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Review of Salmon Escapement Goals in the Alaska Peninsula and Aleutian Islands Management Areas, 2012

by

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and

Jack W. Erickson

January 2013

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

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Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	
trademark	
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

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, ^{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)	
probability of a type II error (acceptance of the null hypothesis when false)	
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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REVIEW OF SALMON ESCAPEMENT GOALS IN THE ALASKA PENINSULA AND ALEUTIAN ISLANDS MANAGEMENT AREAS, 2012

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ABSTRACT

In February 2012, an interdivisional team, including staff from the Division of Commercial Fisheries and the Division of Sport Fish, was formed to review Pacific salmon *Oncorhynchus sp*. escapement goals in the Alaska Peninsula and Aleutian Islands Management areas (Area M). This review was based on the *Policy for the management of sustainable salmon fisheries* (5 AAC 39.222) and the *Policy for statewide salmon escapement goals* (5 AAC 39.223). Of the 28 existing Area M salmon escapement goals evaluated, the team recommended eliminating 4 goals, and leaving the other 24 goals unchanged.

After a comprehensive review of the available data, the team recommended that no changes in the current sustainable escapement goals (SEGs) were warranted for 13 sockeye salmon *O. nerka* systems that include runs to Orzinski, Bear (early and late run), McLees, and Thin Point lakes; Mortensens, Christianson, and Swanson lagoons; North Creek; and Meshik, Sandy, Ilnik, and Cinder rivers. No change was recommended for the sockeye salmon biological escapement goal (BEG) at Nelson River. In addition, the team recommended no changes to the current SEGs for five chum salmon *O. keta* aggregates in the North and South Alaska Peninsula; two pink salmon *O. gorbuscha* aggregates in the South Peninsula , and two coho salmon *O. kisutch* goals at Nelson and Ilnik rivers. One Chinook salmon *O. tshawytscha* BEG (Nelson River) also did not warrant change.

The team recommended eliminating the Thin point Lake coho salmon SEG of 3,000 fish; the Bechevin Bay pink salmon SEG of 31,000 fish (even year goal) and 1,600 fish (odd year goal); and the Unimak District chum salmon SEG of 800 fish.

Key words: Pacific salmon, *Oncorhynchus*, escapement goal, Area M, Alaska Peninsula, stock status.

INTRODUCTION

This report documents the 2012 review of salmon escapement goals in the Alaska Peninsula and Aleutian Islands Management areas (Area M) based on the Alaska Board of Fisheries (board) *Policy for the management of sustainable salmon fisheries* (SSFP; 5 AAC 39.222) and the *Policy for statewide salmon escapement goals* (EGP; 5 AAC 39.223). Recommendations from this review are made to the directors of the divisions of Commercial and Sport Fisheries of the Alaska Department of Fish and Game (department), and are intended to take effect for salmon stocks returning in 2013. Salmon escapement goals in Area M were last reviewed in 2010 (Witteveen et al. 2009).

Two important terms defined in the SSFP are:

- "*biological escapement goal* (BEG): the escapement that provides the greatest potential for maximum sustained yield (MSY); …" and
- "*sustainable escapement goal* (SEG): 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…".

A report documenting the established escapement goals for stocks of 5 Pacific salmon species (Chinook *O. tshawytscha*, sockeye *O. nerka*, coho *O. kisutch*, pink *O. gorbuscha*, and chum *O. keta* salmon) spawning in the Kodiak, Chignik, Alaska Peninsula and Aleutian Islands Management areas of Alaska was prepared in 2001 (Nelson and Lloyd 2001). Most of the escapement goals documented in the 2001 report were based on average escapement estimates and spawning habitat availability, and had been implemented in the early 1970s and 1980s.

Since 2001, escapement goals for Area M have gone through board review 3 times (2004, 2007, and 2010; Nelson et al. 2006; Honnold et al. 2007, Witteveen et al. 2009).

In February 2012, the Salmon Escapement Goal Interdivisional Review Team (hereafter referred to as the team) was formed to review the existing Area M salmon escapement goals and recent escapements for stocks with escapement goals. The team included staff from the Division of Commercial Fisheries (CF) and the Division of Sport Fish (SF): Steve Honnold (CF), Matthew Nemeth (CF), Nicholas Sagalkin (CF), Heather Finkle (CF), Birch Foster (CF), Michelle Moore (CF), Jack Erickson (SF) Jeff Wadle (CF), Bob Murphy (CF), Aaron Poetter (CF), David Barnard (CF), James Hasbrouck (SF), and Donn Tracy (SF).

For this review the team 1) determined the appropriate goal type (BEG or SEG) for each Area M salmon stock with an existing goal, based on the quality and quantity of available data; 2) determined the most appropriate methods to evaluate the escapement goal ranges; 3) estimated the escapement goal for each stock and compared these estimates with the current goal; 4) determined if a goal could be developed for any stocks or stock-aggregates that currently have no goal; 5) developed recommendations for each goal evaluated to present to the directors of the divisions of Commercial Fisheries and Sport Fish for approval; and 6) reviewed recent escapements to all stocks with escapement goals.

STUDY AREA

Area M comprises two separate management areas: 1) the Alaska Peninsula Management Area and 2) the Aleutian Islands Management Area (Figure 1).

Alaska Peninsula Management Area includes all waters of Alaska from Cape Menshikof to Cape Sarichef and from a line extending from Scotch Cap through the easternmost tip of Ugamak Island, to a line extending 135° southeast from Kupreanof Point (55°33.98’ N lat, 159°35.88’ W long; 5 AAC 09.100). The area is divided into 6 commercial fishing districts: the Southeastern (comprising the Southeastern District Mainland and the Shumagin Islands), South Central, Southwestern, Unimak, Northwestern, and Northern districts (5 AAC 09.200). Commonly, aggregates of these districts are referred to as the South Peninsula and North Peninsula (Figure 2). These districts are further subdivided into sections and smaller statistical areas.

The Aleutian Islands Management Area includes the waters of Alaska surrounding the Aleutian Islands west of Cape Sarichef and west of a line extending from Scotch Cap through the easternmost tip of Ugamak Island, including waters surrounding the Pribilof Islands (5 AAC 12.100), except the Atka-Amlia Islands Area described in 5 AAC 11.101 (Figure 1). The Aleutian Islands area is separated into 4 commercial fishing districts: the Akutan, Unalaska, Umnak, and Adak districts. There is little commercial salmon fishing in the area and very few of the 458 known salmon streams are consistently monitored for escapement (Holmes 1997).

BACKGROUND

Nelson River on the North Peninsula is the only Chinook salmon system in Area M with an escapement goal (Witteveen et al. 2009; Table 1; Figure 3). Chinook salmon escapement at this system is primarily monitored by weir counts. There are no spawning stocks of Chinook salmon documented along the South Peninsula or Aleutian Islands.

