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Chum Salmon Stock Status and Escapement Goals in Southeast Alaska

by

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and

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

Symbols and Abbreviations

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Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
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)

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

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CHUM SALMON STOCK STATUS AND ESCAPEMENT GOALS IN SOUTHEAST ALASKA

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ABSTRACT

In Southeast Alaska, chum salmon (*Oncorhynchus keta*) are known to spawn in more than 1,200 streams. The Alaska Department of Fish and Game has maintained a standardized survey program to index spawning chum salmon abundance at 81 summer-run and seven fall-run streams. Sustainable escapement goals are established for five fall-run stocks that support directed fisheries (Cholmondeley Sound, Port Camden, Security Bay, Excursion River, and Chilkat River), and for three summer-run stocks comprising aggregates of index streams over broad subregions (Southern Southeast, Northern Southeast Inside, and Northern Southeast Outside). Summer-run chum salmon escapement goals were not met from 2008 to 2010 in the Northern Southeast Inside and Southern Southeast subregions. Summer-run chum salmon escapements in the Northern Southeast Outside Subregion were above the lower bound sustainable escapement goal in four of the past five years. Escapement goals have generally been met for fall-run stocks with the exception of Port Camden, which was below goal from 2007 to 2009. We reanalyzed escapement goals for Southern Southeast and Northern Southeast Inside summer-run chum salmon, incorporating two additional decades of data from the 1960s–1970s. Based on this analysis, we recommend revising the lower bound sustainable escapement goal of 68,000 index spawners in the Southern Southeast Subregion to 54,000 index spawners, and revising the lower bound sustainable escapement goal of 149,000 index spawners in the Northern Southeast Inside Subregion to 119,000 index spawners. The annual common property harvest of chum salmon in Southeast Alaska averaged 6.2 million fish per year since 2001; hatchery-produced fish accounted for an average of 73% of the commercial harvest. No Southeast Alaska stocks of chum salmon currently meet the criteria for stocks of concern as defined by the State of Alaska's Policy for Management of Sustainable Salmon Fisheries (5 AAC 39.222).

Key words: chum salmon, *Oncorhynchus keta*, escapement goals, escapement index, stock status, Chilkat River, Cholmondeley Sound, Excursion Inlet, Lynn Canal, Port Camden, Security Bay, Taku River.

INTRODUCTION

Chum salmon (*Oncorhynchus keta*) are known to spawn in more than 1,200 streams in Southeast Alaska. Chum salmon are harvested primarily in commercial net fisheries and to a lesser extent by commercial troll fisheries, as well as sport, personal use, and subsistence fisheries. Annual commercial harvests of chum salmon in Southeast Alaska were historically at high levels in the early to mid-1900s, then gradually declined to their lowest levels in the late 1970s (Figure 1). The total harvest of chum salmon increased dramatically in the 1990s, including a peak total harvest of 16.0 million fish in 1996, and averaged 9.7 million fish over the most recent decade, 2001–2010. The common property harvest (total harvest minus hatchery cost recovery) of chum salmon during this same period averaged 6.4 million fish. Much of this increase was due to the production of hatchery fish, which accounted for an average of 73% of the commercial common property harvest of chum salmon from 2001 to 2010. Over that same 10-year period, the total ex-vessel value of the commercial chum salmon harvest averaged $32 million a year—well ahead of the next most valuable species, pink salmon (*O. gorbuscha*), at $23 million a year.

Stock-specific harvest information is not available for the vast majority of wild chum salmon stocks in Southeast Alaska, which are predominantly harvested in mixed stock fisheries far from their spawning grounds. Chum salmon are primarily harvested incidentally to other species in common property fisheries, which are managed based on abundance of other target species; for example, summer-run chum salmon stocks in Southeast Alaska are harvested incidentally in directed pink salmon purse seine fisheries. Some chum salmon runs are harvested directly in terminal or near-terminal fisheries, which allows for some accounting of stock-specific harvest; however, in many cases these fish also migrate through mixed stock fisheries where the stock composition of catches may not be known.

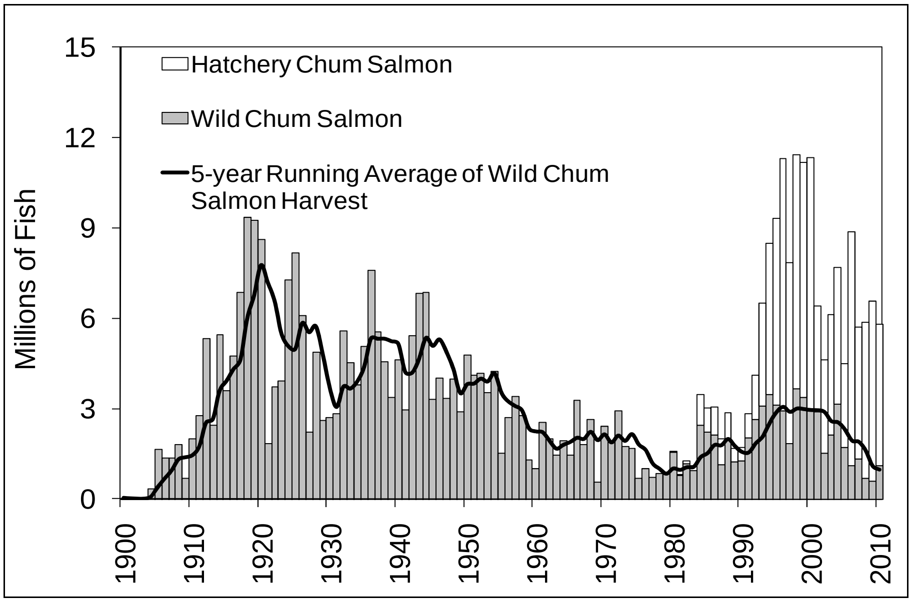

Figure 1.–Annual common property harvest of chum salmon in Southeast Alaska from 1890 to 2010 showing estimated harvests of both hatchery-produced and wild chum salmon. (Data prior to 1960 are from Byerly et al. 1999)[1].)

The Alaska Department of Fish and Game (ADF&G) developed a standardized program to estimate an annual index of spawning chum salmon abundance based primarily on aerial surveys (Heinl et al. 2004; Heinl 2005; Eggers and Heinl 2008). The trends in these indices provide a meaningful indicator of trends in the relative abundance of spawning chum salmon in Southeast Alaska. These indices were also the basis of the first escapement goals for chum salmon in Southeast Alaska, which were established in 2009 (Eggers and Heinl 2008). Lower bound sustainable escapement goals were developed for three broad regional aggregates of streams for summer chum salmon stocks, and sustainable escapement goal ranges were established for five additional fall chum salmon stocks.

In 2000 and 2001, the Alaska Board of Fisheries adopted the *Policy for the Management of Sustainable Salmon Fisheries* (5AAC 39.222) and the *Policy for Statewide Salmon Escapement Goals* (5 AAC 39.223) into state regulation to ensure that the state's salmon stocks would be conserved, managed, and developed using the sustained yield principle. These policies require ADF&G to report on salmon stock status to the board on a regular basis and to document existing salmon escapement goals, establish goals for stocks for which escapement can be reliably measured, and perform an analysis when these goals are created or modified. In order to meet requirements of these policies, Heinl et al. (2004) and Heinl (2005) produced ADF&G's first reports on stock status of chum salmon in Southeast Alaska. They did not identify any chum salmon stocks in Southeast Alaska for which existing information was sufficient to establish escapement goals. Eggers and Heinl (2008) provided an update on stocks status and recommendations on the first formal escapement goals for chum salmon in Southeast Alaska. This report represents an update concerning the status of chum salmon in the region through 2010, including recommended changes in escapement goals (Table 1).

[1] Note: Past reports in this series included private hatchery cost-recovery harvests in Figure 1.

Table 1.–Summary of escapement goals for Southeast Alaska chum salmon stocks and recommended escapement goals.

Stock Unit	Enumeration Method	Current Escapement Goal			Recommended Escapement Goal		
		Goal	Type	Year	Action	Goal	Type
Southern Southeast Summer-Run	Aggregate Peak Surveys	68,000	Lower Bound SEG[a]	2009	Revise	54,000	Lower Bound SEG
Northern Southeast Inside Summer-Run	Aggregate Peak Surveys	149,000	Lower Bound SEG	2009	Revise	119,000	Lower Bound SEG
Northern Southeast Outside Summer-Run	Aggregate Peak Surveys	19,000	Lower Bound SEG	2009	No change	–	–
CholmondeleySound Fall-Run	Aggregate Peak Surveys	30,000–48,000	SEG	2009	No change	–	–
Port Camden Fall-Run	Aggregate Peak Surveys	2,000–7,000	SEG	2009	No change	–	–
Security Bay Fall-Run	Peak Aerial Survey	5,000–15,000	SEG	2009	No change	–	–
Excursion River Fall-Run	Peak Aerial Survey	4,000–18,000	SEG	2009	No change	–	–
Chilkat River Fall-Run	Expanded Fish Wheel Count	75,000–170,000	SEG	2009	No change	–	–

[a] Sustainable escapement goal (SEG).

STOCK ASSESSMENT

ESCAPEMENT MONITORING

There are more than 1,200 streams and rivers in Southeast Alaska for which ADF&G has a record of at least one annual adult chum salmon spawning count since 1960, and counts of 1,000 or more chum salmon were obtained at approximately 450 of those streams prior to 1985 (ADF&G Integrated Fisheries Database). Long time series of escapement information are not available, however, for the vast majority of those streams. Summer chum salmon are most easily observed early in the season when there are few pink salmon present. It is often not possible to estimate numbers of chum salmon in streams that have substantial populations of pink salmon, and recent high pink salmon abundance may have masked chum salmon escapements in many areas (Van Alen 2000). Of the chum salmon populations that have been consistently monitored, most have been monitored through aerial surveys, though several have been monitored annually by foot surveys. Inriver fish wheel counts have been used to monitor salmon escapements to the Taku and Chilkat rivers, two large glacial, mainland river systems.

In their review of available ADF&G chum salmon escapement survey data, 1960–2002, Heinl et al. (2004) identified 82 chum salmon streams, 76 summer-run and six fall-run, that had sufficient survey information to be useful for assessing trends in spawning populations. Another three stocks were also examined, but treated separately (Fish Creek–Hyder, Taku River, and Chilkat-Klehini River). Efforts have been made to continue to monitor this set of streams on an annual basis. Eggers and Heinl (2008) recently updated the indices and increased the number of chum salmon index streams to 81 summer-run and seven fall-run systems upon which current escapement goals are based.

Heinl et al. (2004) pointed out the many limitations of these survey counts. In addition to the challenge of separating pink and chum salmon during routine aerial surveys, these subjective survey counts can only be used as is and it is not possible to adjust them to account for counting bias among observers or convert them to estimates of total escapement. An *escapement estimate* is a statistically reliable measure of escapement magnitude; i.e., the total number of fish in the escapement. An escapement estimate is approximately in the same units as the estimates of harvest, and harvest estimates and escapement estimates can logically be added together to produce an estimate of total run size. Alternatively, an *escapement index* is a relative measure of escapement, useful for year-to-year comparisons. The maximum survey counts used here underestimate the true escapement and can only be considered a relative indicator (or index) of escapement level.

WILD CHUM SALMON STOCKS

Southeast Alaska chum salmon index streams were grouped into appropriate stock groups by area and run-timing based on marine-tagging and genetic studies (Eggers and Heinl 2008). Chum salmon populations in Southeast Alaska are generally divided into two runs based on migration timing: summer-run fish peak during the period mid-July to mid-August and fall-run fish peak in September or later (Figure 2). Allozyme studies by Kondzela et al. (1994), Phelps et al. (1994), and Wilmot et al. (1994) suggested that run-timing is an isolating mechanism for chum salmon populations: "reproductive isolation between summer-run and fall-run chum salmon is an important component of the genetic diversity of this species" (Phelps et al. 1994). Marine tagging experiments conducted in the 1900s (e.g., Rich 1926, Rich and Suomela 1929, and Rich and Morton 1930) demonstrated that Southeast Alaska chum salmon populations are mostly segregated into northern and southern components: northern fish migrated to inside waters via the entrances to Icy and Chatham straits, while southern fish migrated to spawning areas through the entrance to Sumner Strait and Dixon Entrance. Genetic studies of Southeast Alaska and northern British Columbia chum salmon by Kondzela et al. (1994) also supported this separation of northern and southern components.

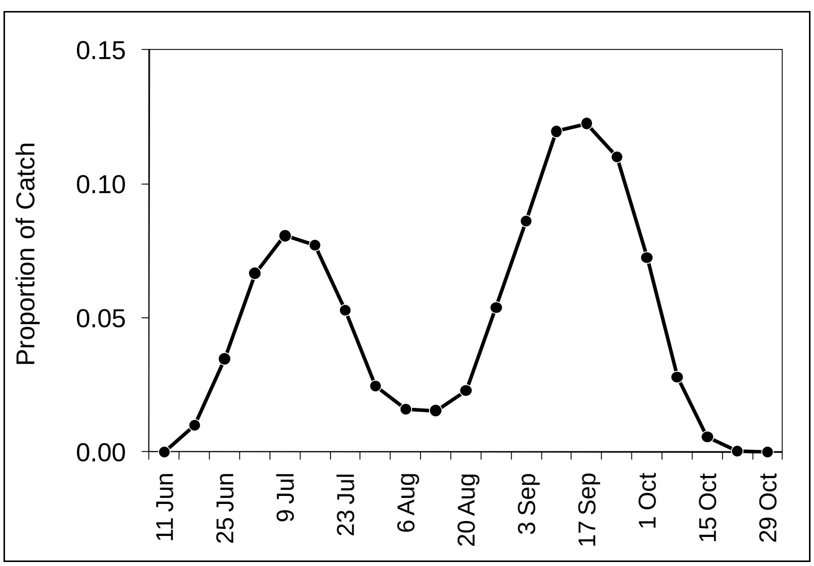

Figure 2.–Mean run-timing of chum salmon in the Lynn Canal (District 15) commercial drift gillnet fishery, illustrated by plotting the mean weekly proportion of the total annual harvest of chum salmon in the fishery, 1960–2010. All chum salmon harvested in this fishery from statistical week 34 (average midweek date 20 August) and later are considered fall-run fish.

Southeast Alaska summer-run chum salmon index streams were grouped into three stock groups that comprise aggregates of index streams across broad subregions (Eggers and Heinl 2008). The Southern Southeast Subregion includes 13 index streams located primarily on inner islands and the mainland from Sumner Strait south to Dixon Entrance (districts 1–7; Figures 3 and 4). The Northern Southeast Inside Subregion includes 63 index streams located on inside waters north of Sumner Strait (districts 8–12, 14–15, and District 13 subdistricts 51–59; Figures 3 and 4). The Northern Southeast Outside Subregion includes five index streams located on the outside waters of Chichagof and Baranof islands in northern Southeast Alaska (District 13, excluding Peril Straits and Hoonah Sound subdistricts 51–59; Figures 3 and 4). Southeast Alaska fall-run chum salmon index streams were grouped into stocks that support, or have supported, terminal commercial fisheries in the past. These stocks include Cholmondeley Sound, Security Bay, Port Camden, Excursion Inlet, and the Chilkat River.

We have compiled annual peak aerial and foot survey data for all of the index streams. If a particular index stream was missing escapement counts for any given year, an iterative expectation-maximization algorithm (McLachlan and Krishnan 1997) was used to impute a missing value. Values were imputed based on the assumption that the expected count for a given year was equal to the sum of all counts for a given stream, times the sum of all the counts in a given year for all the streams in the unit of interest, divided by the sum of all counts over all years for all the streams in the unit of interest. Data were arranged in a matrix and the imputed value was calculated as the row total times column total divided by grand total—in this case, the unit of interest is the stock group, and interpolations for missing values were made at the stock group level. This method is based on an assumed multiplicative relation between yearly count and unit count, with no interaction.

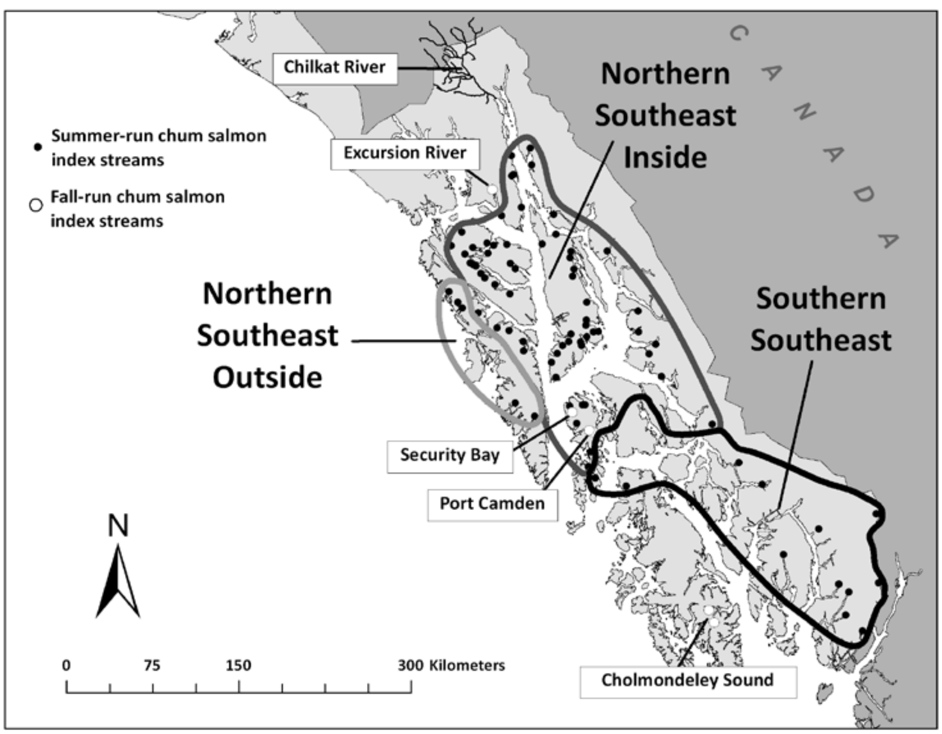

Figure 3.–Locations of ADF&G chum salmon index streams and summer chum salmon stock groups in Southeast Alaska.

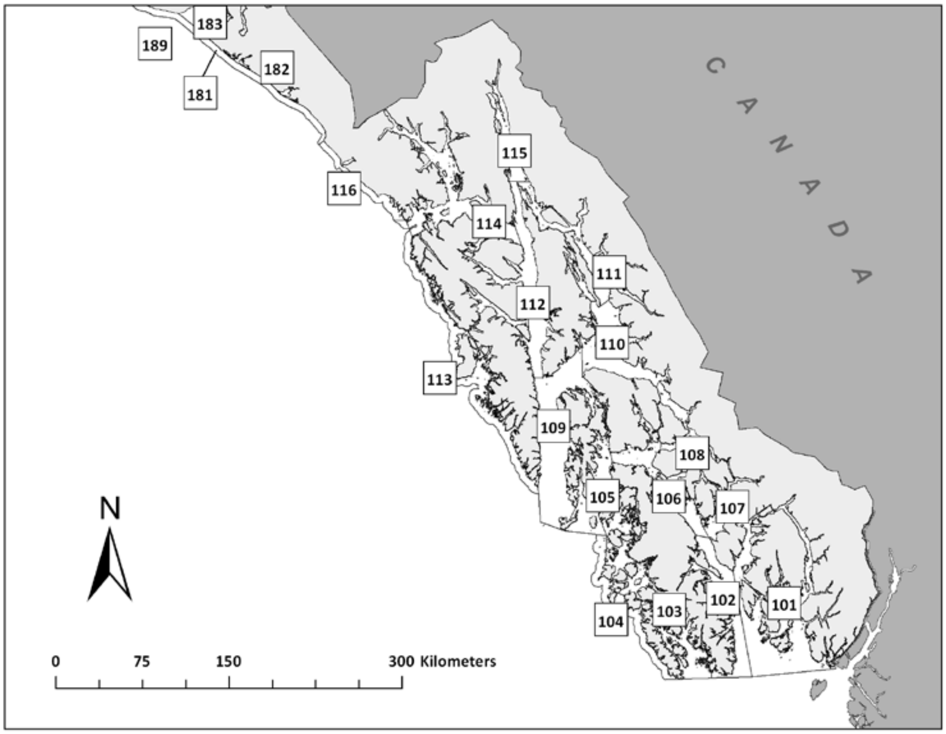

Figure 4.–Locations of ADF&G regulatory districts in Southeast Alaska.

HATCHERY CHUM SALMON STOCKS

Although salmon hatcheries have contributed to the commercial harvest in Southeast Alaska since well before the 1980s, the hatchery production of chum salmon in Southeast Alaska increased substantially in the last three decades. In 1980, hatchery operators in Southeast Alaska released 8.7 million chum salmon fry at eight locations; by 2010, this number had risen to 458 million fry released at 19 locations (Figure 5).

Significant hatchery runs of chum salmon have been developed in southern Southeast Alaska by Southern Southeast Regional Aquaculture Association (SSRAA). Initial releases occurred in 1980 and increased to an average of 94 million fry per year in the 1990s (Figure 6). Production was increased again in the early 2000s and averaged 122 million fish per year from 2004 to 2010. SSRAA has released summer chum salmon at Nakat Inlet, Earl West Cove, Neets Bay, Anita Bay, and Kendrick Bay. SSRAA also releases fall-run stocks at Nakat Inlet and Neets Bay, and fall runs averaged roughly 20% of production over the last 10 years. Over the years, SSRAA has marked nearly 100% of all of releases in order to track returns: broods 1979–2002 were marked with coded wire tags, and broods 2002 and later were thermally marked. The 2002 brood was double-marked with both coded wire tags and thermal marks in order to compare estimates of harvest based on analyses using each mark type.

