325
	SE of esc.					284			193			96			8	476
Females	n					4			121			145			2	272
	%					0.6			18.1			21.7			0.3	40.7
	SE of %					0.3			1.7			1.9			0.2	2.7
	Escapement					34			1,017			1,218			17	2,285
	SE of esc.					17			171			200			12	352
Combined	n					204			264			205			3	676
	%					29.4			39.5			30.7			0.4	100.0
	SE of %					3.3			2.5			2.3			0.3	0.0
	Escapement					1,648			2,214			1,722			25	5,610
	SE of esc.					287			338			272			15	757

[a] From Freeman and McPherson (2004).

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PANEL D. AGE COMPOSITION OF MEDIUM AND LARGE CHINOOK SALMON IN THE UNUK RIVER IN 2002[b]															
		BROOD YEAR AND AGE CLASS														
		2000	1999	1998	1999	1998	1997	1998	1997	1996	1997	1996	1995	1996	1995	
		0.1	1.1	2.1	0.2	1.2	2.2	0.3	1.3	2.3	0.4	1.4	2.4	0.5	1.5	Total
Males	n					180			153			105			2	440
	%					28.3			19.4			13.3			0.3	61.2
	SE of %					4.1			1.7			1.4			0.2	3.9
	Escapement					2,437			1,675			1,146			22	5,280
	SE of esc.					690			225			167			16	815
Females	n					4			111			187	1		3	306
	%					0.6			14.1			23.7	0.1		0.4	66.0
	SE of %					0.3			1.5			2.0	0.1		0.2	3.9
	Escapement					48			1,212			2,042	11		33	5,697
	SE of esc.					25			174			266	11		19	408
Combined	n					184			264			292	1		5	746
	%					28.8			33.5			37.0	0.1		0.6	100.0
	SE of %					4.1			2.4			2.0	0.1		0.3	0.0
	Escapement					2,485			2,887			3,188	11		55	8,626
	SE of esc.					697			358			392	11		25	1,060

[b] From Weller and McPherson (2003b).

PANEL E. AGE COMPOSITION OF SMALL, MEDIUM AND LARGE CHINOOK SALMON IN THE STIKINE RIVER IN 2002													
Males	n		19			91		0	117	0	247	2	1	477
	%		1.8			8.7			11.1		23.3	0.2	0.1	45.2
	SE of %		0.6			1.9			1.0		1.4	0.1	0.1	2.1
	Escapement		1,045			5,000			6,342		13,368	108	54	25,917
	SE of esc.		324			1,118			875		1,715	77	54	2,828
Females	n					3			128		446	4	0	581
	%					0.3			12.1		42.1	0.4		54.8
	SE of %					0.2			1.0		1.9	0.2		2.1
	Escapement					165			6,928		24,139	216		31,449
	SE of esc.					100			984		2,918	110		3,719
Combined	n		19			94			245		693	6	1	1,058
	%		1.8			9.0			23.1		65.4	0.6	0.1	100.0
	SE of %		0.6			2.0			1.4		2.3	0.2	0.1	0.0
	Escapement		1,045			5,165			13,270		37,507	324	54	57,366
	SE of esc.		324			1153			1650		4413	137	54	6,102

[c] From Der Hovanisian et al. (2004).

PANEL F. AGE COMPOSITION OF MEDIUM AND LARGE CHINOOK SALMON IN ANDREW CREEK IN 2002							
Males	n	3	19	30	29	1	82
	%	1.3	8.5	17.9	17.7	0.6	45.8
	SE of %	0.8	2.8	3.0	3.0	0.6	4.2
	Escapement	24	161	337	335	12	869
	SE of esc.	15	50	90	93	12	179
Females	n			12	75	2	89
	%			7.3	45.7	1.2	54.2
	SE of %			2.0	4.1	0.9	4.2
	Escapement			139	867	23	1,029
	SE of esc.			49	208	17	242
Combined	n	3	19	42	104	3	171
	%	1.3	8.5	25.0	63.3	1.8	100.0
	SE of %	0.8	2.8	3.4	4.2	1.1	0.0
	Escapement	24	161	475	1,203	35	1,899
	SE of esc.	15	50	120	279	21	392

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PANEL G. AGE COMPOSITION OF MEDIUM AND LARGE CHINOOK SALMON IN THE KING SALMON RIVER IN 2002															
	BROOD YEAR AND AGE CLASS														
	2000	1999	1998	1999	1998	1997	1998	1997	1996	1997	1996	1995	1996	1995	
	0.1	1.1	2.1	0.2	1.2	2.2	0.3	1.3	2.3	0.4	1.4	2.4	0.5	1.5	Total
Males n		2			5			26			6				39
%		3.2			8.1			44.4			10.2				65.9
SE of %		2.1			3.4			5.9			3.6				5.6
Escapement		5			14			76			18				113
SE of esc.		3			6			16			7				20
Females n								7			13				20
%								11.9			22.8				34.1
SE of %								4.0			5.1				5.9
Escapement								20			38				58
SE of esc.								8			11				14
Combined n		2			5			33			19				59
%		3.2			8.1			56.3			32.4				100.0
SE of %		2.1			3.3			5.5			5.1				0.0
Escapement		5			14			96			56				171
SE of esc.		3			6			18			13				27

From Scott McPherson, ADF&G, Douglas, personal communication.