A total of 14 sockeye salmon stocks (13 systems) in Area M have escapement goals in place (Witteveen et al. 2009). Three of these stocks are located along the South Peninsula, 10 are located along the North Peninsula, and one is located on Unalaska Island (Table 1; Figure 2 and Figure 3). All of these stocks directly affect the daily management of associated fisheries and 6

of these systems currently have weirs for direct enumeration of escapement. Escapements of the remaining stocks are monitored via aerial surveys.

Coho salmon are not monitored in many Area M streams due to the difficulty and expense of conducting surveys during late fall. However, there are escapement goals in place for 3 coho stocks (Honnold et al. 2007), 2 on the North and one on the South Peninsula (Table 1; Figure 3). There are no coho salmon escapement goals for the Aleutian Islands where, similar to Area M, conducting aerial surveys has proven to be difficult and expensive.

Pink salmon are generally a high-volume commercial species in Area M and are managed as aggregates of streams by district or section. There are odd- and even-year goals for each aggregate. A total of 4 stock-aggregate pink salmon escapement goals have been established in Area M (Table 1; Figure 3). These stock-aggregate goals comprise the respective sums of aerial survey escapement objectives for 165 individual index streams (Honnold et al. 2007; Nelson and Lloyd 2001). All but 5 of the index streams are located along the South Peninsula.

A total of 6 stock-aggregate escapement goals have been established for chum salmon in Area M (Table 1; Figure 3). These stock-aggregate goals comprise the respective sums of aerial survey escapement objectives for 136 individual index streams (Honnold et al. 2007; Nelson and Lloyd 2001). Sixty-seven of these index streams are located along the South Peninsula and 69 are found along the North Peninsula. There are no chum salmon escapement goals for the Aleutian Islands, where conducting aerial surveys to monitor escapement are problematic and costly.

METHODS

During the review process, escapement goals were evaluated for one Chinook, 14 sockeye, and 3 coho salmon stocks (Table 1). In addition, 4 pink and 6 chum salmon stock-aggregate goal ranges were reviewed (Table 1). We conducted our review similarly to the 2009 review (Witteveen et al. 2009), primarily examining recent (2009–2011) data and updating previous analyses. We did not review or analyze data for most stocks in which goals were eliminated in 2009. A formal meeting, via teleconference, to discuss and develop recommendations was held on February 29, 2012. The team also communicated on a regular basis by telephone and email.

Available escapement, harvest, and age data associated with each stock or combination of stocks to be examined were compiled from research reports, management reports, and unpublished historical databases. Limnological and spawning habitat data were compiled for each system when available. The team evaluated the type, quality, and amount of data for each stock according to criteria described in Bue and Hasbrouck[1] (Table 2). This evaluation was used to assist in determining the appropriate type of escapement goal to apply to each stock, as defined in the SSFP and EGP.

BIOLOGICAL ESCAPEMENT GOAL DETERMINATION

There were no Area M spawning stocks with BEGs that the team determined needed to be reevaluated.

[1] 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*.

SUSTAINABLE ESCAPEMENT GOAL DETERMINATION

Sustainable escapement goals (SEGs) for Area M salmon stocks were developed using several methods, depending on the system, species, and type of data available. For this review, most SEGs were determined using the percentile method (Bue and Hasbrouck *Unpublished*), risk analysis (Bernard et al. 2009), or spawner-recruit model (Ricker 1954, Quinn and Deriso 1999; described above). Other methods used were the yield analysis (Hilborn and Walters 1992), euphotic volume model (Koenings and Kyle 1997), and zooplankton forage model (Koenings and Kyle 1997). These latter 2 habitat-based models assess the likely number of fish that can be supported given available habitat or food. Escapement goals were generally not based on results from these models, but results were instead used as a secondary, alternative analysis that was less dependent on fish count data. When used, results from the euphotic volume and zooplankton forage models were reported as corroborating or not corroborating the primary analysis.

The percentile approach followed the methods of Bue and Hasbrouck *Unpublished*, whereby the contrast of the escapement data (i.e., ratio of the highest observed escapement to the lowest observed escapement) and the exploitation rate of the stock were used to select the percentiles of observed annual escapements to be used for estimating the SEG. Low contrast (<4) implies that stock productivity is known for only a limited range of escapements. According to this approach, percentiles of the total range of observed annual escapements that are used to develop an SEG for a stock with low contrast should be relatively wide, in an attempt to improve future knowledge of stock productivity. In cases where data contrast was less than 4 and the exploitation rate was low, the lower end of the SEG range was the 15th percentile of the escapement data and the upper end of the range was the maximum observed escapement estimate. Alternately, in cases where contrast was larger, the percentiles of observed annual escapements used to estimate an SEG were narrowed. For stocks with high contrast and at least moderate exploitation, the lower end of the SEG range was increased from the 15th to the 25th percentile as a precautionary measure for stock protection. The percentiles used at different levels of contrast were:

Escapement Contrast and Exploitation	SEG Range
Low Contrast (<4)	15th Percentile to maximum observation
Medium Contrast (4 to 8)	15th to 85th Percentile
High Contrast (>8); Low Exploitation	15th to 75th Percentile
High Contrast (>8); High Exploitation	25th to 75th Percentile

The risk analysis (Bernard et al. 2009) was used to establish an SEG, in the form of a precautionary reference point (PRP), from a time series of observed escapement estimates using probability distributions. This method is based on estimating the risk of management error and is particularly appropriate in situations where a stock (or stock aggregate) is not "targeted" and observed escapement estimates are the only reliable data available. In essence, this analysis estimates the probability of detecting escapement falling below the SEG in a predetermined number of consecutive years (k). For example, if we believe there is cause for concern when escapement falls below the SEG for 3 consecutive years, k would be equal to 3. Simultaneously,

a second probability is estimated, that is the probability of taking action (e.g., closing a fishery to protect the stock) for 3 consecutive years when no action was needed. This analysis assumes that escapement observations follow a lognormal distribution and have a stationary mean (i.e., no temporal trend).

The yield analysis was similar to that used by Hilborn and Walters (1992), and entailed applying a tabular approach to examine escapement versus yield relationships. Escapements were arranged into size intervals. Multiple ranges for the size intervals were used, to provide varying aggregations of escapements. For each escapement interval, several measures of yield from the observed escapements in that interval were calculated. Specifically, the average and median return per spawner, average and median surplus yield (estimated as the return minus parental spawning escapement), and average and median observed harvest. The average and median were both calculated because averages are highly influenced by large or small values.