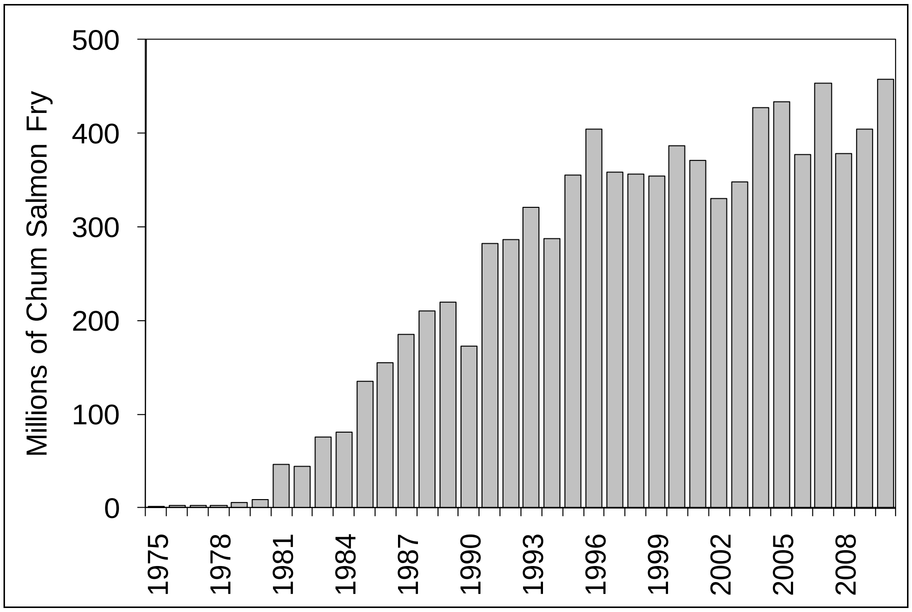

Figure 5.–Number of hatchery-produced chum salmon fry released annually in Southeast Alaska, 1975–2010.

Significant hatchery runs of chum salmon have been developed in northern Southeast Alaska by Northern Southeast Regional Aquaculture Association (NSRAA). Initial releases occurred in 1981 and increased steadily to an average of 133 million fry per year from 2001 to 2010, making it the largest producer of chum salmon in the state. The largest chum salmon releases have been at Hidden Falls and Deep Inlet. NSRAA has not consistently marked a large portion of its releases (Figure 6); however, thermal marking was initiated with the 1991 brood, and the proportion of releases that were thermally marked averaged 80% since 2004.

Douglas Island Pink and Chum, Inc. (DIPAC) has also developed significant hatchery runs of chum salmon in northern Southeast Alaska. Initial releases occurred in 1977, increased through the 1980s, and have been fairly stable since 1991, with average releases of 99 million fry annually (Figure 6). DIPAC releases chum salmon at Amalga Harbor, Gastineau Channel, Limestone Inlet, and Boat Harbor. DIPAC has consistently marked its releases, initially with coded wire tags (through the 1992 brood) and later with thermal marks (since the 1991 brood), and 100% of its releases have been thermal marked since the 1997 brood.

Smaller numbers of hatchery chum salmon have also been released by Kake Non-Profit Fisheries Corporation (at Gunnuck Creek and Southeast Cove), Sheldon Jackson College (at Crescent Bay and Deep Inlet), Armstrong-Keta, Inc. (at Port Armstrong), and Metlakatla Indian Community (at Annette Island). The total releases for these operators combined ranged from 26 to 97 million fish since 1997 (Figure 6).

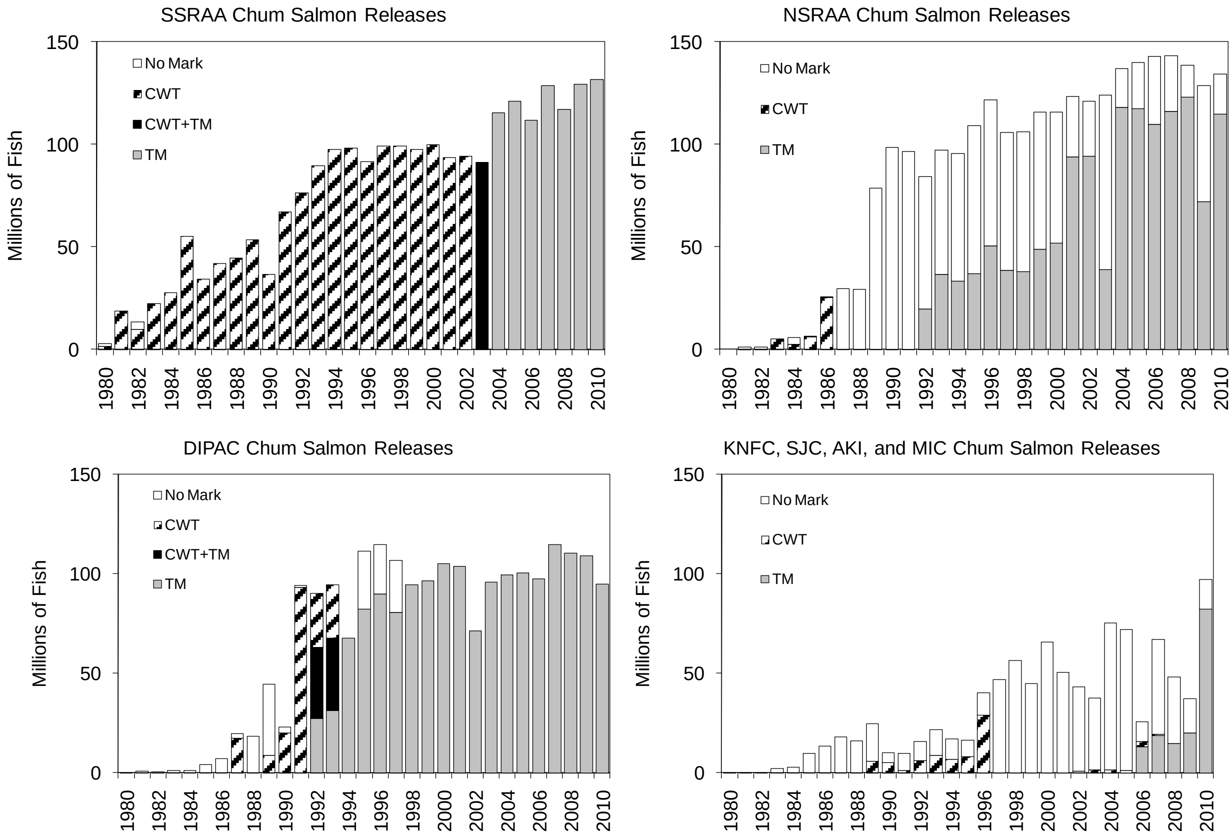

Figure 6.–Annual releases of chum salmon by nonprofit hatcheries in Southeast Alaska, 1979–2010. Releases are presented by type of mark: no mark, coded wire tag (CWT), thermal mark (TM), and coded wire tag and thermal mark combined. (NSRAA = Northern Southeast Regional Aquaculture Association; SSRAA = Southern Southeast Regional Aquaculture Association; DIPAC = Douglas Island Pink & Chum, Inc.; KNFC = Kake Non-Profit Fisheries Corp.; SJC = Sheldon Jackson College; AKI =Armstrong-Keta, Inc.; MIC = Metlakatla Indian Community. Does not include ADF&G hatchery releases from 1976 to 1991.)

HARVEST

Commercial harvest data are compiled from ADF&G fish ticket information. Commercial harvest data provide estimates of the total harvest in a fishery, but not stock composition. Wild chum salmon are harvested primarily in mixed stock fisheries, typically some distance from spawning areas, and it is usually not possible to account for stock-specific harvests. Some chum salmon runs, particularly fall-run fish, are harvested directly in terminal or near-terminal fisheries, which allows for some accounting of stock-specific harvest; however, in many cases, those fish also migrate through mixed stock fisheries where the stock composition of catches may not be known.

Since the early 1990s, a large proportion of the chum salmon harvest in common property fisheries of Southeast Alaska has been composed of hatchery stocks, particularly during the summer-run period. Hatchery runs are intensively harvested in terminal areas (defined in regulation as either terminal harvest areas or special harvest areas), and harvests in these areas are considered specific to the respective hatchery stocks released at that site. Substantial harvest of hatchery stocks also occurs in traditional mixed stock common property fisheries. Hatchery operators report estimates of the total number of hatchery chum salmon harvested each year

(White 2010). Methods used to estimate harvests in mixed stock fisheries vary, however, from comprehensive thermal mark sampling to best estimates based on consultation between ADF&G management biologists and hatchery operators (Heinl 2005).

In the Southern Southeast Subregion, hatchery chum salmon releases from SSRAA facilities have been coded-wire-tagged or thermal marked from the outset of production (Figure 6). In addition, almost all of the common property chum salmon harvested in southern Southeast Alaska (i.e., districts 1–8) fisheries have been sampled for coded wire tags or thermal marks since 1983. Estimated harvests of unmarked fish (wild fish and unmarked hatchery fish from Annette Island release sites) and hatchery fish through 2007 were obtained from Eggers and Heinl (2008). Estimates of hatchery harvest for 2008–2010 were provided by SSRAA. These estimates include summer- and fall-run fish combined. Harvest estimates for this subregion include harvests of hatchery fish in hatchery terminal areas and separate estimates of the harvests of wild *and* hatchery fish in traditional mixed stock common property fisheries outside of hatchery terminal areas (Appendix B1). The exploitation rate on wild summer chum salmon in traditional mixed stock commercial net fisheries throughout districts 1–8 is assumed to be at least moderate based on harvest rates achieved on hatchery stocks in those fisheries.

Little stock-specific harvest data are available for chum salmon in the Northern Southeast Inside Subregion, which includes districts 9–12, 14–15, and the Hoonah Sound portion of District 13 (subdistricts 51–59). Common property harvests during the summer season (pre-statistical week 34) in Lynn Canal (District 15) and the Taku-Snettisham area (District 11) have been composed primarily of hatchery fish since 1985, while harvests in districts 10, 12, 13 (Hoonah Sound), and 14 have been composed of mixed hatchery and wild fish. Harvests during the fall-run season (statistical week 34 and later) are considered wild chum salmon as there are no significant hatchery runs of fall chum salmon in the Northern Southeast Inside Subregion (Appendix B2). The exploitation rate on summer-run chum salmon in traditional, mixed stock commercial net fisheries in the Northern Southeast Inside Subregion is assumed to be at least moderate.

The Northern Southeast Outside Subregion includes District 13 (except Hoonah Sound). Harvests in this subregion include mixed harvests of wild and hatchery fish in traditional common property fisheries outside of hatchery terminal areas, and known harvests of hatchery fish inside hatchery terminal areas (Appendix B3). The exploitation rate on Northern Southeast Outside Subregion chum salmon in traditional mixed stock commercial purse seine fisheries is assumed to be at least moderate.

ESCAPEMENT GOALS

The status of chum salmon stocks in Southeast Alaska was judged primarily by performance in meeting established escapement goals. Formal escapement goals are established for eight chum salmon stock groups in the Southeast region, and all are classified as *sustainable* escapement goals (Table 1; Eggers and Heinl 2008). Escapement goal classifications are defined in the *Policy for the Management of Sustainable Salmon Fisheries* (5 AAC 39.222) under Section (f) as:

> "(3) "*biological* escapement goal" or "(BEG)" means the escapement that provides the greatest potential for maximum sustained yield;" and
>
> "(36) "*sustainable* escapement goal" or "(SEG)" means a level of escapement, indicated by an index or an escapement estimate, that is known to provide for sustained yield over a 5

to 10 year period, used in situations where a BEG cannot be estimated or managed for; …will be stated as a range "(SEG Range)" or a lower bound "(Lower Bound SEG)"…"

Available information for most chum salmon stocks in Southeast Alaska fits into the "fair" or "poor" categories as defined by Bue and Hasbrouck (*unpublished*)[2], primarily due to lack of stock-specific harvest information, estimates of total escapement, or estimates of return by age:

Fair: Escapement estimated or indexed and harvest estimated with reasonably good accuracy but precision lacking for one if not both; no age data; data insufficient to estimate total return and construct brood tables.

Poor: Escapement indexed (e.g., single foot/aerial survey) such that the index provides a fairly reliable measure of escapement; no harvest and age data.

Most chum salmon escapement goals in Southeast Alaska were derived using two methods—a simple percentile approach recommended by Bue and Hasbrouck (*unpublished*) for setting sustainable escapement goals based on percentiles of historic escapement data and a risk analysis method developed by Bernard et al. (2009). These methods have been used extensively throughout Alaska (Munro and Volk 2010) to set *sustainable* escapement goals in situations where stock assessment data were insufficient to establish a *biological* escapement goal through a more technical approach. *Lower bound sustainable* escapement goals were established for summer chum salmon in Southeast Alaska, rather than ranges, because they are harvested in mixed stock commercial fisheries and their escapements cannot be effectively managed to fall within a range.

ESCAPEMENT GOAL REVISIONS

The current summer-run chum salmon escapement goals for the Southern Southeast and Northern Southeast Inside subregions are *lower bound sustainable* escapement goals based on the 25th percentile of peak survey estimates to aggregates of index streams from the early 1980s to 2007. Eggers and Heinl (2008) used survey data starting in the early 1980s to provide the most complete data set possible with which to establish escapement goals. For approximately half the index streams in these subregions, however, survey information exists going back to 1960. Therefore, we re-evaluated the escapement goals for these two subregions using all available historic data in order to provide the broadest time series possible on which to base the goals, including two periods of high productivity in the 1960s and 1980s–1990s, and a period of low productivity in the 1970s. We did not re-examine the goal for the Northern Southeast Outside Subregion as very little survey information exists for index streams in that subregion prior to 1980.

We re-evaluated escapement goals using the simple percentile approach recommended by Bue and Hasbrouck (*unpublished*), whereby the contrast of the escapement data (i.e., the ratio of the highest observed escapement to the lowest observed escapement) and the exploitation rate of the stock were used to select percentiles of observed annual escapements to be used for estimating a *sustainable* escapement goal. Contrast in the escapement data is simply the maximum escapement value divided by the minimum escapement value. Low contrast (<4) implies that stock productivity is known for only a limited range of escapements. According to this approach,

[2] Bue, B. G., and J. J. Hasbrouck. *Unpublished*. Escapement goal review of salmon stocks of Upper Cook Inlet. Alaska Department of Fish and Game, Report to the Alaska Board of Fisheries, November 2001 (and February 2002), Anchorage. Subsequently referred to as Bue and Hasbrouck (*unpublished)*.

percentiles of the total range of observed annual escapements that are used to estimate a sustainable escapement goal for a stock with low contrast should be relatively wide in an attempt to improve future knowledge of stock productivity. As contrast increased, Bue and Hasbrouck recommended that percentiles used to estimate the goal be narrowed. For exploited stocks with high contrast, the lower bound of the escapement goal range was set at the 25th percentile as a precautionary measure for stock protection (Table 2).

Since the current escapement goals were based on data through 2007, we were careful to base our analysis on the years 1960–2007. We did not include the three most recent years of lower index values, 2008–2010, as index counts for these years were below the current escapement goals for both subregions. Indices from 2008 to 2010 could be incorporated into future escapement goal analysis if it is clear that those low counts represent normal stock fluctuations, such as those that occurred during the 1960s and 1970s.

Table 2.–Criteria used to estimate sustainable escapement goals.

Escapement Contrast[a] and Exploitation	Sustainable Escapement Goal Range
Low contrast (<4)	15th percentile to maximum observation
Medium contrast (4–8)	15th to 85th percentile
High contrast (>8); low exploitation	15th to 75th percentile
High contrast (>8); exploited population	25th to 75th percentile

[a] Relative range of the entire time series of escapement data calculated by dividing the maximum observed escapement value by the minimum observed escapement value.

Southern Southeast Summer-Run Chum Salmon

The current Southern Southeast Subregion escapement goal is set at the 25th percentile of the sum of annual peak escapement survey counts to 13 index streams over the years 1980–2007. We identified eight streams in the index with survey counts for greater than 50% of the years 1960–1979. This set of eight index streams also accounted for a large portion (median = 74%) of the annual subregion escapement index from 1980 to 2007. We calculated escapement indices for the years 1960–1979 by expanding this set of eight index streams in three steps as follows. First, we grouped these eight streams together and imputed missing values for the years 1960–1979 (16% of the data points). Second, we summed the annual surveys to this set of eight index streams, 1960–1979. Finally, we estimated the total Southern Southeast Subregion escapement indices for 1960–1979, by dividing the annual sum-of-surveys to this set of eight index streams by the median proportion of 74%. These calculations provided annual escapement indices for the years 1960–2007 (Appendix A1). Given the high contrast (>8) in the entire 1960–2007 escapement series, and at least moderate exploitation rate, we used the 25th percentile of the escapement index to calculate a *lower bound sustainable* escapement goal of 54,000 chum salmon counted on peak surveys to the 13 index streams in this subregion (compared to the current goal of 68,000 based only on 1980–2007 data; Figure 7).

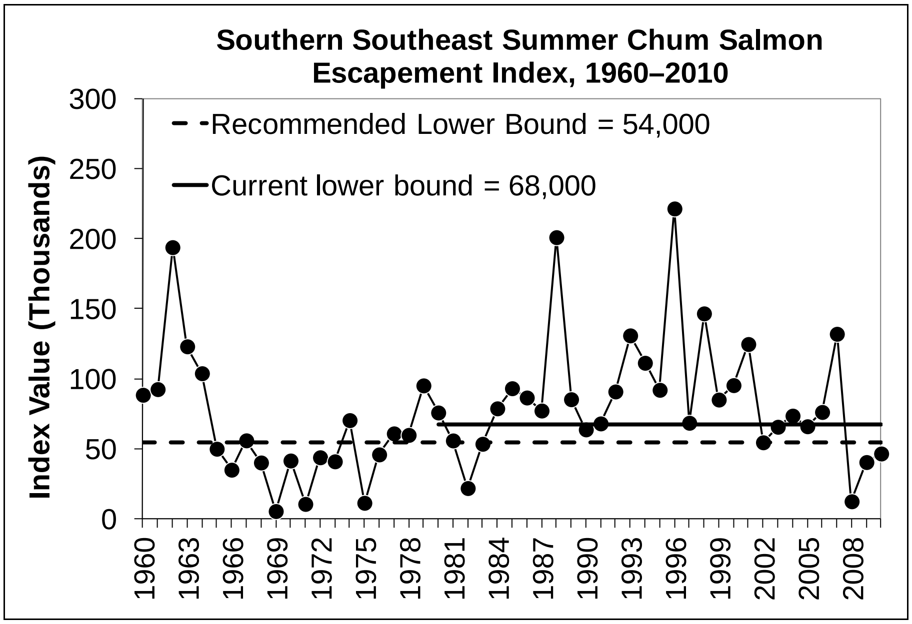

Figure 7.–Observed escapement index values, current *lower bound sustainable* escapement goal of 68,000 index spawners (solid line), and recommended new *lower bound sustainable* escapement goal of 54,000 index spawners (dashed line) for Southern Southeast Subregion summer-run chum salmon, 1960–2010.

Northern Southeast Inside Summer-Run Chum Salmon

The current Northern Southeast Inside Subregion escapement goal is set at the 25th percentile of the annual sum of peak escapement survey data to 63 index streams over the years 1982–2007. We identified 31 streams in the index with survey counts for greater than 50% of the years 1960–1981. This set of 31 index streams also accounted for a large portion (median = 68%) of the annual subregion escapement index from 1982 to 2007. We calculated escapement indices for the years 1960–1981 by expanding this set of 31 index streams in three steps as follows. First, we grouped these 31 streams together and imputed missing values for the years 1960–1981 (27% of the data points). Second, we summed the annual surveys to this set of 31 index streams, 1960–1981. Finally, we estimated the total Northern Southeast Inside Subregion escapement indices for 1960–1981, by dividing the annual sum-of-surveys to this set of 31 index streams by the median proportion of 68%. These calculations provided annual escapement indices for the years 1960–2007 (Appendix A2). Given the high contrast (>8) in the entire 1960–2007 escapement series, and at least moderate exploitation rate, we used the 25th percentile of the escapement index to calculate a *lower bound sustainable* escapement goal of 119,000 chum salmon counted on peak surveys to the 63 index streams in this subregion (compared to the current goal of 149,000 based only on 1982–2007 data; Figure 8).