PANEL H. AGE COMPOSITION OF MEDIUM AND LARGE CHINOOK SALMON IN THE TAKU RIVER IN 2002[d]											
Males n		6		301	3	230	6	87	0		633
%		0.2		9.7	0.1	24.7	0.7	10.3			45.8
SE of %		0.1		0.9	0.1	1.3	0.3	0.9			1.5
Escapement		104		5,331	52	13,561	390	5,651			25,089
SE of esc.		45		825	31	1,766	164	887			2,647
Females n				4		269	12	175		2	462
%				0.2		31.6	1.4	20.7		0.2	54.2
SE of %				0.1		1.4	0.4	1.2		0.1	1.5
Escapement				117		17,331	779	11,368		130	29,725
SE of esc.				72		2,254	241	1,565		92	4,601
Combined n		6		305	3	499	18	262	0	2	1,095
%		0.2		9.9	0.1	56.4	2.1	31.0	0.0	0.2	100.0
SE of %		0.1		0.9	0.1	1.5	0.4	1.4	0.0	0.1	0.0
Escapement		104		5,448	52	30,892	1,169	17,019	0	130	54,814
SE of esc.		32		1,051	63	4,731	128	1,516	55	55	5,979

[d] From Edgar Jones, ADF&G, Douglas, personal communication.

PANEL I. AGE COMPOSITION OF MEDIUM AND LARGE CHINOOK SALMON IN THE CHILKAT RIVER IN 2002[e]											
Males n				34		115		57		0	206
%				8.4		28.8		14.6			51.9
SE of %				1.4		2.3		1.8			2.5
Escapement				373		1,273		648			2,294
SE of esc.				123		180		128			252
Females n						97		92		3	192
%						24.4		23.0		0.7	48.1
SE of %						2.2		2.1		0.4	2.5
Escapement						1,080		1,019		31	2,130
SE of esc.						156		189		19	245
Combined n				34		212		149		3	398
%				8.4		53.2		37.7		0.7	100.0
SE of %				1.4		2.5		2.4		0.4	
Escapement				373		2,353		1,667		31	4,424
SE of esc.				123		312		294		19	450

[e] From: Ericksen (2003).

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PANEL J. AGE COMPOSITION OF MEDIUM AND LARGE CHINOOK SALMON IN THE ALSEK RIVER IN 2002[f]															
	BROOD YEAR AND AGE CLASS														
	2000	1999	1998	1999	1998	1997	1998	1997	1996	1997	1996	1995	1996	1995	
	0.1	1.1	2.1	0.2	1.2	2.2	0.3	1.3	2.3	0.4	1.4	2.4	0.5	1.5	Total
Males n		2			25			144	2		98			1	272
%		0.3			4.2			25.2	0.3		17.2			0.2	47.5
SE of %		0.2			0.8			1.8	0.2		1.6			0.2	2.1
Escapement		32			402			2,396	33		1,635			17	4,515
SE of esc.		25			185			243	24		189			17	764
Females n		1			15			173	5		106				300
%		0.2			2.5			30.3	0.9		18.6				52.5
SE of %		0.2			0.7			1.9	0.4		1.6				2.1
Escapement		16			242			2,886	83		1,768				4,995
SE of esc.		16			102			272	38		198				914
Combined n		3			40			317	7		204			1	572
%		0.5			6.8			55.5	1.2		35.8			0.2	100.0
SE of %		0.3			1.1			2.1	0.5		2.0			0.2	0.0
Escapement		48			644			5,282	116		3,403			17	9,510
SE of esc.		34			271			417	45		305			17	717

[f] From Pahlke and Waugh (2003).

PANEL K. AGE COMPOSITION OF SMALL, MEDIUM AND LARGE CHINOOK SALMON IN THE SITUK RIVER IN 2002[g]															
Males n	19	4		50	1		10			1					85
%	13.7	2.9		41.7	0.8		8.3			0.8					68.2
SE of %	1.4	1.3		4.5	0.8		2.3			0.8					4.2
Escapement	233	49		712	14		142			14					1,164
SE of esc.	24	23													
Females n				14	1		19	1		3					38
%				11.7	0.8		15.9	0.8		2.5					31.8
SE of %				3.0	0.8		3.2	0.8		1.4					4.2
Escapement				199	14		271	14		43					542
SE of esc.								14							
Combined n	19	4		64	2		29	1		4					123
%	13.7	2.9		53.4	1.7		24.2	0.8		3.3					100.0
SE of %	1.4	1.3		4.0	1.2		3.8	0.8		1.6					0.0
Escapement	233	49		911	28		413	14		57					1,706
SE of esc.	24	23		70	20		65	14		28					34

[g] From McPherson et al. (*In prep.-b*).

