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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*) spawn in more than 1,200 streams. The Alaska Department of Fish and Game maintains a standardized survey program to index spawning chum salmon abundance at 87 summer-run and seven fall-run streams. Lower-bound sustainable escapement goals are established for summer-run stocks comprising aggregates of index streams over three broad subregions (Southern Southeast, Northern Southeast Inside, and Northern Southeast Outside) and sustainable escapement goal ranges are established for five fall-run stocks that support directed fisheries (Cholmondeley Sound, Port Camden, Security Bay, Excursion River, and Chilkat River). We reviewed chum salmon escapement goals and recommend that summer-run chum salmon goals continue to be based on the 25th percentiles of historical escapement index counts, primarily due to the uncertainty regarding harvest rates. We recommend reducing the Northern Southeast Inside Subregion lower-bound sustainable escapement goal from 119,000 to 107,000 fish. For fall-run chum salmon stocks, except for the Chilkat River, we also recommend continuing to base escapement goals on the 25th and 75th percentiles of historical escapement index counts, and recommend no changes at this time. Summer-run chum salmon escapement goals were met in four of the past five years in the Southern Southeast and Northern Southeast Outside subregions, and in three of the past five years in the Northern Southeast Inside Subregion. Escapement goals were met for the five fall-run stocks 84% of the time over the past 5 years. The annual common property harvest of chum salmon in Southeast Alaska averaged 6.9 million fish per year since 2007; hatchery-produced fish accounted for an average 85% of that 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*) 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 10.1 million fish over the most recent ten years, 2007–2016. The common property harvest (total harvest minus hatchery cost recovery) of chum salmon during this same period averaged 6.9 million fish. Much of this increase was due to the production of hatchery fish, which accounted for an average 85% of the commercial common property harvest of chum salmon from 2007 to 2016. Over that same 10-year period, the total exvessel value of the commercial chum salmon harvest averaged $58 million a year—well ahead of the next most valuable species, pink salmon (*O. gorbuscha*), at $47 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.

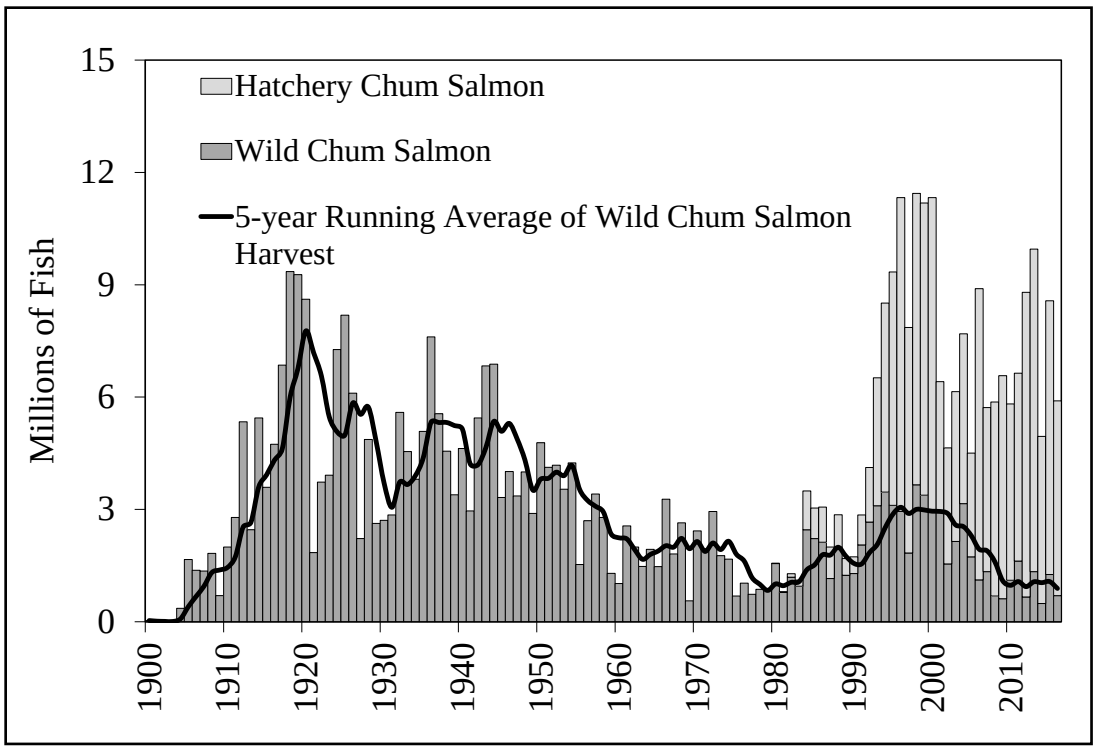

Figure 1.–Annual common property[1] harvest of chum salmon in Southeast Alaska from 1900 to 2016 showing estimated harvests of both hatchery-produced and wild chum salmon. (Data prior to 1960 are from Byerly et al. 1999).

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 also formed the basis of the first escapement goals for chum salmon in Southeast Alaska, which were established in 2009 (Eggers and Heinl 2008) with some modified in 2012 and 2015 (Piston and Heinl 2011, 2014). Lower-bound sustainable escapement goals were developed for three broad regional aggregates of streams for summer-run chum salmon stocks, and sustainable escapement goal ranges were established for five additional fall-run 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 and escapement goals to the board on a regular basis, document and review existing salmon escapement goals, establish goals for stocks for which escapement can be reliably measured, and prepare scientific analyses with supporting data when 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

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

information was sufficient to establish escapement goals. Eggers and Heinl (2008) provided an update on stock status and recommendations on the first formal escapement goals for chum salmon in Southeast Alaska, which were updated by Piston and Heinl (2011, 2014). This report represents an update concerning the status of chum salmon in the region through 2016, including an evaluation of current escapement goals (Table 1).

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

		Current Escapement Goal			Recommended Escapement Goal		
Stock Unit	Enumeration Method	Goal	Type	Year	Action	Goal	Type
Southern Southeast Summer-Run	Aggregate Peak Surveys	62,000	Lower-Bound SEG[a]	2015	No change		
Northern Southeast Inside Summer-Run	Aggregate Peak Surveys	119,000	Lower-Bound SEG	2012	Change	107,000	Lower-bound SEG
Northern Southeast Outside Summer-Run	Aggregate Peak Surveys	25,000	Lower-Bound SEG	2015	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	75,000–250,000	SEG	2015	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 (ADF&G Integrated Fisheries Database). Counts of 1,000 or more chum salmon were obtained at approximately 450 of those streams prior to 1985, when hatchery production of chum salmon began on a large scale. 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, although 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. Piston and Heinl (2014) updated these indices and increased the number of chum salmon index streams to 87 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 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, whereas 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.

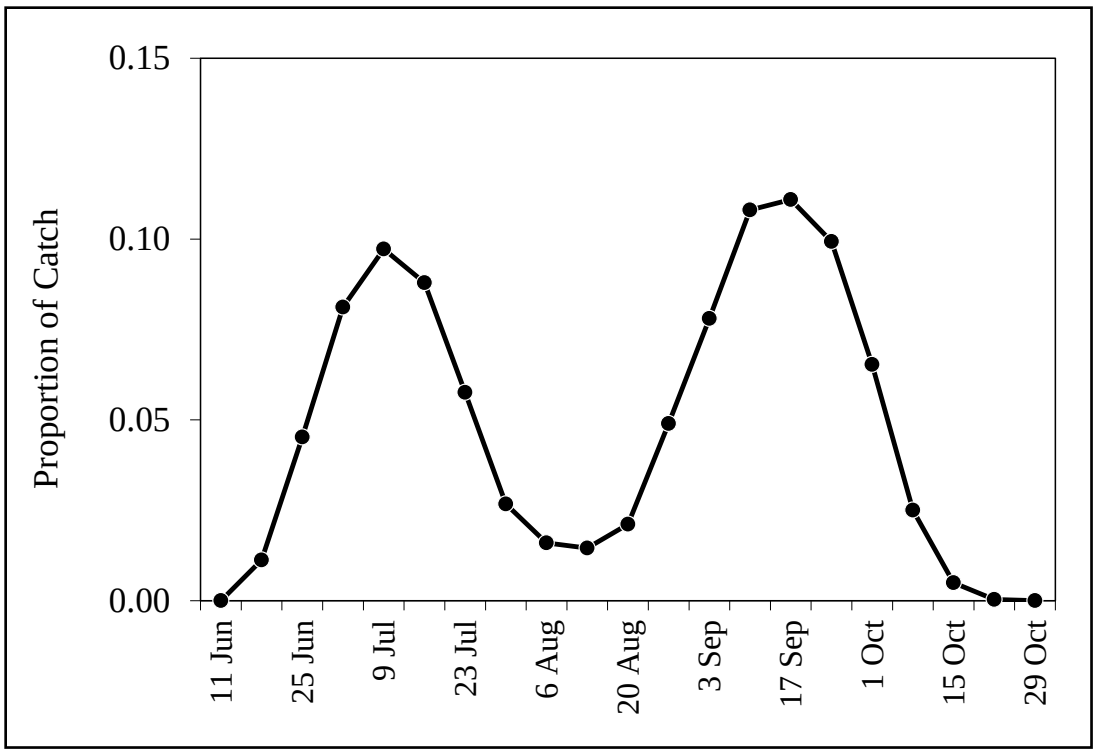

Figure 2.–Mean run-timing of chum salmon in the Lynn Canal (District 15) commercial drift gillnet fishery, illustrated by plotting the mean weekly proportion of the total annual harvest of chum salmon in the fishery, 1960–2016. All chum salmon harvested in this fishery from statistical week 34 (average midweek date 19 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, Piston and Heinl 2014). The Southern Southeast Subregion includes 15 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 nine 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 interpolate a missing value in order to maintain a set of index counts that is comparable across all years. Values were interpolated 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 interpolated 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.

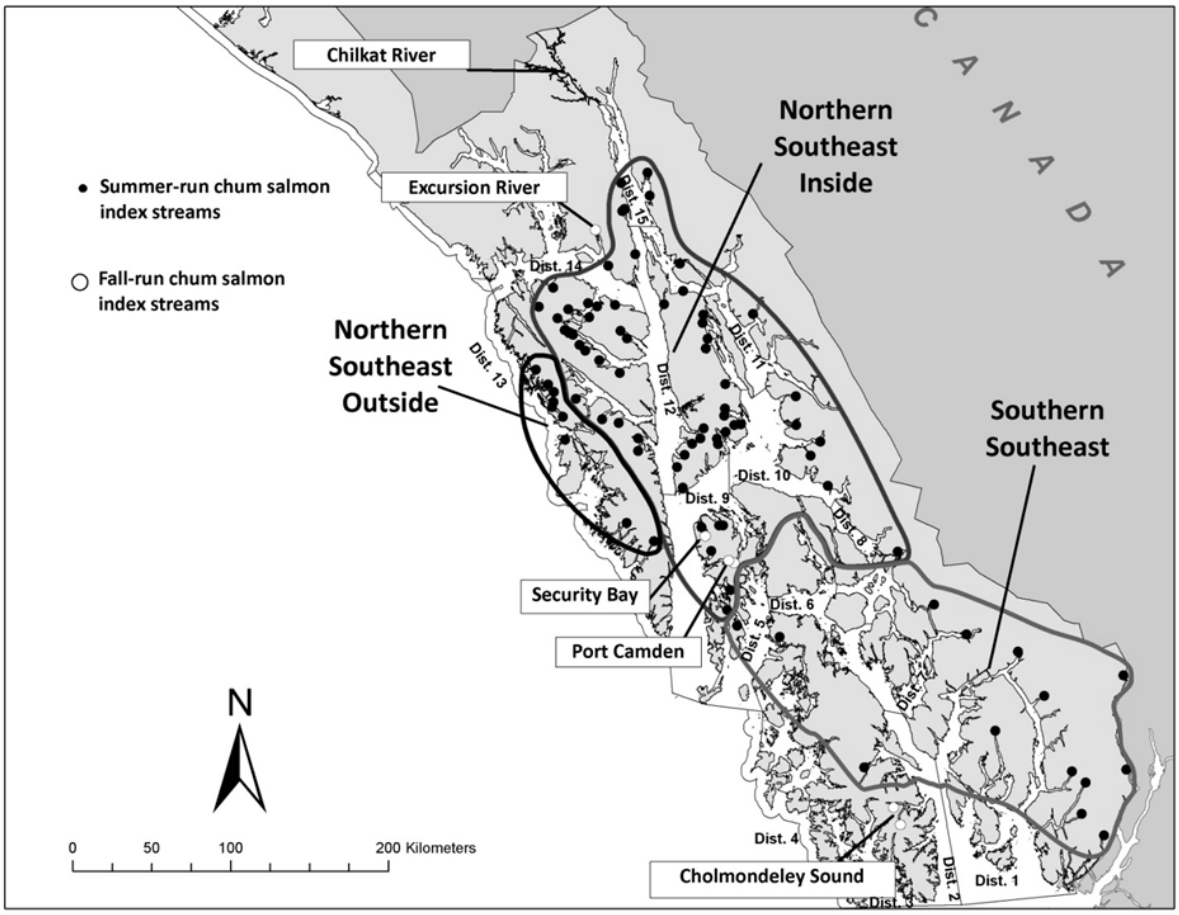

Figure 3.–Locations of ADF&G chum salmon index streams and summer chum salmon stock groups in Southeast Alaska.

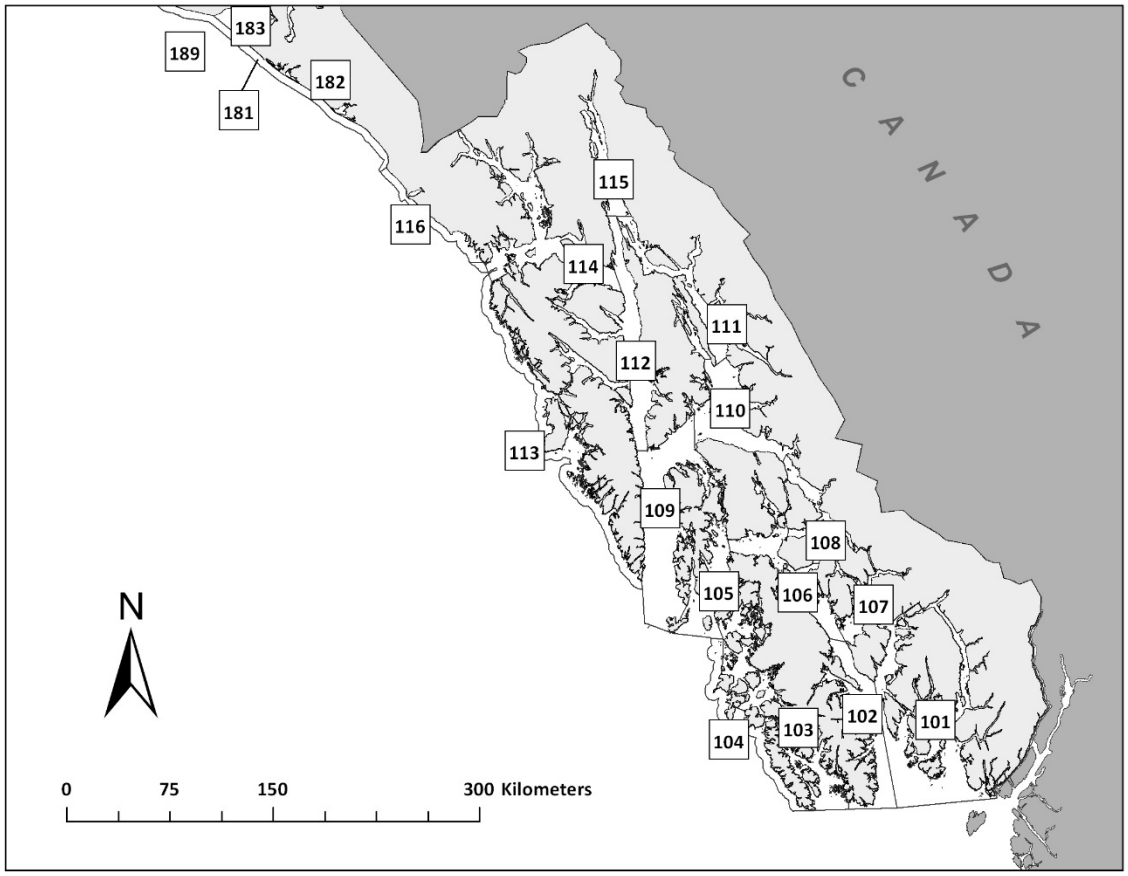

Figure 4.–Locations of ADF&G regulatory districts in Southeast Alaska.