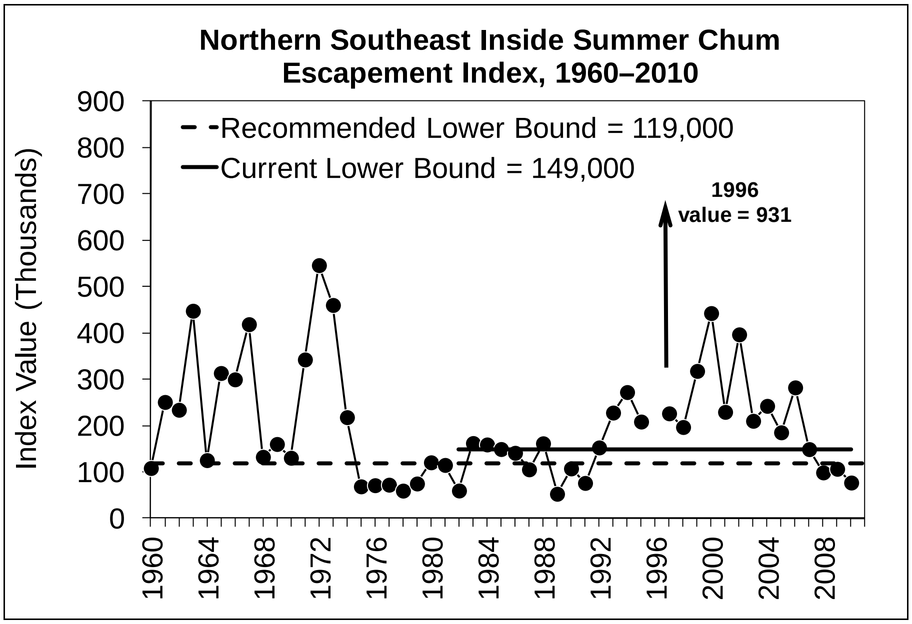

Figure 8.–Observed escapement index values, current *lower bound sustainable* escapement goal of 149,000 index spawners (solid line), and recommended new *lower bound sustainable* escapement goal of 119,000 index spawners (dashed line) for Northern Southeast Inside Subregion summer-run chum salmon, 1960–2010.

ESCAPEMENT GOAL RECOMMENDATIONS

We summarize the escapement goal recommendations as follows:

1. Southern Southeast summer-run chum salmon: change the existing *lower bound sustainable* escapement goal of 68,000 index spawners to 54,000 index spawners based on a reanalysis that incorporated two decades of additional data, 1960–1979. Index counts are the aggregate peak aerial and foot survey counts for the 13 indicator streams for this stock.

2. Northern Southeast Inside summer-run chum salmon: change the existing *lower bound sustainable* escapement goal of 149,000 index spawners to 119,000 index spawners based on a reanalysis that incorporated two decades of additional data, 1960–1981. Index counts are the aggregate peak aerial and foot survey counts for the 63 indicator streams for this stock.

STOCK STATUS

Southern Southeast Summer-Run Chum Salmon

The Southern Southeast Subregion includes summer-run chum salmon index streams located on the inner islands and mainland of Southeast Alaska, from Sumner Strait south to Dixon entrance. Peak escapement survey data were available for eight index streams since 1960 and for all 13 index streams since 1980 (Figure 9; Appendix A1). Escapement indices were at low levels during the mid-1960s to late 1970s, exhibited an increasing trend into the 1990s, and have since trended downward. In 2009, ADF&G established a *lower bound sustainable* escapement goal of 68,000 chum salmon counted on peak surveys to the aggregate set of index streams. Escapement indices were below the current escapement goal over the past three years, 2008–2010.

Wild chum salmon harvests in the Southern Southeast Subregion were relatively stable and averaged 650 thousand fish annually from 1960 to the early 1980s. The total harvest of chum salmon in this subregion increased substantially in the late 1980s and 1990s, primarily due to hatchery production (Figure 9, Appendix B1). From 1990 to 2010, the chum salmon harvest in traditional mixed stock fisheries averaged 2.2 million fish. Harvests in terminal hatchery areas (not including cost-recovery harvests) averaged an additional 400,000 fish. Although hatchery runs have decreased slightly from the peak runs of the mid-1990s, overall chum salmon harvests (including hatchery fish) have been at high levels. Estimated harvests of wild chum salmon increased in the 1980s and peaked in the mid-1990s, but have declined over the past decade (Figure 10, Appendix B1).

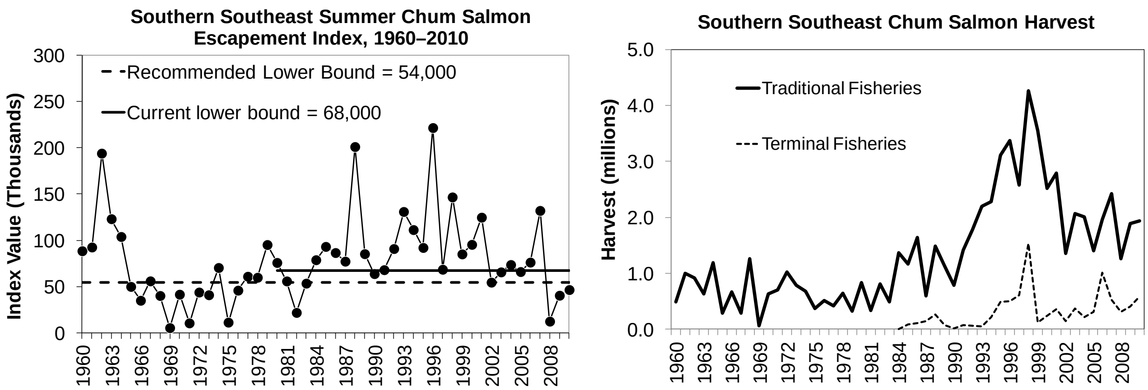

Figure 9.–Escapement index for wild summer-run chum salmon in the Southern Southeast stock group (1980–2010, left) and the annual common property harvest of chum salmon in the Southern Southeast Subregion, districts 1–8, 1960–2010 (right). (Terminal harvests do not include hatchery cost recovery.)

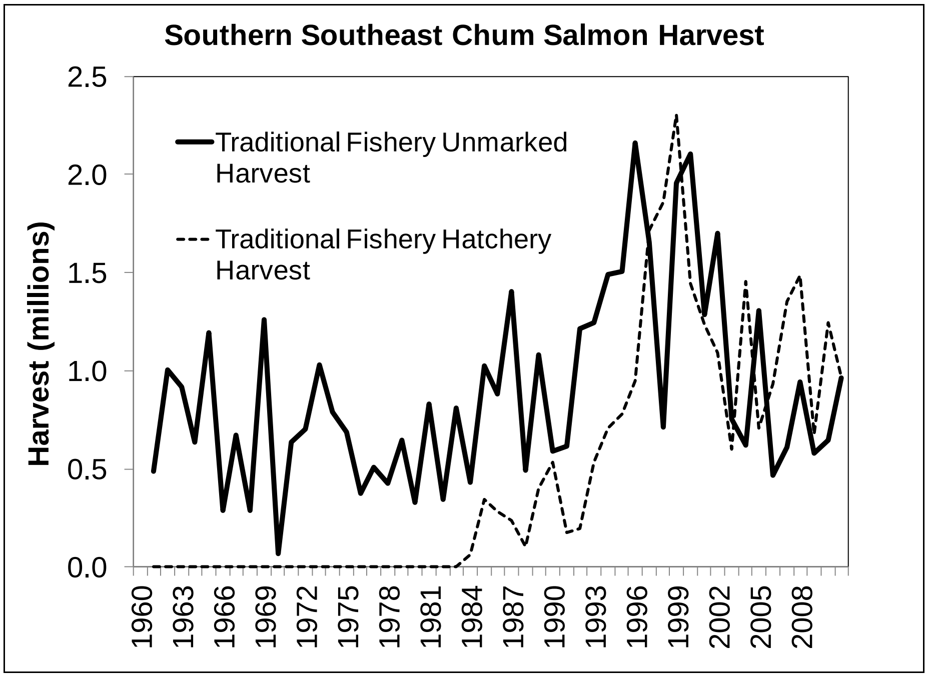

Figure 10.–Estimated annual harvest of unmarked chum salmon (includes wild fish and unmarked hatchery fish from Annette Island release sites) and hatchery chum salmon in traditional common property fisheries in the Southern Southeast Subregion, districts 1–8.

Northern Southeast Inside Summer-run and Fall-run Chum Salmon

The Northern Southeast Inside Subregion includes summer-run chum salmon index streams located on the inside waters of Southeast Alaska north of Sumner Strait. Peak escapement survey data were available for 31 index streams since 1960 and for all 63 index streams since 1982 (Figure 11; Appendix A2). Escapement indices were at high levels in the 1960s, then declined to low levels in the 1970s–1980s. Escapement indices trended upward into the late 1990s and have trended downward over the last decade. In 2009, ADF&G established a *lower bound sustainable* escapement goal of 149,000 chum salmon counted on peak surveys to the aggregate set of index streams. Escapement indices were below the current escapement goal over the past three years, 2008–2010.

Hatchery runs of chum salmon in the Northern Southeast Inside Subregion (closely tracked by the District 11 and 15 summer-run harvests and hatchery terminal harvests in the subregion) increased rapidly in the early 1990s and have remained high since that time (Figure 11). The estimated summer chum salmon harvest in Northern Southeast Inside Subregion traditional fisheries (traditional fisheries through week 33, districts 109, 110 112, 113 inside, and 114, and 111 and 115 prior to 1985) has followed a pattern similar to escapements, with low harvests in the 1970s and 1980s, increased harvests in the 1990s and 2000s, and low harvests after 2007 (Figure 11). From 1990 to 2010, the total harvest of chum salmon in the subregion's traditional mixed stock fisheries averaged 1.5 million fish (Appendix B2).

The wild chum salmon harvests in the fall-run period declined in the early 1990s and have been relatively low since (Figure 12). Annual fall-run harvests in the Northern Southeast Inside Subregion averaged 430 thousand from 1960 to 1990, but only 140 thousand since 1995.

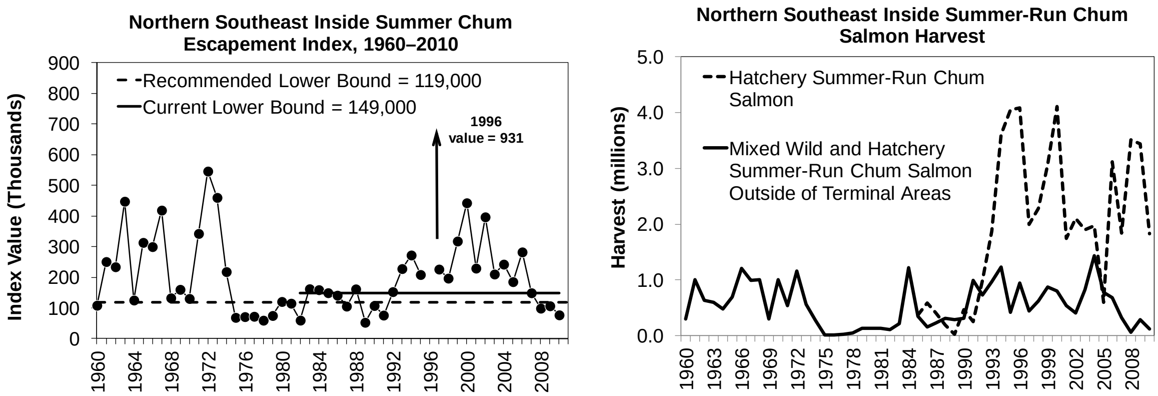

Figure 11.–Escapement index for wild summer-run chum salmon in the Northern Southeast Inside stock group (1982–2010, left) and the harvest of chum salmon in the Northern Southeast Inside Subregion of Southeast Alaska, 1960–2010 (right). The estimated harvest of hatchery summer-run chum salmon includes all harvest in districts 11 and 15 and hatchery terminal harvests in District 12 through statistical week 33. The harvest of mixed wild and hatchery summer-run chum salmon outside of hatchery terminal areas includes all harvests in districts 9–10, 12, 14, and inside subdistricts of District 13 through statistical week 33.

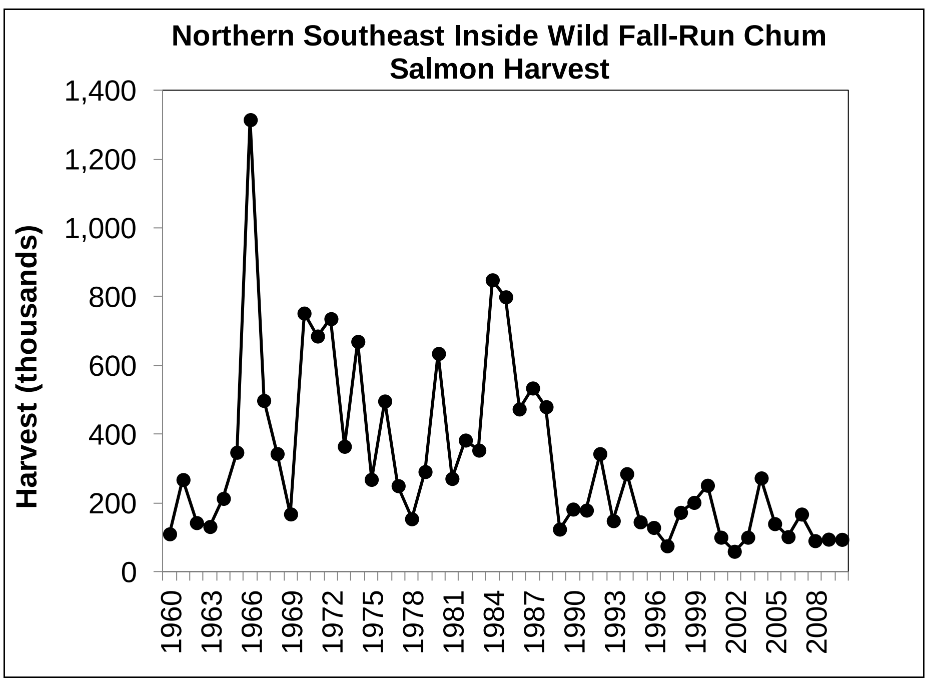

Figure 12.–Harvest of fall-run chum salmon in the Northern Southeast Inside Subregion. Chum salmon harvested in statistical week 34 (average midweek date 20 August) and later are considered fall-run fish.

Northern Southeast Outside Summer-Run Chum Salmon

The Northern Southeast Outside Subregion includes primarily summer-run chum salmon index streams on the outside waters of Chichagof and Baranof islands in northern Southeast Alaska. Peak escapement survey data were available for five index streams since 1982 (Appendix A3). In 2009, ADF&G established a *lower bound sustainable* escapement goal of 19,000 chum salmon counted on peak surveys to the five index streams combined. Escapement indices were below the current goal in 2009 and above the goal 2010 (Figure 13). Total chum salmon harvests were relatively low until the onset of hatchery runs in the early 1980s. Chum salmon harvests have greatly increased since the 1990s and increases were made largely of hatchery runs (Figure 13, Appendix B3).

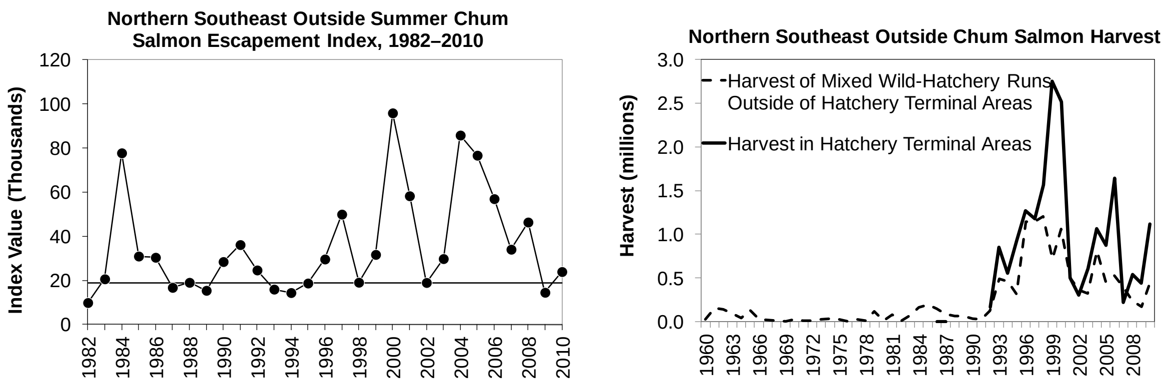

Figure 13.–Escapement index for wild summer-run chum salmon in the Northern Southeast Outside stock group, 1982–2010 (left), and harvest of chum salmon in the Northern Southeast Outside Subregion, 1960–2010 (right).

Cholmondeley Sound Fall-Run Chum Salmon

Cholmondeley Sound (Prince of Wales Island) fall-run chum salmon support a terminal commercial purse seine fishery that has provided commercial fishermen with a valuable opportunity to extend the fishing season beyond the directed pink salmon purse seine season that ends in late August. Harvests of fall chum salmon in Cholmondeley Sound (subdistrict 102-40) averaged 42,000 fish in the 1970s and 1980s, but increased to an average of 122,000 fish a year from 1991 to 2004, including a peak harvest of 359,000 chum salmon in 1998. Chum salmon abundance decreased abruptly in 2005 and harvests through 2010 were very low due to conservative management of the fishery (Figure 14; Piston and Brunette 2011). These fish are also harvested in other mixed stock fisheries prior to reaching the terminal area, so a complete accounting of the total harvest is not possible.

Prior to 2009, management of the fall chum salmon fishery in Cholmondeley Sound was based on an informal escapement target of 30,000 chum salmon at Disappearance Creek (ADF&G stream number 102-40-043) and peak aerial escapement survey counts of 10,000–15,000 fish in Lagoon Creek (ADF&G stream number 102-40-060; Heinl et al. 2004). The escapement at Disappearance Creek was measured at an adult counting weir operated nearly annually from 1961 to 1984. The weir was typically removed once the escapement target had been met, however, and was not always operated continuously when it was in place (Heinl et al. 2004);

thus, all of the weir counts during those years represent minimum escapement estimates. Beginning in 1985, aerial surveys were used to monitor escapements to Disappearance and Lagoon creeks to ensure that escapement targets were met (Heinl et al. 2004). Those management targets were not escapement goals as defined in the Escapement Goal Policy (5 AAC 39.223), but were based on the best professional judgment of area management staff. Peak escapement survey estimates have ranged from 8,000 to 50,000 chum salmon in Disappearance Creek, and 4,000 to 50,000 chum salmon in Lagoon Creek (Appendix A4).

In 2009, ADF&G established a *sustainable* escapement goal of 30,000–48,000 chum salmon counted on peak aerial surveys to Disappearance and Lagoon creeks combined (Eggers and Heinl 2008). Escapement indices were within the current escapement goal range in 2009 and exceeded the escapement goal in 2010 (Figure 14). The department also operated a weir at Disappearance Creek from 2008 to 2010 and obtained total escapement estimates of 55,000 in 2008 (Piston and Heinl 2010a), 61,500 in 2009 (Piston and Heinl 2010b), and 85,600 in 2010 (Piston and Brunette 2011).

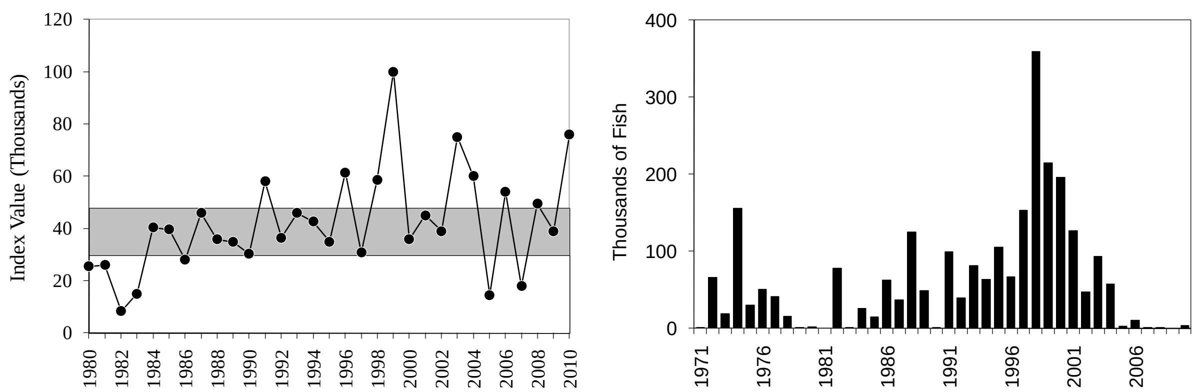

Figure 14.–Annual escapement index and *sustainable* escapement goal range (shaded area) of wild fall-run chum salmon in Cholmondeley Sound (1980–2010), and purse seine harvest of fall chum salmon in adjacent subdistrict 102-40 (1971–2010). All chum salmon harvested in statistical week 34 (average midweek date 20 August) and later were considered fall-run fish.

Port Camden Fall-Run Chum Salmon

Port Camden (Kuiu Island) fall-run chum salmon have been harvested in a terminal commercial purse seine fishery in subdistrict 109-43 in years when run strength appeared adequate to provide a harvest of fish surplus to escapement needs. The chum salmon harvest at Port Camden averaged 12,000 fish in years when the terminal fishery was conducted, with a maximum harvest of 51,000 fish in 1992 (Figure 15). Port Camden fall chum salmon are likely also harvested in other mixed stock fisheries prior to reaching the terminal area, so a complete accounting of the total harvest is not possible.