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SUMMARY: PERCENTAGE AGE COMPOSITION ESTIMATED FROM CHINOOK SALMON SAMPLED IN 11 SOUTHEAST ALASKA RIVERS IN 2002[a]

	BROOD YEAR AND AGE CLASS													
	2000	1999	1998	1999	1998	1997	1998	1997	1996	1997	1996	1995	1996	1995
	0.1	1.1	2.1	0.2	1.2	2.2	0.3	1.3	2.3	0.4	1.4	2.4	0.5	1.5
1. Keta	NE	2%		1%	33%		4%	31%		4%	26%			
2. Blossom	NE	2%		5%	23%		3%	33%		11%	24%			
3. Chickamin	NE	<1%			29%			40%			31%			<1%
4. Unuk	NE				29%			33%			37%			1%
5. Stikine	NE	2%			9%			23%			65%	1%		<1%
6. Andrew Cr	NE	1%			9%			25%			63%			2%
7. King Salmon	NE	3%			8%			56%			32%			
8. Taku	NE	<1%			10%	<1%		56%	2%		31%			<1%
9. Chilkat	NE	NE			8%			53%			38%			1%
10. Alsek	NE	1%			7%			56%	1%		36%			<1%
11. Situk	14%	3%		53%	2%		24%	1%		3%	<1%			

[a] Small fish not included (NE) in experimental design, except on Stikine and Situk rivers, 2002.

SUMMARY: ESTIMATED NUMBERS OF CHINOOK SALMON BY AGE CLASS IN ESCAPEMENTS TO 11 KEY SE ALASKA RIVERS IN 2002

	BROOD YEAR AND AGE CLASS														
	2000	1999	1998	1999	1998	1997	1998	1997	1996	1997	1996	1995	1996	1995	
	0.1	1.1	2.1	0.2	1.2	2.2	0.3	1.3	2.3	0.4	1.4	2.4	0.5	1.5	Total
1. Keta	0	23	0	17	497	0	65	464	0	65	393	0	0	0	1,524
2. Blossom	0	27	0	54	250	0	35	361	0	116	268	0	0	0	1,111
3. Chickamin	0	0	0	0	1,648	0	0	2,214	0	0	1,722	0	0	25	5,609
4. Unuk	0	0	0	0	2,485	0	0	2,887	0	0	3,188	11	0	55	8,626
5. Stikine	0	1,045	0	0	5,165	0	0	13,270	0	0	37,507	325	0	54	57,366
6. Andrew Cr	0	24	0	0	161	0	0	475	0	0	1,203	0	0	35	1,898
7. King Salmon	0	5	0	0	14	0	0	96	0	0	56	0	0	0	171
8. Taku	0	104	0	0	5,448	52	0	30,892	1,169	0	17,019	0	0	130	54,814
9. Chilkat	0	0	0	0	373	0	0	2,353	0	0	1,667	0	0	31	4,424
10. Alsek	0	48	0	0	644	0	0	5,282	116	0	3,403	0	0	17	9,510
11. Situk	233	49	0	911	28	0	413	14	0	57	0	0	0	0	1,704

SUMMARY: PERCENTAGE SEX COMPOSITION THAT WERE MALES BY AGE CLASS ESTIMATED FROM CHINOOK SALMON SAMPLED IN 11 KEY SE ALASKA RIVERS IN 2002

	BROOD YEAR AND AGE CLASS													
	2000	1999	1998	1999	1998	1997	1998	1997	1996	1997	1996	1995	1996	1995
	0.1	1.1	2.1	0.2	1.2	2.2	0.3	1.3	2.3	0.4	1.4	2.4	0.5	1.5
1. Keta		100%		100%	100%		72%	66%		45%	36%			
2. Blossom		100%		100%	100%		100%	42%		10%	30%			
3. Chickamin					98%			54%			29%			33%
4. Unuk					98%			58%			36%	0%		40%
5. Stikine		100%			97%			48%			36%	33%		100%
6. Andrew Cr					100%			71%			28%			34%
7. King Salmon					105%			79%			32%			
8. Taku		100%			98%	100%		44%	33%		33%			0%
9. Chilkat					100%			54%			39%			0%
10. Alsek					62%			45%	28%		48%			100%
11. Situk	100%	100%		78%	50%		34%	0%		25%				
Average	100%	100%		93%	92%		69%	51%		27%	35%			44%

Appendix A5.–Average length (MEF), by age, of chinook salmon in selected systems in Southeast Alaska and transboundary rivers, 2002.

PANEL A. AVERAGE LENGTH OF CHINOOK SALMON IN THE KETA RIVER IN 2002														
	BROOD YEAR AND AGE CLASS													
	2000	1999	1998	1999	1998	1997	1998	1997	1996	1997	1996	1995	1996	1995
	0.1	1.1	2.1	0.2	1.2	2.2	0.3	1.3	2.3	0.4	1.4	2.4	0.5	1.5
Males n		10		3	86		8	52		5	24			
Average length		445		613	664		791	808		938	955			
SD		74		60	52		47	72		84	96			
SE		23		34	6		16	10		38	20			
Females n							3	27		6	43			
Average length							837	853		938	955			
SD							54	36		53	96			
SE							31	7		22	15			
Combined n		10		3	86		11	79		11	67			
Average length		445		613	664		804	823		925	940			
SD		74		60	52		51	65		67	66			
SE		23		34	6		15	7		20	8			