HATCHERY CHUM SALMON STOCKS

Hatchery production of chum salmon in Southeast Alaska has increased substantially over the past four decades. In 1980, hatchery operators in Southeast Alaska released 8.7 million chum salmon fry at eight locations; by 2016, this number had risen to 515 million fry released at 21 locations (Figures 5 and 6). Seven new release sites for chum salmon have been approved in Southeast Alaska since 2012: Crawfish Inlet (Northern Southeast Regional Aquaculture Association [NSRAA]), Thomas Bay (NSRAA), Port Malmesbury (NSRAA); Port Lucy (Armstrong-Keta, Inc), Burnett Inlet (Southern Southeast Regional Aquaculture Association [SSRAA]; former Alaska Aquaculture Inc. release site through 1995), McLean Arm (alternate year releases occurring between Kendrick and McLean; SSRAA), and Port Asumcion (SSRAA). As of 2016, chum salmon releases had only occurred at Crawfish Inlet, McLean Arm, and Burnett Inlet (Figure 6).

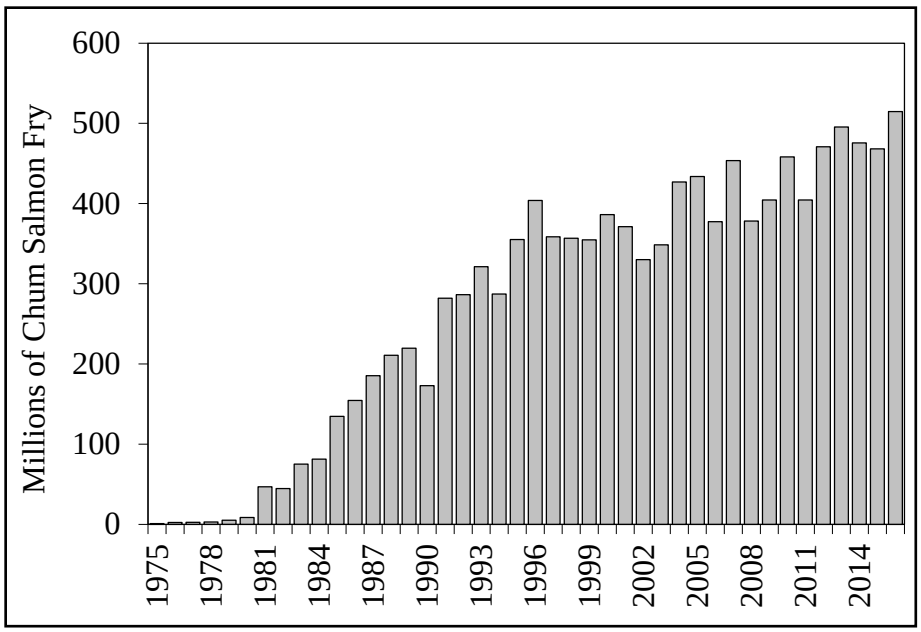

Figure 5.–Number of hatchery-produced chum salmon fry released annually in Southeast Alaska, 1975–2016.

Significant hatchery runs of chum salmon have been produced in southern Southeast Alaska by Southern Southeast Regional Aquaculture Association (SSRAA). Initial releases occurred in 1980 and production increased to an average of 94 million fry per year in the 1990s (Figure 7). Production gradually increased again, starting in the early 2000s and averaged 137 million fish per year from 2007 to 2016. SSRAA has released summer chum salmon at Nakat Inlet, Kendrick Bay, McLean Arm, Neets Bay, Earl West Cove, Anita Bay, and Burnett Inlet. SSRAA also releases fall-run stocks at Nakat Inlet, Neets Bay, and Burnett Inlet, and fall runs averaged roughly 20% of production over the last 10 years. SSRAA has marked nearly 100% of all 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.

Significant hatchery runs of chum salmon have been produced in northern Southeast Alaska by Northern Southeast Regional Aquaculture Association (NSRAA). Initial releases occurred in 1981 and production increased steadily to an average of 152 million fry per year from 2007 to 2016, making it the largest producer of chum salmon in the state. The largest chum salmon releases have been at Hidden Falls (Kasnyku and Takatz bays; Figure 6) and Deep Inlet. Historically, NSRAA has not consistently marked a large portion of its releases (Figure 7); however, thermal marking was initiated with the 1991 brood, and the proportion of releases that were thermally marked averaged 88% since 2004 and 98% since 2011.

Douglas Island Pink and Chum, Inc. (DIPAC) has also produced significant hatchery runs of chum salmon in northern Southeast Alaska. Initial releases occurred in 1977; production increased through the 1980s, and has been fairly stable since 1991, with average releases of 100 million fry annually (Figure 7). 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.

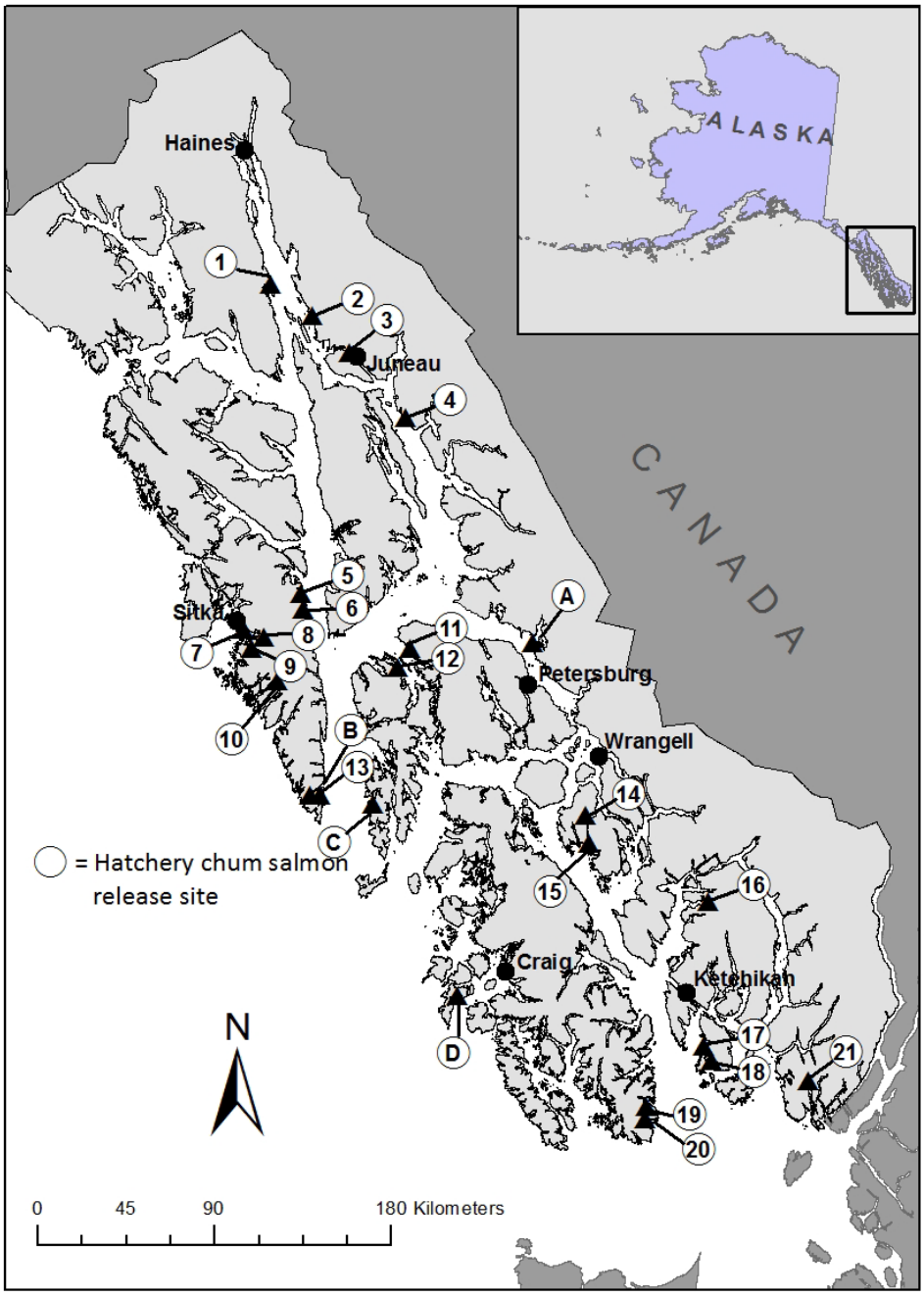

Figure 6.–Map of Southeast Alaska showing major towns and current hatchery chum salmon release sites. Hatchery release sites and operators are represented by numbered circles: 1) Boat Harbor (DIPAC), 2) Amalga Harbor (DIPAC), 3) Gastineau Channel (DIPAC), 4) Limestone Inlet (DIPAC), 5) Kasnyku Bay (NSRAA), 6) Takatz Bay (NSRAA), 7) Crescent Bay (Sitka Sound Science Center), 8) Bear Cove (NSRAA), 9) Deep Inlet (NSRAA), 10) Crawfish Inlet (NSRAA), 11) Kake (Kake Non-Profit Fisheries Corporation), 12) Southeast Cove (NSRAA), 13) Port Armstrong (Armstrong-Keta Inc.), 14) Anita Bay (SSRAA), 15) Burnett Inlet (SSRAA), 16) Neets Bay (SSRAA), 17) Chester Bay (Metlakatla Indian Community), 18) Tamgas Harbor (Metlakatla Indian Community), 19) Kendrick Bay (SSRAA), 20) McLean Arm (SSRAA), 21) Nakat Inlet (SSRAA). Four recently approved release sites have not had a chum salmon release as of 2016: A) Thomas Bay (NSRAA), B) Port Lucy (Armstrong-Keta Inc.), C) Port Malmesbury (NSRAA), D) Port Asumcion (SSRAA).

Smaller numbers of hatchery chum salmon have been released by Kake Non-Profit Fisheries Corporation (at Gunnuck Creek and Southeast Cove), Sitka Sound Science Center (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 7). Releases from Armstrong-Keta, Inc. have been 100% thermal marked since 2006, and approximately 90% of the chum salmon released annually from these operators have been thermal marked during the most recent 10-year period (Figure 7).

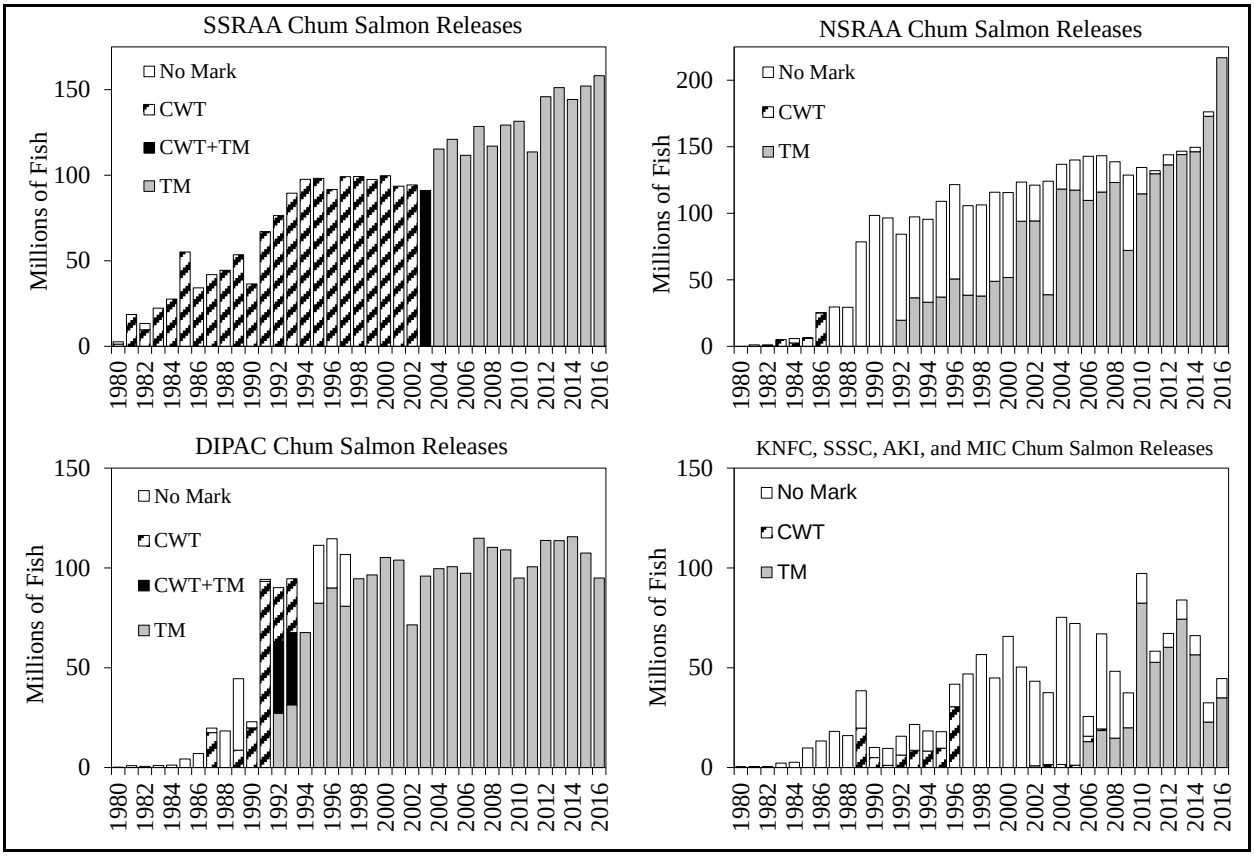

Figure 7.–Annual releases of chum salmon by nonprofit hatcheries in Southeast Alaska, 1980–2016. Releases are presented by type of mark: no mark, coded wire tag (CWT), thermal mark (TM), and coded wire tag and thermal mark combined. (NSRAA = Northern Southeast Regional Aquaculture Association; SSRAA = Southern Southeast Regional Aquaculture Association; DIPAC = Douglas Island Pink & Chum, Inc.; KNFC = Kake Non-Profit Fisheries Corp.; SSSC = Sitka Sound Science Center; AKI =Armstrong-Keta, Inc.; MIC = Metlakatla Indian Community (MIC has not provided release information since 2013; we assumed 2014–2016 releases were of similar size to 2013 in this figure). Does not include ADF&G hatchery releases from 1980 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 are required to provide ADF&G with estimates of the total number of hatchery chum salmon harvested each year (see Stopha 2016 and previous reports in that series). 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).

Almost all of the common property chum salmon harvested in southern Southeast Alaska fisheries (i.e., Districts 1–8) have been sampled for coded wire tags or thermal marks since 1983. SSRAA began thermal marking 100% of their chum salmon releases in 2003 and implemented a sampling program to collect and analyze otoliths from traditional mixed stock net fishery landings at Ketchikan and Petersburg in 2005. This program now provides the best estimates of the harvest of hatchery and wild stock chum salmon in Southeast Alaska. Detailed analysis of the harvest of hatchery and unmarked chum salmon in southern Southeast Alaska net fisheries from 2006 to 2010 can be found in Brunette et al. (2013). Historical harvest estimates for this subregion include harvests of hatchery fish in hatchery terminal areas and estimates of the combined harvests of wild and hatchery fish in traditional mixed stock common property fisheries outside of hatchery terminal areas (Appendix B1). These estimates include summer- and fall-run fish combined. The harvest 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 (Eggers and Heinl 2008; see below in escapement goal review section).

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; average midweek date 19 August) 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 harvest rate on wild summer-run chum salmon in traditional, mixed stock commercial net fisheries in the Northern Southeast Inside Subregion is assumed to be at least moderate (Eggers and Heinl 2008).

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 harvest rate on Northern Southeast Outside Subregion chum salmon in traditional mixed stock commercial purse seine fisheries is assumed to be at least moderate (Eggers and Heinl 2008).

ESCAPEMENT GOALS

The status of wild 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; Piston and Heinl 2014). 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.

The sustainable escapement goal for Chilkat River fall-run chum salmon was based on a stock-recruit analysis (Eggers and Heinl 2008), which was updated in 2014 (Piston and Heinl 2014); however, the remaining Southeast Alaska chum salmon escapement goals were derived primarily using a simple "percentile approach" (Bue and Hasbrouck *unpublished*; Clark et al. 2014). This method has been used extensively throughout Alaska (see Munro and Volk 2010) to set sustainable escapement goals in situations where stock assessment data were fair or poor and insufficient to establish a biological escapement goal using productivity models. In the original percentile approach (Bue and Hasbrouk *unpublished*), sustainable escapement goals were based on four tiers of percentiles of observed escapement counts as determined by contrast in escapement data and harvest rate on the stock (Table 2). Contrast in escapement data is simply the maximum escapement count divided by the minimum escapement count. Low contrast (<4) implies that density dependent survival has been experienced for only a limited range of escapements. According to this approach of Bue and Hasbrouck, percentiles of the total range of observed annual escapement counts 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, the percentiles used to estimate the goal were 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).

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[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).*

Table 2.–Criteria used to set sustainable escapement goals based on percentiles of observed escapement counts (Bue and Hasbrouck *unpublished*).