The euphotic volume (EV) model followed the methods of Koenings and Kyle (1997) and estimated adult escapement, in part, by determining the volume of lake water capable of primary production that could sustain a rearing population of juvenile sockeye salmon. The euphotic volume indicated a level of phytoplankton forage (primary production) available to zooplankton, and thus, a level of zooplankton forage available for rearing juvenile fish. The model assumed that shallower light penetration would result in lower adult production compared to lakes with deeper light penetration because the shallower lakes would not have the primary production necessary to sustain a larger rearing population. The EV model assumes there is no primary productivity below depths at which light has been attenuated by 99%.

The zooplankton model, as described in Witteveen et al. (2005), estimated smolt production based on an available zooplankton biomass fed upon by smolt of a targeted threshold size, in a lake of known size (Koenings and Kyle 1997). The zooplankton model, like the EV model, uses the premise that availability of forage could impact survival of juvenile fish and subsequent adult production. Adult production was calculated using species fecundity and marine survival rates. The zooplankton model assumes zooplankton is the only available forage.

CHINOOK SALMON

Escapement goal background and previous reviews

Nelson River is located in the Nelson Lagoon Section of the Northern District of the Alaska Peninsula Management Area (Figure 2 and Figure 3). Nelson River has the only Chinook salmon escapement goal currently established in Area M. Escapement has been counted almost every year since 1974 from either a tower (1974–1988) or a weir (1989–present). Since 1985, salmon escapement was only assessed through the end of the sockeye salmon run, which is before most of the Chinook salmon run has passed. In nearly all years, an aerial survey was conducted to count Chinook salmon downstream of the tower or weir on the day that, or a few days after, the weir or tower was removed. Stock-specific catch data are available from the Nelson Lagoon Section gillnet fishery due to the terminal nature of that fishery. The first published escapement goal for Nelson River was developed in 1985 and a range was set at 4,500 to 9,000 Chinook salmon based on weir and counting tower data collected from 1978 to 1984 (Nelson and Lloyd 2001; Appendix A). The goal was changed in 1993 to a range of 3,200 to 6,400 Chinook salmon based on aerial survey data collected from 1985 to 1992 (Nelson and Lloyd 2001). The SEG was modified in 2003 (Nelson et al. 2006) to a BEG of 2,400 to 4,400 fish using a Ricker spawner recruit curve (Ricker 1954) and corroborated with a habitat model

(Parken et al. 2006.). The BEG was corroborated in 2006 using a Ricker spawner-recruit curve, and there was consensus to not reevaluate the goal in 2009, resulting in no change to the Nelson River Chinook salmon BEG (Witteveen et al. 2009).

2012 review

Nelson River Chinook salmon escapements since the last review were similar to those in the recent past (Table 1). There was no compelling information to suggest that any changes were necessary to the current BEG and the team agreed that no review was necessary in 2012.

SOCKEYE SALMON

Orzinski Lake

Escapement goal background and previous reviews

Orzinski Lake is located in the Northwest Stepovak Section of the Southeastern District (Figure 2 and Figure 3). The first published escapement goal for Orzinski Lake was developed in 1980 and a range was set at 15,000 to 20,000 sockeye salmon (Nelson and Lloyd 2001; Appendix B). Aerial surveys were used to estimate escapement into Orzinski Lake from 1968 through 1989 and a weir was used from 1990 through the present. An escapement goal review of this system was conducted during 2003. All available stock assessment data were analyzed using the percentile, euphotic volume, smolt biomass as a function of zooplankton biomass, and lake surface area methods, and these analyses reasonably corroborated the existing SEG and no change was warranted (Nelson et al. 2006). During the 2006 escapement goal review (Honnold et al. 2007), team staff examined escapement data using the percentile approach and determined there was no significant change in the estimate and the goal would remain the same. With 3 years of additional data, the 2009 escapement goal review team determined that the additional stock assessment data would not substantially affect the results of previous escapement goal analyses. Thus, there was consensus to not reevaluate the goal in 2009 and there was no change to the Orzinski Lake sockeye salmon SEG.

2012 review

Stock-specific harvest estimates for Orzinski Lake sockeye salmon were not available. Recent escapement estimates and age compositions were examined to determine if a change in the escapement goal was justified. Escapements since the last review were similar to those in the recent past (Table 1) and the team agreed that no further analysis was necessary.

Thin Point Lake

Escapement goal background and previous reviews

Thin Point Lake is located in the Thin Point Section of the Southwestern District (Figure 2 and Figure 3). The first published escapement goal for Thin Point Lake was developed in the late 1980s and a range was set at 14,000 to 28,000 sockeye salmon (Nelson and Lloyd 2001; Appendix C). Aerial surveys have been used to estimate escapement into Thin Point Lake from 1968 to the present and a weir was used from 1994 to 1998.

An escapement goal review of this system was conducted during 2003. All available stock assessment data were analyzed using the percentile, euphotic volume analysis, smolt biomass as a function of zooplankton biomass, and lake surface area methods (Nelson et al. 2006). The authors concluded that these analyses reasonably corroborated the existing SEG and no change

was warranted (Table 1). With 3 years of additional data, the 2009 escapement goal review team determined that the additional stock assessment data would not substantially affect the results of previous escapement goal analyses. Thus, there was consensus to not reevaluate the goal in 2009 and there was no change to the Thin Point Lake sockeye salmon SEG.

2012 review

Stock-specific harvest estimates for Thin Point Lake sockeye salmon were not available. Recent escapement data (Table 1) were examined to determine if a change in the escapement goal was justified and the team agreed that no further analysis was necessary.

Mortensens Lagoon

Escapement goal background and previous reviews

Mortensens Lagoon is located in the Mortensens Lagoon Section of the Southwestern District (Figure 2 and Figure 3). The first published escapement goal range for Mortensens Lagoon was developed in the late 1980s and set at 3,200 to 6,400 sockeye salmon (Nelson and Lloyd 2001; Appendix D). Aerial surveys have been used to estimate escapement into Mortensens Lagoon from 1968 to the present and a weir was operated from 2001 to 2006.

An escapement goal review conducted during 2003 using the percentile, euphotic volume analysis, smolt biomass as a function of zooplankton biomass, and lake surface area methods concluded that these analyses reasonably corroborated the existing SEG and no change was warranted (Nelson et al. 2006). During the subsequent 2006 escapement goal review, the team utilized the percentile approach and also corroborated the 3,200 to 6,400 sockeye salmon SEG (Honnold et al. 2007). With 3 years of additional data, the 2009 escapement goal review team determined that the additional stock assessment data would not substantially affect the results of previous escapement goal analyses. Thus, there was consensus to not reevaluate the goal in 2009 and there was no change to the Mortensens Lagoon sockeye salmon SEG.

2012 review

Stock-specific harvest estimates for Mortensens Lagoon sockeye salmon were not available. Recent escapement data (Table 1) were examined to determine if a change in the escapement goal was justified and the team agreed that no further analysis was necessary.