Prior to 2009, management of the fishery was based on an informal escapement target of 4,000 chum salmon counted on aerial surveys at each of the two primary fall-run chum salmon streams in Port Camden: Port Camden South Head Creek (ADF&G stream number 109-43-006) and Port Camden West Head Creek (ADF&G stream number 109-43-008; Figure 15; Appendix A5). Both are relatively short streams in terms of spawning habitat; runs average slightly smaller in the west head creek and run timing is about 10–14 days later than the south head creek (Eggers and

Heinl 2008). The management targets were not escapement goals as defined in the Escapement Goal Policy (5 AAC 39.223), but were based on the best professional judgment of area management staff. In 2009, ADF&G established a *sustainable* escapement goal of 2,000–7,000 chum salmon counted on peak aerial surveys to the two Port Camden streams combined (Eggers and Heinl 2008). Escapement indices were below the current escapement goal range in 2009 and within the range in 2010 (Figure 15).

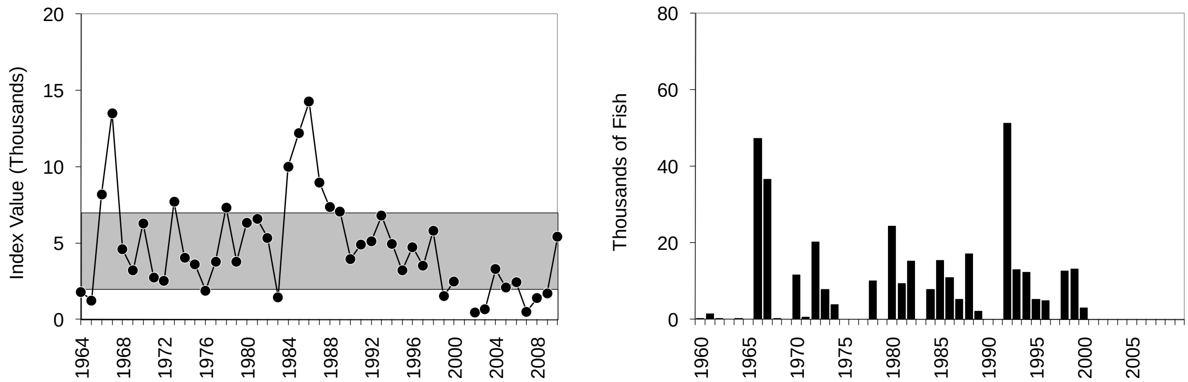

Figure 15.–Annual escapement index and *sustainable* escapement goal range (shaded area) of wild fall-run chum salmon in Port Camden (1964–2010), and purse seine harvest of fall chum salmon in adjacent subdistrict 109-43 (1960–2010). All chum salmon harvested in statistical week 34 (average midweek date 20 August) and later were considered fall-run fish.

Enhancement projects were conducted at the two Port Camden streams beginning in the mid-1980s by NSRAA, U. S. Forest Service (USFS), and ADF&G (ADF&G 2004). The goals of the enhancement projects were to rehabilitate fall chum salmon stocks in Port Camden and to provide additional fall chum salmon to the common property fishery. NSRAA constructed and operated instream incubation boxes on the two Port Camden streams, and was permitted to collect up to 10 million chum salmon eggs annually. Fry were released from the incubation boxes from 1986 to 1998, with an average release of more than 4 million fry from 1991 to 1998. In addition, the USFS constructed an intertidal spawning channel in the west head creek in 1989. The channel was designed to allow for easier passage of fish from the intertidal area into the stream and to take advantage of available groundwater in an area not previously used by spawning chum salmon, although little actual spawning occurred in the constructed channel (ADF&G 2004).

The enhancement work at Port Camden did not result in increased production of fall chum salmon and the project was cancelled in 2000. Runs of chum salmon to Port Camden have been poor since the late 1990s and there has not been a fall fishery since 2000. The peak survey counts to both index streams combined averaged 6,000 fish per year from 1964 to 1998, but only 2,000 fish per year since 1999.

Security Bay Fall-Run Chum Salmon

Security Bay (Kuiu Island) fall-run chum salmon have been harvested in a terminal commercial purse seine fishery in subdistrict 109-45 during years when the run strength appeared adequate to provide a harvest of fish surplus to escapement needs (Figure 16). The chum salmon harvest at Security Bay averaged 11,500 fish in years when the terminal fishery was conducted, with a maximum harvest of 71,000 fish in 1984. These fish are likely also harvested in other mixed stock fisheries prior to reaching the terminal area, so a complete accounting of the total harvest is not possible. Escapements have been assessed through aerial surveys since 1960 at Salt Chuck Creek (ADF&G stream number 109-45-013), the primary chum salmon stream in Security Bay (Figure 16; Appendix A5).

Prior to 2009, management of the fishery at Security Bay was based on an informal escapement target of 10,000–20,000 chum salmon counted on a peak aerial survey at Salt Chuck Creek (Eggers and Heinl 2008). The management target was not an escapement goal as defined in the Escapement Goal Policy (5 AAC 39.223), but was based on the best professional judgment of area management staff. In 2009, ADF&G established a *sustainable* escapement goal of 5,000–15,000 chum salmon counted on a peak aerial survey at Salt Chuck Creek (Eggers and Heinl 2008). Escapement indices were within the current escapement goal range in 2009 and 2010 (Figure 16).

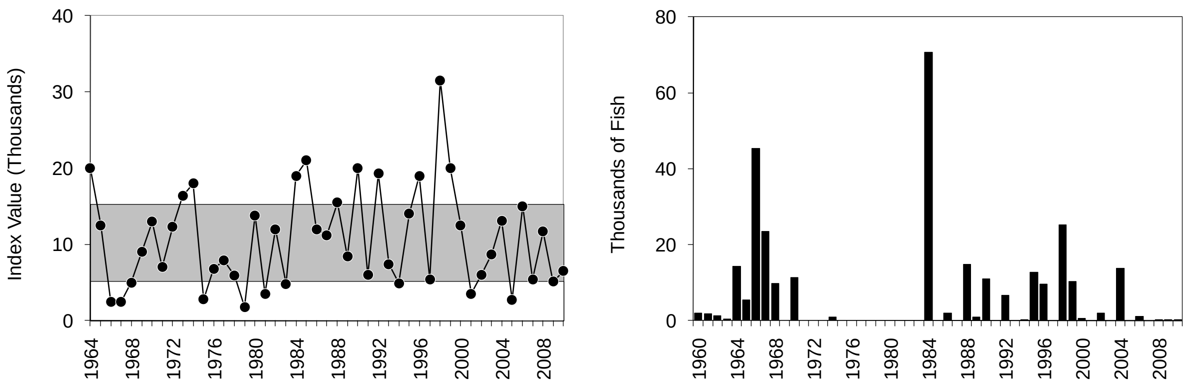

Figure 16.–Annual escapement index and *sustainable* escapement goal range (shaded area) of wild fall-run chum salmon in Salt Chuck Creek (1964–2010), and purse seine harvest of fall chum salmon in adjacent Security Bay subdistrict 109-45 (1960–2010). All chum salmon harvested in statistical week 34 (average midweek date 20 August) and later were considered fall-run fish.

Excursion River Fall-Run Chum Salmon

Excursion Inlet fall-run chum salmon have been harvested in a terminal commercial purse seine fishery in subdistrict 114-80 during years when the run strength appeared adequate to provide a harvest of fish surplus to escapement needs. These fish are likely also harvested in other mixed stock fisheries prior to reaching the terminal area, so a complete accounting of the total harvest is not possible. The area open to seining is limited to section 14-C by the *Northern Southeast Seine Salmon Fishery Management Plan* (5 AAC 33.366(b)) to minimize the impact openings might have on other migrating stocks (e.g., Chilkat River fall chum salmon). Escapements have been assessed through aerial surveys since 1960 at the Excursion River (ADF&G stream number 114-80-020), the primary chum salmon producing stream in Excursion Inlet (Figure 17; Appendix A5). Survey and harvest data suggest runs were much larger in the 1960s and 1970s than in more recent times. The harvest averaged 95,000 fish from 1960 to 1981 in years when the terminal fishery was conducted, but has only averaged 27,000 fish since that time. From 2001 to 2010, the harvest averaged only 6,100 fish and there was no fishery in four of the past six years. Similarly, peak aerial survey estimates at the Excursion River averaged 20,000 fish from 1960 to 1981, but only 6,800 since 1981. In 2009, ADF&G established a *sustainable* escapement goal of 4,000–18,000 chum salmon counted on a peak aerial survey at the Excursion River (Eggers and Heinl 2008). Escapement indices were below the current escapement goal range in 2009 and within the goal range in 2010 (Figure 17).

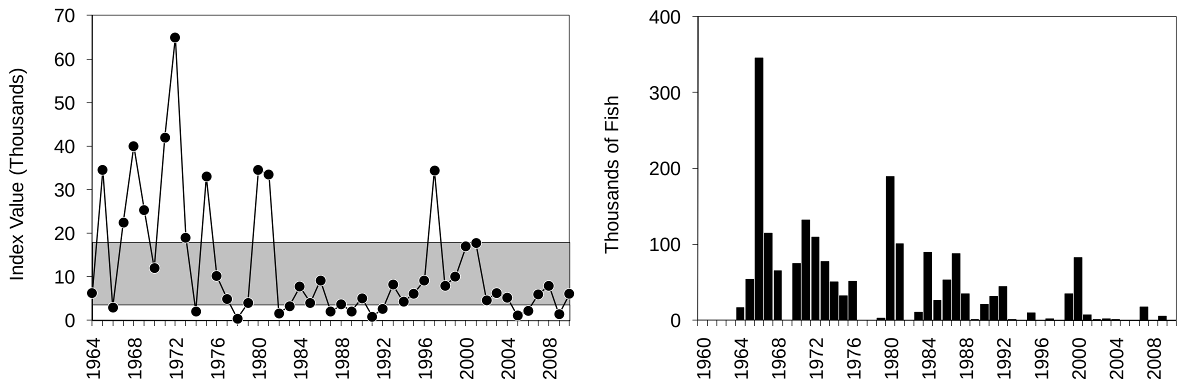

Figure 17.–Annual escapement index and *sustainable* escapement goal range (shaded area) of wild fall-run chum salmon in the Excursion River (1964–2010), and purse seine harvest of fall chum salmon in adjacent Excursion Inlet subdistrict 114-80 (1960–2010). All chum salmon harvested in statistical week 34 (average midweek date 20 August) and later were considered fall-run fish.

Chilkat River Fall-Run Chum Salmon

The Chilkat River drainage near Haines supports one of the largest fall chum salmon runs in the region. Most of the spawning takes place in the mainstem and side channels of the Chilkat River (ADF&G stream number 115-32-025) and its major tributary, the Klehini River (ADF&G stream number 115-32-046). Chilkat River fall-run chum salmon are primarily harvested in the Lynn Canal (District 15) commercial drift gillnet fishery, although they are likely also harvested to some degree in other mixed stock fisheries prior to reaching Lynn Canal.

Harvest and survey data suggest runs were much larger from the 1960s to early 1980s. The commercial harvest of fall chum salmon averaged nearly 300,000 fish per year during the 1970s and 1980s, but harvest and fisheries performance measures declined during the 1990s and the harvest has averaged 60,000 fish per year since 1989 (Figure 18). Harvests have been lower in many recent years due in part to fishery restrictions specifically implemented to protect this stock by reducing effort in the fishery (Bachman 2005). The chum salmon escapement to the Chilkat River drainage was historically monitored via aerial surveys, which also exhibited a decline in the 1990s (Figure 19, Appendix A6); however, the department considers historic aerial surveys of the drainage to be unreliable for indexing escapement due to the highly glacial nature of the system. Since 1994, drainagewide escapement estimates have been based on inriver fish wheel catches calibrated to total escapement estimated from mark-recapture studies conducted in 1990 and 2002–2005 (Bachman 2005; Eggers and Heinl 2008). Fall chum salmon abundance has increased since the 1990s, and the harvest rate in the Lynn Canal drift gillnet fishery averaged 26% since 1994 (Table 3).

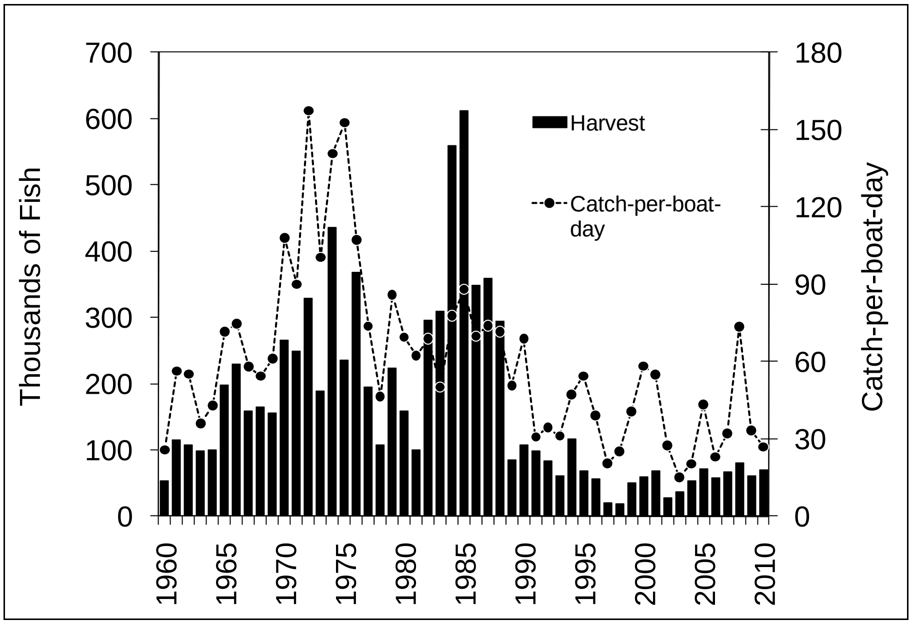

Figure 18.–Annual commercial drift gillnet harvest and catch-per-boat-day of fall chum salmon in Lynn Canal (District 15), 1960–2010. All chum salmon harvested in statistical week 34 (average midweek date 20 August) and later were considered fall-run fish.

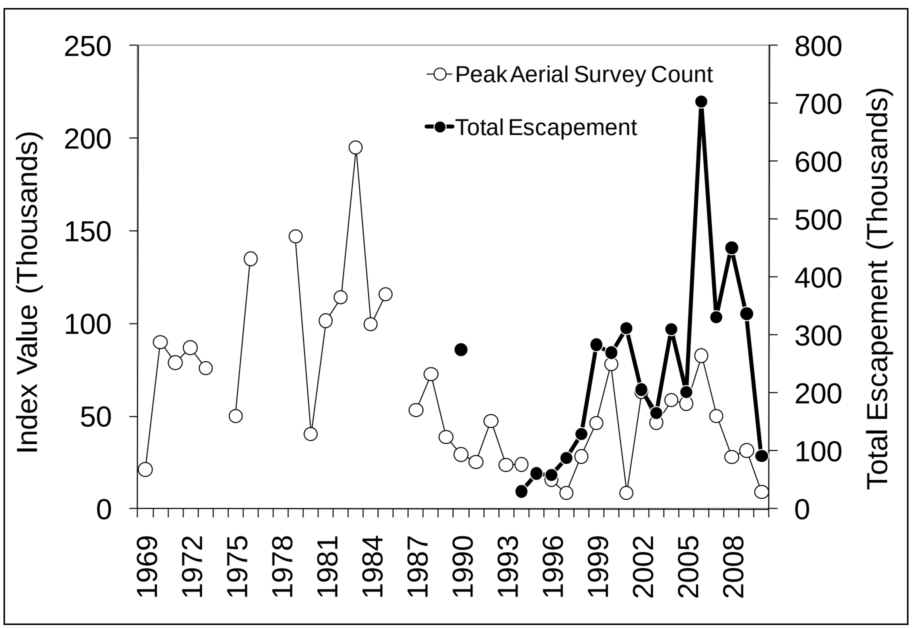

Figure 19.–Annual peak aerial survey index of spawning chum salmon in the Chilkat and Klehini rivers, 1969–2010, and estimated total escapement of chum salmon in the Chilkat River in 1990 and 1994–2010.

In 2009, ADF&G established a *sustainable* escapement goal of 75,000–170,000 or, equivalently, a fish wheel index catch of 1,125–2,550 chum salmon, based on a stock-recruit analysis of the 1994–2002 brood years (Eggers and Heinl 2008). The goal was considered a *sustainable* escapement goal rather than a *biological* escapement goal because only nine brood years were available for analysis. There will be a significant increase in the escapement contrast in future stock-recruit data when returns from recent larger escapements are accounted for and the goal will be revised prior to the next Alaska Board of Fisheries meeting in 2015. Estimated escapements were above the current escapement goal range in 2009 and within the range in 2010 (Figure 20).

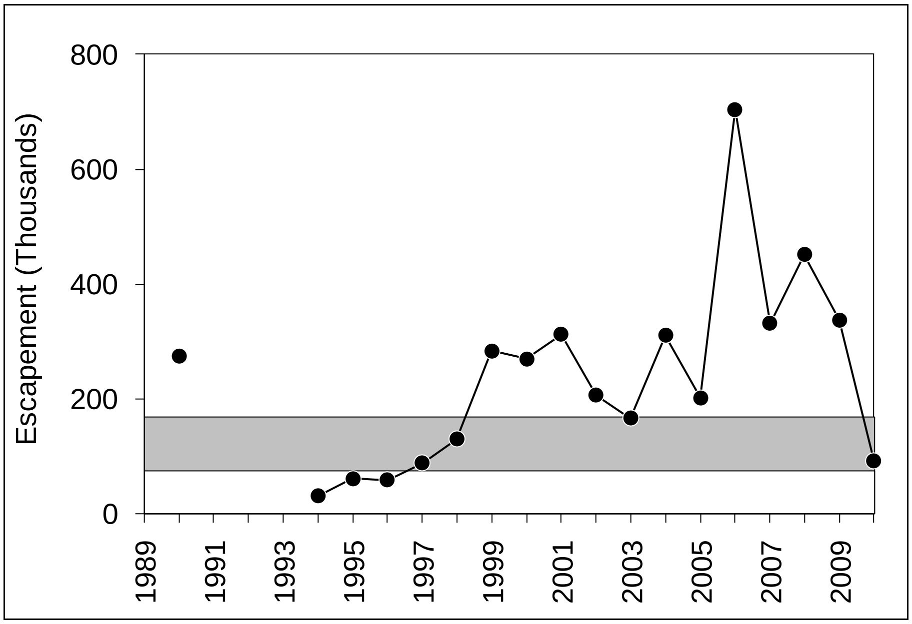

Figure 20.–Annual escapement estimates and *sustainable* escapement goal range (shaded area) of Chilkat River fall chum salmon, 1990 and 1994–2010.

Table 3.–Total escapement of Chilkat River fall chum salmon, based on mark-recapture studies and expanded fish wheel catches, and estimated annual commercial harvests, total returns, and harvest rates, 1990–2010.

Year	Fish Wheel Operations Dates	Fish Wheel Operations Catch	Peak Aerial Survey Count[a]	Estimated Escapement[b]	Commerical Harvest[c]	Estimated Total Return	Estimated Harvest Rate[d]
1990	14 Aug–25 Oct	3,025	29,350	**275,000**	107,014	**382,014**	28%
1994	18 Jun–11 Sept	*454*[e]	24,000	*30,296*	116,599	146,895	79%
1995	18 Jun–11 Sept	*1,107*[e]	ND	*61,123*	69,201	130,324	53%
1996	18 Jun–11 Sept	*1,010*[e]	16,000	*58,523*	56,437	114,960	49%
1997	11 Jun–9 Oct	1,315	9,000	*87,667*	20,850	108,517	19%
1998	8 Jun–13 Oct	1,947	28,000	*129,800*	19,239	149,039	13%
1999	7 Jun–8 Oct	4,250	46,000	*283,333*	50,576	333,909	15%
2000	9 Jun–7 Oct	4,045	78,000	*269,667*	60,201	329,868	18%
2001	6 Jun–7 Oct	4,680	9,000	*312,000*	68,898	380,898	18%
2002	7 Jun–19 Oct	2,895	63,300	**206,000**	39,942	**245,942**	16%
2003	6 Jun–21 Oct	3,402	46,600	**166,000**	36,565	**202,565**	18%
2004	7 Jun–19 Oct	4,266	58,700	**310,000**	52,394	**362,394**	14%
2005	6 Jun–11 Oct	3,126	51,300	**202,000**	71,020	**273,020**	26%
2006	9 Jun–14 Oct	10,563	83,000	*704,000*	58,290	762,290	8%
2007	7 Jun–9 Oct	4,967	50,250	*331,000*	68,599	399,599	17%
2008	6 Jun–10 Oct	6,770	28,150	*451,000*	80,875	531,875	15%
2009	31 May–9 Oct	5,051	31,500	*337,000*	61,589	398,589	15%
2010	5 Jun–11 Oct	1,368	9,100	*91,000*	69,369	160,369	43%
Average		4,111	38,897	239,189	61,537	300,726	26%

[a] Drainagewide aerial counts include the Klehini and Chilkat rivers combined.

[b] Escapements for years in bold text are based on mark-recapture; in other years, escapement estimated by expanding fish wheel catch by 1÷0.15.

[c] Commercial harvest of fall chum salmon includes all Lynn Canal (District 15) chum salmon harvested from statistical week 34 through the end of the season.

[d] Harvest rate considered minimum; stock likely also harvested in mixed stock fisheries prior to entering Lynn Canal.

[e] Fish wheel catch was expanded for early closure based on timing from 1997–2007.