PANEL B. AVERAGE LENGTH OF CHINOOK SALMON IN THE BLOSSOM RIVER IN 2002														
Males n		1		2	15		3	13		1	7			
Average length		410		558	680		808	839		890	966			
SD				95	43		45	78			61			
SE				68	11		26	22			23			
Females n								18		9	16			
Average length								866		922	920			
SD								41		39	77			
SE								10		13	19			
Combined n		1		2	15		3	31		10	23			
Average length		410		558	680		808	854		919	934			
SD				95	43		45	60		38	74			
SE				68	11		26	11		12	16			

PANEL C. AVERAGE LENGTH OF CHINOOK SALMON IN THE CHICKAMIN RIVER IN 2002														
Males n		2			187			121			56			1
Average length		400			673			806			937			1035
SD		42			52			74			71			
SE		30			4			7			9			
Females n					4			98			121			2
Average length					720			839			901			948
SD					51			40			49			4
SE					25			4			4			3
Combined n		2			191			219			177			3
Average length		400			674			820			912			977
SD		42			53			64			59			51
SE		30			4			4			4			29

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Appendix A5.–Page 2 of 5.

PANEL D. AVERAGE LENGTH OF CHINOOK SALMON IN THE UNUK RIVER IN 2002[b]														
	BROOD YEAR AND AGE CLASS													
	2000	1999	1998	1999	1998	1997	1998	1997	1996	1997	1996	1995	1996	1995
	0.1	1.1	2.1	0.2	1.2	2.2	0.3	1.3	2.3	0.4	1.4	2.4	0.5	1.5
Males n		2			180			153			105			2
Average length		368			639			802			921			928
SD		18			56			65			66			46
SE		13			4			5			6			33
Females n					4			111			187	1		3
Average length					671			826			895	760		955
SD					49			42			47			57
SE					25			4			3			33
Combined n		2			184			264			292	1		5
Average length		368			640			812			904	760		944
SD		18			56			58			56			49
SE		13			4			4			3			22

[b] From Weller and McPherson (2003b).

PANEL E. AVERAGE LENGTH OF CHINOOK SALMON IN THE STIKINE RIVER IN 2002[c]														
Males n		18			83	1		96	1		194	1		
Average length		380			557	508		796	842		885	776		
SD		34			64			98			56			
SE		8			7			10			4			
Females n					1			104			341	2		
Average length					572			793			846	837		
SD								61			37	27		
SE								6			2	19		
Combined n		18			84	1		200	1		535	3		
Average length		380			557	508		795	842		860	816		
SD		34			64			85			46	40		
SE		8			7			6			2	23		

[c] From Little Tahltan River samples: Der Hovanisian et al. (2004).

PANEL F. AVERAGE LENGTH OF CHINOOK SALMON IN ANDREW CREEK IN 2002														
Males n		6			19			30			29			1
Average length		381			566			735			839			925
SD		61			63			86			72			
SE		25			14			16			13			
Females n								12			75			2
Average length								763			839			908
SD								36			49			55
SE								10			6			33
Combined n		6			19			42			104			3
Average length		381			566			743			839			913
SD		61			63			76			56			34
SE		25			14			12			5			20

-continued-

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PANEL G. AVERAGE LENGTH OF CHINOOK SALMON IN THE KING SALMON RIVER IN 2002														
	BROOD YEAR AND AGE CLASS													
	2000	1999	1998	1999	1998	1997	1998	1997	1996	1997	1996	1995	1996	1995
	0.1	1.1	2.1	0.2	1.2	2.2	0.3	1.3	2.3	0.4	1.4	2.4	0.5	1.5
Males n		3			5			26			6			
Average length		417			641			777			918			
SD		32			27			62			96			
SE		19			12			12			39			
Females n								7			13			
Average length								831			903			
SD								37			37			
SE								14			10			
Combined n		3			5			33			19			
Average length		417			641			789			908			
SD		32			27			62			59			
SE		19			12			11			14			

PANEL H. AVERAGE LENGTH OF CHINOOK SALMON IN THE TAKU RIVER IN 2002[d]														
Males n		203	2		303	3		230	6		87			
Average length		344	360		538	563		735	833		868			
SD		35	28		55	19		65	97		61			
SE		2	20		3	11		4	40		7			
Females n					4			269	12		175	2		
Average length					638			753	789		832	820		
SD					40			41	42		47	50		
SE					20			3	12		4	35		
Combined n		203	2		307	3		499	18		262	2		
Average length		344	360		540	563		745	803		844	820		
SD		36	28		56	19		54	66		55	50		
SE		3	20		3	11		2	16		3	35		

[d] From Edgar Jones, ADF&G, Douglas, personal communication.

PANEL I. AVERAGE LENGTH OF CHINOOK SALMON IN THE CHILKAT RIVER IN 2002[e]														
Males n		13			51			197			75			
Average length		360			568			793			915			
SD		32			64			77			60			
SE		9			9			5			7			
Females n								167			118	1		2
Average length								813			871	920		837
SD								40			42			42
SE								3			4			30
Combined n		13			51			364			193	1		2
Average length		360			568			802			888	920		837
SD		32			64			64			55			42
SE		9			9			3			4			30

[e] From Ericksen (2003).