Tier	Escapement Contrast and Exploitation	Sustainable Escapement Goal Range
Tier 1	High contrast (>8); exploited population	25th to 75th percentile
Tier 2	High contrast (>8); low exploitation	15th to 75th percentile
Tier 3	Medium contrast (4–8)	15th to 85th percentile
Tier 4	Low contrast (<4)	15th percentile to maximum observation

Sustainable escapement goals were established in 2009 for aggregate summer-run stocks and the fall-run Cholmondeley Sound stock using survey data from the early 1980s to 2007 and for fall-run stocks at Security Bay, Port Camden, and Excursion River using survey data from the early 1960s to 2007 (Eggers and Heinl 2008). These stocks all exhibit high contrast in escapement data (>8) and are thought to experience at least moderate harvest rates; therefore, escapement goals were based on the 25th and 75th percentiles of historical escapement counts following the criteria outlined in Table 2. Lower-bound sustainable escapement goals were established for summer-run chum salmon, rather than ranges, because summer-run fish are harvested in mixed stock commercial fisheries and their escapements cannot be managed to fall within a range. Piston and Heinl (2011) re-evaluated the escapement goals for Southern Southeast and Northern Southeast Inside subregion summer-run chum salmon using historical data back to 1960 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. The goals for Southern Southeast and Northern Southeast Outside subregion summer-run chum salmon were re-evaluated again in 2014, to account for the addition of new index streams to those stock groups (Piston and Heinl 2014).

ESCAPEMENT GOAL REVIEW

Clark et al. (2014) recently provided a comprehensive evaluation of the percentile approach as a scientifically defensible method to estimate proxies for escapements that produce maximum sustainable yield (S_{MSY}). Clark et al. (2014) concluded:

> "All of [our] analyses indicate that the four tiers of the Percentile Approach are likely sub-optimal as proxies for determining a range of escapements around S_{MSY}. The upper bounds of SEGs [sustainable escapement goals] developed with this approach may actually be unsustainable in that they may specify spawning escapement that is close to or exceeds the carrying capacity of the stock. The lower bound percentile of SEG Tier 1 (25%) also appears somewhat higher than necessary. Escapements in the lower 60 to 65 percentiles are optimal across a wide range of productivities, serial correlation in escapements, and measurement error in escapements."

As a result of their evaluation, Clark et al. (2014) recommended replacing the four tiers with three new tiers that appear to represent reasonable proxies for S_{MSY} for stocks with low to moderate (40% or less) average harvest rates (Table 3). In addition, Clark et al. (2014) recommended that the percentile approach *not* be used for stocks which experience harvest rates greater than 40%; instead, they recommended making improvements in stock assessment so that goals could be based on productivity models. If the percentile approach is used for stocks with average harvest rates greater than 40% they suggested that the lower bound should be set no lower than the 25th

percentile to avoid potential overfishing and the upper bound should be set at the 75th percentile or greater, regardless of the level of measurement error.

Table 3.–Criteria used to set sustainable escapement goals based on percentiles of observed escapement counts for stocks with low to moderate (40% or less) average harvest rates (Clark et al. 2014).

Tier	Escapement Contrast and Measurement Error	Sustainable Escapement Goal Range
Tier 1	High contrast (>8); high measurement error (aerial and foot surveys)	20th to 60th percentiles
Tier 2	High contrast (>8); low measurement error (weirs, towers)	15th to 65th percentiles
Tier 3	Low contrast (≤8)	5th to 65th percentiles

We reviewed Southeast Alaska chum salmon escapement goals to determine if changes are required with respect to the new percentile approach outlined by Clark et al. (2014). Southeast Alaska chum salmon stocks would best fit Tier 1 percentile ranges, as there is high measurement error and high contrast (>8) in available escapement data. Harvest rates on wild chum salmon are poorly known, however, but are assumed to be moderate (Eggers and Heinl 2008) and possibly exceed 40% in many cases. Therefore, using one of the percentile ranges in Table 3 is not advised.

Summer-Run Chum Salmon:

We calculated both the 25th and 20th percentiles of escapement indices for summer-run chum salmon using all available data (1960–2016 for Northern Southeast Inside and Southern Southeast subregions; 1982–2016 for Northern Southeast Outside Subregion). The current escapement goals for the Southern Southeast and Northern Southeast Outside subregions had been modified in 2015 (using data through 2013; Piston and Heinl 2014) and, as a result, the newly calculated 25th percentiles were the same as the current lower-bound SEGs (Table 4). The 25th percentile of Northern Southeast Inside Subregion index counts was 10% lower than the current lower-bound SEG (107,000 vs. 119,000 index fish). For comparison, the 20th percentiles of index counts are lower for all three subregions, though the change would be minor (4%, or 1,000 fish) for the Northern Southeast Outside Subregion (Table 4).

Available information suggests summer-run chum salmon stocks in the Southern Southeast Subregion may experience harvest rates greater than 40%. The only direct estimates of harvest rates on wild chum salmon are for the Fish Creek chum salmon run, near Hyder, for which harvest rates averaged 58% from 1991 to 1995 (range: 38–70%; Heinl et al. 2000). Estimated mixed stock fishery harvest rates on SSRAA hatchery summer-run chum salmon by release site for the 10 years 2007–2016 averaged 30% for Neets Bay, 53% for Nakat Inlet, 60% for Anita Bay, and 72% for Kendrick Bay (SSRAA unpublished data[3]). The rate that hatchery runs are harvested in mixed stock fisheries depends on proximity of the release site to mixed stock corridors and the degree to which fish are accounted for in the terminal area, but this information also suggests average harvest rates on wild summer-run chum salmon could exceed 40%. In addition, wild sockeye salmon runs at Hugh Smith and McDonald lakes, which are harvested incidentally in the same southern Southeast Alaska net fisheries as wild summer-run chum salmon, experience harvest rates that

[3] Historical SSRAA hatchery summer-run chum salmon return by release site obtained from http://ssraa.org/chum-historic-releases/ on 2 June 2017.

routinely exceed 40% (Geiger et al. 2003; Johnson et al. 2005; Heinl et al. 2007; Brunette and Piston 2017).

As a result of the uncertainty regarding harvest rates, we recommend escapement goals for summer-run chum salmon continue to be based on the 25th percentile of historical escapement index counts—a precautionary approach suggested by Clark et al. (2014) for stocks which experience average harvest rates ≥40%. In the analysis by Clark et al. (2014; pages 26–27), the best percentile range for Southeast Alaska pink salmon stocks (and some Kodiak pink salmon stocks) was actually the 40–85th percentiles. Because Southeast Alaska summer-run chum salmon are harvested incidentally in the purse seine fishery, which is managed primarily for pink salmon, and stock assessment of summer-run chum salmon is similar to that of pink salmon (based on peak survey counts), maintaining the lower-bound of summer-run chum salmon escapement goals at the 25th percentile is more precautionary than basing the goals on the 20th percentiles.

We also recommend updating lower-bound sustainable escapement goals using escapement survey data over all years available through 2016 (Table 4), which we will consider the set of baseline years for each subregion. For the Northern Southeast Outside and Southern Southeast subregions our re-evaluation resulted in no change to current goals. For the Northern Southeast Inside Subregion, the escapement goal would be reduced slightly from 119,000 to 107,000 fish (Table 1). Finally, we recommend maintaining these escapement goals unchanged into the future unless streams are added or removed from the indices, or stock assessment improves to a point that more rigorous escapement goal development methods can be used.

Table 4.–Current lower-bound sustainable escapement goals for Southeast Alaska summer-run chum salmon compared to updated goals based on the 25th and 20th percentiles of escapement indices.

	Southern Southeast Summer-Run	Northern Southeast Inside Summer-Run	Northern Southeast Outside Summer-Run
Current Goal	62,000	119,000	25,000
Year Adopted	2015	2012	2015
Percentile Used	25th	25th	25th
Data Years Used	1960–2013	1960–2007	1982–2013
Data Years Available	1960–2016	1960–2016	1982–2016
Contrast	35	18	8
Updated 25th percentile	62,000	107,000	25,000
% Change	0%	-10%	0%
Updated 20th percentile	54,000	100,000	24,000
% Change	-13%	-16%	-4%

Fall-Run Chum Salmon:

We calculated the 25–75th and the 20–60th percentile ranges of escapement indices for fall-run chum salmon stocks at Cholmondeley Sound, Port Camden, Security Bay, and Excursion River using all available data through 2016. The newly calculated 25th percentiles were exactly the same as the lower bounds of current escapement goals for Port Camden, Security Bay, and Cholmondeley Sound (Table 5). The 75th percentiles were slightly lower than the current upper bounds for Port Camden (-14%) and Security Bay (-7%) and higher for Cholmondeley Sound (13%). The 20th percentiles were exactly the same as the lower bounds of current escapement goals for Port Camden and Security Bay, and slightly lower for Cholmondeley Sound (Table 5).

The 60th percentiles were lower than the current upper bounds for those three stocks (-29% for Port Camden, -20% for Security Bay, and -4% for Cholmondeley Sound), although the difference in numbers of fish was small. Thus, the escapement goal ranges for Port Camden and Security Bay would decrease as a result of changes to the upper bounds, but the escapement goal range for Cholmondeley Sound would be very similar to the current goal no matter which new percentile ranges were used (Table 5). Conversely, newly calculated percentiles for the Excursion River stock were lower than the current sustainable escapement goal range at all percentiles. The escapement goal range for Excursion River would drop from 4,000–18,000 to 3,000–12,000 based on the 25–75th percentiles, and to 2,000–8,000 based on the 20–60th percentiles, which is about 50% lower than the current goal (Table 5).

Harvest rates on fall-run chum salmon stocks at Port Camden, Security Bay, Excursion River, and Cholmondeley Sound are not known due to lack of estimated total escapements and because fish from all of these locations are also harvested to varying degrees in mixed stock fisheries prior to entering the terminal area where fall fisheries occur. Total escapements were estimated at Disappearance Creek, an index stream in Cholmondeley Sound, for three years, 2008–2010 (Piston and Heinl 2010a, 2010b; Piston and Brunette 2011), during which time escapements averaged 1.9 times peak aerial survey counts. This expansion factor is relatively small (see Eggers et al. 2012), but index counts at Disappearance Creek and other Southeast Alaska chum salmon index streams include estimates of the number of fish in the mouth and intertidal areas because they are meant to represent the maximum number of fish observed to have escaped fisheries. In order to estimate approximate harvest rates on fall-run chum salmon over a wide range of escapement sizes, we expanded escapement survey counts by multiples of 2, 3, and 5. Terminal harvest rates based on these multiples were: 31%, 25%, and 18% at Cholmondeley Sound; 39%, 37%, and 28% at Port Camden; 22%, 18%, and 13% at Security Bay; and 57%, 49%, and 40% at Excursion Inlet (Table 5).

We recommend maintaining the current escapement goals for these fall-run stocks for many of the same reasons outlined above for summer-run chum salmon. Although terminal harvest rates may average less than 40% for three of these four stocks, again, *total* harvest rates are not known and could approach or exceed 40%, particularly for the Cholmondeley Sound stock, which is also harvested in general fall chum salmon openings in District 2, outside of the terminal area (Piston and Heinl 2010a). Terminal harvest rates have been lower over the past decade or more due to lower abundance of fall-run chum salmon at all locations, and because fisheries have only been sporadically conducted in recent years, sometimes with very little fishery participation even when openings are offered (particularly at Port Camden, Security Bay, and Excursion Inlet; Appendix B5). For Cholmondeley Sound, Security Bay, and Port Camden goals, the lower bounds at the updated 20th or 25th percentiles would be identical or nearly so to the current lower bounds, and small changes to the upper bounds based on updated 60th or 75th percentiles (Table 5) would represent differences in numbers of fish not easily identified during an aerial survey. In addition, it may not be practical to manage the Port Camden fishery for the relatively narrow escapement goal range (2,000–5,000 fish) based on the updated 20–60th percentiles.

We also recommend maintaining the current Excursion River goal due to the generally poor runs since the mid-1980s (Figure 15) and potentially high harvest rates in the directed terminal fishery (Table 5). Fall-run chum salmon stocks in northern Southeast Alaska have declined since the mid-to-late 1980s (Figures 10, 15, 16, 19, and 20), but the reasons for these declines are not known. The combination of poor stock assessment information, potentially high harvest rates in the

terminal area, and general declines in fall-run chum salmon in northern Southeast Alaska makes lowering the goal potentially risky. Maintaining the current goal will likely have little impact on management of the directed fishery and offers an extra degree of stock protection. Despite the lower runs since the late 1980s, the current Excursion River goal has not been missed in more than two consecutive years since 1990.

Table 5.–Current sustainable escapement goals for Southeast Alaska fall-run chum salmon compared to updated goals based on the 25–75th percentiles and 20–60th percentiles of escapement indices, and estimated harvest rates in directed terminal fisheries (total harvest rates are unknown).

	Cholmondeley Sound Fall	Port Camden Fall	Security Bay Fall	Excursion River Fall
Current Goal	30,000–48,000	2,000–7,000	5,000–15,000	4,000–18,000
Year Adopted	2009	2009	2009	2009
Percentiles Used	25th to 75th	25th to 75th	25th to 75th	25th to 75th
Data Years Used	1980–2007	1964–2007	1964–2007	1964–2007
Data Years Available	1980–2016	1964–2016	1964–2016	1964–2016
Contrast	12	32	18	144
Updated 25th–75th percentile	30,000–54,000	2,000–6,000	5,000–14,000	3,000–12,000
% Change	0% to 13%	0% to -14%	0% to -7%	-25% to -33%
Updated 20th–60th percentile	28,000–46,000	2,000–5,000	5,000–12,000	2,000–8,000
% Change	-7% to -4%	0% to -29%	0% to -20%	-50% to -56%
Terminal Harvest Rate–Index × 2	31%	39%	22%	57%
Terminal Harvest Rate–Index × 3	25%	37%	18%	49%
Terminal Harvest Rate–Index × 5	18%	28%	13%	40%

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 nine index streams since 1960 and for all 15 index streams since 1980 (Figure 8; Appendix A1). In 2014, ADF&G modified the lower-bound sustainable escapement goal to 62,000 chum salmon counted on peak surveys to the aggregate set of index streams (Piston and Heinl 2014). Escapement indices were low during the mid-1960s to late 1970s, increased into the 1990s, and have generally remained above the escapement goal over the past two decades, with the exception of poor escapement years from 2008 to 2010 (Figure 8). Escapement indices were above the current escapement goal in four of the past five years, 2012–2016, and the 2011 index of 157,000 was the fourth highest in the time series.

Wild chum salmon harvests in the Southern Southeast Subregion were relatively stable and averaged 650,000 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 8; Appendix B1). From 1990 to 2016, the chum salmon harvest in traditional mixed stock fisheries averaged 2.3 million fish. Harvests in terminal hatchery areas (not including cost-recovery harvests) averaged an additional 497,000 fish.

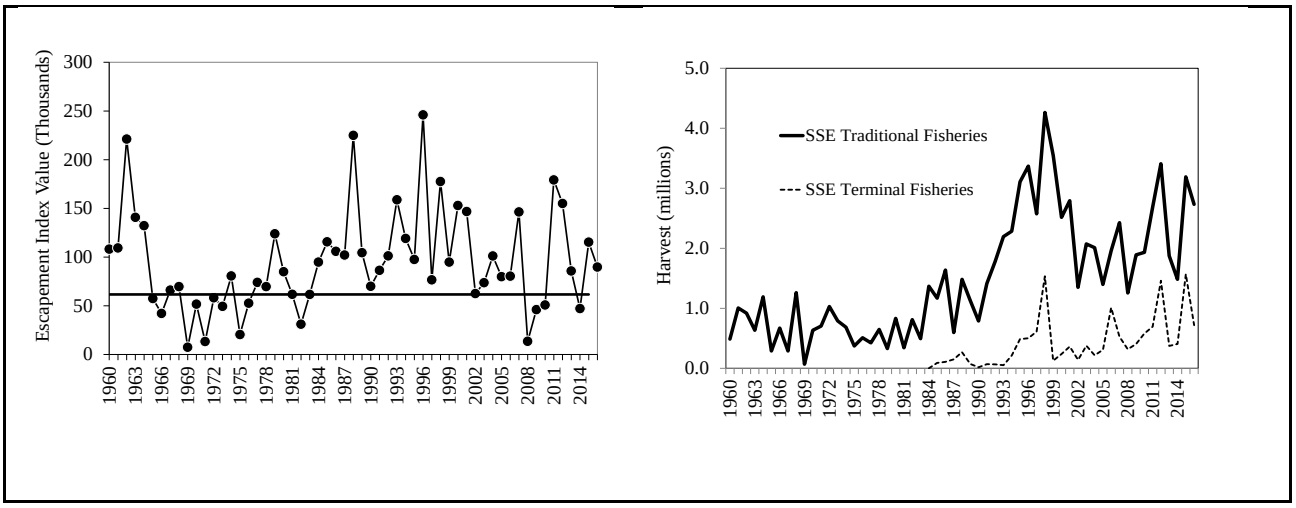

Figure 8.–Escapement index for wild summer-run chum salmon in the Southern Southeast stock group (1980–2016, left) and the annual common property harvest of chum salmon in the Southern Southeast Subregion, Districts 1–8, 1960–2016 (right). (Terminal harvests do not include hatchery cost recovery.) The horizontal black line in the escapement figure is the current lower-bound SEG of 62,000 fish.