Taku River Fall-Run Chum Salmon

The transboundary Taku River (ADF&G stream number 111-32-032) supports fall-run chum salmon that spawn in Canada. Taku River fall chum salmon stocks are primarily harvested in the commercial drift gillnet fishery in Taku Inlet (subdistrict 111-32), but are also harvested incidentally in the Canadian inriver coho salmon drift gillnet fishery. The Transboundary Technical Committee of the Pacific Salmon Commission established an interim escapement goal of 50,000–80,000 chum salmon for the Taku River in the 1980s (TTC 1986). There was no scientific basis for the goal, which was established by professional judgment, and the goal has not been formally adopted by ADF&G (Heinl et al. 2004). Fish wheels, operated jointly by ADF&G and Canadian Department of Fisheries and Oceans (CDFO), provide the only index of abundance available for Taku River fall chum salmon. The harvest of fall chum salmon in Taku Inlet increased in the 1970s and averaged 45,000 fish a year from 1970 to 1985. The harvest then declined in the late 1980s to very low levels in the late 1990s and has averaged only 3,000 fish a year over the past decade (Figure 21). Fish wheel counts also declined sharply in the early 1990s and abundance appears to have remained at low levels since that time (Figure 22).

The department has not recommended Taku River fall chum salmon as a candidate stock of concern (Heinl et al. 2004) due to the lack of reliable escapement information and a meaningful escapement goal, and because this stock spawns entirely in Canada. Total escapements of chum salmon in the Taku drainage have yet to be estimated, and attempts by ADF&G and CDFO to estimate escapement through mark-recapture methods have been unsuccessful due to low rates of tagging. Aerial survey counts are unreliable for measuring abundance due to the highly glacial nature of the Taku River system (Andel 2010). The department will continue to closely monitor this stock and implement conservative fishery management as needed. Commercial harvests have been lower in recent years, due in part to fishery restrictions specifically implemented to protect this stock by reducing effort in the fishery, particularly later in the season (statistical weeks 35–36; August 20–September 9; TTC 2003; Figure 23). In addition, retention of fall chum salmon in Canadian inriver fisheries has not been permitted for many years (TTC 1999).

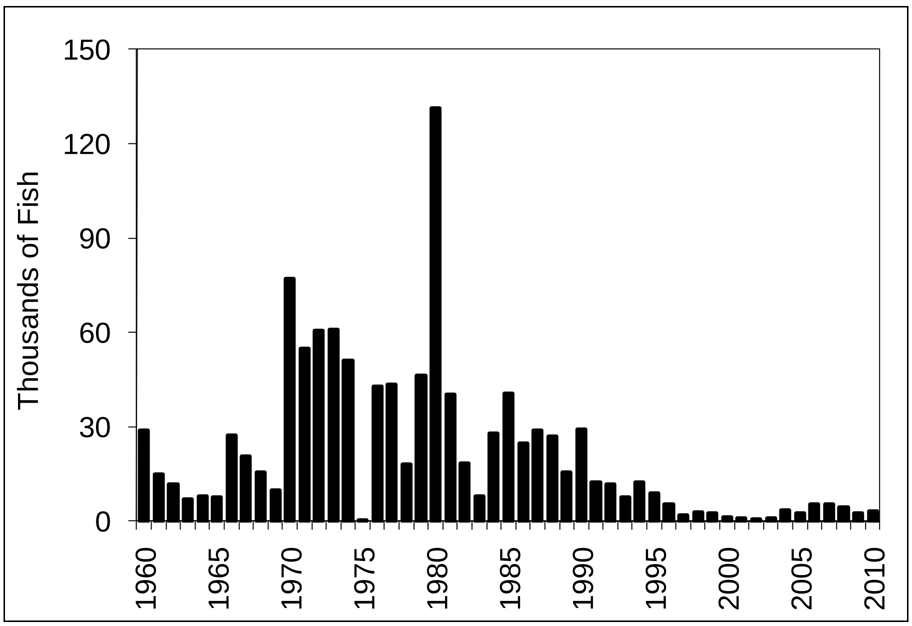

Figure 21.–Annual commercial drift gillnet harvest of wild fall-run chum salmon in Taku Inlet (subdistrict 111-32; 1960–2010). All chum salmon harvested in statistical week 34 (average midweek date 20 August) and later are considered fall-run fish.

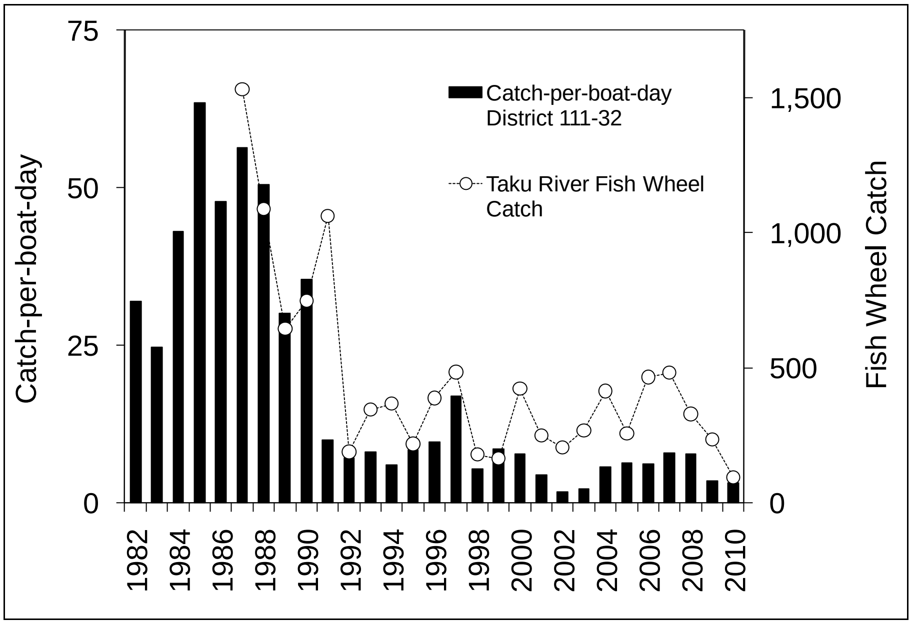

Figure 22.–Annual commercial drift gillnet catch-per-boat-day of fall-run chum salmon in Taku Inlet (subdistrict 111-32; 1982–2010) plotted with the Taku River fish wheel catch of all chum salmon (1987–2010). All chum salmon harvested in statistical week 34 (average midweek date 20 August) and later are considered fall-run fish.

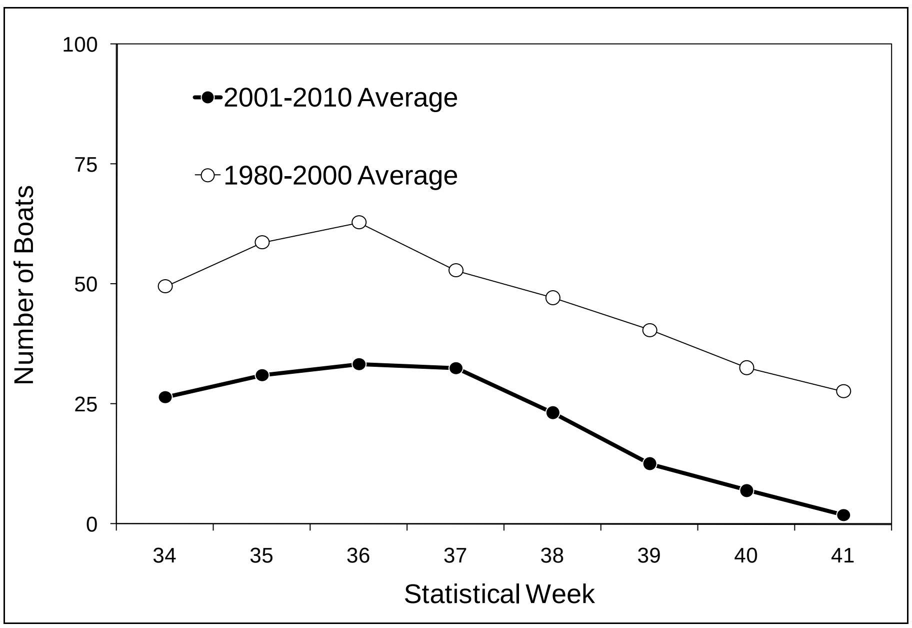

Figure 23.–Average number of boats fishing by statistical week in the Taku Inlet (subdistrict 111-32) commercial drift gillnet fishery, 1980–2010. All chum salmon harvested in statistical week 34 (average midweek date 20 August) and later are considered fall-run fish.

DISCUSSION

Escapement indices and formal escapement goals for chum salmon in Southeast Alaska were only recently developed (Eggers and Heinl 2008). Summer-run chum salmon escapement goals in the Northern Southeast Inside and Southern Southeast subregions were not met from 2008 to 2010 (Figures 9 and 11). Preliminary escapement information from 2011, however, shows that escapements of summer chum salmon were well above goal in the Southern Southeast Subregion. In the Northern Southeast Inside Subregion, escapements in 2011 were higher than the prior three years, but were still below the current goal for the fourth straight year. Summer-run chum salmon escapements in the Northern Southeast Outside Subregion have been relatively stable over the past three decades and were above the lower bound sustainable escapement goal in four of the past five years. Escapement goals have generally been met for fall-run stocks with the exception of Port Camden, which was below goal from 2007 to 2009.

Salmon escapement goals should allow for uncertainty associated with measurement techniques, observed variability in the stock measured, and changes in climatic and oceanographic conditions, as expressed in the *Policy for the Management of Sustainable Salmon Fisheries* (5 AAC 39.222 (c)(2)(C)). Lower bound sustainable escapement goals for Northern Southeast Inside and Southern Southeast summer chum salmon were recently revised to incorporate data from 1960 to 1980. The purpose of this revision was to provide the broadest time series possible on which to base escapement goals, including two periods of high productivity in the 1960s and 1980s–1990s, and the period of low productivity in the 1970s. This approach has also been used for Southeast Alaska pink salmon escapement goals, which are similarly based on very long time series (1960–2007) of survey data to aggregates of index streams in three subregions (Heinl et al. 2008). We note that recent low index counts of chum salmon in Southern Southeast and Northern Southeast Inside subregions from 2008 to 2010 are still below the recommended escapement goals.

Improved stock assessment is needed to ensure that low index counts are not simply the result of limitations in the methods used to monitor chum salmon. Escapement information is derived largely from aerial survey counts, which present special challenges in separating chum salmon from much more abundant pink salmon in the same streams, as well as relating observer counts to actual abundance. The department recently conducted work to ground-truth aerial survey counts in the Ketchikan area and applied for funding to conduct helicopter surveys of large Ketchikan-area mainland systems. Helicopter surveys have been used extensively for stock assessment of Chinook and coho salmon on many of the same systems because they allow for closer inspection of fish on the spawning grounds than is possible with fixed-wing aircraft. Helicopter surveys will allow surveyors to obtain improved views of these streams, validate observations of chum and pink salmon abundance, identify primary chum salmon spawning areas, and improve managers' ability to identify chum salmon during routine aerial surveys of other index streams in the area.

The level of uncertainty already inherent in aerial survey counts would certainly be exacerbated by straying of large numbers of hatchery fish into Southeast Alaska chum salmon index streams. High rates of straying may require the department to adjust or qualify chum salmon escapement indices and goals in the future. From 2008 to 2010, the department conducted otolith sampling studies to document straying of hatchery chum salmon into wild-stock index streams in Southeast Alaska (Piston and Heinl *in prep*). Hatchery strays were found in nearly every index stream that was sampled. Proportions of hatchery fish were generally highest in streams closest to hatchery release sites, but proportions of hatchery fish greater than 10% were detected in some streams more than 50 km from the nearest release site. In the Northern Southeast Inside Subregion, proportions of stray hatchery fish in excess of 5% were detected at the majority of index streams, and the overall estimated proportion of hatchery fish in the entire subregion escapement index in 2010 was 13.5% (95% CI=12.1%–15.0%). From 2008 to 2010, the estimated overall proportion of hatchery strays in the Northern Southeast Outside Subregion index was less than 2% annually. The state is currently working to design and fund research to clarify the extent of hatchery straying in the region and to assess impacts of large-scale chum salmon enhancement on wild stocks.

The Chilkat and Taku rivers were historically two of the largest fall chum salmon producers in the region (Heinl et al. 2004; Bachman 2005), and reasons for the decline in these stocks are almost certainly complex and remain unknown. Possible contributing factors include natural hydrological changes in spawning areas (in both drainages), overharvest, interspecific competition, or reduced survival due to interactions with hatchery releases of chum salmon that occurred during the same period (Jensen 1999; Tobler 2002). Improved assessment of Chilkat River fall chum salmon since 1990 indicates that escapements have increased since the lowest observed levels of the early 1990s. Further, these studies have demonstrated low harvest rates on the stock in the face of fishery restrictions (Table 3).

Studies conducted in the neritic environment of Icy Strait suggest that chum salmon consume only a small portion of the available food resource, and other species of planktivorous fish may have a greater impact on food sources available to wild chum salmon than do hatchery-produced stocks of chum salmon (Orsi et al. 2004). Studies designed to assess the interaction of Taku River fall chum salmon fry and DIPAC-released summer-run chum salmon in the Taku Inlet-Stephens Passage area indicated that interactions between hatchery and wild chum salmon in Taku Inlet were possible due to the co-occurrence of these fish, primarily in the outer inlet, but no direct indications of competitive effects on wild chum salmon fry were detected (Reese et al. 2009). Hatchery release strategies in the Taku Inlet area were found to promote early spatial segregation and prey partitioning between hatchery and wild fish, reducing the probability of competition between the two stocks (Sturdevant et al. 2011).

Our knowledge of the harvest of wild chum salmon, particularly summer-run fish, is still imprecise. Hatchery operators report estimates of the total number of chum salmon harvested each year (White 2010). Although harvests are presented as if they are known, there is certainly error in the estimates that are reported. In areas where stock identification of harvest is not available (e.g., much of Northern Southeast Alaska), the occurrence of hatchery fish in mixed stock fisheries masks our ability to monitor trends in the harvest of wild chum salmon. Rough harvest estimates of wild chum salmon can be estimated by simply subtracting the reported contribution of hatchery fish in the common property fisheries from the total commercial harvest of chum salmon (Heinl et al. 2004; McGee 2004; Heinl 2005). Based on this information, annual harvests of wild summer-run chum salmon appear to have increased from the late 1970s to the 1990s throughout Southeast Alaska, before declining to levels similar to the 1960s and 1970s in recent years (Figure 1). Despite apparent increases in wild chum salmon abundance in the 1980s and 1990s, harvest levels and total population levels did not rebound to nearly the same degree as pink salmon (Zadina et al. 2004) and wild coho salmon (*O. kisutch*; Shaul et al. 2004), and remained well below harvest levels of the early 20th century (Van Alen 2000).

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APPENDIX A:
SOUTHEAST ALASKA CHUM SALMON ESCAPEMENT INDICES

Appendix A1.–Peak escapement index series for 13 Southern Southeast summer-run chum salmon index streams, by survey type, 1960–2010. (Note: bold values were interpolated.)

District	101	101	101	101	101	101	101
Management Area	Ketchikan	Ketchikan	Ketchikan	Ketchikan	Ketchikan	Ketchikan	Ketchikan
Subregion	SSE	SSE	SSE	SSE	SSE	SSE	SSE
Survey Type	Aerial	Aerial	Foot	Aerial	Aerial	Aerial	Aerial
Run Type	Summer	Summer	Summer	Summer	Summer	Summer	Summer
Stream No.	101-11-101	101-15-019	101-15-085	101-30-030	101-30-060	101-45-078	101-55-020
Stream Name	Hidden Inlet	Tombstone River	Fish Creek	Keta River	Marten River	Carroll Creek	Wilson River
1960	800	500	–	2,500	1,500	**8,809**	–
1961	500	700	–	500	600	**9,211**	–
1962	**6,076**	41,000	–	**41,569**	**9,393**	4,800	–
1963	4,800	9,600	–	9,000	10,000	30,000	–
1964	15,900	1,500	–	27,000	5,000	8,000	–
1965	2,000	5,000	–	7,000	2,900	2,000	–
1966	2,000	6,000	–	5,500	2,000	1,500	–
1967	**1,757**	**5,066**	–	**12,019**	300	2,400	–
1968	14,000	4,000	–	400	**1,950**	3,000	–
1969	800	1,200	–	1,200	700	40	–
1970	200	1,200	–	15,000	10,000	500	–
[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	
1972	5,000	3,000	–	10,000	2,000	**4,375**	–
1973	6,000	5,350	–	5,680	3,500	2,850	–
1974	3,100	7,000	–	8,750	500	3,000	–
1975	**360**	400	–	550	100	1,500	–
1976	540	900	–	7,600	400	8,000	–
1977	1,500	12,025	–	14,500	1,507	4,520	–
1978	7,700	5,300	–	13,500	200	5,600	–
1979	1,200	6,500	–	5,300	100	9,900	–
1980	2,900	4,580	4,951	10,000	9,200	8,200	**8,752**
1981	350	1,000	1,797	3,500	400	800	4,000
1982	550	550	2,452	3,000	300	8,000	500
1983	3,600	18,500	2,455	800	500	3,500	300
1984	800	9,250	2,237	16,500	300	11,000	**9,093**
1985	1,400	5,000	4,556	30,000	1,200	5,850	10,700
1986	430	10,000	5,604	46,000	1,000	600	10,000
1987	1,500	12,800	16,080	10,100	1,000	5,000	**8,912**
1988	1,400	20,000	11,591	47,000	17,500	44,000	28,000
1989	500	12,100	7,433	11,000	**4,335**	**8,943**	10,800
1990	650	4,400	2,403	30,000	**3,243**	**6,690**	10,000
1991	150	5,500	1,187	11,000	**3,459**	5,000	5,000
1992	500	2,600	8,731	20,000	6,000	13,000	10,000
1993	**2,278**	22,800	14,620	28,000	3,500	5,500	5,000
1994	1,500	7,500	4,500	40,100	2,500	3,200	23,000
1995	5,000	5,000	3,150	20,000	950	25,000	800
1996	2,700	5,200	2,564	90,000	4,000	30,000	**25,529**
1997	160	5,500	483	15,000	1,500	3,500	18,000
1998	4,300	8,000	4,707	43,000	10,100	10,000	10,000
1999	800	3,000	1,296	20,000	1,000	10,000	5,000
2000	600	4,000	5,395	22,000	1,000	14,000	16,000
2001	3,800	4,000	3,540	45,000	200	20,000	15,000
2002	700	3,000	4,250	20,000	**2,775**	2,000	9,000
2003	1,200	5,400	8,640	16,000	**3,338**	**6,886**	**7,578**
2004	550	14,000	15,790	8,000	**3,741**	2,500	**8,493**
2005	550	3,000	3,910	5,000	**3,356**	**6,923**	10,000
2006	**1,327**	4,000	9,100	20,000	5,500	2,000	10,000
2007	5,000	20,000	4,140	10,000	40,000	10,000	20,000
2008	1,500	200	418	500	1,000	**1,319**	1,000
2009	2,000	10,000	1,680	4,000	4,000	**4,249**	5
2010	50	8,000	2,200	12,000	1,000	3,500	4,000

-continued-

Appendix A1.–Page 2 of 2.

District	101	101	105	105	107	107	
Management Area	Ketchikan	Ketchikan	Petersburg	Petersburg	Petersburg	Petersburg	
Subregion	SSE	SSE	SSE	SSE	SSE	SSE	Southern
Survey Type	Aerial	Aerial	Aerial	Aerial	Aerial	Aerial	Southeast
Run Type	Summer	Summer	Summer	Summer	Summer	Summer	Subregion
Stream No.	101-55-040	101-71-04K	105-20-012	105-42-005	107-40-025	107-40-049	
Stream Name	Blossom River	King Creek	P Beauclerc S Arm E	Calder Creek	Oerns Creek	Harding River	Index Total[a] (×1,000)
1960	–	**6,214**	–	–	200	45,000	**89**
1961	–	5,000	–	–	2,000	50,000	**93**
1962	–	**13,604**	–	–	2,000	25,000	**194**
1963	–	3,200	–	–	4,500	20,000	**123**
1964	–	7,500	–	–	2,000	10,000	**104**
1965	–	250	–	–	700	17,200	**50**
1966	–	**2,464**	–	–	**532**	**5,989**	**35**
1967	–	**3,934**	–	–	1,000	15,000	**56**
1968	–	**2,825**	–	–	**610**	3,000	**40**
1969	–	25	–	–	**85**	100	**6**
1970	–	3,000	–	–	**631**	300	**42**
1971	–	2,000	–	–	**162**	2,000	**11**
1972	–	7,200	–	–	**666**	300	**44**
1973	–	2,700	–	–	**622**	3,700	**41**
1974	–	**4,946**	–	–	13,800	11,050	**71**
1975	–	600	–	–	1,400	3,600	**12**
1976	–	7,600	–	–	1,020	8,000	**46**
1977	–	3,000	–	–	3,100	5,000	**61**
1978	–	2,800	–	–	750	8,500	**60**
1979	–	2,450	–	–	29	45,000	**95**
1980	4,000	7,000	**910**	**1,178**	1,200	13,100	76
1981	8,000	600	200	**869**	**498**	34,000	56
1982	200	500	200	200	280	5,300	22
1983	**3,316**	**3,940**	**643**	1,500	**477**	14,100	54
1984	4,100	6,000	**946**	**1,224**	1,080	16,400	79
1985	8,000	5,000	700	290	590	20,000	93
1986	**5,359**	3,300	400	2,000	**770**	1,200	87
1987	**4,783**	**5,684**	200	700	1,300	9,300	77
1988	5,000	10,000	2,600	1,000	490	12,520	201
1989	800	300	**1,024**	200	4,000	24,000	85
1990	1,100	800	300	**991**	530	2,800	64
1991	5,000	300	**817**	**1,057**	700	29,000	68
1992	4,000	9,200	600	700	150	15,500	91
1993	3,500	7,000	4,000	2,000	800	32,000	131
1994	8,000	15,000	300	1,300	50	4,500	111
1995	12,000	8,000	1,200	150	900	10,000	92
1996	12,000	12,000	3,500	3,500	1,600	29,000	222
1997	1,500	10,000	1,500	700	**610**	**10,169**	69
1998	10,000	35,000	1,000	3,500	1,100	6,000	147
1999	5,000	8,000	500	2,700	2,900	25,000	85
2000	2,000	11,000	2,200	3,000	500	13,800	95
2001	12,000	4,000	800	500	1,000	15,000	125
2002	5,000	1,500	1,020	400	50	5,000	55
2003	**4,067**	**4,833**	**788**	850	200	6,000	66
2004	5,000	**5,416**	1,000	3,000	30	6,200	74
2005	8,000	8,000	2,400	3,000	1,000	11,000	66
2006	7,000	**5,609**	800	2,900	100	8,000	76
2007	12,000	3,000	600	900	200	6,300	132
2008	3,000	1,000	250	1,000	**112**	1,300	13
2009	5,000	800	830	1,623	400	**6,007**	41
2010	10,000	2,600	550	1,350	300	1,150	47
Median=							71
Minimum=							6
Maximum=							222
Contrast=							39.5

[a] Index total is the sum of all 13 index streams. Values from 1960 to 1979 were calculated using the average proportion of the total index represented by streams with consistent long-term survey data from 1960 to 2010.