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PANEL J. AVERAGE LENGTH OF CHINOOK SALMON IN THE ALSEK RIVER IN 2002[f]														
	BROOD YEAR AND AGE CLASS													
	2000	1999	1998	1999	1998	1997	1998	1997	1996	1997	1996	1995	1996	1995
	0.1	1.1	2.1	0.2	1.2	2.2	0.3	1.3	2.3	0.4	1.4	2.4	0.5	1.5
Males n		2			16			80	1		65			
Average length		452			546			815	873		910			
SD		45			52			88			59			
SE		32			13			10			7			
Females n		1			14			123	4		76			
Average length		447			615			784	803		864			
SD					78			42	66		44			
SE					21			4	33		5			
Combined n		3			30			203	5		141			
Average length		451			578			797	817		885			
SD		32			73			66	65		56			
SE		19			13			5	29		5			

[f] From Klukshu River weir: Pahlke and Waugh (2003).

PANEL K. AVERAGE LENGTH OF CHINOOK SALMON IN THE SITUK RIVER IN 2002														
Males n	19	4		50	1		8			1				
Average length	360	409		565	475		765			830				
SD	35	17		77			41							
SE	8	9		11			14							
Females n				14	1		17	1		3				
Average length				669	605		764	830		852				
SD				74			37			13				
SE				20			9			7				
Combined n	19	4		64	2		25	1		4				
Average length	360	409		588	540		764	830		846				
SD	35	17		87	92		38			15				
SE	8	9		11	65		8			8				

-continued-

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SUMMARY: AVERAGE LENGTH OF MALE CHINOOK SALMON SAMPLED IN SOUTHEAST ALASKA IN 2002														
	BROOD YEAR AND AGE CLASS													
	2000	**1999**	**1998**	**1999**	**1998**	**1997**	**1998**	**1997**	**1996**	**1997**	**1996**	**1995**	**1996**	**1995**
	0.1	**1.1**	**2.1**	**0.2**	**1.2**	**2.2**	**0.3**	**1.3**	**2.3**	**0.4**	**1.4**	**2.4**	**0.5**	**1.5**
1. Keta		445			664		791	808		938	955			
2. Blossom					680			839			966			
3. Chickamin					673			806			937			
4. Unuk					639			802			921			
5. Stikine		380			557			796			885			
6. Andrew Cr		381			566			735			839			
7. King Salmon					641			777			918			
8. Taku		344			538			735	833		868			
9. Chilkat		360			568			793			915			
10. Alsek					546			815			910			
11. Situk	360	409		565			765							

SUMMARY: AVERAGE LENGTH OF FEMALE CHINOOK SALMON SAMPLED IN SOUTHEAST ALASKA IN 2002														
	BROOD YEAR AND AGE CLASS													
	2000	**1999**	**1998**	**1999**	**1998**	**1997**	**1998**	**1997**	**1996**	**1997**	**1996**	**1995**	**1996**	**1995**
	0.1	**1.1**	**2.1**	**0.2**	**1.2**	**2.2**	**0.3**	**1.3**	**2.3**	**0.4**	**1.4**	**2.4**	**0.5**	**1.5**
1. Keta							837	853		938	955			
2. Blossom								866		922	920			
3. Chickamin					720			839			901			
4. Unuk					671			826			895			
5. Stikine								793			846			
6. Andrew Cr								763			839			
7. King Salmon								831			903			
8. Taku					638			753	789		832			
9. Chilkat								813			871			
10. Alsek					615			784			864			
11. Situk				669			764							

SUMMARY: AVERAGE LENGTH OF CHINOOK SALMON SAMPLED IN SOUTHEAST ALASKA IN 2002 SEXES COMBINED														
	BROOD YEAR AND AGE CLASS													
	2000	1999	1998	1999	1998	1997	1998	1997	1996	1997	1996	1995	1996	1995
	0.1	**1.1**	**2.1**	**0.2**	**1.2**	**2.2**	**0.3**	**1.3**	**2.3**	**0.4**	**1.4**	**2.4**	**0.5**	**1.5**
1. Keta		445			664		804	823		925	940			
2. Blossom					680			854		919	934			
3. Chickamin					674			820			912			
4. Unuk					640			812			904			944
5. Stikine		380			557			795			860			
6. Andrew Cr		381			566			743			839			
7. King Salmon					641			789			908			
8. Taku		344			540			745	803		844			
9. Chilkat		360			568			802			888			
10. Alsek					578			797	817		885			
11. Situk	360	409		588			764			846				
Averages	360	387		588	611		784	798	810	897	891			944

Note: age classes with fewer than four fish sampled were not reported in summary panels.

Appendix A6.–Differences in mean lengths (Panel A) and test results (Z, Panel B) for statistical differences in mean lengths between age-1.2 chinook salmon (sexes combined) sampled in 11 rivers in Southeast Alaska in 2002. Bold numbers indicate probability of <0.01 that they are the same.