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. In 2012, ADF&G modified the lower-bound sustainable escapement goal to 119,000 chum salmon counted on peak surveys to the aggregate set of index streams. Peak escapement survey data were available for 31 index streams since 1960 and for all 63 index streams since 1982 (Figure 9; Appendix A2). Escapement indices were generally high in the 1960s, and then declined in the 1970s–1980s. The escapement index trended upward into the late 1990s, trended downward through 2010, and has fluctuated considerably since that time (Figure 9). Escapement indices were above the current escapement goal in three of the past five years, 2012–2016.

Hatchery runs of chum salmon in the Northern Southeast Inside Subregion increased rapidly in the early 1990s and have remained high since that time (Figure 9). The estimated summer chum salmon harvest in Northern Southeast Inside Subregion traditional fisheries (traditional fisheries through week 33; Districts 109–112, 113 inside, 114, and 115) increased in the 1990s and 2000s as a result of increased hatchery returns (Figure 9). From 2000 to 2016, the total harvest of summer chum salmon in the subregion's traditional mixed stock fisheries averaged 1.6 million fish (Appendix B2). Harvests in terminal hatchery areas (not including cost-recovery harvests) averaged an additional 1.3 million fish over the same period.

Unlike the Southern Southeast Subregion, which has substantial returns of fall-run hatchery chum salmon, fall-run chum salmon in the Northern Southeast Inside Subregion are primarily wild fish and we can estimate their harvest by considering fish harvested from statistical week 34 and later as fall-run fish. Wild chum salmon harvests in the fall-run period declined in the early 1990s and have remained low since (Figure 10). Annual fall-run harvests in the Northern Southeast Inside Subregion averaged 430,000 from 1960 to 1990, but only 128,000 since 1995.

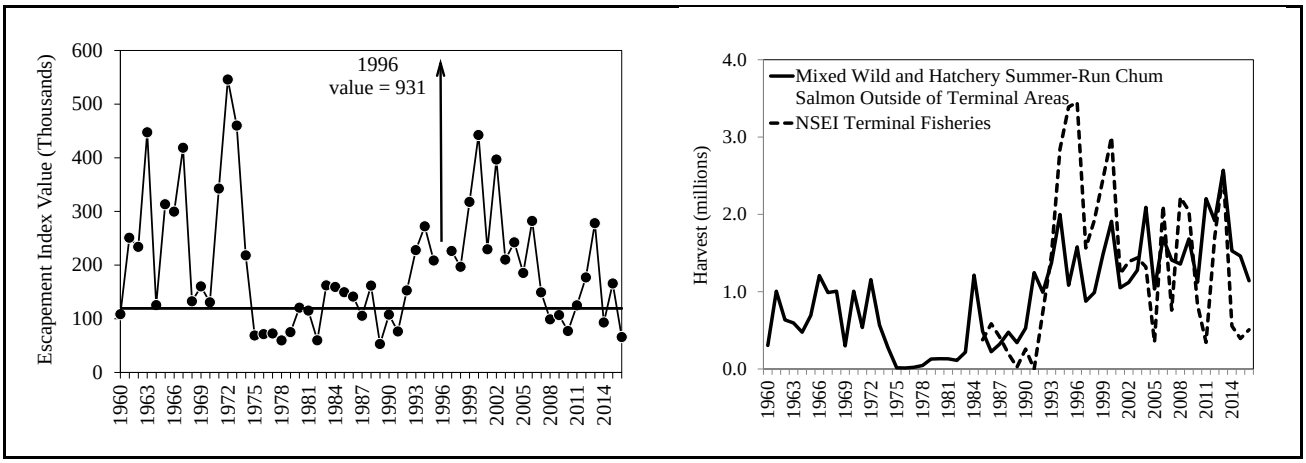

Figure 9.–Escapement index for wild summer-run chum salmon in the Northern Southeast Inside stock group (1960–2016, left) and the harvest of chum salmon in the Northern Southeast Inside Subregion of Southeast Alaska, 1960–2016 (right). The harvest of mixed wild and hatchery summer-run chum salmon outside of hatchery terminal areas includes all harvests in Districts 9–12, 14–15, and inside subdistricts of District 13 through statistical week 33 (average midweek date 12 August). The horizontal black line in the escapement figure is the current lower-bound SEG of 119,000 fish.

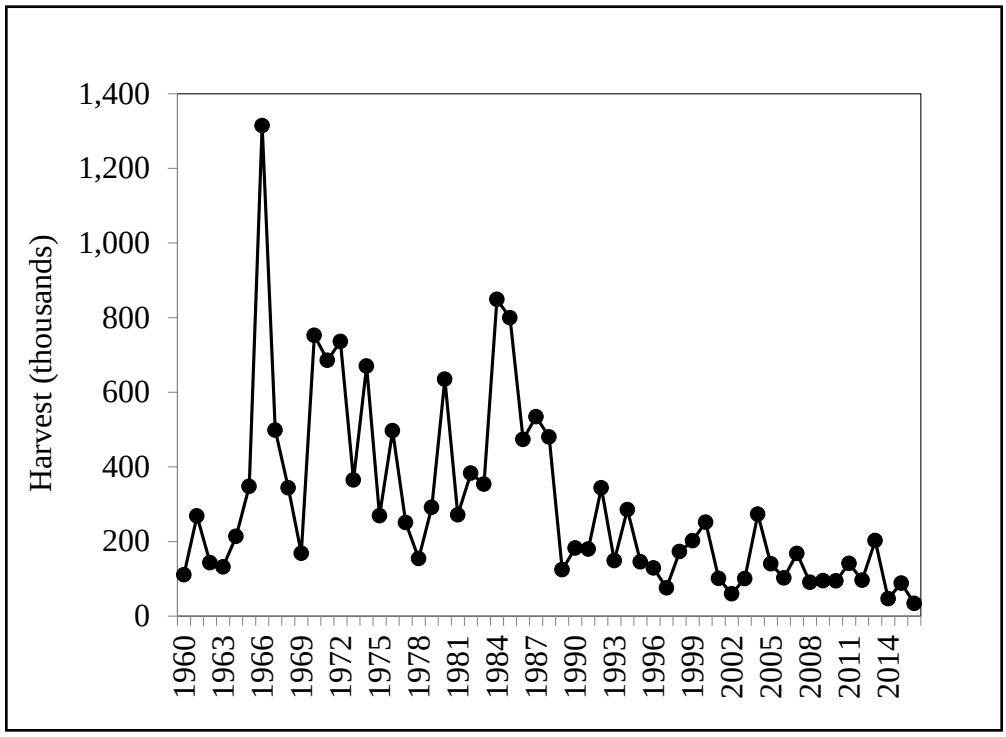

Figure 10.–Harvest of fall-run chum salmon in the Northern Southeast Inside Subregion, 1960–2016. Chum salmon harvested in statistical week 34 (average midweek date 19 August) and later are considered fall-run fish.

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 nine index streams since 1982 (Appendix A3). In 2014, ADF&G modified the lower-bound sustainable escapement goal to 25,000 chum salmon counted on peak surveys to nine index streams combined (Piston and Heinl 2014). Escapement indices were slightly below the current goal in 2009, 2011, and 2013, but have been above goal in four of the past five years (Figure 11). Total chum salmon harvests were relatively low until the onset of hatchery runs in the early 1980s and greatly increased since the 1990s due to increased hatchery production (Figure 11; Appendix B3).

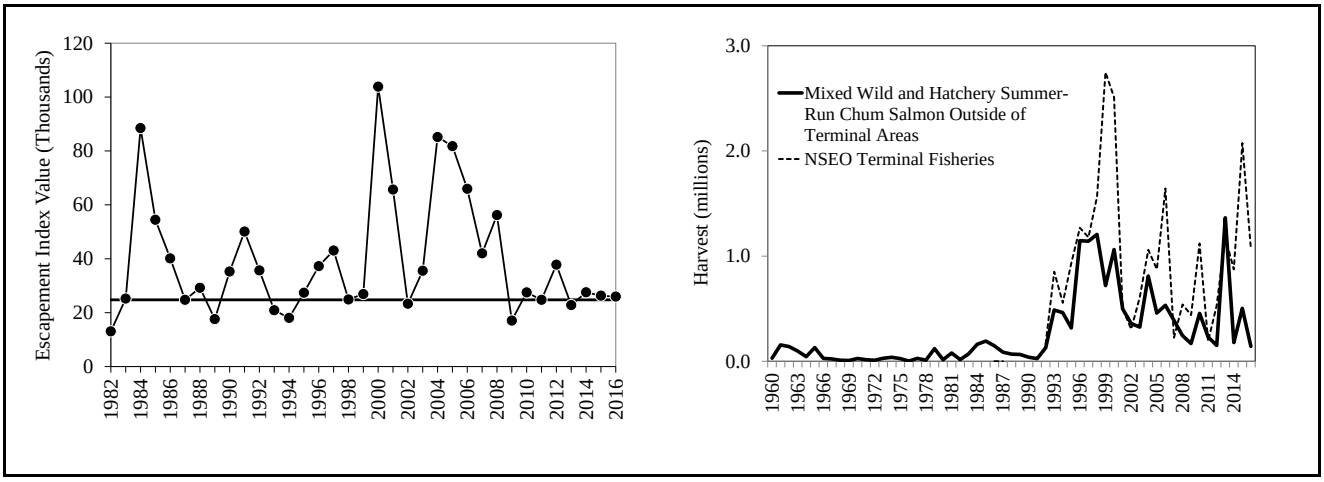

Figure 11.–Escapement index for wild summer-run chum salmon in the Northern Southeast Outside stock group, 1982–2016 (left), and harvest of chum salmon in the Northern Southeast Outside Subregion, 1960–2016 (right). The horizontal black line in the escapement figure is the current lower-bound SEG of 25,000 fish.

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 12; Piston and Brunette 2011). In 2011, the harvest of 81,000 fall chum salmon was well above the long-term average, but the 2012 harvest of 41,000 fish was below average and harvests have remained low through 2016. 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). 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. 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). 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). More recently, the department operated a weir and conducted mark-recapture studies 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).

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 or above the current escapement goal range in seven of ten years from 2007 to 2016 (Figure 12).

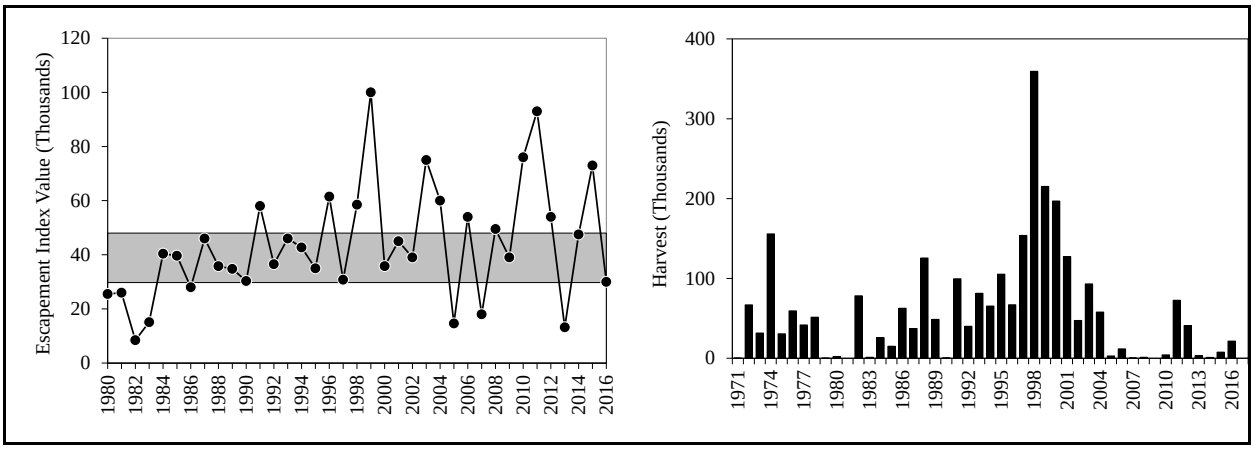

Figure 12.–Annual escapement index and sustainable escapement goal range (shaded area) of wild fall-run chum salmon in Cholmondeley Sound (1980–2016, left), and purse seine harvest of fall chum salmon in adjacent subdistrict 102-40 (1971–2016, right). All chum salmon harvested in statistical week 34 (average midweek date 19 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 13). There has been little or no fall chum salmon harvest at Port Camden since 2000. 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; 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). The escapement index was within or above the current escapement goal range annually since 2012 (Figure 13).

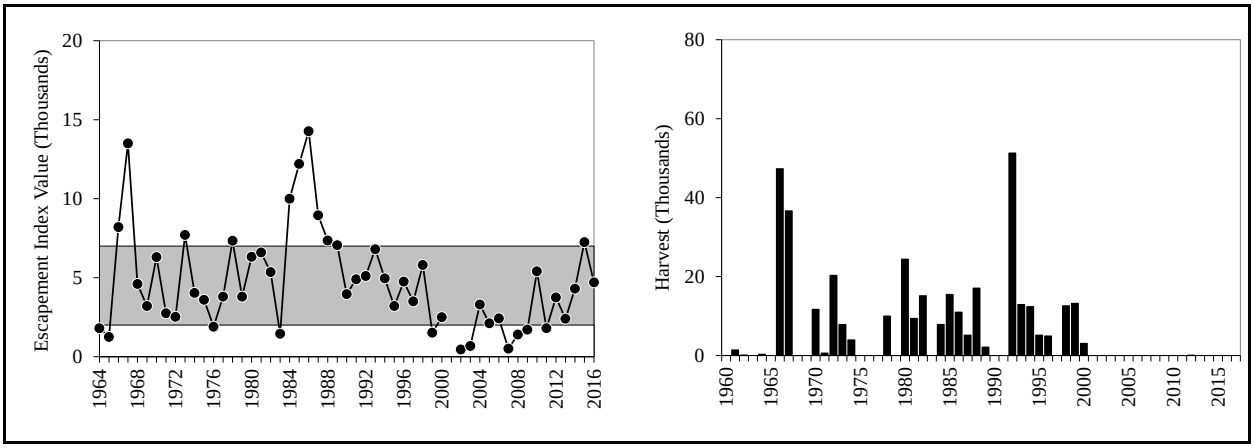

Figure 13.–Annual escapement index and sustainable escapement goal range (shaded area) of wild fall-run chum salmon in Port Camden (1964–2016, left), and purse seine harvest of fall chum salmon in adjacent subdistrict 109-43 (1960–2016, right). All chum salmon harvested in statistical week 34 (average midweek date 19 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 2,700 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 14). The chum salmon harvest at Security Bay averaged 9,400 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 14; 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). The escapement index was within or above the current escapement goal range in four of the past five years, 2012–2016 (Figure 14).

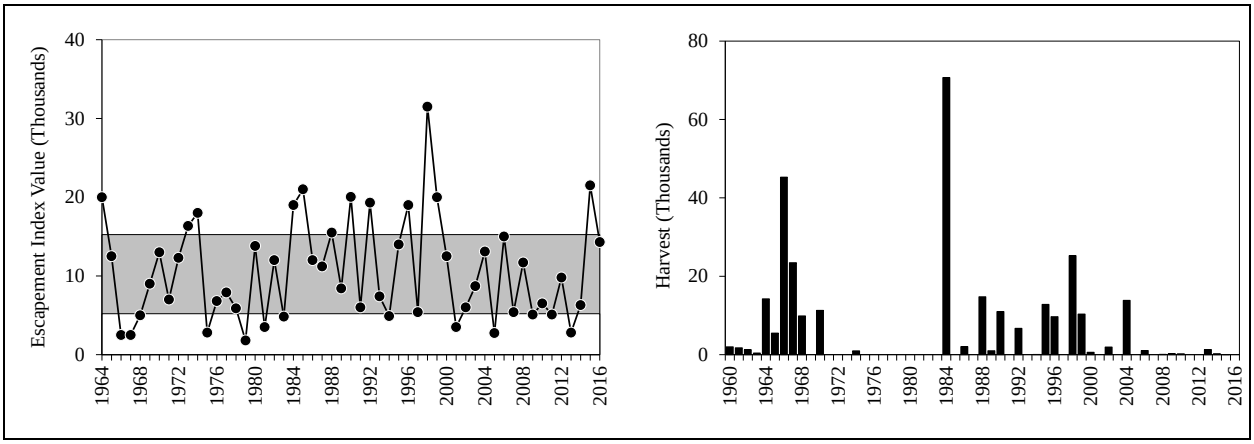

Figure 14.–Annual escapement index and sustainable escapement goal range (shaded area) of wild fall-run chum salmon in Salt Chuck Creek (1964–2016, left), and purse seine harvest of fall chum salmon in adjacent Security Bay subdistrict 109-45 (1960–2016, right). All chum salmon harvested in statistical week 34 (average midweek date 19 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 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 15; 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 26,000 fish since that time. From 2007 to 2016, the harvest averaged only 14,200 fish and no fishery was conducted in five of the ten years. Similarly, peak aerial survey estimates at the Excursion River averaged 20,000 fish from 1960 to 1981, but only 6,700 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). The escapement index was within the current escapement goal range in three of the past five years, 2012–2016 (Figure 15).