Appendix A2.–Peak escapement index series for 63 Northern Southeast Inside summer-run chum salmon index streams, 1960–2010. (Note: bold values were interpolated.)

District	108	109	109	109	109	109	109	109
Management Area	Petersburg	Petersburg	Petersburg	Petersburg	Petersburg	Petersburg	Petersburg	Petersburg
Subregion	NSE Inside	NSE Inside	NSE Inside	NSE Inside	NSE Inside	NSE Inside	NSE Inside	NSE Inside
Survey Type	Foot	Aerial	Aerial	Aerial	Aerial	Aerial	Aerial	Aerial
Run Type	Summer	Summer	Summer	Summer	Summer	Summer	Summer	Summer
Stream No.	108-41-010	109-30-016	109-44-037	109-44-039	109-45-017	109-52-007	109-62-014	109-62-024
Stream Name	North Arm Creek	Tyee Head East	Saginaw Bay S Head	Saginaw Creek	Lookout Point Cr Sec B	Rowan Creek	Sample Creek	Petrof Bay W Head
1960	524	–	–	–	–	–	–	–
1961	500	–	–	–	–	–	–	–
1962	100	–	–	–	–	–	–	–
1963	503	–	–	–	–	–	–	–
1964	**572**	–	–	–	–	–	–	–
1965	15	–	–	–	–	–	–	–
1966	**1,367**	–	–	–	–	–	–	–
1967	875	–	–	–	–	–	–	–
1968	1,400	–	–	–	–	–	–	–
1969	**731**	–	–	–	–	–	–	–
1970	**595**	–	–	–	–	–	–	–
1971	**1,562**	–	–	–	–	–	–	–
1972	**2,490**	–	–	–	–	–	–	–
1973	160	–	–	–	–	–	–	–
1974	100	–	–	–	–	–	–	–
1975	**314**	–	–	–	–	–	–	–
1976	**325**	–	–	–	–	–	–	–
1977	295	–	–	–	–	–	–	–
1978	630	–	–	–	–	–	–	–
1979	835	–	–	–	–	–	–	–
1980	1,450	–	–	–	–	–	–	–
1981	643	–	–	–	–	–	–	–
1982	840	700	350	650	30	50	200	150
1983	812	**4,700**	**885**	150	**492**	**1,161**	150	**495**
1984	3,470	**4,611**	2,590	400	500	500	1,600	**485**
1985	1,826	400	2,600	**455**	350	500	700	2,000
1986	1,068	7,000	1,300	350	1,150	1,300	4,500	300
1987	1,040	6,100	1,600	600	600	150	500	100
1988	1,280	13,500	500	500	350	700	1,200	700
1989	404	4,000	300	50	1,000	1,300	800	45
1990	4,095	10,000	**587**	50	800	100	**483**	**328**
1991	265	600	**416**	**232**	200	**546**	**343**	400
1992	708	8,500	600	1,000	**463**	**1,094**	600	1,700
1993	926	7,500	1,100	300	800	900	500	**695**
1994	740	4,500	600	300	400	300	300	400
1995	570	23,300	1,540	50	950	1,200	1,100	**636**
1996	2530	18,000	3,200	3,300	2,000	650	2,000	2,000
1997	1,420	1,950	300	**690**	300	2,000	**1,017**	600
1998	**1,115**	1,050	1,100	1,000	900	2,000	300	300
1999	**1,801**	6,300	3,000	**969**	**964**	1,400	400	500
2000	2,280	34,000	3,000	800	**1,342**	3,200	300	500
2001	820	400	400	1,000	**696**	2,100	**1,032**	500
2002	881	100	**2,164**	**1,209**	400	**2,840**	**1,783**	**1,210**
2003	606	2,500	**1,147**	**641**	300	**1,505**	**945**	**641**
2004	800	4,100	500	1,400	**735**	4,700	2,200	1,400
2005	850	300	**1,011**	**565**	700	600	**833**	350
2006	1,100	4,000	300	**860**	**856**	10,000	1,500	1,100
2007	883	1,300	**813**	300	**452**	**1,067**	1,000	300
2008	**560**	500	**540**	200	**300**	**708**	1,000	200
2009	891	**3,048**	300	200	**323**	100	150	50
2010	360	400	**417**	600	**234**	**543**	4,300	200

-continued-

District	110	110	110	110	110	110	110	110
Management Area	Petersburg	Petersburg	Petersburg	Petersburg	Petersburg	Petersburg	Petersburg	Petersburg
Subregion	**NSE Inside**	**NSE Inside**	**NSE Inside**	**NSE Inside**	**NSE**	**NSE**	**NSE Inside**	**NSE Inside**
Survey Type	Foot	Aerial	Aerial	Aerial	Aerial	Aerial	Aerial	Aerial
Run Type	Summer	Summer	Summer	Summer	Summer	Summer	Summer	Summer
Stream No.	110-13-004	110-22-004	110-22-012	110-22-014	110-23-008	110-23-010	110-23-019	110-23-040
Stream Name	Dry Bay Creek	Amber Creek N Arm Pybus	Donkey Creek	Cannery Cove Pybus Bay	Johnston Creek	Bowman Creek	Snug Cove Gambier Bay	East of Snug Cove
1960	**883**	–	–	–	–	–	–	–
1961	**2,044**	–	–	–	–	–	–	–
1962	**1,907**	–	–	–	–	–	–	–
1963	**3,648**	–	–	–	–	–	–	–
1964	1,000	–	–	–	–	–	–	–
1965	**2,553**	–	–	–	–	–	–	–
1966	2,800	–	–	–	–	–	–	–
1967	7,625	–	–	–	–	–	–	–
1968	395	–	–	–	–	–	–	–
1969	400	–	–	–	–	–	–	–
1970	6,000	–	–	–	–	–	–	–
1971	9,000	–	–	–	–	–	–	–
1972	2,515	–	–	–	–	–	–	–
1973	**3,749**	–	–	–	–	–	–	–
1974	2,609	–	–	–	–	–	–	–
1975	200	–	–	–	–	–	–	–
1976	**581**	–	–	–	–	–	–	–
1977	1,854	–	–	–	–	–	–	–
1978	550	–	–	–	–	–	–	–
1979	110	–	–	–	–	–	–	–
1980	2,570	–	–	–	–	–	–	–
1981	1,308	–	–	–	–	–	–	–
1982	568	40	1,600	220	10	20	150	30
1983	177	50	1,300	150	600	80	**539**	**841**
1984	**928**	300	2,600	1,000	2,500	400	750	1,200
1985	**870**	160	1,455	150	400	**474**	**496**	600
1986	**823**	500	450	350	600	500	700	1,500
1987	1,675	250	3,300	1,515	800	400	300	**547**
1988	329	300	6,300	3,350	8,000	3,460	2,300	4,300
1989	290	**124**	600	**465**	400	100	**175**	150
1990	1,582	850	2,800	700	2,000	400	950	1,650
1991	56	200	1,200	100	700	**242**	450	1,150
1992	1,360	**359**	1,500	1,500	500	**485**	700	150
1993	3,218	500	6,000	2,700	1,200	500	800	800
1994	1,055	**640**	3,900	2,400	**1,929**	250	**904**	**1,411**
1995	1,550	600	7,900	1,600	550	300	180	320
1996	3,771	1,200	13,000	4,800	7,200	2,000	800	1,200
1997	4,200	50	11,000	1,800	500	300	600	**1,173**
1998	1,344	500	12,000	2,900	600	**625**	**653**	400
1999	336	800	10,500	3,400	600	400	450	800
2000	**2,579**	2,100	15,000	6,200	2,700	1,100	900	1,100
2001	540	450	4,500	2,800	1,050	500	1,000	400
2002	**2,312**	**933**	2,100	1,525	**2,811**	**1,259**	400	900
2003	355	**494**	2,500	1,300	**1,490**	**667**	**698**	**1,090**
2004	1,790	600	8,100	5,200	2,100	900	1,300	400
2005	741	200	4,000	1,800	900	500	420	2,300
2006	1,060	1,150	10,000	3,100	1,000	2,300	1,600	4,000
2007	570	400	2,500	450	300	400	1,200	1,900
2008	139	500	800	600	200	400	100	100
2009	700	700	400	900	**747**	200	200	**546**
2010	1,776	1,000	500	780	**540**	800	700	500

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District	110	110	110	110	111	111	111	111
Management Area	Petersburg	Petersburg	Petersburg	Petersburg	Juneau	Juneau	Juneau	Juneau
Subregion	NSE Inside	NSE Inside	NSE Inside	NSE Inside	NSE Inside	NSE Inside	NSE Inside	NSE Inside
Survey Type	Aerial	Aerial	Aerial	Aerial	Aerial	Aerial	Aerial	Aerial
Run Type	Summer	Summer	Summer	Summer	Summer	Summer	Summer	Summer
Stream No.	110-32-009	110-33-013	110-34-006	110-34-008	111-13-010	111-15-024	111-15-030	111-16-040
Stream Name	Chuck River Windham Bay	Lauras Creek	Glen Creek	Sanborn Creek	Mole River	Windfall Harbor W Side	Pack Creek	Swan Cove Creek
1960	–	3,200	**741**	150	–	–	700	–
1961	–	**4,919**	**1,715**	**3,218**	–	–	**3,229**	–
1962	–	5,000	3,000	5,000	–	–	7,400	–
1963	–	**8,777**	4,500	150	–	–	**5,762**	–
1964	–	**2,459**	10,000	500	–	–	**1,614**	–
1965	–	500	**2,142**	200	–	–	**4,033**	–
1966	–	45,000	11,000	4,000	–	–	**3,857**	–
1967	–	20,000	100	35,000	–	–	500	–
1968	–	**2,599**	**906**	2,000	–	–	**1,706**	–
1969	–	**3,141**	**1,095**	**2,055**	–	–	400	–
1970	–	**2,559**	**892**	**1,674**	–	–	700	–
1971	–	25,000	2,000	3,000	–	–	6,000	–
1972	–	25,500	2,000	500	–	–	3,200	–
1973	–	4,000	1,500	3,000	–	–	5,000	–
1974	–	20,000	1,000	900	–	–	5,000	–
1975	–	200	50	100	–	–	80	–
1976	–	300	**487**	**915**	–	–	1,100	–
1977	–	300	700	400	–	–	**932**	–
1978	–	1,800	1,700	500	–	–	500	–
1979	–	300	60	**962**	–	–	**965**	–
1980	–	1,500	900	1,400	–	–	200	–
1981	–	600	**786**	1,200	–	–	**1,481**	–
1982	**316**	2,000	50	1,200	400	300	950	350
1983	25	200	**766**	350	150	**713**	100	**479**
1984	700	3,500	1,200	1,900	400	1,500	1,000	2,100
1985	**788**	900	700	400	500	**656**	2,400	300
1986	300	1,500	500	900	300	300	700	1,000
1987	**557**	700	405	2,000	**934**	200	1,000	200
1988	2,600	3,520	900	3,400	700	350	300	600
1989	**279**	500	600	500	**468**	**232**	**771**	**156**
1990	600	1,500	**507**	2,400	500	200	600	550
1991	30	1,050	900	1,000	200	100	200	100
1992	1,000	1,800	800	900	300	700	600	**452**
1993	1,000	1,400	1,600	2,900	200	250	800	**674**
1994	500	1,500	850	950	4,000	200	3,500	1,200
1995	400	800	500	1,600	340	20	800	**617**
1996	7,100	2,320	500	14,300	**8,247**	3,000	8,000	900
1997	2,000	180	3,000	1,000	**2,004**	**995**	6,500	200
1998	**1,039**	500	725	1,000	**1,742**	3,000	8,000	2,000
1999	300	900	100	700	6,000	1,100	4,000	500
2000	3,050	4,800	4,000	8,200	2,010	600	2,600	625
2001	1,100	1,300	500	2,500	875	2,500	1,500	100
2002	200	**2,670**	1,800	1,200	3,100	1,950	5,000	1,000
2003	**1,110**	350	700	1,095	500	4,000	17,000	500
2004	3,000	2,800	3,000	7,300	8,000	**1,066**	12,500	1,000
2005	**979**	650	700	6,300	6,000	**815**	1,000	**548**
2006	1,400	600	1,000	7,300	3,000	300	4,500	**834**
2007	500	1,420	1,300	1,700	900	**655**	1,000	300
2008	400	900	400	1,500	**876**	300	950	1,000
2009	1,600	**722**	200	1,200	**944**	**466**	1,000	400
2010	600	300	850	700	2,500	300	2,100	**238**

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District	111	111	111	111	112	112	112	112
Management Area	Juneau	Juneau	Juneau	Juneau	Juneau	Juneau	Sitka	Sitka
Subregion	NSE Inside	NSE Inside	NSE Inside	NSE Inside	NSE Inside	NSE Inside	NSE Inside	NSE Inside
Survey Type	Aerial	Aerial	Aerial	Foot	Aerial	Aerial	Aerial	Aerial
Run Type	Summer	Summer	Summer	Summer	Summer	Summer	Summer	Summer
Stream No.	111-17-010	111-33-010	111-41-005	111-50-069	112-15-062	112-19-010	112-21-005	112-21-006
Stream Name	King Salmon River	Prospect Creek Speel	Admiralty Creek	Fish Creek Douglas I.	Robinson Creek	Wilson River	Clear River Kelp Bay	Ralphs Creek
1960	10,000	–	**830**	1,010	**909**	500	600	2,700
1961	**3,995**	–	**1,921**	1,500	**2,104**	**2,589**	3,000	750
1962	15,200	–	**1,792**	**2,187**	**1,963**	**2,415**	9,000	**4,778**
1963	**7,128**	–	**3,428**	**4,183**	**3,754**	8,000	45,000	12,000
1964	**1,997**	–	3,000	**1,172**	**1,052**	**1,294**	4,000	200
1965	**4,990**	–	**2,399**	**2,928**	**2,628**	**3,233**	31,000	9,000
1966	2,325	–	400	1,219	500	500	12,000	200
1967	2,000	–	300	4,500	920	350	**16,699**	**8,548**
1968	**2,111**	–	4,025	**1,239**	**1,112**	**1,368**	15,000	3,000
1969	1,500	–	**1,227**	1,200	500	100	5,000	**3,271**
1970	2,000	–	**999**	**1,220**	50	**1,347**	25,000	1,000
1971	1,500	–	9,600	**3,201**	3,800	400	15,000	**6,994**
1972	2,500	–	3,500	3,000	8,200	400	5,000	9,000
1973	14,000	–	10,000	**4,299**	9,000	**4,748**	45,000	5,000
1974	6,000	–	800	1,200	1,000	1,900	15,000	1,500
1975	60	–	2,000	185	1,700	350	**2,746**	**1,405**
1976	500	–	650	1,342	750	100	500	**1,456**
1977	100	–	100	850	1,130	**747**	**2,888**	**1,478**
1978	**949**	–	200	1,366	**500**	**615**	1,300	**1,217**
1979	100	–	500	1,360	800	2,000	4,000	**1,531**
1980	400	–	1,100	3,200	3,000	400	1,000	900
1981	11,500	–	**881**	1,200	2,000	**1,187**	**4,588**	3,500
1982	500	300	450	1,219	500	200	5,000	3,000
1983	300	75	520	1,466	3,200	**2,083**	8,000	6,000
1984	4,150	800	5,100	3,380	550	3,800	4,000	1,000
1985	3,200	**692**	1,500	6,683	500	160	2,000	5,000
1986	4,750	500	1,000	2,047	1,200	500	12,000	4,200
1987	2,000	200	500	281	500	400	23,000	1,000
1988	1,300	1,750	250	609	350	350	25,000	100
1989	300	50	200	1,187	400	500	**1,608**	3,000
1990	1,050	300	800	1,486	1,200	500	8,000	2,000
1991	1,300	200	200	2,194	1,000	**979**	2,000	**1,822**
1992	1,300	400	200	1,839	1,000	1,900	4,000	1,100
1993	1,000	400	500	639	1,800	6,000	3,500	4,000
1994	5,800	500	500	3,943	1,500	2,000	5,000	2,000
1995	2,200	600	200	2,941	400	2,200	8,000	10,800
1996	9,000	**4,320**	900	6,595	2,750	5,600	5,000	8,395
1997	3,400	321	50	1,890	4,000	500	12,000	7,000
1998	7,100	5,000	700	849	1,000	3,100	3,000	4,000
1999	3,500	500	**1,874**	1,570	2,000	4,000	15,000	5,000
2000	4,110	2,250	300	7,915	1,350	5,700	4,800	11,300
2001	1,150	1,000	5,500	815	**1,621**	2,000	5,500	14,400
2002	2,800	3,000	3,500	146	4,750	3,100	3,000	9,000
2003	4,000	400	600	1,150	3,200	10,000	**6,401**	8,430
2004	5,000	1,100	**1,429**	**2,408**	1,000	3,000	3,000	5,600
2005	6,000	**860**	500	**1,841**	2,500	5,500	**5,644**	5,300
2006	3,500	800	2,500	2,710	**1,995**	10,000	1,100	12,300
2007	1,150	800	4,700	270	**1,054**	1,000	2,500	4,000
2008	800	1,100	**583**	888	800	2,900	400	4,000
2009	1,700	1,900	500	**1,058**	2,400	1,700	**3,201**	2,200
2010	4,600	2,900	300	**764**	1,750	**1,014**	400	2,600

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Appendix A2.–Page 5 of 8.