PANEL A: DIFFERENCES IN MEAN LENGTHS FOR AGE-1.2 FISH, SEXES COMBINED

System	Age class	Average length	SE	Difference in mean length										
				Keta	Blossom	Chickamin	Unuk	Stikine	Andrew Cr	King Salmon	Taku	Chilkat	Alsek	Situk
1. Keta	1.2	664	6	0	16	10	-24	-107	-98	-23	-125	-96	-86	
2. Blossom	1.2	680	11	-16	0	-6	-40	-123	-114	-39	-141	-112	-102	
3. Chickamin	1.2	674	4	-10	6	0	-34	-117	-108	-33	-135	-106	-96	
4. Unuk	1.2	640	4	24	40	34	0	-83	-74	1	-101	-72	-62	
5. Stikine	1.2	557	7	107	123	117	83	0	9	84	-18	11	21	
6. Andrew Cr	1.2	566	14	98	114	108	74	-9	0	75	-27	2	12	
7. King Salmon	1.2	641	12	23	39	33	-1	-84	-75	0	-102	-73	-63	
8. Taku	1.2	540	3	125	141	135	101	18	27	102	0	29	39	
9. Chilkat	1.2	568	9	96	112	106	72	-11	-2	73	-29	0	10	
10. Alsek	1.2	578	13	86	102	96	62	-21	-12	63	-39	-10	0	
11. Situk	1.2													
		664	6	0	16	10	-24	-107	-98	-23	-125	-96	-86	

PANEL B: TEST VALUES FOR DIFFERENCES IN MEAN LENGTHS FOR AGE-1.2 FISH, SEXES COMBINED

System	Age class	Average length	SE	Test statistics for differences in mean length										
				Keta	Blossom	Chickamin	Unuk	Stikine	Andrew Cr	King Salmon	Taku	Chilkat	Alsek	Situk
1. Keta	1.2	664	6	0.00	1.28	1.39	**-3.33**	**-11.61**	**-6.43**	-1.71	**-18.31**	**-8.90**	**-6.01**	
2. Blossom	1.2	680	11	-1.28	0.00	-0.51	**-3.42**	**-9.43**	**-6.40**	-2.40	**-12.26**	**-7.89**	**-5.99**	
3. Chickamin	1.2	674	4	-1.39	0.51	0.00	**-6.01**	**-14.51**	**-7.42**	**-2.61**	**-26.26**	**-10.80**	**-7.06**	
4. Unuk	1.2	640	4	**3.33**	**3.42**	**6.01**	0.00	**-10.29**	**-5.08**	0.08	**-19.62**	**-7.34**	**-4.56**	
5. Stikine	1.2	557	7	**11.61**	**9.43**	**14.51**	**10.29**	0.00	0.57	**6.05**	-2.27	0.97	1.42	
6. Andrew Cr	1.2	566	14	**6.43**	**6.40**	**7.42**	**5.08**	-0.57	0.00	**4.07**	-1.85	0.12	0.63	
7. King Salmon	1.2	641	12	1.71	2.40	**2.61**	-0.08	**-6.05**	**-4.07**	0.00	**-8.17**	**-4.87**	**-3.56**	
8. Taku	1.2	540	3	**18.31**	**12.26**	**26.26**	**19.62**	2.27	1.85	**8.17**	0.00	**2.99**	**2.88**	
9. Chilkat	1.2	568	9	**8.90**	**7.89**	**10.80**	**7.34**	-0.97	-0.12	**4.87**	**-2.99**	0.00	0.63	
10. Alsek	1.2	578	13	**6.01**	**5.99**	**7.06**	**4.56**	-1.42	-0.63	**3.56**	**-2.88**	-0.63	0.00	
11. Situk	1.2													

Appendix A7.–Differences in mean lengths (Panel A) and test results (Z, Panel B) for statistical differences in mean lengths between age-1.3 chinook salmon (sexes combined) sampled in 11 rivers in Southeast Alaska in 2002. Bold numbers indicate probability of <0.01 that they are the same.

PANEL A: DIFFERENCES IN MEAN LENGTHS FOR AGE-1.3 FISH, SEXES COMBINED

System	Age class	Average length	SE	Difference in mean length										
				Keta	Blossom	Chickamin	Unuk	Stikine	Andrew Cr	King Salmon	Taku	Chilkat	Alsek	Situk
1. Keta	1.3	823	7	0	31	-3	-11	-28	-80	-34	-79	-21	-26	
2. Blossom	1.3	854	11	-31	0	-34	-42	-59	-111	-65	-110	-52	-57	
3. Chickamin	1.3	820	4	3	34	0	-8	-25	-77	-31	-76	-18	-23	
4. Unuk	1.3	812	4	11	42	8	0	-17	-69	-23	-68	-10	-15	
5. Stikine	1.3	795	6	28	59	25	17	0	-52	-6	-51	7	2	
6. Andrew Cr	1.3	743	12	80	111	77	69	52	0	46	2	59	54	
7. King Sal.	1.3	789	11	34	65	31	23	6	-46	0	-45	13	8	
8. Taku	1.3	745	2	79	110	76	68	51	-2	45	0	58	53	
9. Chilkat	1.3	802	3	21	52	18	10	-7	-59	-13	-58	0	-5	
10. Alsek	1.3	797	5	26	57	23	15	-2	-54	-8	-53	5	0	
11. Situk	1.3	823	7	0	31	-3	-11	-28	-80	-34	-79	-21	-26	