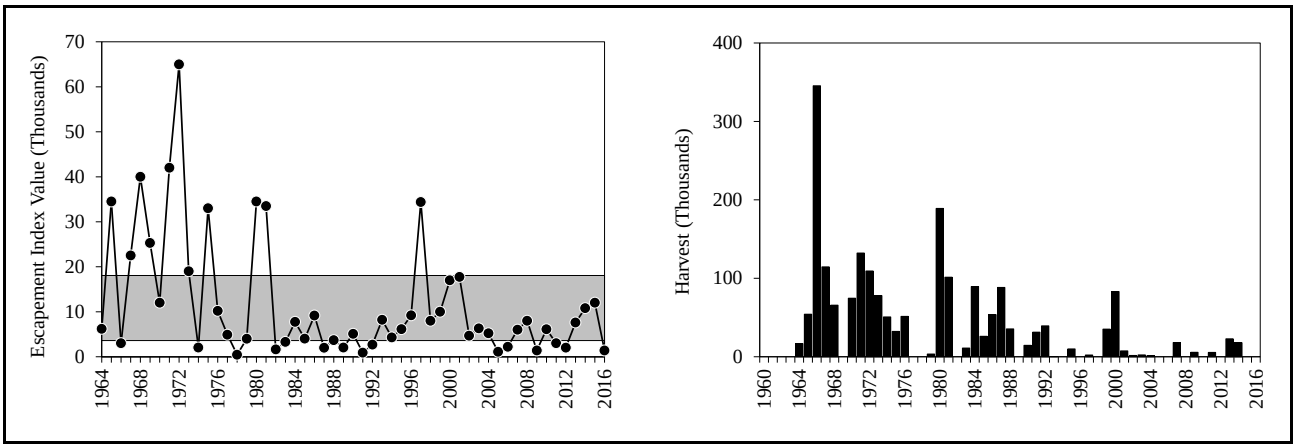

Figure 15.–Annual escapement index and sustainable escapement goal range (shaded area) of wild fall-run chum salmon in the Excursion River (1964–2016, left), and purse seine harvest of fall chum salmon in adjacent Excursion Inlet subdistrict 114-80 (1960–2016, right). All chum salmon harvested in statistical week 34 (average midweek date 19 August) and later were considered fall-run fish.

Chilkat River Fall-Run Chum Salmon

The Chilkat River drainage near Haines supports the largest fall chum salmon run in the region (Halupka et al. 2000). 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 63,000 fish per year since 1989 (Figure 16). Harvests were lower in many years in the 1990s due in part to fishery restrictions specifically implemented to protect this stock by reducing effort in the fishery (Bachman 2005). The number of boat days in the fall fishery declined from an average of 3,143 prior to 1990 to 1,749 from 1990 to 2016.

The chum salmon escapement to the Chilkat River drainage was historically monitored via aerial surveys, which also exhibited a decline in the 1990s (Figure 17; Appendix A6); however, the department considers historical aerial surveys of the drainage to be unreliable for indexing escapement due to the highly glacial nature of the system. Drainagewide escapement estimates from 1994 to 2016 are 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). Chilkat River fall chum salmon total runs averaged 291,000 fish since 1994, and the harvest rate in the Lynn Canal drift gillnet fishery averaged 24% during that time (Table 6).

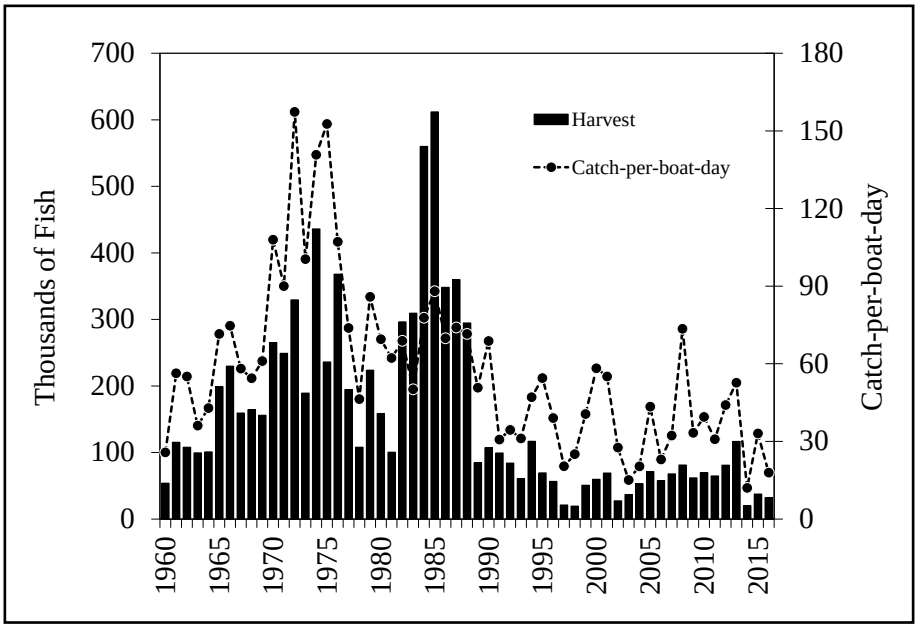

Figure 16.–Annual commercial drift gillnet harvest and catch-per-boat-day of fall chum salmon in Lynn Canal (District 15), 1960–2016. All chum salmon harvested in statistical week 34 (average midweek date 19 August) and later were considered fall-run fish.

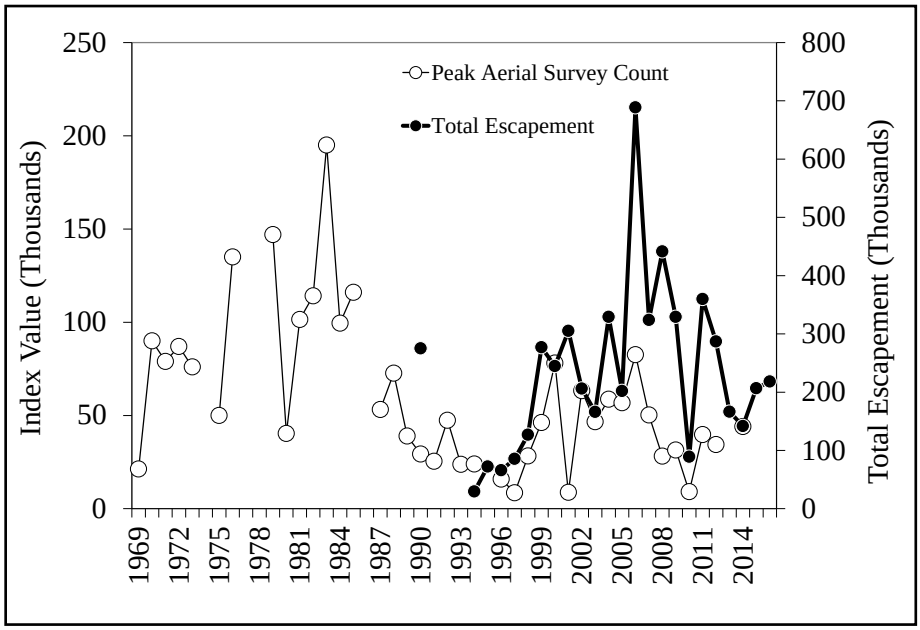

Figure 17.–Annual peak aerial survey index of spawning chum salmon in the Chilkat and Klehini rivers, 1969–2016, and estimated total escapement of chum salmon in the Chilkat River in 1990 and 1994–2016.

In 2014, ADF&G modified the sustainable escapement goal to 75,000–250,000 or, equivalently, a fish wheel index catch of 1,160–3,875 chum salmon, based on an updated stock-recruit analysis of the 1994–2008 brood years (Piston and Heinl 2014). The goal was considered a sustainable escapement goal rather than a biological escapement goal because of uncertainty in escapement estimates for this stock. Estimated escapements were within or above the current escapement goal range annually since 1997 (Figure 18).

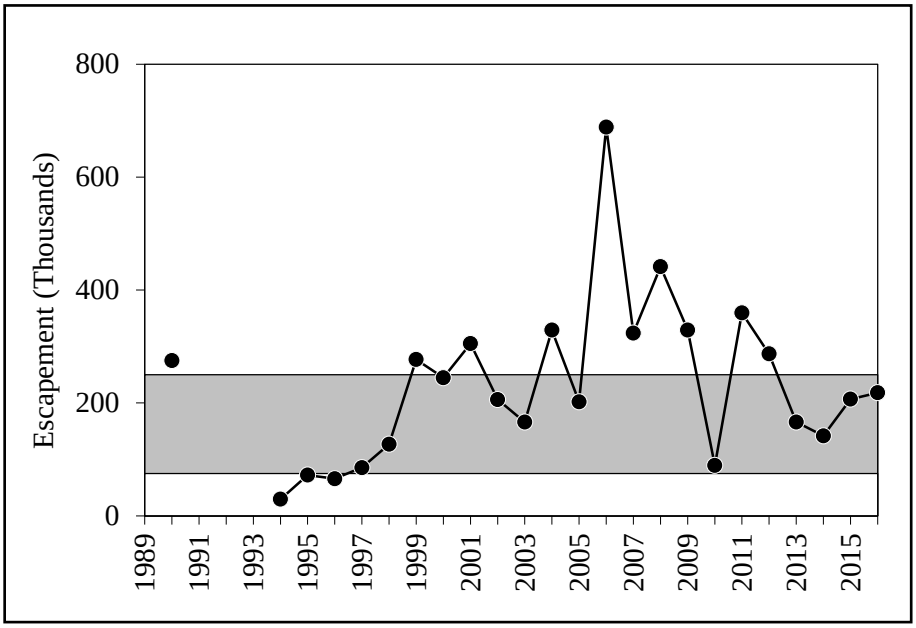

Figure 18.–Annual escapement estimates and sustainable escapement goal range (shaded area) of Chilkat River fall chum salmon, 1990 and 1994–2016.

Table 6.–Total escapement of Chilkat River fall chum salmon, based on mark-recapture studies and expanded fish wheel catches, and estimated annual commercial harvests, total runs, and harvest rates, 1990–2016.

Year	Fish Wheel Operations		Peak Aerial Survey Count[a]	Estimated Escapement[b]	Commerical Harvest[c]	Estimated Total Run	Estimated Harvest Rate[d]
	Dates	Catch					
1990	14 Aug–25 Oct	3,025	29,350	**275,000**	106,982	381,982	28%
1994	18 Jun–11 Sept	454[e]	24,000	29,593	116,599	146,192	80%
1995	18 Jun–11 Sept	1,107[e]	ND	72,158	69,201	141,359	49%
1996	18 Jun–11 Sept	1,010[e]	16,000	65,835	56,437	122,272	46%
1997	11 Jun–9 Oct	1,311	9,000	85,455	20,850	106,305	20%
1998	8 Jun–13 Oct	1,945	28,000	126,781	19,239	146,020	13%
1999	7 Jun–8 Oct	4,249	46,000	276,963	50,576	327,539	15%
2000	9 Jun–7 Oct	3,754	78,000	244,698	59,365	304,063	20%
2001	6 Jun–7 Oct	4,680	9,000	305,057	68,898	373,955	18%
2002	7 Jun–19 Oct	2,898	63,300	**206,000**	27,134	233,134	12%
2003	6 Jun–21 Oct	3,846	46,600	**166,000**	36,640	202,640	18%
2004	7 Jun–19 Oct	4,277	58,700	**329,000**	52,755	381,755	14%
2005	6 Jun–11 Oct	3,125	51,300	**202,000**	71,020	273,020	26%
2006	9 Jun–14 Oct	10,563	83,000	688,530	57,363	745,893	8%
2007	7 Jun–9 Oct	4,967	50,250	323,765	68,056	391,821	17%
2008	6 Jun–10 Oct	6,770	28,150	441,290	80,875	522,165	15%
2009	31 May–9 Oct	5,049	31,500	329,110	61,589	390,699	16%
2010	5 Jun–11 Oct	1,369	9,100	89,236	69,362	158,598	44%
2011	4 Jun–10 Oct	5,517	39,800	359,615	64,813	424,428	15%
2012	13 Jun–7 Oct	4,401	34,400	286,871	81,196	368,067	22%
2013	6 Jun–3 Oct	2,550	ND	166,217	116,379	282,596	41%
2014	6 Jun–16 Oct	2,175	44,000	141,773	19,558	161,331	12%
2015	8 Jun–6 Oct	3,171	ND	206,696	37,204	243,900	15%
2016	9 Jun–5 Oct	3,346	ND	218,103	31,657	249,760	13%
Average		3,982	38,708	234,823	61,395	296,945	25%

[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÷0.015.

[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 average run 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). 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 based on professional judgment. The goal was not formally adopted by ADF&G (Heinl et al. 2004) and was removed from bilateral technical committee management reports in 2015 (TTC 2015). Fish wheels, operated jointly by ADF&G and Department of Fisheries and Oceans Canada (DFO), provide the only index of abundance available for Taku River fall

chum salmon. The commercial harvest of fall chum salmon in the Taku Inlet drift gillnet fishery 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 2,600 fish a year over the past decade (Figure 19). Fish wheel counts also declined sharply in the early 1990s and abundance appears to have remained at low levels since that time (Figure 20).

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 DFO 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; midweek dates 26 August–2 September; TTC 2003; Figure 21). In addition, retention of fall chum salmon in Canadian inriver fisheries has not been permitted since at least 1998 (e.g., TTC 1999).

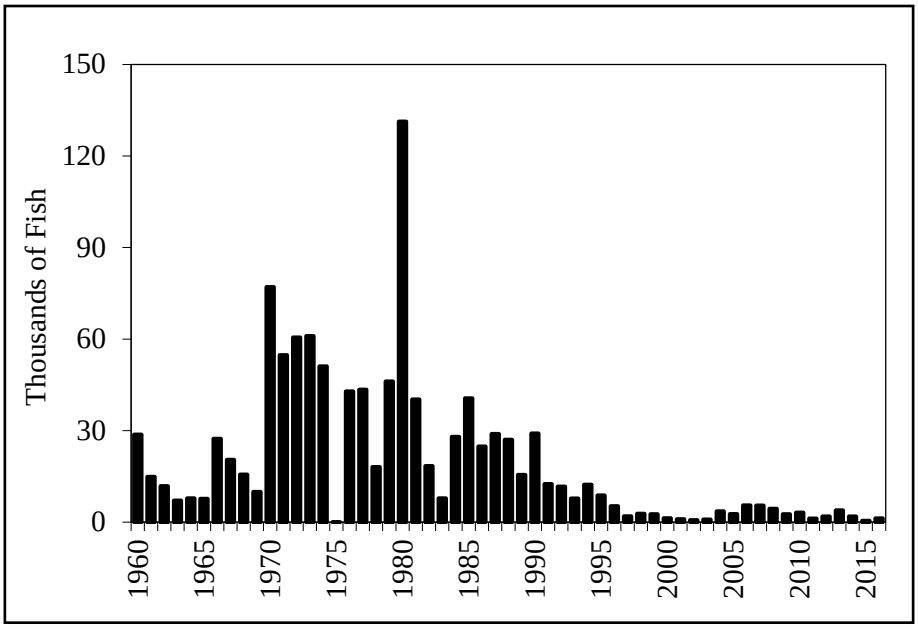

Figure 19.–Annual commercial drift gillnet harvest of wild fall-run chum salmon in Taku Inlet (subdistrict 111-32; 1960–2016). All chum salmon harvested in statistical week 34 (average midweek date 19 August) and later are considered fall-run fish.

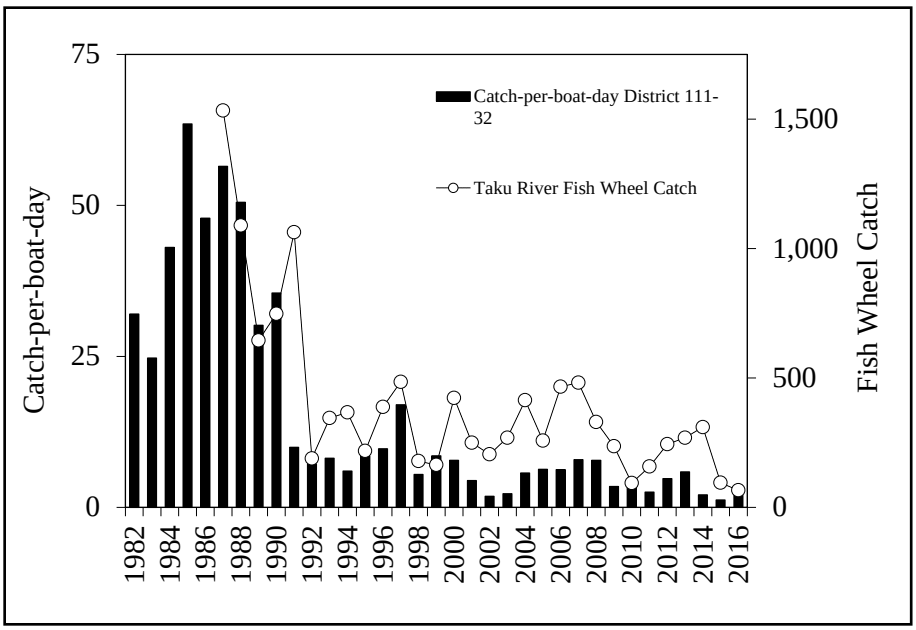

Figure 20.–Annual commercial drift gillnet catch-per-boat-day of fall-run chum salmon in Taku Inlet (subdistrict 111-32; 1982–2016) plotted with the Taku River fish wheel catch of all chum salmon (1987–2016). All chum salmon harvested in statistical week 34 (average midweek date 19 August) and later are considered fall-run fish.