District	112	112	112	112	112	112	112	112
Management Area	Juneau	Juneau	Juneau	Juneau	Juneau	Juneau	Juneau	Juneau
Subregion	NSE Inside	NSE	NSE	NSE	NSE	NSE Inside	NSE Inside	NSE Inside
Survey Type	Aerial	Aerial	Aerial	Aerial	Aerial	Aerial	Aerial	Aerial
Run Type	Summer	Summer	Summer	Summer	Summer	Summer	Summer	Summer
Stream No.	112-42-	112-44-	112-46-	112-47-	112-48-	112-48-019	112-48-	112-48-035
Stream Name	Kadashan Creek	Saltery Bay Head	Seal Bay Head	Long Bay Head	Big Goose Creek	Little Goose Creek	West Bay Head Creek	Tenakee Inlet Head
1960	–	700	4,000	10,000	5,000	–	1,000	4,000
1961	–	**3,433**	3,000	10,000	25,000	–	24,000	10,000
1962	–	1,750	4,400	2,800	7,400	–	3,200	6,000
1963	–	3,000	12,000	1,800	11,000	–	8,000	13,000
1964	–	**1,716**	**6,462**	8,570	4,200	–	3,000	320
1965	–	**4,288**	**16,146**	**17,671**	**14,196**	–	**14,763**	350
1966	–	3,100	3,500	2,000	4,150	–	13,350	5,200
1967	–	1,800	19,000	17,000	6,000	–	30,700	20,530
1968	–	**1,814**	1,000	**7,475**	**6,005**	–	3,020	**4,753**
1969	–	**2,192**	5,000	5,000	10,200	–	4,000	7,500
1970	–	**1,786**	4,000	3,000	1,100	–	1,800	5,000
1971	–	75	20,000	7,000	18,000	–	9,000	1,200
1972	–	2,900	49,000	35,000	29,000	–	18,000	12,000
1973	–	4,000	33,000	28,000	5,300	–	13,000	12,000
1974	–	**2,984**	20,500	17,000	5,000	–	6,000	2,500
1975	–	1,500	4,000	4,000	3,000	–	500	500
1976	–	**976**	10,500	3,000	550	–	150	**2,557**
1977	–	400	1,000	150	250	–	400	800
1978	–	**816**	1,000	3,000	1,000	–	**2,809**	**2,138**
1979	–	200	1,000	1,650	300	–	**3,534**	180
1980	–	100	5,000	4,700	2,500	–	**5,686**	200
1981	–	2,000	2,000	2,000	2,000	–	2,500	1,500
1982	**1,567**	**1,119**	2,800	5,000	3,000	10	1,000	300
1983	**4,249**	12,300	7,700	12,000	14,100	**1,606**	2,000	4,000
1984	**4,168**	250	6,200	8,430	7,600	**1,576**	1,600	1,000
1985	3,000	400	5,000	7,000	10,050	100	15,300	1,900
1986	1,800	1,000	4,500	10,000	10,000	50	2,000	1,050
1987	**2,764**	300	1,000	1,000	1,300	**1,045**	1,000	1,100
1988	7,600	200	6,200	6,000	5,400	130	4,300	1,925
1989	1,000	500	1,000	1,200	2,100	**523**	1,800	1,300
1990	2,100	200	2,700	2,200	3,050	100	500	1,500
1991	1,000	1,000	5,500	3,200	5,000	**755**	2,000	2,000
1992	2,000	1,100	9,300	10,100	8,300	200	8,400	6,100
1993	3,500	1,050	7,000	7,100	19,700	1,000	10,500	9,200
1994	6,200	2,800	19,000	42,500	39,200	1,500	29,510	18,000
1995	3,600	2,000	7,000	10,000	22,000	500	7,900	13,000
1996	43,000	32,700	89,000	105,000	84,000	2,000	57,000	103,000
1997	3,500	3,500	5,700	19,900	9,400	1,400	15,000	11,000
1998	3,000	400	11,000	15,000	10,000	7,700	23,000	6,700
1999	2,500	1,100	20,000	28,000	21,000	2,150	32,000	15,000
2000	10,800	10,500	22,500	28,500	25,000	4,800	42,000	15,000
2001	700	4,150	5,000	2,275	2,935	1,000	5,200	10,000
2002	19,000	21,000	55,000	42,000	23,000	7,500	23,500	28,500
2003	5,700	700	7,600	4,000	1,100	5,000	5,000	12,000
2004	10,000	4,100	12,000	10,700	4,500	800	20,000	5,500
2005	3,000	2,000	13,000	9,000	1,500	8,000	8,000	4,500
2006	3,500	2,500	8,000	12,200	2,900	6,500	12,800	5,300
2007	**3,905**	2,500	3,600	12,000	3,500	1,950	12,500	4,000
2008	2,500	1,100	6,050	19,000	900	5,700	5,800	2,800
2009	500	500	3,750	3,800	3,000	5,300	4,200	1,300
2010	800	300	2,800	1,800	1,200	1,800	3,900	1,200

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District	112	112	112	112	112	112	112	113
Management Area	Juneau	Juneau	Juneau	Juneau	Juneau	Juneau	Juneau	Sitka
Subregion	NSE	NSE Inside	NSE	NSE Inside	NSE Inside	NSE	NSE Inside	NSE
Survey Type	Aerial	Aerial	Aerial	Aerial	Aerial	Aerial	Aerial	Aerial
Run Type	Summer	Summer	Summer	Summer	Summer	Summer	Summer	Summer
Stream No.	112-50-	112-50-	112-65-	112-72-011	112-73-024	112-80-	112-90-014	113-53-
Stream Name	Kennel Creek	Freshwater Creek	Greens Creek	Weir Creek N Arm Hood Bay	Weir Creek S Arm Hood Bay	Chaik Bay Creek	Whitewater Creek	Saook Bay West Head
1960	**1,736**	–	**1,052**	**1,413**	**1,445**	**3,160**	**1,539**	–
1961	**4,018**	–	**2,434**	**3,270**	9,000	**7,313**	**3,560**	–
1962	1,750	–	**2,271**	**3,050**	5,000	20,000	2,350	–
1963	4,000	–	7,000	**5,835**	**5,968**	**13,048**	**6,353**	–
1964	**2,008**	–	3,500	**1,635**	**1,672**	8,560	**1,780**	–
1965	**5,018**	–	**3,040**	**4,084**	**4,177**	**9,133**	**4,447**	–
1966	3,850	–	5,025	**3,906**	500	2,200	3,211	–
1967	9,500	–	1,500	**5,457**	300	13,000	6,000	–
1968	6,500	–	1,800	**1,728**	**1,767**	1,000	4,000	–
1969	1,400	–	1,000	300	4,200	1,500	500	–
1970	5,900	–	200	150	6,000	1,500	1,200	–
1971	1,500	–	500	500	5,000	2,800	**4,862**	–
1972	3,500	–	4,100	1,500	3,000	3,860	9,000	–
1973	**7,369**	–	2,000	400	4,000	12,000	14,000	–
1974	3,000	–	200	500	5,000	3,000	6,000	–
1975	2,000	–	500	50	300	800	500	–
1976	1,100	–	400	40	300	3,500	200	–
1977	1,500	–	4,000	100	1,800	**2,111**	300	–
1978	300	–	700	100	1,000	**1,738**	800	–
1979	800	–	6,000	**978**	100	2,000	400	–
1980	2,000	–	3,200	1,080	1,500	4,000	2,000	–
1981	2,600	–	2,000	1,400	1,000	1,000	200	–
1982	140	250	**553**	450	500	1,600	300	**1,124**
1983	500	600	500	700	500	2,000	2,550	**3,046**
1984	1,400	600	1,800	1,800	1,600	6,900	3,000	1,500
1985	2,000	2,000	4,000	5,000	5,800	2,500	2,000	5,000
1986	2,200	750	6,500	1,300	3,000	8,300	2,000	1,000
1987	450	**696**	1,750	630	1,800	2,000	700	**1,982**
1988	1,100	300	800	1,600	620	6,500	1,800	3,500
1989	500	300	500	700	400	2,000	2,000	**992**
1990	4,050	300	4,150	1,000	500	1,500	1,700	3,500
1991	2,050	100	200	1,000	200	500	**1,070**	2,000
1992	3,150	1,000	600	8,300	4,300	11,200	5,000	2,000
1993	8,900	1,650	1,000	7,700	2,200	23,600	9,900	**4,280**
1994	1,300	1,300	1,100	2,300	500	6,500	2,500	500
1995	4,200	6,000	900	650	1,500	6,300	4,100	100
1996	39,300	2,600	11,500	22,000	13,000	21,000	4,500	6,600
1997	7,000	500	2,000	**4,003**	4,900	8,100	3,000	1,700
1998	2,700	**1,297**	500	500	550	5,000	2,000	4,000
1999	3,300	**2,095**	1,200	13,000	6,000	10,000	8,950	**5,968**
2000	3,000	**2,918**	2,300	3,000	16,500	21,700	5,300	10,630
2001	5,000	1,000	1,500	3,900	3,600	12,000	1,700	9,500
2002	2,950	4,750	1,450	8,000	4,050	10,750	1,500	5,500
2003	1,000	500	3,000	500	500	3,800	3,700	**3,947**
2004	2,000	2,400	2,150	2,300	2,500	13,000	4,200	3,500
2005	1,400	1,800	500	4,000	2,500	4,000	2,500	**3,481**
2006	3,700	**1,861**	**2,610**	7,100	3,500	8,700	4,000	17,500
2007	1,500	**983**	1,000	2,000	**2,120**	2,500	**2,092**	6,950
2008	400	1,000	550	**1,749**	500	4,100	1,500	1,800
2009	1,500	1,500	200	**1,887**	**1,500**	1,300	1,000	490
2010	800	700	1,100	1,000	700	900	700	2,400

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Appendix A2.–Page 7 of 8.

District Management Area Subregion Survey Type Run Type Stream No.	113 Sitka NSE Inside Aerial Summer 113-54-	113 Sitka NSE Inside Aerial Summer 113-56-	114 Juneau NSE Inside Aerial Summer 114-23-	114 Juneau NSE Inside Aerial Summer 114-25-010	114 Juneau NSE Inside Aerial Summer 114-27-	114 Juneau NSE Inside Aerial Summer 114-31-	114 Juneau NSE Inside Aerial Summer 114-32-	114 Juneau NSE Inside Aerial Summer 114-33-
Stream Name	Rodman Creek	Ushk Bay W End	Mud Bay River	Homeshore Creek	Spasski Creek	Game Creek	Seagull Creek	Neka River
1960	**1,503**	–	–	–	2,000	**4,179**	1,050	5,250
1961	**3,477**	–	–	–	**4,531**	**9,670**	1,200	10,700
1962	600	–	–	–	**4,227**	**9,020**	2,200	11,800
1963	**6,205**	–	–	–	25,000	45,000	4,000	23,500
1964	**1,738**	–	–	–	750	275	500	**7,476**
1965	5,000	–	–	–	**5,659**	**12,077**	**3,089**	**18,679**
1966	**4,154**	–	–	–	7,400	6,000	8,500	43,500
1967	**5,803**	–	–	–	9,000	30,000	1,700	9,000
1968	**1,837**	–	–	–	500	6,000	**1,307**	3,000
1969	**2,221**	–	–	–	5,500	9,500	**1,580**	16,500
1970	3,000	–	–	–	400	1,000	700	8,200
1971	500	–	–	–	2,100	20,000	2,500	43,000
1972	2,360	–	–	–	15,500	40,000	**5,383**	51,000
1973	1,500	–	–	–	3,000	12,000	**4,536**	39,000
1974	1,500	–	–	–	300	3,500	**2,150**	10,000
1975	500	–	–	–	400	400	200	7,000
1976	200	–	–	–	1,500	5,200	300	**4,251**
1977	**1,004**	–	–	–	8,000	1,700	2,300	9,000
1978	1,500	–	–	–	2,000	2,000	3,500	1,600
1979	**1,040**	–	–	–	**1,355**	7,000	300	9,000
1980	500	–	–	–	5,300	13,300	550	8,500
1981	1,000	–	–	–	4,000	5,500	4,200	6,000
1982	300	**1,172**	500	**339**	800	2,500	220	2,500
1983	**2,903**	**3,176**	400	550	500	8,000	1,550	24,500
1984	**2,849**	2,025	220	7,000	3,250	12,200	2,400	10,550
1985	500	500	**1,129**	**846**	3,500	4,300	5,300	7,000
1986	1,000	2,000	**1,068**	515	2,300	3,900	500	12,500
1987	3,000	3,000	150	**598**	500	8,000	2,300	8,000
1988	500	3,500	100	150	950	5,600	600	4,000
1989	**945**	**1,034**	**399**	100	910	1,500	200	2,800
1990	3,000	300	**813**	300	2,500	2,000	110	11,000
1991	**1,365**	3,000	200	600	1,500	2,300	1,200	4,400
1992	**2,734**	**2,992**	50	700	3,000	3,000	1,200	9,700
1993	**4,080**	**4,464**	2,000	1,100	3,700	11,900	4,100	12,500
1994	**4,872**	500	300	2,200	4,600	3,400	1,700	9,300
1995	**3,733**	**4,084**	300	4,000	3,200	4,800	1,700	9,700
1996	8,000	1,600	1,100	1,050	9,700	35,100	7,000	24,800
1997	3,500	**4,431**	1,000	200	4,500	9,000	7,800	9,500
1998	2,500	**3,854**	200	400	4,200	4,000	300	8,600
1999	3,800	**6,224**	3,500	500	2,000	7,000	3,000	20,000
2000	6,800	19,000	350	500	900	4,100	1,250	29,000
2001	8,100	12,100	4,500	1,300	9,500	12,100	3,000	23,000
2002	5,500	9,000	2,250	1,100	9,400	2,000	4,500	11,500
2003	9,000	1,500	**1,590**	800	3,500	15,000	600	16,000
2004	7,500	3,000	3,100	2,200	4,000	5,000	800	7,400
2005	1,410	**3,630**	5,000	1,500	3,000	2,000	**1,820**	4,800
2006	8,710	15,500	7,500	**1,600**	2,500	7,500	**2,772**	20,000
2007	8,060	**2,920**	6,500	3,000	3,550	5,300	1,500	8,000
2008	1,800	1,070	600	**561**	1,500	3,760	75	1,050
2009	370	770	3,000	2,200	2,000	1,500	250	1,700
2010	800	130	900	1,400	1,800	300	600	5,900

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District	114	114	115	115	115	115	115	
Management Area	Juneau	Juneau	Juneau	Juneau	Juneau	Juneau	Juneau	
Subregion	NSE Inside	NSE	NSE Inside	NSE	NSE	NSE	NSE Inside	Northern
Survey Type	Aerial	Aerial	Aerial	Aerial	Aerial	Aerial	Aerial	Southeast
Run Type	Summer	Summer	Summer	Summer	Summer	Summer	Summer	Inside
Stream No.	114-34-	114-40-	115-10-042	115-10-	115-10-	115-20-	115-20-052	Subregion
Stream Name	Humpback Creek	Trail River	St James Bay NW Side	St. James River	Endicott River	Berners River	Sawmill Creek Berners River	Index Total [a] (×1,000)
1960	**2,467**	–	–	–	–	–	–	**108**
1961	**5,708**	–	–	–	–	–	–	**251**
1962	12,700	–	–	–	–	–	–	**234**
1963	5,000	–	–	–	–	–	–	**448**
1964	**2,853**	–	–	–	–	–	–	**125**
1965	**7,129**	–	–	–	–	–	–	**313**
1966	500	–	–	–	–	–	–	**300**
1967	3,000	–	–	–	–	–	–	**419**
1968	400	–	–	–	–	–	–	**133**
1969	11,000	–	–	–	–	–	–	**160**
1970	400	–	–	–	–	–	–	**130**
1971	9,000	–	–	–	–	–	–	**343**
1972	21,000	–	–	–	–	–	–	**546**
1973	10,500	–	–	–	–	–	–	**460**
1974	3,200	–	–	–	–	–	–	**218**
1975	11,600	–	–	–	–	–	–	**69**
1976	5,100	–	–	–	–	–	–	**71**
1977	3,000	–	–	–	–	–	–	**72**
1978	3,000	–	–	–	–	–	–	**60**
1979	2,000	–	–	–	–	–	–	**75**
1980	4,500	–	–	–	–	–	–	**121**
1981	7,000	–	–	–	–	–	–	**115**
1982	2,300	370	400	**342**	**937**	**515**	4,580	60
1983	2,250	3,000	825	5,000	**2,539**	**1,397**	250	162
1984	4,000	1,650	800	60	500	800	2,500	159
1985	3,700	500	2,910	100	**2,337**	5,400	400	149
1986	4,500	400	700	360	210	1,070	600	141
1987	2,500	500	1,000	**604**	400	600	1,500	106
1988	550	2,500	1,900	492	2,500	406	800	162
1989	800	500	350	**302**	5,000	100	100	53
1990	1,500	200	750	150	4,600	500	1,150	107
1991	2,800	7,400	1,100	**436**	900	**657**	430	76
1992	4,400	400	600	200	2,550	220	450	153
1993	5,500	800	700	250	1,500	800	1,150	228
1994	6,300	300	600	**1,558**	800	4,000	3,050	272
1995	4,600	**1,843**	105	**1,194**	**3,265**	125	**1,388**	209
1996	27,000	500	850	2,400	10,000	5,900	5,700	931
1997	5,600	1,400	300	200	**3,542**	770	1,000	226
1998	4,000	500	100	**1,126**	2,000	1,025	1,100	197
1999	6,500	8,000	50	510	1,900	780	**2,115**	318
2000	7,400	4,000	550	72	200	250	2,979	443
2001	6,050	200	**959**	6,000	1,100	10,000	**1,527**	229
2002	4,350	6,500	2,800	1,200	3,000	3,400	**2,639**	397
2003	2,500	1,000	**878**	5,000	16,100	**1,811**	550	210
2004	2,500	1,300	1,800	**1,387**	2,400	1,950	1,000	242
2005	3,500	3,500	1,600	2,050	18,750	1,500	900	185
2006	3,200	1,900	**1,179**	**1,615**	2,000	5,400	450	282
2007	2,000	2,500	**623**	**853**	2,500	1,000	600	149
2008	500	560	**413**	100	500	5,800	500	99
2009	900	1,700	500	**602**	15,800	12,000	1,000	107
2010	1,300	686	**323**	**435**	3,500	1,100	200	77
Median=								162
Minimum=								53
Maximum=								931
Contrast=								17.6

[a]Index total is the sum of all 63 index streams. Values from 1960 to 1981 were calculated using the average proportion of the total index represented by streams with consistent long-term survey data from 1960 to 2010.

Appendix A3.–Peak escapement index series for five Northern Southeast Outside summer-run chum salmon index streams, 1982–2010. (Note: bold values were interpolated.)

District	113	113	113	113	113	
Management Area	Sitka	Sitka	Sitka	Sitka	Sitka	
Subregion	NSE Outside	NSE Outside	NSE Outside	NSE Outside	NSE Outside	Northern
Survey Type	Aerial	Aerial	Aerial	Foot	Aerial	Southeast
Run Type	Summer	Summer	Summer	Summer	Summer	Outside
Stream No.	113-22-015	113-32-005	113-72-005	113-73-003	113-81-011	Subregion
Stream Name	Whale Bay Great Arm Head	W Crawfish NE Arm Hd	Sister Lake SE Head	Lake Stream Ford Arm	Black River	Index Total (×1,000)
1982	3,900	1,933	3,000	**541**	500	10
1983	2,500	1,224	**4,903**	2,000	10,000	21
1984	1,500	30,000	25,000	**4,261**	17,000	78
1985	2,000	2,500	11,000	450	15,000	31
1986	5,500	18,000	3,500	400	3,000	30
1987	4,000	4,100	3,000	651	5,000	17
1988	6,500	3,500	5,000	1,033	3,000	19
1989	1,300	500	4,000	1,610	8,000	15
1990	4,000	3,000	18,000	959	2,500	28
1991	**7,873**	**8,816**	17,000	1,456	1,000	36
1992	4,000	1,000	18,000	1,140	500	25
1993	**3,475**	2,000	5,000	1,559	**3,922**	16
1994	3,400	3,000	4,000	3,000	1,000	14
1995	7,550	5,000	4,450	1,416	300	19
1996	4,200	10,500	12,650	1,271	1,000	30
1997	11,000	6,000	10,000	2,955	20,000	50
1998	1,300	7,000	5,750	2,631	2,400	19
1999	5,000	8,000	8,000	1,697	9,000	32
2000	27,000	33,000	4,041	844	31,000	96
2001	18,300	9,177	1,910	5,900	23,000	58
2002	1,000	3,500	6,550	1,927	6,000	19
2003	12,800	2,300	2,000	6,700	6,000	30
2004	11,800	13,000	22,300	1,560	37,150	86
2005	23,800	32,370	11,270	540	8,700	77
2006	24,000	9,000	8,000	4,055	11,920	57
2007	8,340	12,300	6,530	1,280	5,602	34
2008	4,200	4,300	14,900	8,475	14,500	46
2009	3,000	3,500	3,000	820	4,200	15
2010	2,420	8,170	5,240	595	7,500	24
Median						30
Minimum=						10
Maximum=						96
Contrast=						9.7

Appendix A4.–Peak escapement index series for Cholmondeley Sound fall-run chum salmon index streams, 1980–2010. (Note: bold values were interpolated.)

District	102	102	
Management Area	Ketchikan	Ketchikan	
Survey Type	Aerial	Aerial	
Run-timing	Fall	Fall	
Stream No.	102-40-043	102-40-060	Index Total
Stream Name	Disappearance Creek	Lagoon Creek	(×1,000)
1980	13,500	12,000	26
1981	21,000	5,000	26
1982	1,800	6,633	8
1983	4,000	11,100	15
1984	**23,401**	16,982	40
1985	26,000	13,632	40
1986	16,000	12,000	28
1987	32,500	13,500	46
1988	21,000	14,800	36
1989	19,800	15,000	35
1990	22,000	8,300	30
1991	33,000	25,000	58
1992	21,000	15,500	37
1993	29,000	17,000	46
1994	22,700	20,000	43
1995	20,000	15,000	35
1996	38,000	23,500	62
1997	18,000	12,800	31
1998	32,500	26,000	59
1999	50,000	50,000	100
2000	21,500	14,300	36
2001	22,000	23,000	45
2002	22,000	17,000	39
2003	45,000	30,000	75
2004	30,000	30,000	60
2005	7,600	7,000	15
2006	38,000	16,000	54
2007	9,500	8,500	18
2008	35,500	14,000	50
2009	26,000	13,000	39
2010	45,000	31,000	76
Minimum=			8
Maximum=			100
Contrast=			11.9

Appendix A5.–Peak escapement index series for Northern Southeast Subregion fall-run chum salmon index streams, 1964–2010. (Note: bold values were interpolated.)