PANEL B: TEST VALUES FOR DIFFERENCES IN MEAN LENGTHS FOR AGE-1.3 FISH, SEXES COMBINED

System	Age class	Average length	SE	Test statistics for differences in mean length										
				Keta	Blossom	Chickamin	Unuk	Stikine	Andrew Cr	King Salmon	Taku	Chilkat	Alsek	Situk
1. Keta	1.3	823	7	0.00	2.38	-0.37	-1.36	**-3.04**	**-5.76**	**-2.61**	**-10.61**	**-2.71**	**-3.10**	
2. Blossom	1.3	854	11	-2.38	0.00	**-2.90**	**-3.59**	**-4.71**	**-6.82**	**-4.18**	**-9.73**	**-4.52**	**-4.78**	
3. Chickamin	1.3	820	4	0.37	**2.90**	0.00	-1.41	**-3.47**	**-6.09**	**-2.65**	**-16.19**	**-3.45**	**-3.76**	
4. Unuk	1.3	812	4	1.36	**3.59**	1.41	0.00	-2.36	**-5.45**	-1.97	**-14.47**	-1.92	-2.45	
5. Stikine	1.3	795	6	**3.04**	**4.71**	**3.47**	2.36	0.00	**-3.88**	-0.48	**-7.81**	1.02	0.26	
6. Andrew Cr	1.3	743	12	**5.76**	**6.82**	**6.09**	**5.45**	**3.88**	0.00	**2.83**	0.12	**4.74**	**4.20**	
7. King Sal.	1.3	789	11	**2.61**	**4.18**	**2.65**	1.97	0.48	**-2.83**	0.00	**-3.95**	1.13	0.67	
8. Taku	1.3	745	2	**10.61**	**9.73**	**16.19**	**14.47**	**7.81**	-0.12	**3.95**	0.00	**13.94**	**10.06**	
9. Chilkat	1.3	802	3	**2.71**	**4.52**	**3.45**	1.92	-1.02	**-4.74**	-1.13	**-13.94**	0.00	-0.87	
10. Alsek	1.3	797	5	**3.10**	**4.78**	**3.76**	2.45	-0.26	**-4.20**	-0.67	**-10.06**	0.87	0.00	
11. Situk	1.3													

Appendix A8.–Differences in mean lengths (Panel A) and test results (Z, Panel B) for statistical differences in mean lengths between age-1.4 chinook salmon (sexes combined) sampled in 11 rivers in Southeast Alaska in 2002. Bold numbers indicate probability of <0.01 that they are the same.

PANEL A: DIFFERENCES IN MEAN LENGTHS FOR AGE-1.4 FISH, SEXES COMBINED

	Age	Average		Difference in mean length										
System	class	length	SE	Keta	Blossom	Chickamin	Unuk	Stikine	Andrew Cr	King Salmon	Taku	Chilkat	Alsek	Situk
1. Keta	1.4	940	8	0	-6	-28	-36	-80	-101	-32	-96	-52	-55	
2. Blossom	1.4	934	16	6	0	-22	-30	-74	-95	-26	-90	-46	-49	
3. Chickamin	1.4	912	4	28	22	0	-8	-52	-73	-4	-68	-24	-27	
4. Unuk	1.4	904	3	36	30	8	0	-44	-65	4	-60	-16	-19	
5. Stikine	1.4	860	2	80	74	52	44	0	-21	48	-16	28	25	
6. Andrew Cr	1.4	839	5	101	95	73	65	21	0	69	5	49	46	
7. King Sal.	1.4	908	14	32	26	4	-4	-48	-69	0	-64	-20	-23	
8. Taku	1.4	844	3	96	90	68	60	16	-5	64	0	44	41	
9. Chilkat	1.4	888	4	52	46	24	16	-28	-49	20	-44	0	-3	
10. Alsek	1.4	885	5	55	49	27	19	-25	-46	23	-41	3	0	
11. Situk	1.4													

PANEL B: TEST VALUES FOR DIFFERENCES IN MEAN LENGTHS FOR AGE-1.4 FISH, SEXES COMBINED

	Age	Average		Test statistics for differences in mean length										
System	class	length	SE	Keta	Blossom	Chickamin	Unuk	Stikine	Andrew Cr	King Salmon	Taku	Chilkat	Alsek	Situk
1. Keta	1.4	940	8	0.00	-0.34	**-3.13**	**-4.21**	**-9.70**	**-10.71**	-2.04	**-11.06**	**-5.83**	**-5.92**	
2. Blossom	1.4	934	16	0.34	0.00	**-1.33**	-1.84	**-4.59**	**-5.67**	-1.24	**-5.51**	**-2.79**	**-2.94**	
3. Chickamin	1.4	912	4	**3.13**	1.33	0.00	-1.60	**-11.63**	**-11.40**	-0.28	**-12.97**	**-4.26**	**-4.37**	
4. Unuk	1.4	904	3	**4.21**	1.84	1.60	0.00	**-12.20**	**-11.15**	0.29	**-13.25**	**-3.22**	**-3.40**	
5. Stikine	1.4	860	2	**9.70**	**4.59**	**11.63**	**12.20**	0.00	**-3.90**	**3.51**	**-4.08**	**6.31**	**4.88**	
6. Andrew Cr	1.4	839	5	**10.71**	**5.67**	**11.40**	**11.15**	**3.90**	0.00	**4.78**	0.81	**7.68**	**6.69**	
7. King Sal.	1.4	908	14	2.04	1.24	0.28	-0.29	**-3.51**	**-4.78**	0.00	**-4.59**	-1.42	-1.60	
8. Taku	1.4	844	3	**11.06**	**5.51**	**12.97**	**13.25**	**4.08**	-0.81	**4.59**	0.00	**8.45**	**7.07**	
9. Chilkat	1.4	888	4	**5.83**	**2.79**	**4.26**	**3.22**	**-6.31**	**-7.68**	1.42	**-8.45**	0.00	-0.49	
10. Alsek	1.4	885	5	**5.92**	**2.94**	**4.37**	**3.40**	**-4.88**	**-6.69**	1.60	**-7.07**	0.49	0.00	
11. Situk	1.4													