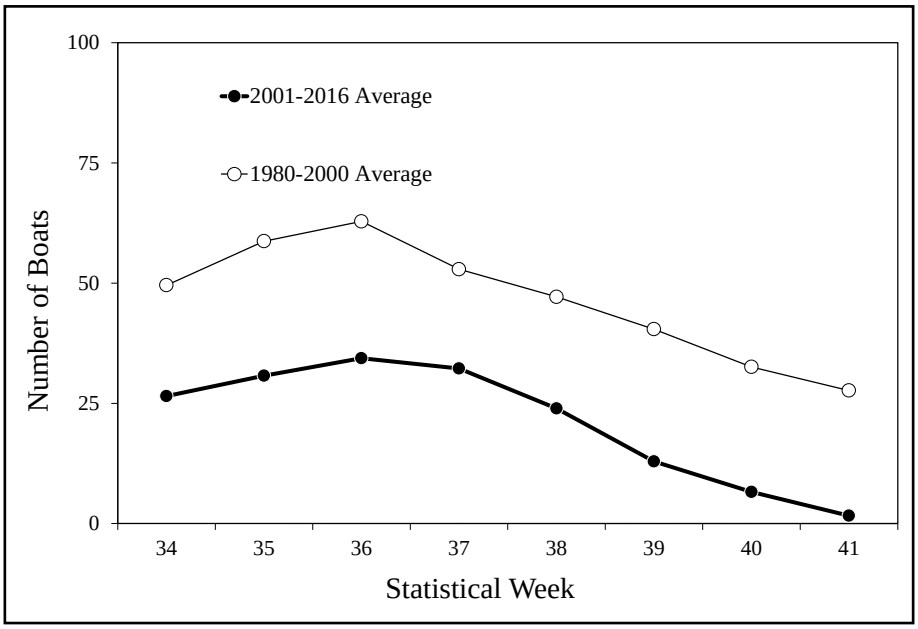

Figure 21.–Average number of boats fishing by statistical week in the Taku Inlet (subdistrict 111-32) commercial drift gillnet fishery, 1980–2016. All chum salmon harvested in statistical week 34 (average midweek date 19 August) and later are considered fall-run fish.

DISCUSSION

Escapement indices of summer-run chum salmon have generally declined since reaching high levels in the 1990s, and have fluctuated greatly over the last decade. Escapement goals were met in 4 of the past 5 years in the Southern Southeast and Northern Southeast Outside subregions, and in 3 of the past 5 years in the Northern Southeast Inside Subregion (Figures 8, 9, and 11). Escapement goals were met for the five fall-run stocks with formal escapement goals 84% of the time from 2012 to 2016. Currently, no stocks of chum salmon meet the criteria for stocks of concern as defined by the sustainable salmon fisheries policy.

Escapement information for chum salmon 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. Since 2012, the department has worked to improve escapement survey counts in southern Southeast Alaska by conducting helicopter surveys of large, primarily mainland, rivers and foot surveys of three smaller index streams. These additional helicopter and foot surveys were timed as much as possible to coincide with regularly scheduled fixed-wing aircraft surveys to allow for direct comparison between methods and to provide managers with an opportunity to obtain immediate feedback on their aerial survey estimates. Survey counts of Chinook and coho salmon in many of the same systems have been conducted exclusively from helicopters (Der Hovanisian et al. 2011; Shaul et al. 2011) because they allow for closer inspection of fish on the spawning grounds than is possible with fixed-wing aircraft, which are conducted at much higher speed and altitude. From 2012 to 2016, twelve of the fifteen chum salmon index streams in the Southern Southeast Subregion were surveyed by helicopter and/or foot in multiple years. The largest discrepancies between fixed-wing aerial, helicopter, and foot survey counts of chum salmon appear to be primarily related to the difficulties of species identification from the air. The primary benefits of these extra surveys were to allow managers more confidence in judging species composition during surveys and to ensure a reliable peak survey count was obtained for the summer-run chum salmon escapement index. Efforts will be made to continue conducting helicopter and foot surveys on as many streams as funding allows into the future, which will increase confidence that escapement indices are tracking relative chum salmon abundance over time.

The level of uncertainty already inherent in aerial survey counts is exacerbated in some streams by the presence of stray hatchery fish. From 2008 to 2011, the department conducted otolith sampling studies to document straying of hatchery chum salmon into wild-stock index streams in Southeast Alaska (Piston and Heinl 2012a, b). 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 sampled. The overall estimated proportion of hatchery fish in the entire Northern Southeast Inside Subregion escapement index was 13.5% (95% CI = 12.1–15.0%) in 2010, and 9.8% (95% CI = 8.9–10.7%) in 2011. From 2008 to 2010, the estimated overall proportion of hatchery strays in the Northern Southeast Outside Subregion index was less than 2% annually. The proportions of stray hatchery fish in sampled Southern Southeast Subregion index streams was similarly relatively low, although overall estimates were not made for that subregion (Piston and Heinl 2012a).

ADF&G continues to work with the Prince William Sound Science Center, the Sitka Sound Science Center, and private nonprofit hatchery groups on research designed to clarify the extent of hatchery

straying in the region and to assess impacts of large-scale chum salmon enhancement on wild stocks in Southeast Alaska and Prince William Sound (field work began in 2012 and is ongoing in 2017). The proportion of hatchery fish in Southeast Alaska index streams sampled from 2013 to 2015 ranged from 5.0% to 8.1% in the Southern Southeast Subregion, 1.5% to 2.1% in the Northern Southeast Outside Subregion, and 6.5% to 12.7% in the Northern Southeast Inside Subregion (Knudsen et al. 2016). The overall proportion of hatchery strays in all Southeast Alaska index streams combined was estimated to be 7.3% in 2013, 5.4% in 2014, and 9.2% in 2015. Since these studies were conducted, ADF&G approved seven new hatchery release sites for summer chum salmon, and additional new sites have been discussed at Regional Planning Team meetings. This is the largest increase in chum salmon release sites in Southeast Alaska since the late 1980s. Once all of these new release sites are up to full production, the proportion of stray hatchery chum salmon in Southeast Alaska index streams will likely increase in all three subregions and additional straying studies should be conducted at that time.

Our knowledge of the harvest of wild chum salmon, particularly summer-run fish, is still imprecise because of the high abundance of hatchery fish in mixed stock commercial fisheries. Hatchery operators are required to provide ADF&G with estimates of the total number of hatchery chum salmon harvested each year (see Stopha 2017 and previous reports in that series). A large portion of the annual common property chum salmon harvest (39% over the past decade) occurs within terminal harvest areas adjacent to hatchery release sites where stock composition is assumed to be entirely hatchery fish. However, methods used to estimate contributions to mixed stock fisheries vary among hatchery operators, from comprehensive thermal mark sampling of fisheries landings (Brunette et al. 2013) to "best estimates", which are sometimes based on consultation with ADF&G management biologists (Heinl 2005; Davidson et al. 2011). Rough harvest estimates of wild chum salmon can be produced 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, total harvest (and, therefore, total population) 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).

The chum salmon continues to be the most valuable salmon species in Southeast Alaska commercial fisheries. Prices for chum salmon products such as fresh, frozen, and smoked fillets; canned salmon; and roe and ikura have increased significantly in recent years, resulting in a corresponding increase in wholesale value (Gunner Knapp, Professor of Economics, University of Alaska, 2012, personal communication). Average exvessel prices for net-caught round chum salmon at the dock more than doubled, from $0.28/lb (1998–2007) to $0.72/lb since 2008 (Figure 22). Increases in wholesale and exvessel prices, coupled with recent increases in chum salmon abundance due to hatchery production, resulted in an increase in exvessel value paid to commercial fishermen from an average of $25 million a year from 1994 to 2005 to $57 million per year from 2006 to 2016. In years when purse seine fisheries were curtailed due to low pink salmon abundance, chum salmon fisheries in terminal hatchery areas have provided fisherman a valuable economic safety net.

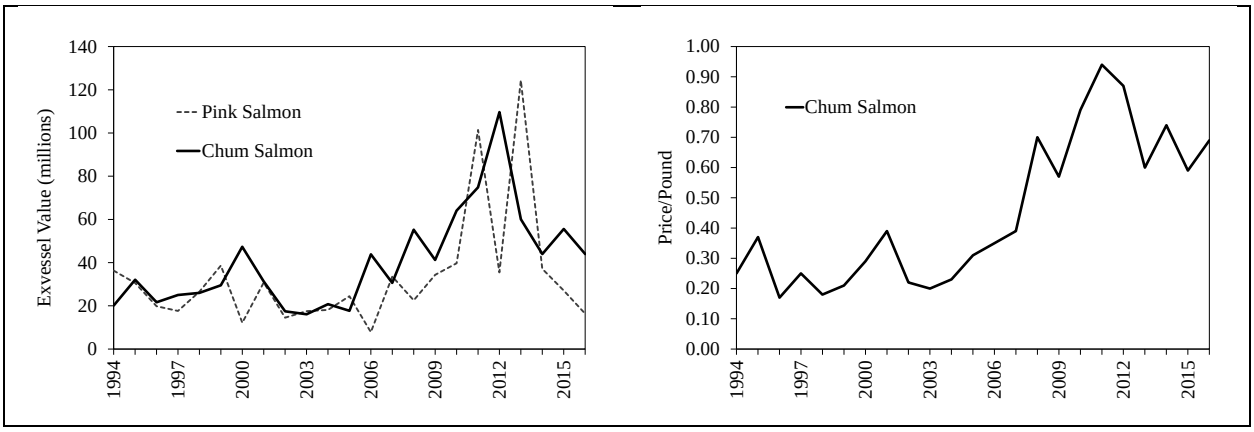

Figure 22.–Exvessel values (in dollars) of the pink and chum salmon harvest in Southeast Alaska (left), and average price per pound of chum salmon in Southeast Alaska (right), 1994–2016.

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APPENDIX A:
SOUTHEAST ALASKA CHUM SALMON ESCAPEMENT INDICES

Appendix A1.–Peak escapement index series for 15 Southern Southeast summer-run chum salmon index streams, by survey type, 1960–2016. (Note: bold values were interpolated.)

District	101	101	101	101	101	101
Management Area	Ketchikan	Ketchikan	Ketchikan	Ketchikan	Ketchikan	Ketchikan
Subregion	SSE	SSE	SSE	SSE	SSE	SSE
Survey Type	Aerial or Foot	Aerial	Foot	Aerial	Aerial	Aerial or Foot
Run Type	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
Stream Name	Hidden Inlet	Tombstone River	Fish Creek	Keta River	Marten River	Carroll Creek
1960	800	500	–	2,500	1,500	**9,452**
1961	500	700	–	500	600	**9,552**
1962	**6,551**	41,000	–	**39,784**	**10,282**	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	**1,957**	**6,114**	–	**11,882**	300	2,400
1968	14,000	4,000	–	**12,530**	**3,238**	3,000
1969	800	1,200	–	1,200	700	300
1970	200	1,200	–	15,000	10,000	500
1971	600	1,200	–	400	500	**1,156**
1972	5,200	3,000	–	10,000	2,000	**5,079**
1973	6,000	5,350	–	5,680	3,500	2,850
1974	3,100	7,000	–	8,750	500	3,000
1975	**605**	400	–	550	100	5,575
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	**5,725**	10,326
1980	2,900	4,580	9,199	10,000	9,200	8,200
1981	350	1,000	1,797	3,500	400	800
1982	550	550	5,795	3,000	300	11,000
1983	3,600	18,500	4,525	800	500	3,500
1984	800	9,250	3,549	16,500	300	11,000
1985	1,400	5,000	13,598	30,000	1,200	7,500
1986	430	10,000	9,107	46,000	1,000	600
1987	1,500	12,800	28,418	10,100	1,000	6,122
1988	1,400	20,000	23,476	47,000	17,500	44,000
1989	500	12,100	13,593	11,000	**5,129**	10,000
1990	650	4,400	3,666	30,000	**3,436**	3,942
1991	150	5,500	1,826	11,000	**4,242**	12,282

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District	101	101	101	101	101	101
Management Area	Ketchikan	Ketchikan	Ketchikan	Ketchikan	Ketchikan	Ketchikan
Subregion	SSE	SSE	SSE	SSE	SSE	SSE
Survey Type	Aerial or Foot	Aerial	Foot	Aerial	Aerial	Aerial or Foot
Run Type	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
Stream Name	Hidden Inlet	Tombstone River	Fish Creek	Keta River	Marten River	Carroll Creek
1992	500	2,600	15,236	20,000	6,000	13,000
1993	**3,287**	22,800	25,807	28,000	3,500	5,500
1994	1,500	7,500	7,251	40,100	2,500	3,200
1995	5,000	5,000	3,667	20,000	950	25,000
1996	2,700	5,200	3,243	90,000	4,000	30,000
1997	**1,585**	5,500	502	15,000	1,500	3,500
1998	4,300	8,000	17,533	43,000	10,100	10,000
1999	800	3,000	1,380	20,000	1,000	10,000
2000	600	4,000	7,648	22,000	1,000	14,000
2001	3,800	4,000	**11,775**	45,000	**7,209**	20,000
2002	700	3,000	5,392	20,000	**3,072**	2,000
2003	1,200	4,000	11,674	16,000	**3,619**	**6,737**
2004	550	15,000	23,920	8,000	**4,965**	2,500
2005	550	3,000	4,485	5,000	**3,922**	**7,302**
2006	**1,664**	4,000	9,100	20,000	5,500	2,000
2007	5,000	20,000	4,285	10,000	40,000	10,000
2008	1,500	200	418	500	1,000	**1,229**
2009	2,000	10,000	1,680	4,000	4,000	**4,207**
2010	50	8,000	2,200	12,000	1,000	3,500
2011	16,000	60,000	2,455	20,000	13,000	14,700
2012	5,000	47,000	2,830	26,000	10,000	13,000
2013	1,300	23,000	633	11,900	8,000	2,000
2014	285	10,500	2,466	4,250	500	2,560
2015	4,000	25,000	7,759	10,000	5,200	17,500
2016	2,800	23,800	6,255	6,500	2,850	15,700

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District	101	101	101	101	102	105
Management Area	Ketchikan	Ketchikan	Ketchikan	Ketchikan	Ketchikan	Petersburg
Subregion	SSE	SSE	SSE	SSE	SSE	SSE
Survey Type	Aerial	Aerial	Aerial	Aerial	Aerial or Foot	Aerial or Foot
Run Type	Summer	Summer	Summer	Summer	Summer	Summer
Stream No.	101-55-020	101-55-040	101-71-04K	101-75-015	102-60-082	105-20-012
Stream Name	Wilson River	Blossom River	King Creek	Eulachon River	Harris River	P Beauclerc S Arm E
1960	–	–	**6,098**	250	–	–
1961	–	–	5,000	3,000	–	–
1962	–	–	**12,465**	**3,463**	–	–
1963	–	–	3,200	1,400	–	–
1964	–	–	7,500	10,000	–	–
1965	–	–	250	700	–	–
1966	–	–	**2,371**	2,000	–	–
1967	–	–	**3,723**	**1,034**	–	–
1968	–	–	**3,926**	**1,091**	–	–
1969	–	–	25	410	–	–
1970	–	–	3,000	3,000	–	–
1971	–	–	2,000	650	–	–
1972	–	–	7,200	4,600	–	–
1973	–	–	2,700	1,975	–	–
1974	–	–	**4,540**	1,200	–	–
1975	–	–	600	600	–	–
1976	–	–	7,600	500	–	–
1977	–	–	3,000	3,500	–	–
1978	–	–	2,800	1,400	–	–
1979	–	–	2,450	250	–	–
1980	**7,578**	4,000	7,000	1,500	4,000	**1,053**
1981	4,000	8,000	600	350	**5,675**	200
1982	500	200	500	200	600	500
1983	300	**3,670**	**3,554**	1,200	**5,665**	**764**
1984	**8,460**	4,100	6,000	6,000	**8,715**	**1176**
1985	10,700	8,000	5,000	872	**10,626**	700
1986	10,000	**6,303**	3,300	5,000	**9,729**	400
1987	**9,112**	**6,082**	**5,890**	200	**9,386**	200
1988	28,000	5,000	10,000	1,000	11,000	2,600
1989	10,800	800	300	**1,117**	**9,600**	**1,295**
1990	10,000	1,100	800	**748**	**6,432**	300
1991	5,000	5,000	300	**924**	**7,940**	**1,071**