District	109	109		109		114	
Management Area	Petersburg	Petersburg		Petersburg		Juneau	
Subregion	NSE Inside	NSE Inside		NSE Inside		NSE Inside	
Survey Type	Aerial	Aerial		Aerial		Aerial	
Run Type	Fall	Fall		Fall		Fall	
Stream No.	109-43-006	109-43-008		109-45-013		114-80-020	
Stream Name	Port Camden S Head	Port Camden W Head	Index Total (×1,000)	Salt Chuck Security	Index Total (×1,000)	Excursion River	Index Total (×1,000)
1964	300	1,500	2	20,000	20	6,200	6
1965	50	1,200	1	12,500	13	34,500	35
1966	8,000	200	8	2,500	3	3,000	3
1967	10,000	3,500	14	2,500	3	22,500	23
1968	4,000	600	5	5,000	5	40,000	40
1969	2,100	**1,103**	3	9,000	9	25,300	25
1970	5,000	1,300	6	13,000	13	12,000	12
1971	2,000	750	3	7,000	7	42,000	42
1972	2,500	20	3	12,300	12	65,000	65
1973	7,000	700	8	16,350	16	19,000	19
1974	2,630	1,400	4	18,001	18	2,050	2
1975	2,300	1,300	4	2,800	3	33,000	33
1976	1,450	450	2	6,810	7	10,200	10
1977	3,000	800	4	7,900	8	4,900	5
1978	6,100	1,235	7	5,875	6	450	0
1979	3,300	500	4	1,800	2	4,000	4
1980	4,100	2,220	6	13,800	14	34,500	35
1981	4,100	2,500	7	3,500	4	33,500	34
1982	3,800	1,550	5	12,000	12	1,640	2
1983	771	680	1	4,830	5	3,300	3
1984	6,800	3,200	10	19,000	19	7,750	8
1985	8,700	3,500	12	21,000	21	4,025	4
1986	8,200	6,070	14	12,000	12	9,150	9
1987	7,400	1,550	9	11,200	11	2,000	2
1988	4,100	3,250	7	15,500	16	3,700	4
1989	4,700	2,350	7	8,410	8	2,050	2
1990	3,000	960	4	20,040	20	5,100	5
1991	3,100	1,800	5	6,000	6	900	1
1992	2,900	**2,206**	5	19,300	19	2,700	3
1993	5,100	1,700	7	7,400	7	8,200	8
1994	3,800	1,150	5	4,900	5	4,300	4
1995	2,000	1,200	3	14,000	14	6,140	6
1996	3,400	1,350	5	19,000	19	9,200	9
1997	2,000	1,500	4	5,400	5	34,400	34
1998	3,600	2,200	6	31,500	32	8,000	8
1999	920	600	2	20,000	20	10,000	10
2000	1,400	1,100	3	12,500	13	17,000	17
2001	ND	ND	ND	3,500	4	17,750	18
2002	300	150	0	6,000	6	4,680	5
2003	131	545	1	8,700	9	6,300	6
2004	1,700	1,600	3	13,100	13	5,200	5
2005	1,820	290	2	2,750	3	1,100	1
2006	2,250	170	2	15,000	15	2,203	2
2007	280	225	1	5,400	5	6,000	6
2008	1,150	250	1	11,700	12	8,000	8
2009	**1,211**	500	2	5,100	5	1,400	1
2010	3,900	1,500	5	6,500	7	6,100	6
Minimum=			0		2		0
Maximum=			14		32		65
Contrast=			32		18		144

Appendix A6.–Peak aerial survey counts of Chilkat and Klehini river fall-run chum salmon, 1969–2010. (Note: bold values were interpolated.)

District	115	115	
Management Area	Juneau	Juneau	
Survey Type	Aerial	Aerial	
Run-timing	Fall	Fall	
Stream No.	115-32-025	115-32-046	Sum of Surveys
Stream Name	Chilkat River	Klehini River	(×1,000)
1969	17,500	**3,756**	21
1970	80,000	10,000	90
1971	73,000	6,000	79
1972	85,000	2,000	87
1973	65,000	11,000	76
1974	ND	ND	ND
1975	40,000	10,000	50
1976	120,000	15,000	135
1977	ND	ND	ND
1978	ND	ND	ND
1979	121,000	**25,967**	14
1980	28,000	12,350	4
1981	82,000	19,500	10
1982	98,000	16,104	11
1983	176,000	19,000	19
1984	61,000	38,500	10
1985	91,000	25,000	11
1986	ND	ND	ND
1987	**43,801**	9,400	53
1988	48,700	24,000	73
1989	37,700	1,250	39
1990	19,500	9,850	29
1991	**20,969**	4,500	25
1992	23,450	24,000	47
1993	**19,571**	4,200	24
1994	17,000	7,000	24
1995	ND	ND	ND
1996	12,300	3,600	16
1997	7,000	**1,502**	9
1998	**23,298**	5,000	28
1999	**38,070**	8,170	46
2000	61,200	16,900	78
2001	**7,222**	1,550	9
2002	61,800	1,500	63
2003	42,600	4,000	47
2004	45,703	13,000	59
2005	55,400	1,400	57
2006	**68,031**	14,600	83
2007	29,250	21,000	50
2008	25,500	2,650	28
2009	25,000	6,500	32
2010	7,500	**1,603**	9
Minimum=			9
Maximum=			195
Contrast=			23

APPENDIX B:
SOUTHEAST ALASKA CHUM SALMON HARVEST

Appendix B1.–Annual harvest of chum salmon in the Southern Southeast Subregion, 1960–2010.

	Common Property Fisheries[a]						
Year	Traditional Unmarked Harvest[b]	Traditional Hatchery Harvest	Traditional Fisheries Total	Terminal Hatchery	Other Fisheries[c]	Hatchery Cost Recovery	Total Harvest
1960	487,048	–	487,048	–	–	–	487,048
1961	1,005,349	–	1,005,349	–	–	–	1,005,349
1962	918,768	–	918,768	–	–	–	918,768
1963	634,211	–	634,211	–	–	–	634,211
1964	1,192,522	–	1,192,522	–	–	–	1,192,522
1965	289,062	–	289,062	–	–	–	289,062
1966	671,682	–	671,682	–	–	–	671,682
1967	289,819	–	289,819	–	–	–	289,819
1968	1,261,197	–	1,261,197	–	–	–	1,261,197
1969	69,259	–	69,259	–	–	–	69,259
1970	635,258	–	635,258	–	–	–	635,258
1971	703,419	–	703,419	–	–	–	703,419
1972	1,029,904	–	1,029,904	–	–	–	1,029,904
1973	791,673	–	791,673	–	–	–	791,673
1974	684,874	–	684,874	–	–	–	684,874
1975	373,659	–	373,659	–	–	–	373,659
1976	509,270	–	509,270	–	–	–	509,270
1977	425,413	–	425,413	–	–	–	425,413
1978	648,609	–	648,609	–	–	–	648,609
1979	329,390	–	329,390	–	–	–	329,390
1980	832,585	–	832,585	–	639	–	833,224
1981	342,486	–	342,486	–	106	–	342,592
1982	811,452	–	811,452	260	13	778	812,503
1983	431,456	62,452	493,908	–	152	18,148	512,208
1984	1,025,664	343,229	1,368,893	296	783	453,054	1,823,026
1985	883,835	285,147	1,168,982	91,417	1,203	132,986	1,394,588
1986	1,402,372	235,249	1,637,621	107,513	888	99,213	1,845,235
1987	492,477	103,514	595,991	149,412	4,034	434,249	1,183,686
1988	1,083,549	400,598	1,484,147	270,007	4,435	318,452	2,077,041
1989	590,940	535,777	1,126,717	73,032	1,257	55,004	1,256,010
1990	615,183	174,231	789,414	18,493	1,518	89,410	898,835
1991	1,214,943	198,005	1,412,948	69,987	5,938	59,676	1,548,549
1992	1,244,839	535,643	1,780,482	66,295	996	328,190	2,175,963
1993	1,489,432	705,763	2,195,195	52,793	482	689,118	2,937,588
1994	1,503,888	780,474	2,284,362	216,040	432	940,366	3,441,200

[a] Includes harvest in traditional fisheries in districts 1–8, Annette Island fisheries, and common property harvests in hatchery terminal areas.

[b] Includes wild fish and unmarked hatchery fish from Annette Island release sites.

[c] Includes spring troll, test fisheries, and other minor harvests of chum salmon.

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Year	Common Property Fisheries[a] Traditional Unmarked Harvest[b]	Traditional Hatchery Harvest	Traditional Fisheries Total	Terminal Hatchery	Other Fisheries[c]	Hatchery Cost Recovery	Total Harvest
1995	2,160,207	947,676	3,107,883	486,067	896	987,961	4,582,807
1996	1,654,365	1,715,633	3,369,998	502,882	43	1,738,660	5,611,583
1997	713,934	1,860,716	2,574,650	610,693	1,598	2,160,667	5,347,608
1998	1,956,709	2,306,825	4,263,534	1,534,267	1,870	2,375,770	8,175,441
1999	2,102,494	1,443,973	3,546,467	126,544	5,149	1,883,802	5,561,962
2000	1,284,257	1,232,218	2,516,475	238,770	12,079	1,634,288	4,401,612
2001	1,700,871	1,091,746	2,792,617	362,733	3,540	878,992	4,037,882
2002	752,112	598,433	1,350,545	141,214	2,909	663,294	2,157,962
2003	620,424	1,452,955	2,073,379	376,802	1,344	1,047,613	3,499,138
2004	1,304,239	706,746	2,010,985	218,140	515	763,335	2,992,975
2005	467,429	930,453	1,397,882	309,847	42	691,178	2,398,949
2006	609,539	1,351,995	1,961,534	1,011,078	19	1,042,569	4,015,200
2007	942,245	1,485,874	2,428,119	527,929	235	923,212	3,879,495
2008	577,132	678,594	1,255,726	318,692	19	659,745	2,234,182
2009	645,646	1,246,136	1,891,782	404,707	288	761,810	3,058,587
2010	964,973	967,125	1,932,098	580,787	569	1,129,364	3,642,818

[a] Includes harvest in traditional fisheries in districts 1–8, Annette Island fisheries, and common property harvests in hatchery terminal areas.

[b] Includes wild fish and unmarked hatchery fish from Annette Island release sites.

[c] Includes spring troll, test fisheries, and other minor harvests of chum salmon.

Appendix B2.–Annual harvest of chum salmon in the Northern Southeast Inside Subregion, 1960–2010.

	Common Property Fisheries						
Year	Traditional Summer-Run[a]	Traditional Fall-Run[b]	Traditional Fisheries Total	Terminal Hatchery	Other Fisheries[c]	Hatchery Cost Recovery	Total Harvest
1960	304,318	110,556	414,874	–	–	–	414,874
1961	1,005,871	268,269	1,274,140	–	–	–	1,274,140
1962	634,442	143,129	777,571	–	–	–	777,571
1963	595,968	131,840	727,808	–	–	–	727,808
1964	475,894	213,560	689,454	–	–	–	689,454
1965	692,967	347,671	1,040,638	–	–	–	1,040,638
1966	1,209,087	1,314,644	2,523,731	–	–	–	2,523,731
1967	988,551	498,316	1,486,867	–	–	–	1,486,867
1968	1,006,675	343,713	1,350,388	–	–	–	1,350,388
1969	298,982	168,339	467,321	–	–	–	467,321
1970	1,006,498	752,240	1,758,738	–	–	–	1,758,738
1971	536,033	685,554	1,221,587	–	–	–	1,221,587
1972	1,156,386	736,074	1,892,460	–	–	–	1,892,460
1973	567,938	364,975	932,913	–	–	–	932,913
1974	273,636	669,892	943,528	–	–	–	943,528
1975	15,293	268,801	284,094	–	–	–	284,094
1976	13,449	496,648	510,097	–	–	–	510,097
1977	22,365	250,487	272,852	–	–	–	272,852
1978	45,129	154,339	199,468	–	–	–	199,468
1979	129,070	291,502	420,572	–	–	–	420,572
1980	133,626	634,974	768,600	–	947	752	770,299
1981	131,527	271,472	402,999	–	253	–	403,252
1982	111,147	383,109	494,256	–	332	–	494,588
1983	217,911	353,865	571,776	–	157	31	571,964
1984	1,213,916	848,912	2,062,828	–	870	23	2,063,721
1985	489,594	799,508	1,289,102	376,808	5,002	9	1,670,921
1986	223,636	473,508	697,144	585,042	902		1,283,088
1987	323,581	534,499	858,080	410,572	3,719	32,919	1,305,290
1988	475,272	480,136	955,408	198,087	5,371	160,979	1,319,845
1989	340,866	124,287	465,153	23,572	2,820	44,018	535,563
1990	528,469	182,528	710,997	257,987	7,681	210,773	1,187,438
1991	1,246,746	179,475	1,426,221	–	15,082	275,505	1,716,808
1992	992,171	343,592	1,335,763	734,129	8,618	251,188	2,329,698
1993	1,370,704	148,761	1,519,465	1,471,182	21,981	233,189	3,245,817
1994	1,997,895	285,391	2,283,286	2,842,059	32,772	440,538	5,598,655

[a]Includes harvests in traditional fisheries through statistical week 33 in districts 109–112, 113 inside, 114, and 115.

[b]Harvest in traditional fisheries after statistical week 33 in districts 109–112, 113 inside, 114, and 115.

[c]Includes spring troll, experimental fisheries, and other minor harvest of chum salmon.

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Year	Common Property Fisheries: Traditional Summer-Run[a]	Traditional Fall-Run[b]	Traditional Fisheries Total	Terminal Hatchery	Other Fisheries[c]	Hatchery Cost Recovery	Total Harvest
1995	1,082,382	145,374	1,227,756	3,389,558	39,441	585,156	5,241,911
1996	1,579,008	129,096	1,708,104	3,449,235	53,900	2,378,073	7,589,312
1997	876,213	75,682	951,895	1,564,740	24,455	1,293,222	3,834,312
1998	987,925	172,998	1,160,923	1,923,543	34,325	1,272,666	4,391,457
1999	1,480,841	201,953	1,682,794	2,457,081	31,881	1,366,990	5,538,746
2000	1,909,469	251,732	2,161,201	2,999,824	50,712	2,392,694	7,604,431
2001	1,050,487	100,735	1,151,222	1,228,276	86,577	1,101,456	3,567,531
2002	1,119,013	59,766	1,178,779	1,388,273	16,603	1,870,131	4,453,786
2003	1,277,469	100,665	1,378,134	1,438,365	23,328	3,634,329	6,474,156
2004	2,090,840	273,071	2,363,911	1,320,266	31,988	2,288,070	6,004,235
2005	1,034,067	140,142	1,174,209	344,907	6,581	655,173	2,180,870
2006	1,693,384	102,357	1,795,741	2,110,175	26,050	3,105,869	7,037,835
2007	1,408,649	167,991	1,576,640	761,136	19,441	2,231,832	4,589,049
2008	1,356,330	90,686	1,447,016	2,219,317	8,847	2,070,145	5,745,325
2009	1,682,013	95,031	1,777,044	2,046,100	14,052	2,003,341	5,840,537
2010	1,123,018	94,477	1,217,495	828,143	157,896	1,774,079	3,977,613

[a]Includes harvests in traditional fisheries through statistical week 33 in districts 109–112, 113 inside, 114, and 115.

[b]Harvest in traditional fisheries after statistical week 33 in districts 109–112, 113 inside, 114, and 115.

[c]Includes spring troll, experimental fisheries, and other minor harvest of chum salmon.

Appendix B3.–Annual harvest of chum salmon in the Northern Southeast Outside Subregion, 1960–2010.

Year	Common Property	Common Property	Other Fisheries[d]	Private Hatchery Cost Recovery[c]	Total Chum Salmon Harvest
1960	30,211	–	–	–	30,211
1961	155,730	–	–	–	155,730
1962	139,943	–	–	–	139,943
1963	97,622	–	–	–	97,622
1964	44,201	–	–	–	44,201
1965	131,253	–	–	–	131,253
1966	27,596	–	–	–	27,596
1967	22,718	–	–	–	22,718
1968	10,052	–	–	–	10,052
1969	8,567	–	–	–	8,567
1970	26,687	–	–	–	26,687
1971	15,002	–	–	–	15,002
1972	9,811	–	–	–	9,811
1973	29,466	–	–	–	29,466
1974	37,985	–	–	–	37,985
1975	25,742	–	–	–	25,742
1976	3,178	–	–	–	3,178
1977	27,608	–	–	–	27,608
1978	11,370	–	–	–	11,370
1979	121,016	–	–	–	121,016
1980	15,663	–	65	–	15,728
1981	79,148	–	–	1	79,149
1982	16,447	–	–	–	16,447
1983	71,921	–	–	90	72,011
1984	161,908	–	–	127	162,035
1985	192,853	–	21	56	192,930
1986	147,357	849	–	62,579	210,785
1987	87,633	715	1,003	127,395	216,746
1988	69,052	–	22	33,378	102,452
1989	65,642	–	1	85,058	150,701
1990	39,002	–	–	81,462	120,464
1991	25,427	–	–	41,132	66,559
1992	128,733	168,270	–	116,073	413,076
1993	487,670	851,868	4,813	334,489	1,678,840
1994	462,619	556,476	350	336,577	1,356,022

[a]Includes all traditional harvest types in District 113 (outside subdistricts).

[b]Includes terminal area fisheries only, excluding private hatchery cost-recovery fisheries.

[c]Includes private hatchery cost-recovery fisheries only.

[d]Includes spring troll, experimental fisheries, and other minor harvest of chum salmon.

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Year	Common Property	Common Property	Other Fisheries[d]	Private Hatchery Cost Recovery[c]	Total Chum Salmon Harvest
1995	317,793	935,796	79	134,442	1,388,110
1996	1,146,958	1,269,510	697	419,511	2,836,676
1997	1,142,257	1,179,273	91	282,517	2,604,138
1998	1,206,229	1,563,636	198	355,821	3,125,884
1999	720,313	2,747,460	114	361,094	3,828,981
2000	1,063,075	2,512,013	204	326,414	3,901,706
2001	498,352	502,152	1,342	144,942	1,146,788
2002	359,355	305,779	239	176,926	842,299
2003	325,267	607,083	409	207,663	1,140,422
2004	809,838	1,060,636	124	498,714	2,369,312
2005	459,255	875,343	16	512,479	1,847,093
2006	532,866	1,642,890	17	324,887	2,500,660
2007	389,750	224,751	232	329,715	944,448
2008	244,373	540,311	46	287,822	1,072,552
2009	169,633	440,217	1,041	147,490	758,381
2010	455,617	1,120,066	118	180,558	1,756,359

[a]Includes all traditional harvest types in District 113 (outside subdistricts).

[b]Includes terminal area fisheries only, excluding private hatchery cost-recovery fisheries.

[c]Includes private hatchery cost-recovery fisheries only.

[d]Includes spring troll, experimental fisheries, and other minor harvest of chum salmon.

Appendix B4.–Total annual harvest of chum salmon in Southeast Alaska by subregion, 1960–2010.

Year	Southern Southeast	Northern Southeast Inside	Northern Southeast Outside	Grand Total
1960	487,048	414,874	30,211	932,133
1961	1,005,349	1,274,140	155,730	2,435,219
1962	918,768	777,571	139,943	1,836,282
1963	634,211	727,808	97,622	1,459,641
1964	1,192,522	689,454	44,201	1,926,177
1965	289,062	1,040,638	131,253	1,460,953
1966	671,682	2,523,731	27,596	3,223,009
1967	289,819	1,486,867	22,718	1,799,404
1968	1,261,197	1,350,388	10,052	2,621,637
1969	69,259	467,321	8,567	545,147
1970	635,258	1,758,738	26,687	2,420,683
1971	703,419	1,221,587	15,002	1,940,008
1972	1,029,904	1,892,460	9,811	2,932,175
1973	791,673	932,913	29,466	1,754,052
1974	684,874	943,528	37,985	1,666,387
1975	373,659	284,094	25,742	683,495
1976	509,270	510,097	3,178	1,022,545
1977	425,413	272,852	27,608	725,873
1978	648,609	199,468	11,370	859,447
1979	329,390	420,572	121,016	870,978
1980	833,224	770,299	15,728	1,619,251
1981	342,592	403,252	79,149	824,993
1982	812,503	494,588	16,447	1,323,538
1983	512,208	571,964	72,011	1,156,183
1984	1,823,026	2,063,721	162,035	4,048,782
1985	1,394,588	1,670,921	192,930	3,258,439
1986	1,845,235	1,283,088	210,785	3,339,108
1987	1,183,686	1,305,290	216,746	2,705,722
1988	2,077,041	1,319,845	102,452	3,499,338
1989	1,256,010	535,563	150,701	1,942,274
1990	898,835	1,187,438	120,464	2,206,737
1991	1,548,549	1,716,808	66,559	3,331,916
1992	2,175,963	2,329,698	413,076	4,918,737
1993	2,937,588	3,245,817	1,678,840	7,862,245
1994	3,441,200	5,598,655	1,356,022	10,395,877

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Year	Southern Southeast	Northern Southeast Inside	Northern Southeast Outside	Grand Total
1995	4,582,807	5,241,911	1,388,110	11,212,828
1996	5,611,583	7,589,312	2,836,676	16,037,571
1997	5,347,608	3,834,312	2,604,138	11,786,058
1998	8,175,441	4,391,457	3,125,884	15,692,782
1999	5,561,962	5,538,746	3,828,981	14,929,689
2000	4,401,612	7,604,431	3,901,706	15,907,749
2001	4,037,882	3,567,531	1,146,788	8,752,201
2002	2,157,962	4,453,786	842,299	7,454,047
2003	3,499,138	6,474,156	1,140,422	11,113,716
2004	2,992,975	6,004,235	2,369,312	11,366,522
2005	2,398,949	2,180,870	1,847,093	6,426,912
2006	4,015,200	7,037,835	2,500,660	13,553,695
2007	3,879,495	4,589,049	944,448	9,412,992
2008	2,234,182	5,745,325	1,072,552	9,052,059
2009	3,058,587	5,840,537	758,381	9,657,505
2010	4,192,815	3,977,613	1,756,359	9,926,787