Christianson Lagoon

Escapement goal background and previous reviews

Christianson Lagoon is located in the Urilla Bay Section of the Northwestern District (Figure 2 and Figure 3). The first published escapement goal range for Christianson Lagoon was developed in the 1980s and set at 25,000 to 50,000 sockeye salmon (Nelson and Lloyd 2001; Appendix E). Aerial surveys have been used to estimate escapement into Christianson Lagoon from 1960 to the present.

An escapement goal review of this system conducted during 2003 using the percentile method (Nelson et al. 2006) concluded that the analysis reasonably corroborated the existing SEG and no change was warranted (Nelson et al. 2006). The subsequent 2006 escapement goal review team also utilized the percentile approach and corroborated the 25,000 to 50,000 sockeye salmon SEG (Honnold et al. 2007). With 3 years of additional data, the 2009 escapement goal review team determined that the additional stock assessment data would not substantially affect the results of

previous escapement goal analyses. Thus, there was consensus to not reevaluate the goal in 2009 and there was no change to the Christianson Lagoon sockeye salmon SEG (Witteveen et al. 2009).

2012 review

Stock-specific harvest estimates for Christianson Lagoon sockeye salmon were not available. Recent escapement data (Table 1) were examined to determine if a change in the escapement goal was justified and the team agreed that no further analysis was necessary.

Swanson Lagoon

Escapement goal background and previous reviews

Swanson Lagoon is located in the Swanson Lagoon Section of the Northwestern District (Figure 2 and Figure 3). The first published escapement goal range for Swanson Lagoon was developed in 1990 and set at 8,000 to 16,000 sockeye salmon (Nelson and Lloyd 2001; Appendix F). Aerial surveys have been used to estimate escapement into Swanson Lagoon from 1960 to the present. The escapement goal review of this system conducted during 2003 using the percentile method concluded that because of data uncertainty and that the established SEG produced sufficient returns of escapement and harvest, no change in the SEG was warranted (Nelson et al. 2006). The subsequent 2006 escapement goal review also utilized the percentile approach and changed the goal to 6,000 to 16,000 sockeye salmon SEG (Honnold et al. 2007). During the 2009 escapement goal review, the percentile algorithm was recalculated using updated escapement estimates from 1990 to 2008. Based on the results of this analysis, the team recommended maintaining the existing 6,000 to 16,000 sockeye salmon SEG (Witteveen et al. 2009).

2012 review

Stock-specific harvest estimates for Swanson Lagoon sockeye salmon were not available. Recent escapement data (Table 1) were examined to determine if a change in the escapement goal was justified and the team agreed that no further analysis of the escapement goal was necessary. However, due to continued low escapements, the stock was recommended as a stock of concern.

North Creek

Escapement goal background and previous reviews

North Creek is located in the Black Hills Section of the Northern District (Figure 2 and Figure 3). The first published escapement goal for North Creek was developed in the late 1980s and a range was set at 4,400 to 8,800 sockeye salmon (Nelson and Lloyd 2001; Appendix G). Aerial surveys have been used to estimate escapement into North Creek from 1960 to the present. An escapement goal review of this system conducted during 2003 using the percentile method concluded that the analysis reasonably corroborated the existing SEG and no change was warranted (Nelson et al. 2006). During the 2006 escapement goal review, the team used the percentile approach and corroborated the 4,400 to 8,800 sockeye salmon SEG (Honnold et al. 2007). During the 2009 escapement goal review, the percentile algorithm was recalculated using updated escapement estimates from 1990 to 2008. Based on the results of this analysis the team recommended maintaining the existing 4,400 to 8,800 sockeye salmon SEG (Witteveen et al. 2009).

2012 review

Stock-specific harvest estimates for North Creek sockeye salmon were not available. Recent escapement data (Table 1) were examined to determine if a change in the escapement goal was justified and the team agreed that no further analysis was necessary.

Nelson River

Escapement goal background and previous reviews

Nelson River is located in the Nelson Lagoon Section of the Northern District (Figure 2 and Figure 3). The first published escapement goal for Nelson River was developed in 1979 and set as an SEG, with a range of 100,000 to 150,000 sockeye salmon (Nelson and Lloyd 2001; Appendix H). Tower counts were used to estimate escapement into Nelson River from 1962 to 1988 and a weir has been used from 1989 to the present. An escapement goal review of this system conducted during 2003 using the Ricker spawner-recruit model, percentile method, euphotic volume analysis, smolt biomass as a function of zooplankton biomass, and lake surface area method recommended that the escapement goal should be reclassified as a BEG, with a range from 97,000 to 219,000 sockeye salmon (Nelson et al. 2006). The 2006 escapement goal review analysis using the Ricker spawner-recruit model corroborated the 97,000 to 219,000 sockeye salmon BEG (Honnold et al. 2007). With 3 years of additional data, the 2009 escapement goal review team determined that the additional stock assessment data would not substantially affect the results of previous escapement goal analyses. Thus, there was consensus to not reevaluate the goal in 2009 and there was no change to the Nelson River sockeye salmon BEG (Witteveen et al. 2009).

2012 review

Stock-specific harvest estimates for Nelson River sockeye salmon were available from 1970 to the present. Recent run data (Table 1) were examined to determine if a change in the escapement goal was justified. The run data from 2009–2011 were similar to the recent past so the team agreed that no further analysis was necessary.

Bear Lake

Escapement goal background and previous reviews

Bear Lake is located in the Bear River Section of the Northern District (Figure 2 and Figure 3). The first published escapement goals for Bear Lake were developed in late 1960s and set as SEGs, with ranges of 150,000 to 175,000 sockeye salmon for the early run; 50,000 to 75,000 sockeye salmon for the late run; and a total run SEG range of 200,000 to 250,000 sockeye salmon (Nelson and Lloyd 2001; Appendix I). Tower counts were used to estimate escapement into Bear River from 1964 to 1985 and a weir has been used from 1986 to the present.

An escapement goal review of this system conducted during 2003 using the Ricker spawner-recruit model, percentile method, euphotic volume analysis, smolt biomass as a function of zooplankton biomass, and lake surface area method indicated that the escapement goal range should be increased to 293,000 to 488,000 sockeye salmon for the total Bear Lake run (176,000 to 293,000 for the early run; 117,000 to 195,000 for the late run; Nelson et al. 2006). The 2006 escapement goal review analysis also utilized the Ricker spawner-recruit model, percentile method, euphotic volume analysis, smolt biomass as a function of zooplankton biomass, and lake surface area methods to analyze data; these methods corroborated the SEGs established in 2003

and no changes were made to the Bear Lake escapement goals (Honnold et al. 2007). With 3 years of additional data, the 2009 escapement goal review team determined that the additional stock assessment data would not substantially affect the results of previous escapement goal analyses. Thus, there was consensus to not reevaluate the goal in 2009 and there was no change to the Bear Lake sockeye salmon SEG (Witteveen et al. 2009).