-continued-

District	101	101	101	101	102	105
Management Area	Ketchikan	Ketchikan	Ketchikan	Ketchikan	Ketchikan	Petersburg
Subregion	SSE	SSE	SSE	SSE	SSE	SSE
Survey Type	Aerial	Aerial	Aerial	Aerial	Aerial or Foot	Aerial or Foot
Run Type	Summer	Summer	Summer	Summer	Summer	Summer
Stream No.	101-55-020	101-55-040	101-71-04K	101-75-015	102-60-082	105-20-012
Stream Name	Wilson River	Blossom River	King Creek	Eulachon River	Harris River	P Beauclerc S Arm E
1992	10,000	4,000	9,200	**1,083**	2,500	600
1993	5,000	3,500	7,000	1,000	14,597	4,000
1994	23,000	8,000	15,000	800	1,800	1,830
1995	800	12,000	8,000	**1,043**	500	2,250
1996	**21,951**	12,000	12,000	300	25,000	5,500
1997	18,000	1,500	10,000	1,000	**7,040**	1,500
1998	10,000	10,000	35,000	1,000	17,000	1,000
1999	5,000	5,000	8,000	800	**8,714**	500
2000	16,000	2,000	11,000	200	55,000	2,200
2001	15,000	12,000	4,000	3,200	3,500	800
2002	9,000	5,000	1,500	**669**	**5,750**	1,020
2003	**6,575**	**4,388**	**4,250**	**788**	**6,773**	327
2004	**9,022**	5,000	**5,831**	**1,081**	15,000	1,000
2005	10,000	8,000	8,000	200	12,000	2,400
2006	10,000	7,000	**4,638**	400	4,300	800
2007	20,000	12,000	3,000	600	**13,452**	600
2008	800	3,000	1,000	**144**	1,000	250
2009	5	5,000	800	2,000	**4,229**	830
2010	4,000	10,000	2,600	**543**	3,500	550
2011	4,000	12,000	3,000	1,000	21,000	**2,222**
2012	10,000	15,000	5,000	500	10,000	3,000
2013	13,000	10,000	5,000	200	1,682	2,498
2014	10,000	2,500	5,000	**494**	4,240	594
2015	1,000	18,000	7,000	1,000	12,000	**1,475**
2016	5,000	9,000	5,000	4,500	5,000	1,000

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District	105	107	107	
Management Area	Petersburg	Petersburg	Petersburg	
Subregion	SSE	SSE	SSE	Southern
Survey Type	Aerial or Foot	Aerial	Aerial	Southeast
Run Type	Summer	Summer	Summer	Subregion
Stream No.	105-42-005	107-40-025	107-40-049	
Stream Name	Calder Creek	Oerns Creek	Harding River	Index Total[a] (×1,000)
1960	–	5,000	45,000	**107**
1961	–	2,000	50,000	**108**
1962	–	2,000	25,000	**219**
1963	–	4,500	20,000	**140**
1964	–	2,000	10,000	**131**
1965	–	700	17,200	**57**
1966	–	**599**	**5,680**	**42**
1967	–	1,000	15,000	**66**
1968	–	**991**	3,000	**69**
1969	–	**105**	100	**7**
1970	–	**735**	300	**51**
1971	–	**188**	2,000	**13**
1972	–	**827**	300	**58**
1973	–	**703**	3,700	**49**
1974	–	13,800	11,050	**80**
1975	–	1,400	3,600	**20**
1976	–	1,020	8,000	**52**
1977	–	3,100	5,000	**73**
1978	–	750	8,500	**69**
1979	–	4,600	45,000	**123**
1980	**1,416**	1,200	13,100	85
1981	620	**446**	34,000	62
1982	1,799	280	5,300	31
1983	499	**445**	14,100	62
1984	1,478	1,080	16,400	95
1985	410	590	20,000	116
1986	2,000	**765**	1,200	106
1987	700	1,300	9,300	102
1988	1,000	490	12,520	225
1989	200	4,000	24,000	104
1990	**1,166**	530	2,800	70
1991	**1,440**	700	29,000	86

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District	105	107	107	
Management Area	Petersburg	Petersburg	Petersburg	
Subregion	SSE	SSE	SSE	Southern
Survey Type	Aerial or Foot	Aerial	Aerial	Southeast
Run Type	Summer	Summer	Summer	Subregion
Stream No.	105-42-005	107-40-025	107-40-049	
Stream Name	Calder Creek	Oerns Creek	Harding River	Index Total[a] (×1,000)
1992	900	150	15,500	101
1993	2,000	800	32,000	159
1994	1,300	**861**	4,500	119
1995	2,430	900	10,000	98
1996	3,500	1,600	29,000	246
1997	700	**554**	**8,708**	77
1998	3,500	1,100	6,000	178
1999	2,700	2,900	25,000	95
2000	3,000	500	13,800	153
2001	500	1,000	15,000	147
2002	400	50	5,000	63
2003	850	500	6,000	74
2004	3,000	30	6,200	101
2005	3,000	1,000	11,000	80
2006	2,900	100	8,000	80
2007	900	200	6,300	146
2008	1,000	**97**	1,300	13
2009	1,623	400	**5,231**	46
2010	1,350	300	1,150	51
2011	7,218	200	2,400	179
2012	2,900	250	4,500	155
2013	1,570	1,400	3,500	86
2014	1,030	800	1,900	47
2015	1,165	400	3,800	115
2016	600	**667**	1,000	90
			Median =	85
			Minimum =	7.3
			Maximum =	246.0
			Contrast =	33.4

– Data for streams that were surveyed intermittently prior to 1980 (En Dashes) were not used for index calculations.

[a] Index total is the sum of all 15 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 2013. For an explanation of the calculation of index values from 1960 to 1979 see Piston and Heinl 2014.

Appendix A2.–Peak escapement index series for 63 Northern Southeast Inside summer-run chum salmon index streams, 1960–2016. (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

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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
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
2011	1,324	**3,534**	**676**	300	**379**	**881**	660	**373**
2012	3,627	150	900	750	550	1,400	1,550	1,200
2013	1,981	**7,647**	**1,500**	900	500	**1,965**	**1,466**	**858**
2014	650	200	**502**	1,600	**277**	**658**	**491**	600
2015	1,222	1,200	**895**	**545**	**494**	**1,172**	**875**	**519**
2016	860	**1,758**	**355**	**216**	**196**	**466**	**347**	**206**

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Appendix A2.–Page 3 of 15.

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 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.	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

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Appendix A2.–Page 4 of 15.

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 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.	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
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
2011	1,371	300	2,700	1,100	200	100	100	**641**
2012	4,253	500	3,700	1,300	900	1,900	500	700
2013	1,503	**723**	4,900	1,900	1,200	700	500	**1,417**
2014	330	**242**	1,600	300	250	800	**298**	1,400
2015	912	**432**	800	200	700	**571**	**531**	**867**
2016	1,841	**171**	1,400	200	**436**	**227**	**211**	**345**

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Appendix A2.–Page 5 of 15.

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

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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
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**
2011	**682**	1,088	400	2,000	1,900	400	1,900	900
2012	800	1,200	1,400	900	1,000	**769**	3,000	2,900
2013	7,100	**1,882**	1,900	3,400	1,700	**1,207**	3,100	600
2014	1,800	**630**	1,500	1,300	**841**	200	**1,349**	6,000
2015	4,500	3,500	900	250	**1,499**	1,500	**2,405**	**714**
2016	1,300	500	1,700	1,900	**595**	**291**	**955**	150

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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**

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Appendix A2.–Page 8 of 15.

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
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
2011	3,000	3,000	**731**	205	4,000	2,500	1,070	3,350
2012	13,800	1,800	2,600	719	1,700	**2,356**	200	5,600
2013	4,000	700	1,700	125	2,300	3,500	550	9,300
2014	3,800	550	150	1,426	**752**	100	900	10,500
2015	12,000	4,300	500	**1,541**	**1,340**	1,000	205	1,610
2016	850	1,100	100	**612**	800	1,300	450	2,500

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District	112	112	112	112	112	112	112	112
Management Area	Juneau	Juneau	Juneau	Juneau	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.	112-42-025	112-44-010	112-46-009	112-47-010	112-48-015	112-48-019	112-48-023	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

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District	112	112	112	112	112	112	112	112
Management Area	Juneau	Juneau	Juneau	Juneau	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.	112-42-025	112-44-010	112-46-009	112-47-010	112-48-015	112-48-019	112-48-023	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
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
2011	500	**2,269**	6,500	4,500	2,500	3,000	2,000	2,500
2012	1,250	1,100	9,000	5,050	6,000	1,200	3,700	3,500
2013	21,000	1,550	22,200	17,500	7,000	8,100	8,000	7,500
2014	1,500	800	4,500	7,200	560	1,190	6,200	225
2015	**4,414**	800	12,000	16,000	400	19,000	950	8,000
2016	1,000	800	5,500	4,520	1,100	900	2,800	6,150

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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 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.	112-50-020	112-50-030	112-65-024	112-72-011	112-73-024	112-80-028	112-90-014	113-53-003
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

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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 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.	112-50-020	112-50-030	112-65-024	112-72-011	112-73-024	112-80-028	112-90-014	113-53-003
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
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
2011	300	2,000	3,000	500	400	1,800	1,500	1,420
2012	400	20	2,510	6,800	3,200	9,500	1,000	3,240
2013	650	6,000	1,810	3,000	500	19,500	2,300	**5,146**
2014	**1,508**	**690**	**876**	**1,640**	**1,246**	6,500	400	2,300
2015	200	1,500	**1,562**	**2,923**	**2,221**	4,500	**2,203**	795
2016	1,530	**491**	100	**1,161**	300	3,300	**875**	1,000

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District	113	113	114	114	114	114	114	114
Management Area	Sitka	Sitka	Juneau	Juneau	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.	113-54-007	113-56-003	114-23-070	114-25-010	114-27-030	114-31-013	114-32-004	114-33-023
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

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District	113	113	114	114	114	114	114	114
Management Area	Sitka	Sitka	Juneau	Juneau	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.	113-54-007	113-56-003	114-23-070	114-25-010	114-27-030	114-31-013	114-32-004	114-33-023
Stream Name	Rodman Creek	Ushk Bay W End	Mud Bay River	Homeshore Creek	Spasski Creek	Game Creek	Seagull Creek	Neka River
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
2011	520	270	800	2,500	4,000	2,500	500	4,500
2012	3,100	2,000	1,500	500	8,400	8,000	**1,667**	12,000
2013	15,300	2,000	10,000	3,500	800	15,500	900	10,700
2014	2,200	300	**846**	**607**	900	500	**851**	1,400
2015	1,835	140	3,000	**1,082**	5,000	5,000	400	2,500
2016	900	500	200	**430**	2,200	1,050	**592**	800

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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 Inside	NSE Inside	NSE Inside	NSE Inside	NSE Inside	NSE Inside	Northern
Survey Type	Aerial	Aerial	Aerial	Aerial	Aerial	Aerial	Aerial	Southeast
Run Type	Summer	Summer	Summer	Summer	Summer	Summer	Summer	Inside Subregion
Stream No.	114-34-010	114-40-035	115-10-042	115-10-046	115-10-080	115-20-010	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

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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 Inside	NSE Inside	NSE Inside	NSE Inside	NSE Inside	NSE Inside	Northern
Survey Type	Aerial	Aerial	Aerial	Aerial	Aerial	Aerial	Aerial	Southeast
Run Type	Summer	Summer	Summer	Summer	Summer	Summer	Summer	Inside Subregion
Stream No.	114-34-010	114-40-035	115-10-042	115-10-046	115-10-080	115-20-010	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)
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
2011	1,300	2,500	120	**705**	23,000	3,300	2,000	125
2012	9,500	1,500	**730**	**1,000**	3,000	**2,056**	100	177
2013	2,400	4,600	200	**1,568**	3,000	1,000	**1,845**	278
2014	**1,887**	120	**370**	50	**1,945**	**1,048**	**617**	93
2015	6,000	**1,543**	5,400	**924**	4,000	600	**1,100**	166
2016	630	**613**	**307**	**367**	200	**730**	**437**	66
							Median =	162
							Minimum =	53
							Maximum =	931
							Contrast =	17.6

– Data for streams that were surveyed intermittently prior to 1982 (En Dashes) were not used for index calculations.

[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 nine Northern Southeast Outside summer-run chum salmon index streams, 1982–2016. (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
Survey Type	Aerial	Aerial or Foot	Aerial or Foot	Aerial or Foot	Aerial or Foot
Run Type	Summer	Summer	Summer	Summer	Summer
Stream No.	113-22-015	113-62-009	113-73-006	113-73-010	113-73-012
Stream Name	Whale Bay Great Arm Head	Kalinin Cove Head	Waterfall Cove Creek	Slocum Arm Head	Khaz Creek
1982	3,900	1,200	**384**	500	1,000
1983	2,500	**1,271**	**741**	**1,587**	**966**
1984	1,500	4,000	1,000	6,000	3,000
1985	2,000	12,000	500	5,000	6,000
1986	5,500	2,550	1,000	3,000	3,200
1987	4,000	4,000	**729**	2,000	1,300
1988	6,500	1,000	4,200	4,000	1,000
1989	1,300	60	**518**	**1,108**	500
1990	4,000	**1,777**	2,000	1,000	2,000
1991	**8,809**	6,000	**1,473**	**3,152**	1,500
1992	4,000	**1,800**	5,000	**2,247**	2,000
1993	**3,677**	**1,054**	500	**1,316**	1,500
1994	3,400	**910**	1,000	**1,136**	600
1995	7,550	685	1,000	3,000	4,000
1996	4,200	800	150	6,000	700
1997	7,000	1,604	3,000	1,000	1,500
1998	1,300	1,600	1,310	1,775	1,135
1999	5,000	250	438	1,000	500
2000	27,000	1,088	1,000	3,900	2,000
2001	18,300	1,270	1,100	4,000	1,000
2002	1,000	968	590	2,000	808
2003	12,800	1,510	4,000	1,680	3,500
2004	11,800	233	1,130	2,000	3,000
2005	23,800	1,110	740	2,360	910
2006	24,000	**3,326**	780	5,000	182
2007	8,340	1,630	520	4,865	930
2008	4,200	5,140	550	3,400	730
2009	3,000	2,000	215	275	57
2010	2,420	580	1,000	**1,733**	281
2011	8,550	1,190	210	500	230

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Appendix A3.–Page 2 of 4.

District	113	113	113	113	113
Management Area	Sitka	Sitka	Sitka	Sitka	Sitka
Subregion	NSE Outside	NSE Outside	NSE Outside	NSE Outside	NSE Outside
Survey Type	Aerial	Aerial or Foot	Aerial or Foot	Aerial or Foot	Aerial or Foot
Run Type	Summer	Summer	Summer	Summer	Summer
Stream No.	113-22-015	113-62-009	113-73-006	113-73-010	113-73-012
Stream Name	Whale Bay Great Arm Head	Kalinin Cove Head	Waterfall Cove Creek	Slocum Arm Head	Khaz Creek
2012	3,700	**1,907**	850	4,000	3,000
2013	2,230	1,000	990	1,800	900
2014	1,510	1,500	1,000	2,090	1,265
2015	6,730	1,250	**783**	1,250	1,200
2016	1,200	180	3,000	360	2,480

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Appendix A3.–Page 3 of 4.

District	113	113	113	113	
Management Area	Sitka	Sitka	Sitka	Sitka	
Subregion	NSE Outside	NSE Outside	NSE Outside	NSE Outside	Northern
Survey Type	Aerial	Aerial	Foot	Aerial	Southeast
Run Type	Summer	Summer	Summer	Summer	Outside
Stream No.	113-32-005	113-72-005	113-73-003	113-81-011	Subregion
Stream Name	W Crawfish NE Arm Hd	Sister Lake SE Head	Lake Stream Ford Arm	Black River	Index Total (×1,000)
1982	1,933	3,000	**645**	500	13
1983	1,224	**4,911**	2,000	10,000	25
1984	30,000	25,000	1,000	17,000	89
1985	2,500	11,000	450	15,000	54
1986	18,000	3,500	400	3,000	40
1987	4,100	3,000	651	5,000	25
1988	3,500	5,000	1,033	3,000	29
1989	500	4,000	1,610	8,000	18
1990	3,000	18,000	959	2,500	35
1991	**9,678**	17,000	1,456	1,000	50
1992	1,000	18,000	1,140	500	36
1993	2,000	5,000	1,559	**4,291**	21
1994	3,000	4,000	3,000	1,000	18
1995	5,000	4,450	1,416	300	27
1996	10,500	12,650	1,271	1,000	37
1997	6,000	10,000	2,955	10,000	43
1998	7,000	5,750	2,631	2,400	25
1999	7,800	1,200	1,697	9,000	27
2000	33,000	4,041	844	31,000	104
2001	9,177	1,910	5,900	23,000	66
2002	3,450	6,550	1,927	6,000	23
2003	2,300	2,000	1,770	6,000	36
2004	6,000	22,300	1,560	37,150	85
2005	32,370	11,270	540	8,700	82
2006	8,680	8,000	4,055	11,920	66
2007	12,300	6,530	1,280	5,602	42
2008	4,300	14,900	8,475	14,500	56
2009	3,500	3,000	820	4,200	17
2010	8,170	5,240	595	7,500	28
2011	4,350	3,000	1,730	5,000	25

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Appendix A3.–Page 4 of 4.