Appendix A9.–Numbers of chinook salmon examined for coded-wire tags and numbers of tags recovered in rivers in Southeast Alaska and transboundary rivers, 1998–2002. Hatchery CWTs expanded by tag ratio reported in Tag Lab database.

	2002					2001				
	Chinook sampled	Hatchery CWTs	Expanded hatchery CWTs	Non-natal wild CWTs	Natal wild CWTs	Chinook sampled	Hatchery CWTs	Expanded hatchery CWTs	Non-natal wild CWTs	Natal wild CWTs
Situk River	574	0	0	0	0	629	0	0	0	0
Alsek River	1,458	0	0	0	0	1,645	0	0	0	0
Chilkat River	1,123	0	0	0	10	823	0	0	0	1
						6 clipped, 5 no tag				
Taku River	5,254	0	0	0	64	6,911	0	0	0	124
	6 no tags 1 lost head test fish, 2 no tagsCYI, 3 lost Nakina heads					*includes 6 lost heads, 10 no tags, 1 nonsense*				
King Salmon R.	74	0	0	0	0	31	0	0	0	0
Stikine River	5,805	0	0	0	1	6,811	2	14	1	0
						1 Taku wild,1 Crystal Lake (Earl West C) ratio 12.6:1, 1 LPW				
Andrew Creek	210	0	0	0	0	220	0	0	0	0
Unuk River	1,637	1	7	0	45	1,986	0	0	0	77
	149 clips, 46 sacrificed, 1 Dipac fish(7.3:1 expansion)					*228 ad clips seen; 88 sacrificed; 77 with CWTs*				
Chickamin River	1,062	3	25	1	0	1,208	2	10	0	0
						3 clips, 2 tags, 1 Tamgas Cr., 7.1:1; 1 Deer Mt, 2.9:1				
Blossom River	101	0	0	0	0	18	1	12	0	0
						1 Crystal Lake (Neets Bay) 11.7:1				
Keta River	298	0	0	0	0	215	0	0	0	0
Totals	17,596	4	32	1	120	20,497	5	36	1	202

-continued-

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	2000					1999				
	Chinook sampled	Hatchery CWTs	Expanded hatchery CWTs	Non-natal wild CWTs	Natal wild CWTs	Chinook sampled	Hatchery CWTs	Expanded hatchery CWTs	Non-natal wild CWTs	Natal wild CWTs
Situk River	680	0	0	0	0	1,077	0	0	0	0
Alsek River	991	0	0	0	0	1,035	0	0	0	0
Chilkat River	772	0	0	0	15	740	0	0	0	11
	31 clipped, 12 lost heads, 4 no tags									
Taku River	3,647	0	0	0	33	1,970	0	0	0	29
King Salmon R.	57	0	0	0		70	0	0	0	0
Stikine River	6,615	2	13	0		2,054	0	0	0	0
	1 LPW, 1 Neets Bay, tag ratio 11.7:1									
Andrew Creek	151	0	0	0	0	154	1	7	0	0
						CLH: Earl West Cove; tag ratio 7.1:1				
Unuk River	1,671	0	0	0	61	1,278	0	0	0	76
Chickamin River	211	1	7	0	0	185	0	0	0	0
	Tamgas Cr., tag ratio 7.1:1									
Blossom River	52	0	0	0	0	13	0	0	0	0
Keta River	462	0	0	0	0	404	1	20	0	0
						Tamgas Cr '95 brood; tag ratio 20:0				
Total	15,309	3	20	0	109	8,980	2	27	0	116

NOTES: 1) Expanded hatchery numbers are from listed Tag Ratios in ADF&G Tag Lab database.

2) Non-natal wild CWTs are recoveries in a stream from chinook smolt that were tagged in another wild river; i.e., Keta River had one chinook tag from Unuk in 1998.

3) Natal CWTs are recoveries of wild chinook tagged as smolt in that river.

Appendix A10.–Computer files used to complete this report.

File name	Description
TOTALCHTS.XLW	Excel workbook with tables and charts with annual counts for each index area.
SUMVER01.XLS	Appendix table A2, with expanded escapement totals for Southeast Alaska
ESC02.XLS	Table 1. Estimated chinook escapement in 2002
GOALS.XLS	Appendix Table A1. Expanded goals for Southeast Alaska.
AGELENGTHSEAK2002.XLS	Appendix Table A4-A7. Length and age summaries for 2002
CWTrecovs.xls	coded-wire tag recoveries.