2012 review

Stock-specific harvest estimates were not available for early-run Bear Lake sockeye salmon; therefore, recent escapement data (Table 1) were examined to determine if a change in the escapement goal was justified. Escapement and harvest data were examined for the late run; however, the 3 additional years of run data were not expected to change the results of the previous spawner-recruit analysis. The team agreed that no further analysis was necessary for the Bear Lake runs.

Sandy River

Escapement goal background and previous reviews

Sandy River is located in the Bear River Section of the Northern District (Figure 2 and Figure 3). An aerial indexed total escapement goal range of 20,000 to 30,000 was developed in the 1970s (Nelson and Lloyd 2001; Appendix J). In 1994, a weir was established for Sandy River and the goal range was doubled to 40,000 to 60,000 to account for more complete counts made at the weir (Nelson and Lloyd 2001). An escapement goal review of this system conducted during 2003 using the percentile method, euphotic volume analysis, smolt biomass as a function of zooplankton biomass, and lake surface area method concluded that because of data uncertainty and that the established SEG produced sufficient returns of escapement and harvest, no change in the SEG was warranted (Nelson et al. 2006). The 2006 escapement goal review using the percentile method with weir and aerial survey count data recommended changing the SEG range to 34,000 to 74,000 fish (Honnold et al. 2007). With 3 years of additional data, the 2009 escapement goal review team determined that the additional stock assessment data would not substantially affect the results of previous escapement goal analyses. Thus, there was consensus to not reevaluate the goal in 2009 and there was no change to the Sandy River sockeye salmon SEG (Witteveen et al. 2009).

2012 review

Stock-specific harvest estimates for Sandy River sockeye salmon were not available. Recent escapement data (Table 1) were examined to determine if a change in the escapement goal was justified and the team agreed that no further analysis was necessary.

Ilnik River

Escapement goal background and previous reviews

The Ilnik River is located in the Ilnik Section of the Northern District and consists of 4 distinct spawning populations: Ilnik River, Willie Creek, Ocean River, and Wildman Lake (Figure 2 and Figure 3). The current SEG for the Ilnik River system was developed in 1991 and set at 40,000 to 60,000 sockeye salmon (Nelson and Lloyd 2001; Appendix K). Aerial surveys were used to estimate escapement into the Ilnik River system from 1960 through 1990 and a weir was used from 1991 through the present. An escapement goal review of this system conducted during 2003 using the percentile method, euphotic volume analysis, smolt biomass as a function of

zooplankton biomass, and lake surface area method concluded that the current escapement goals had produced sufficient returns and found that no change was warranted (Nelson et al. 2006). The 2006 escapement goal review using the percentile method with weir count data corroborated the existing SEG (Honnold et al. 2007). With 3 years of additional data, the 2009 escapement goal review team determined that the additional stock assessment data would not substantially affect the results of previous escapement goal analyses. Thus, there was consensus to not reevaluate the goal in 2009 and there was no change to the Ilnik River sockeye salmon SEG (Witteveen et al. 2009).

2012 review

Stock-specific harvest estimates for Ilnik River sockeye salmon were not available. Recent escapement estimates (Table 1) and age compositions were examined to determine if a change in the escapement goal was justified. The run and age data from 2009–2011 were similar to the recent past so the team agreed that no further analysis was necessary.

Meshik River

Escapement goal background and previous reviews

Meshik River is located in the Inner Port Heiden Section of the Northern District (Figure 2 and Figure 3). The SEG range of 10,000 to 20,000 was initially established in the late 1980s and was based on average peak escapements (Nelson and Lloyd 2001; Appendix L). Aerial surveys have been used to estimate escapement into Meshik River from 1960 through the present. An escapement goal review of this system conducted during 2003 using the percentile method concluded that the analysis reasonably corroborated the existing SEG and no change was warranted (Nelson et al. 2006). Following the 2006 escapement goal review using the percentile method, it was recommended to increase the Meshik River SEG to 20,000 to 60,000 fish; this change was implemented to reflect increased aerial survey effort and the subsequent increased sockeye salmon escapement estimates (Honnold et al. 2007).

In 2007, the board allowed additional fishing time in the Inner Port Heiden Section, which would affect escapement to the Meshik River. The Meshik River sockeye salmon escapement goal did not consider escapement to Red Bluff and Yellow Bluff creeks, which contribute a substantial number of fish to the total escapement transiting the Port Heiden area (generally on the order of 25%) and cannot be managed separately from Meshik River sockeye salmon escapement. With inclusion of the Red Bluff and Yellow Bluff creeks' escapements, the upper range of the 75th percentile of escapement increased substantially, suggesting the need for increasing the upper and lower bounds of the escapement goal. Because of increased aerial surveying effort and the need to account for the contribution of Red Bluff Creek and Yellow Bluff Creek sockeye salmon escapements, the team recommended changing the Meshik River escapement goals from an SEG of 20,000 to 60,000 fish to an SEG of 25,000 to 100,000 fish (Witteveen et al. 2009).

2012 review

Stock-specific harvest estimates for Meshik River sockeye salmon were not available. Recent escapement data (Table 1) were examined to determine if a change in the escapement goal was justified and the team agreed that no further analysis was necessary.

Cinder River

Escapement goal background and previous reviews

Cinder River is located in the Cinder River Section of the Northern District (Figure 2 and Figure 3). An SEG range of 6,000 to 12,000 was initially established in the late 1980s and was based on average peak escapements (Nelson and Lloyd 2001; Appendix M). Aerial surveys have been used to estimate escapement into Cinder River from 1960 through the present. An escapement goal review of this system conducted during 2003 using the percentile method concluded that the analysis reasonably corroborated the existing SEG and no change was warranted (Nelson et al. 2006). The 2006 escapement goal review, also using the percentile method, recommended an increase to the Cinder River SEG to 12,000 to 48,000 fish; this change was implemented to reflect increased aerial survey effort and the subsequent increased sockeye salmon escapement estimates (Honnold et al. 2007). In 2009, the team reviewed escapement data from Mud Creek and Cinder River. Mud Creek and Cinder River share the same outlet; therefore, Mud Creek cannot be managed independently of the Cinder River if a fishery were opened in the Cinder River Section. However, the team found that escapement between the 2 streams was not correlated and surveys of Mud Creek are incomplete. Based on these results, the team recommended keeping the SEG the same (Witteveen et al. 2009).

2012 review

Stock-specific harvest estimates for Cinder River sockeye salmon were not available. Recent escapement data (Table 1) were examined to determine if a change in the escapement goal was justified and the team agreed that no further analysis was necessary.