District	113	113	113	113	
Management Area	Sitka	Sitka	Sitka	Sitka	
Subregion	NSE Outside	NSE Outside	NSE Outside	NSE Outside	Northern
Survey Type	Aerial	Aerial	Foot	Aerial	Southeast
Run Type	Summer	Summer	Summer	Summer	Outside
Stream No.	113-32-005	113-72-005	113-73-003	113-81-011	Subregion
Stream Name	W Crawfish NE Arm Hd	Sister Lake SE Head	Lake Stream Ford Arm	Black River	Index Total (×1,000)
2012	2,900	5,050	7,800	8,600	38
2013	4,200	8,300	1,320	2,070	23
2014	3,065	8,125	570	8,425	28
2015	6,970	4,090	**1,286**	2,725	26
2016	500	5,570	1,010	11,650	26
				Median =	29
				Minimum =	13
				Maximum =	104
				Contrast =	8.0

Appendix A4.–Peak escapement index series for Cholmondeley Sound fall-run chum salmon index streams, 1980–2016. (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
2011	50,000	43,000	93
2012	32,000	22,000	54
2013	5,200	8,000	13
2014	29,500	18,000	48
2015	47,000	26,000	73
2016	14,000	16,000	30
		Minimum =	8
		Maximum =	100
		Contrast =	11.9

Appendix A5.–Peak escapement index series for Northern Southeast Subregion fall-run chum salmon index streams, 1964–2016. (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

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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)
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
2011	600	1,200	2	5,100	5	3,000	3
2012	1,900	1,850	4	9,800	10	2,020	2
2013	1,300	1,100	2	2,800	3	7,600	8
2014	1,600	2,700	4	6,300	6	10,800	11
2015	3,200	4,050	7	21,500	22	12,000	12
2016	3,200	1,500	5	14,300	14	1,400	1
		Minimum =	0		2		0
		Maximum =	14		32		65
		Contrast =	32		18		144

Appendix A6.–Peak aerial survey counts of Chilkat and Klehini rivers fall-run chum salmon, 1969–2016.

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**	147
1980	28,000	12,350	40
1981	82,000	19,500	102
1982	98,000	16,104	114
1983	176,000	19,000	195
1984	61,000	38,500	100
1985	91,000	25,000	116
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
2011	31,500	8,263	40
2012	15,400	19,000	34
2013	ND	ND	ND
2014	36,000	**8,016**	44
2015	ND	ND	ND
2016	ND	ND	ND
		Minimum =	9
		Maximum =	195
		Contrast =	23

APPENDIX B:
SOUTHEAST ALASKA CHUM SALMON HARVEST

Appendix B1.–Harvest of chum salmon in the Southern Southeast Subregion, 1960–2016.

Year	Common Property Traditional Fisheries[a]	Common Property Terminal Hatchery[b]	Other Fisheries[c]	Hatchery Cost Recovery	Total Harvest
1960	487,048	0	0	0	487,048
1961	1,005,349	0	0	0	1,005,349
1962	918,768	0	0	0	918,768
1963	634,211	0	0	0	634,211
1964	1,192,522	0	0	0	1,192,522
1965	289,062	0	0	0	289,062
1966	671,682	0	0	0	671,682
1967	289,819	0	0	0	289,819
1968	1,261,197	0	0	0	1,261,197
1969	69,259	0	0	0	69,259
1970	635,258	0	0	0	635,258
1971	703,419	0	0	0	703,419
1972	1,029,904	0	0	0	1,029,904
1973	791,673	0	0	0	791,673
1974	684,874	0	0	0	684,874
1975	373,659	0	0	0	373,659
1976	509,270	0	0	0	509,270
1977	425,413	0	0	0	425,413
1978	648,609	0	0	0	648,609
1979	329,390	0	0	0	329,390
1980	832,585	0	639	0	833,224
1981	342,486	0	106	0	342,592
1982	811,452	260	13	778	812,503
1983	493,908	0	152	18,148	512,208
1984	1,368,893	296	783	453,054	1,823,026

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Appendix B1.–Page 2 of 3.

Year	Common Property Traditional Fisheries[a]	Common Property Terminal Hatchery[b]	Other Fisheries[c]	Hatchery Cost Recovery	Total Harvest
1985	1,168,982	91,417	1,203	132,986	1,394,588
1986	1,637,621	107,513	888	99,213	1,845,235
1987	595,991	149,412	4,034	434,249	1,183,686
1988	1,484,147	270,007	4,435	318,452	2,077,041
1989	1,126,717	73,032	1,257	55,004	1,256,010
1990	789,414	18,493	1,518	89,410	898,835
1991	1,412,948	69,987	5,938	59,676	1,548,549
1992	1,780,482	66,295	996	328,190	2,175,963
1993	2,195,195	52,793	482	689,118	2,937,588
1994	2,284,362	216,040	432	940,366	3,441,200
1995	3,107,883	486,067	896	987,961	4,582,807
1996	3,369,998	502,882	43	1,738,660	5,611,583
1997	2,574,650	610,693	1,598	2,160,667	5,347,608
1998	4,263,534	1,534,267	1,870	2,375,770	8,175,441
1999	3,546,467	126,544	5,149	1,883,802	5,561,962
2000	2,516,475	238,770	12,079	1,634,288	4,401,612
2001	2,792,617	362,733	3,540	878,992	4,037,882
2002	1,350,545	141,214	2,909	663,294	2,157,962
2003	2,073,379	376,802	1,344	1,047,613	3,499,138
2004	2,010,985	218,140	515	763,335	2,992,975
2005	1,397,882	309,847	42	691,178	2,398,949
2006	1,961,534	1,011,078	19	1,042,569	4,015,200
2007	2,428,119	527,929	235	923,212	3,879,495
2008	1,255,726	318,692	19	659,745	2,234,182
2009	1,891,782	404,707	288	761,810	3,058,587

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Appendix B1.–Page 3 of 3.

Year	Common Property Traditional Fisheries[a]	Common Property Terminal Hatchery[b]	Other Fisheries[c]	Hatchery Cost Recovery	Total Harvest
2010	1,932,098	580,787	569	1,224,351	3,737,805
2011	2,680,668	694,225	978	1,484,606	4,860,477
2012	3,410,258	1,459,036	5,903	1,152,363	6,027,560
2013	1,876,328	373,788	2,767	454,101	2,706,984
2014	1,483,185	406,393	187	554,426	2,444,191
2015	3,189,966	1,569,854	128	582,288	5,342,236
2016	2,732,508	718,826	20,940	599,588	4,071,862

[a] Includes harvest in traditional fisheries in Districts 1–8, and Annette Island fisheries.

[b] Includes common property harvests in terminal hatchery areas.

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

Appendix B2.–Harvest of chum salmon in the Northern Southeast Inside Subregion, 1960–2016.

Year	Common Property Fisheries				Other Fisheries[c]	Hatchery Cost Recovery	Total Harvest
	Traditional Summer-Run[a]	Traditional Fall-Run[b]	Traditional Fisheries Total	Terminal Hatchery			
1960	304,318	110,556	414,874	0	0	0	414,874
1961	1,005,871	268,269	1,274,140	0	0	0	1,274,140
1962	634,442	143,129	777,571	0	0	0	777,571
1963	595,968	131,840	727,808	0	0	0	727,808
1964	475,894	213,560	689,454	0	0	0	689,454
1965	692,967	347,671	1,040,638	0	0	0	1,040,638
1966	1,209,087	1,314,644	2,523,731	0	0	0	2,523,731
1967	988,551	498,316	1,486,867	0	0	0	1,486,867
1968	1,006,675	343,713	1,350,388	0	0	0	1,350,388
1969	298,982	168,339	467,321	0	0	0	467,321
1970	1,006,498	752,240	1,758,738	0	0	0	1,758,738
1971	536,033	685,554	1,221,587	0	0	0	1,221,587
1972	1,156,386	736,074	1,892,460	0	0	0	1,892,460
1973	567,938	364,975	932,913	0	0	0	932,913
1974	273,636	669,892	943,528	0	0	0	943,528
1975	15,293	268,801	284,094	0	0	0	284,094
1976	13,449	496,648	510,097	0	0	0	510,097
1977	22,365	250,487	272,852	0	0	0	272,852
1978	45,129	154,339	199,468	0	0	0	199,468
1979	129,070	291,502	420,572	0	0	0	420,572
1980	133,626	634,974	768,600	0	1,699	752	771,051
1981	131,527	271,472	402,999	0	253	0	403,252
1982	111,147	383,109	494,256	0	332	0	494,588
1983	217,911	353,865	571,776	0	157	31	571,964
1984	1,213,916	848,912	2,062,828	0	870	23	2,063,721
1985	489,594	799,508	1,289,102	376,808	5,002	9	1,670,921

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Year	Common Property Fisheries				Other Fisheries[c]	Hatchery Cost Recovery	Total Harvest
	Traditional Summer-Run[a]	Traditional Fall-Run[b]	Traditional Fisheries Total	Terminal Hatchery			
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	0	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
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	1,123,791	94,477	1,216,268	828,143	38,911	1,894,126	3,977,448

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Year	Common Property Fisheries				Other Fisheries[c]	Hatchery Cost Recovery	Total Harvest
	Traditional Summer-Run[a]	Traditional Fall-Run[b]	Traditional Fisheries Total	Terminal Hatchery			
2011	2,202,343	141,257	2,343,600	343,972	154,777	2,528,151	5,370,500
2012	1,917,928	96,364	2,014,292	1,705,657	40,254	1,853,327	5,613,530
2013	2,570,145	202,339	2,772,484	2,556,816	327,827	1,575,641	7,232,768
2014	1,528,056	46,853	1,574,909	556,964	28,403	898,373	3,058,649
2015	1,460,970	88,217	1,549,187	393,037	38,184	1,615,741	3,596,149
2016	1,140,977	34,191	1,175,168	508,082	22,709	1,596,793	3,302,752

[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.–Harvest of chum salmon in the Northern Southeast Outside Subregion, 1960–2016.

Year	Common Property Traditional Fisheries[a]	Common Property Terminal Hatchery[b]	Other Fisheries[c]	Private Hatchery Cost Recovery[d]	Total Chum Salmon Harvest
1960	30,211	0	0	0	30,211
1961	155,730	0	0	0	155,730
1962	139,943	0	0	0	139,943
1963	97,622	0	0	0	97,622
1964	44,201	0	0	0	44,201
1965	131,253	0	0	0	131,253
1966	27,596	0	0	0	27,596
1967	22,718	0	0	0	22,718
1968	10,052	0	0	0	10,052
1969	8,567	0	0	0	8,567
1970	26,687	0	0	0	26,687
1971	15,002	0	0	0	15,002
1972	9,811	0	0	0	9,811
1973	29,466	0	0	0	29,466
1974	37,985	0	0	0	37,985
1975	25,742	0	0	0	25,742
1976	3,178	0	0	0	3,178
1977	27,608	0	0	0	27,608
1978	11,370	0	0	0	11,370
1979	121,016	0	0	0	121,016
1980	15,663	0	65	0	15,728
1981	79,148	0	0	1	79,149
1982	16,447	0	0	0	16,447
1983	71,921	0	0	90	72,011
1984	161,908	0	0	127	162,035
1985	192,853	0	21	56	192,930

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Year	Common Property Traditional Fisheries[a]	Common Property Terminal Hatchery[b]	Other Fisheries[c]	Private Hatchery Cost Recovery[d]	Total Chum Salmon Harvest
1986	147,357	849	0	62,579	210,785
1987	87,633	715	1,003	127,395	216,746
1988	69,052	0	22	33,378	102,452
1989	65,642	0	1	85,058	150,701
1990	39,002	0	0	81,462	120,464
1991	25,427	0	0	41,132	66,559
1992	128,733	168,270	0	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
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	455,620	1,120,242	118	180,558	1,756,538

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Year	Common Property Traditional Fisheries[a]	Common Property Terminal Hatchery[b]	Other Fisheries[c]	Private Hatchery Cost Recovery[d]	Total Chum Salmon Harvest
2011	230,500	191,124	53	74,427	496,104
2012	150,326	530,065	38	50,036	730,465
2013	1,364,559	1,181,141	13,941	70,198	2,629,839
2014	179,115	874,285	139	122,831	1,176,370
2015	503,574	2,075,662	425	108,925	2,688,586
2016	142,435	1,064,618	227	535,088	1,742,368

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

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

Appendix B4.–Total harvest of chum salmon in Southeast Alaska, 1960–2016.

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

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Year	Southern Southeast	Northern Southeast Inside	Northern Southeast Outside	Grand Total
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
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	3,738,660	3,977,448	1,756,538	9,472,646
2011	4,860,477	5,370,500	496,116	10,727,081
2012	6,027,560	5,613,530	730,465	12,371,555
2013	2,706,984	7,232,768	2,629,839	12,569,591

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Year	Southern Southeast	Northern Southeast Inside	Northern Southeast Outside	Grand Total
2014	2,444,191	3,058,649	1,176,370	6,679,210
2015	5,342,236	3,596,149	2,688,586	11,626,971
2016	4,071,862	3,302,752	1,742,368	9,116,982

Appendix B5.–Terminal harvest of fall-run chum salmon in Southeast Alaska, 1960–2016 ("–" indicates there were no fall openings).

Year	Cholmondeley Sound	Port Camden	Security Bay	Excursion River	Chilkat River
1960	17,208	22	1,993	0	53,655
1961	0	1,435	1,745	0	115,129
1962	0	127	1,272	0	107,788
1963	32,847	0	409	0	99,232
1964	43,372	316	14,239	16,767	100,708
1965	2,688	0	5,501	54,308	198,647
1966	40,763	47,324	45,293	345,427	229,557
1967	93,223	36,668	23,466	114,606	159,053
1968	61,902	28	9,891	65,780	164,239
1969	9,537	–	0	0	155,816
1970	19,362	11,711	11,308	74,585	265,110
1971	88	646	0	132,249	248,811
1972	66,855	20,304	0	109,257	329,216
1973	31,684	7,850	–	78,031	188,968
1974	155,857	3,959	979	50,749	435,915
1975	30,635	–	–	32,320	235,729
1976	59,363	–	–	51,510	367,779
1977	41,677	–	–	–	194,376
1978	51,410	10,005	–	–	107,611
1979	194	0	0	3,453	223,613
1980	1,983	24,413	0	189,084	158,477
1981	–	9,418	–	101,351	100,186
1982	78,300	15,171	–	–	296,127
1983	1,203	0	–	11,063	309,291
1984	25,811	7,890	70,692	89,431	559,916
1985	15,071	15,506	–	26,106	611,698
1986	62,654	10,994	2,065	53,689	348,080
1987	37,213	5,183	–	88,376	359,686

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Year	Cholmondeley Sound	Port Camden	Security Bay	Excursion River	Chilkat River
1988	125,514	17,078	14,769	35,493	294,509
1989	48,739	2,158	995	–	84,308
1990	481	0	10,984	14,538	106,982
1991	99,543	0	–	31,374	99,041
1992	40,136	51,311	6,729	39,383	83,854
1993	81,414	12,932	0	324	60,392
1994	65,414	12,402	56	–	116,599
1995	105,342	5,185	12,819	9,940	69,201
1996	66,991	4,966	9,689	0	56,437
1997	153,833	0	0	2,145	20,850
1998	359,443	12,636	25,267	0	19,239
1999	215,214	13,236	10,368	35,237	50,576
2000	197,016	3,087	621	83,057	59,365
2001	127,258	0	0	7,493	68,898
2002	47,309	–	1,952	1,714	27,134
2003	93,200	–	0	2,360	36,640
2004	57,923	0	13,849	1,413	52,755
2005	2,850	–	0	–	71,020
2006	11,800	–	1,065	0	57,363
2007	389	–	0	18,149	68,056
2008	1,256	–	86	–	80,875
2009	0	–	285	5,697	61,589
2010	4,235	–	226	–	69,362
2011	72,689	–	0	5,479	64,514
2012	40,998	108	0	–	80,606
2013	3,173	–	1,300	22,840	116,356
2014	1,101	0	254	17,856	19,558
2015	7,633	0	20	0	37,204
2016	21,476	–	0	–	31,657