McLees Lake

Escapement goal background and previous reviews

McLees Lake is located in the Unalaska District within the Aleutian Islands Management Area (Figure 4). The first published escapement goal for McLees Lake was developed in 1993 and a range was set at 4,000 to 6,000 sockeye salmon based on spawning capacity (Nelson and Lloyd 2001; Appendix N). Aerial surveys have been used to estimate escapement into McLees on a limited basis from 1967 to 2003 and a weir has been operated by the U.S. Fish and Wildlife Service (USFWS) since 2001. No sockeye salmon were observed during aerial surveys of McLees Lake until 1974. An escapement goal review of this system conducted during 2003, using the percentile method from aerial survey numbers, concluded that with limited aerial survey estimates, few years of weir counts, and no history of management action ever exercised, the goal would be eliminated, but reevaluated in 3 years (Nelson et al. 2006). In 2006, the McLees Lake system was reevaluated with the percentile approach and it was determined that no goal was justified; however, the McLees Lake sockeye salmon system would be reassessed pending collection of additional stock assessment data (Honnold et al. 2007). In 2009, an SEG for McLees Lake sockeye salmon was estimated according to the percentile algorithm resulting in an SEG of 12,000 to 59,000 fish. From the time the weir was first installed at McLees Lake in 2001 until 2004, the average sockeye salmon annual escapement was 71,000 fish. The magnitude of production from a lake the size of McLees was unexpected. The average annual escapement from 2005 to 2008 was 14,000 fish, prompting conservation concerns. Based on limited knowledge of McLees Lake sockeye salmon, a wide escapement goal range (10,000 to

60,000 fish) was recommended during years when a weir is operated, and no SEG in the absence of a weir (Witteveen et al. 2009).

2012 review

Stock-specific harvest estimates for McLees Lake sockeye salmon were not available; there is little or no commercial activity on the stock and much of the limited harvest is taken by subsistence users from the Dutch Harbor/Unalaska area. Recent escapement data (Table 1) were examined to determine if a change in the escapement goal was justified and the team agreed that no further analysis was necessary.

COHO SALMON

Thin Point Lake

Escapement goal background and previous reviews

Thin Point Lake is located in the Thin Point Section of the Southwestern District (Figure 2 and Figure 3). The first published escapement goal for Thin Point Lake coho salmon was developed in 1993 and a range was set at 3,000 to 6,000 fish (Nelson and Lloyd 2001; Appendix O). Aerial surveys were used to estimate coho salmon escapement into Thin Point Lake from 1968 through the present. An escapement goal review of this system conducted during 2003 resulted in the team recommendation to retain only the lower end (3,000) of the SEG to be used as a threshold to alert managers to potential overharvest or changes in productivity because of the lack of reliable escapement data (Nelson et al. 2006). The 2006 escapement goal review of the Thin Point coho salmon escapement goal was limited by data too poor and insufficient to estimate an SEG; therefore, no change was warranted for the SEG threshold (Honnold et al. 2007). With 3 years of additional data, the 2009 escapement goal review team determined that the additional stock assessment data would not substantially affect the results of previous escapement goal analyses. Thus, there was consensus to not reevaluate the goal in 2009 and there was no change to the Thin Point Lake coho salmon SEG (Witteveen et al. 2009).

2012 review

Stock-specific harvest estimates for Thin Point Lake coho salmon were not available. Escapement estimates are inconsistent (Table 1), and team decided further of the goal was warranted.

Nelson River

Escapement goal background and previous reviews

Nelson River is located in the Nelson Lagoon Section of the Northern District (Figure 2 and Figure 3). The first published escapement goal for Nelson River coho salmon was developed in the early 1980s and a range was set at 18,000 to 25,000 fish (Nelson and Lloyd 2001; Appendix P). Aerial surveys were used to estimate coho salmon escapement into Nelson River from 1968 through the present. An escapement goal review of this system conducted during 2003, using a risk analysis, concluded that the lower end (18,000) of the existing goal was appropriate as a threshold (Nelson et al. 2006). The 2006 escapement goal review of the Nelson River coho salmon escapement goal was limited by data too poor and insufficient to estimate an SEG; therefore, no change was warranted for the SEG threshold (Honnold et al. 2007). With 3 years of additional data, the 2009 escapement goal review team determined that the additional stock

assessment data would not substantially affect the results of previous escapement goal analyses. Thus, there was consensus to not reevaluate the goal in 2009 and there was no change to the Nelson River coho salmon SEG (Witteveen et al. 2009).

2012 review

Stock-specific harvest estimates were not available for the Nelson River coho salmon fisheries. Recent escapement estimates (Table 1) were examined to determine if a change in the escapement goal was justified, but the team agreed that no further analysis was necessary.

Ilnik River

Escapement goal background and previous reviews

An Ilnik River coho salmon SEG of 10,000 to 19,000 was adopted in 1993 (Table 1; Appendix Q). This goal was eliminated following the 2004 escapement goal review. Historical aerial survey escapement estimates were often sporadic, due to airplane unavailability, poor weather, or the frequent turbid conditions in the Ilnik River. Escapement estimates during that time were generally below the SEG, likely due to the poor aerial survey coverage. During the 2009 review, it was noted that sport fishing effort increased and there was some directed commercial fishing effort. In response to the increased effort, aerial surveys also increased. Ilnik River coho salmon escapement data from 1985 to 2008 were assessed with the percentile and risk analysis methods. The risk analysis yielded an SEG threshold of 8,700 fish. With the increase of sport fishery harvest and the use of coho salmon catch-per-unit-effort (CPUE) data to make management decisions, the team recommended an SEG threshold of 9,000 fish based on the risk analysis for Ilnik River (Witteveen et al. 2009).

2012 review

Stock-specific harvest estimates were not available for the Ilnik River coho salmon fisheries. Recent escapement estimates (Table 1) were examined to determine if a change in the escapement goal was justified, but the team agreed that no further analysis was necessary.

PINK SALMON

Pink salmon escapement estimates in Area M are based on aerial surveys of fish returning to spawn. Each year since 1968, pink salmon have been counted during one or more flights along the Alaska Peninsula area (Figure 1). Total indexed escapement estimates were calculated by Area M management biologists, with estimation techniques outlined in Shaul and Dinnocenzo (2003).

South Peninsula

Escapement goal background and previous reviews

Even- and odd-year pink salmon escapement goals, by district, were first established in 1992 (Nelson and Lloyd 2001; Appendix R). The sum of the district escapement goal ranges for the South Alaska Peninsula was 1,864,600 to 3,729,300 fish in even-years and 1,637,800 to 3,275,700 fish in odd-years. The difference between even- and odd-year escapement goals was due to higher even-year escapement goals in the Southwestern and Unimak districts.

Stock-specific catch data were not available in this area. Because of this, during a 2003 review of escapement goals (Nelson et al. 2006), the district escapement estimates were aggregated into

a single South Peninsula escapement that was used, with the total pink salmon catch for the South Peninsula, to develop a single Ricker spawner-recruit model (Ricker 1954). Ricker spawner-recruit models were developed from even-year, odd-year and combined even- and odd-year escapement and catch data. The model developed using the combined data was considered the best model (Nelson et al. 2006). The results from this model corroborated the aggregate even- and odd-year goals (sum of the district escapement goal ranges), which were then designated BEGs (Nelson et al. 2006). The 2006 escapement goal review of South Peninsula pink salmon followed the same methods as the 2003 review, with the addition of 2004 and 2005 data. No change was recommended to the escapement goal range; however, the goal was reclassified as an SEG because it was based on aerial survey data (Honnold et al. 2007). With 3 years of additional data, the 2009 escapement goal review team determined that the additional stock assessment data would not substantially affect the results of previous escapement goal analyses. Thus, there was consensus to not reevaluate the goal in 2009 and there was no change to the even- and odd-year pink salmon SEGs (Witteveen et al. 2009).

2012 review

Stock-specific harvest estimates for South Peninsula pink salmon were not available. Recent escapement estimates (Table 1) were examined to determine if a change in the escapement goal was justified, but the team agreed that no further analysis was necessary.

Bechevin Bay

Escapement goal background and previous reviews

The Bechevin Bay Section (Figure 2) pink salmon escapement goals were established in 1992; the even-year goal range was 33,200 to 66,400 fish and the odd-year goal range was 2,400 to 4,800 fish (Nelson and Lloyd 2001). These escapement goals were changed during an escapement goal review in 2003, retaining only lower ranges of the escapement goals of 31,000 and 1,600 for even- and odd-years, respectively (Nelson et al. 2006).

The 2006 escapement goal review of South Peninsula pink salmon followed the same methods as during the 2003 review, with the addition of 2004 and 2005 data. No change was recommended to the escapement goal threshold (Honnold et al. 2007). With 3 years of additional data, the 2009 escapement goal review team determined that the additional stock assessment data would not substantially affect the results of previous escapement goal analyses. Thus, there was consensus to not reevaluate the goal in 2009 and there was no change to the even- and odd-year pink salmon Bechevin Bay SEGs (Witteveen et al. 2009).

2012 review

Stock-specific harvest estimates for Bechevin Bay pink salmon were not available. Escapement estimates are inconsistent (Table 1), and team decided further of the goal was warranted.

CHUM SALMON

Chum salmon escapement estimates in Area M are based on aerial surveys of fish returning to spawn. Total indexed escapement estimates were calculated by Area M management biologists, with estimation techniques outlined in Shaul and Dinnocenzo (2003).

South Peninsula

Escapement goal background and previous reviews

Chum salmon escapement goals, aggregated by district, were established in 1992 (Nelson and Lloyd 2001; Appendix T–W) and remained unchanged after the escapement goal review in 2003 (Nelson et al. 2006). The 2006 escapement goal review of South Peninsula chum salmon corroborated the original goals, with the exception of Unimak District, which was changed from an SEG to an SEG threshold after review of risk analysis results (Honnold et al. 2007). With 3 years of additional data, the 2009 escapement goal review team determined that the additional stock assessment data would not substantially affect the results of previous escapement goal analyses. Thus, there was consensus to not reevaluate the goal in 2009 and there was no change to the chum salmon aggregate SEGs (Witteveen et al. 2009). The current chum salmon escapement goal ranges are: Southeastern District - 106,400 to 212,800 fish; South Central District - 89,800 to 179,600 fish; Southwestern District - 133,400 to 266,800 fish; and Unimak District - 800 fish threshold (Table 1).

2012 review

Stock-specific harvest estimates for South Peninsula chum salmon were not available. Recent escapement estimates (Table 1) were examined to determine if a change in the escapement goal was justified. The team agreed further review of the Unimak District escapement goal was warranted, but review of other chum salmon aggregate escapement goals was unnecessary.

North Alaska Peninsula

Escapement goal background and previous reviews

Chum salmon escapement goals, aggregated by district, were set in 1992 at ranges of 223,600 to 447,200 for the Northwestern District and 119,600 to 239,200 for the Northern District (Nelson and Lloyd 2001; Appendix X and Y). Based on separate Ricker spawner-recruit analyses during the 2003 escapement goal review, the Northwestern District escapement goal was changed to a BEG of 100,000 to 215,000 fish and no change was recommended for the Northern District BEG (Nelson et al. 2006). The 2006 escapement goal review of North Alaska Peninsula chum salmon also used Ricker spawner-recruit models to analyze the available data. No changes were made to the goal ranges; however, the escapement goals were changed from BEGs to SEGs as aerial survey data were used to provide indices of escapement rather than total escapement estimates. With 3 years of additional data, the 2009 escapement goal review team determined that the additional stock assessment data would not substantially affect the results of previous escapement goal analyses. Thus, there was consensus to not reevaluate the goal in 2009 and there was no change to the North Peninsula chum salmon Bay SEGs (Witteveen et al. 2009).

2012 review

Stock-specific harvest estimates for North Alaska Peninsula chum salmon were not available. Recent escapement estimates (Table 1) were examined to determine if a change in the escapement goal was justified, but the team agreed that no further analysis was necessary.

RESULTS

The comprehensive review of the 28 existing Area M salmon escapement goals resulted in recommendations to leave 24 goals unchanged and eliminate 4 goals. Systems that did not

warrant a change to their goals because either their escapement levels have consistently met their goals or have been comparable over the last 3 years include one Chinook salmon system (Nelson River); 13 sockeye salmon systems (Orzinski Lake, Thin Point Lake, Mortensens, Christianson, and Swanson lagoons, North Creek, Nelson Lake, Bear (2 goals; early and late), Sandy, Ilnik, Meshik, and Cinder rivers; and McLees Lake); 2 coho salmon systems (Nelson and Ilnik rivers); 2 pink salmon aggregates; and 5 chum salmon aggregates.

BIOLOGICAL ESCAPEMENT GOAL ESTIMATES

No systems with BEGs warranted further analysis.

SUSTAINABLE ESCAPEMENT GOAL ESTIMATES

Coho Salmon

Thin Point Lake

Stock Status

The current Thin Point Lake coho salmon lower-bound SEG of 3,000 fish was adopted in 2004 (Table 1). Since 2004, escapements have been within the range every year except 2009, 2010, and 2011. In 2010, an estimate was not made due to poor visibility. In 2009 and 2011, escapements were below the goal.

Evaluation of Recent Data

Surveys of Thin Point Lake coho are opportunistic to larger systems that attract more fishing effort. Surveys are very difficult because of poor water visibility.

Escapement Goal Recommendation

There is very little directed effort on Thin Point Lake coho salmon. The team agreed that due to poor data quality and minimal effort the Thin Point Lake coho salmon SEG should be eliminated.

Pink Salmon

Bechevin Bay

Stock Status

The current Bechevin Bay pink salmon SEG of 31,000 fish during even years and 1,600 fish during odd years was adopted in 2004 (Table 1). Aerial survey escapement estimates from 5 systems are used as an index for the total escapement in the Bechevin Bay Section. Since 2004, odd-year escapements have been above the SEG and even-year escapements were above in 2004 and 2006, but below the SEG in 2008 and 2010.

Evaluation of Recent Data

There is no directed fishery for Bechevin Bay pink salmon, and pink salmon harvest in 2008 and 2010 was very low. Escapement estimates are difficult to obtain, but the estimate in 2010 was below the goal.

Escapement Goal Recommendation

Fisheries in Bechevin Bay target chum salmon, rather than pink salmon, stocks. The team agreed that due to poor data quality, the Bechevin Bay pink salmon aggregate SEG for even- and odd-years should be eliminated.

Chum Salmon

Unimak District

Stock Status

The current Unimak District chum salmon aggregate SEG threshold of 800 fish was adopted in 2007 (Table 1). Since 2007, escapements have been above the threshold every year.

Evaluation of Recent Data

Surveys of Unimak District chum are opportunistic to larger systems that attract more fishing effort.

Escapement Goal Recommendation

This SEG is very low in relation to the precision of aerial surveys. The team agreed that due to poor data quality, as a result of difficulty in monitoring, the Unimak District chum salmon aggregate SEG should be eliminated.

DISCUSSION

Establishing prudent escapement goals is an evolving process, not only because each year provides more data, but also because methods to determine such goals are becoming more standardized and well documented. The SSFP and EGP are important steps in this evolution. Ideally, escapement goals should be based, in part, on ecological theory, principles of sustained yield, and empirical observations (Ricker 1954).

The methodologies used in this escapement goal evaluation were limited by the available data. Stock-specific catch data were not available for any stocks in Area M, with the exception of Nelson River Chinook and sockeye salmon, and Bear Lake late-run sockeye salmon. While 5 systems in Area M (plus one additional system in the Aleutian Islands Management Area) currently have weirs for direct enumeration of escapement and are easily accessible for collection of representative age data, escapement estimates for the remaining systems are determined via aerial survey observations. Aerial survey escapement estimates can be inaccurate and imprecise due to weather conditions, differences between observers, and logistical limitations.

This comprehensive review of the 28 existing salmon escapement goals in Area M resulted in recommendations to eliminate 4 goals. These changes should not have noticeable effects on future management decisions.

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TABLES AND FIGURES

Table 1.–Current escapement goals, escapements observed from 2009 through 2011, and escapement goal recommendations in 2012 for Chinook, sockeye, coho, pink, and chum salmon stocks of the Alaska Peninsula Management and Aleutian Islands areas.

		Current Escapement Goal				Escapements			
System	Escapement Data[a]	Type (BEG, SEG)	Range			2009	2010	2011	2012 Recommendation
Chinook Salmon									
Nelson River	WC/PAS	BEG	2,400	to	4,400	2,048	2,769	1,704	No change
Sockeye Salmon									
Orzinski Lake	WC	SEG	15,000	to	20,000	21,457	18,039	16,764	No change
Thin Point Lake	PAS	SEG	14,000	to	28,000	33,500	12,400	14,500	No change
Mortensens Lagoon	PAS	SEG	3,200	to	6,400	25,000	6,600	500	No change
Christianson Lagoon	PAS	SEG	25,000	to	50,000	48,100	27,900	35,200	No change
Swanson Lagoon	PAS	SEG	6,000	to	16,000	1,000	1,700	1,000	No change
North Creek	PAS	SEG	4,400	to	8,800	8,000	18,500	10,200	No change
Nelson River	WC	BEG	97,000	to	219,000	157,000	108,000	89,000	No change
Bear Lake									
Early	WC	SEG	176,000	to	293,000	216,237	226,534	207,451	No change
Late	WC	SEG	117,000	to	195,000	133,263	142,966	132,549	No change
Sandy River	WC	SEG	34,000	to	74,000	36,000	37,000	37,500	No change
Ilnik River	WC	SEG	40,000	to	60,000	66,000	59,000	43,000	No change
Meshik River	PAS	SEG	25,000	to	100,000	88,200	63,700	86,800	No change
Cinder River	PAS	SEG	12,000	to	48,000	133,600	108,900	106,000	No change
McLees Lake	WC/PAS	SEG[b]	10,000	to	60,000	10,120	32,842	36,602	No change
Coho Salmon									
Thin Point Lake	PAS	SEG	3,000			900		200	Remove SEG
Nelson River	PAS	SEG	18,000			22,000	15,000	21,000	No change
Ilnik River	PAS	SEG	9,000			24,000	19,600	22,000	No change
Pink Salmon									
South Peninsula Total - even years	PAS	SEG	1,864,600	to	3,729,300		742,912		No change
South Peninsula Total - odd years	PAS	SEG	1,637,800	to	3,275,700	3,067,000		2,494,950	No change
Bechevin Bay Section - even years	PAS	SEG	31,000				13,600		Remove SEG
Bechevin Bay Section - odd years	PAS	SEG	1,600			72,000		2,400	Remove SEG
Chum Salmon									
Southeastern District	PAS	SEG	106,400	to	212,800	106,500	62,612	145,300	No change
South Central District	PAS	SEG	89,800	to	179,600	18,600	85,600	169,000	No change
Southwestern District	PAS	SEG	133,400	to	266,800	385,730	142,650	176,425	No change
Unimak District	PAS	SEG	800			1,400	1,050	7,000	Remove SEG
Northwestern District	PAS	SEG	100,000	to	215,000	84,460	144,100	151,400	No change
Northern District	PAS	SEG	119,600	to	239,200	154,131	145,310	96,952	No change

[a] PAS = Peak Aerial Survey; WC = Weir Count.

[b] McLees Lake sockeye salmon SEG will be in effect is a weir is in place; there will be no goal if a weir is not opened.

Table 2.–General criteria used to assess quality of data in estimating Area M salmon escapement goals.

Data Quality	**Criteria**
Excellent	Escapement, harvest, and age all estimated with relatively good accuracy and precision (i.e., escapement estimated by a weir or hydroacoustics; harvest estimated by Statewide Harvest Survey or fish tickets); escapement and return estimates can be derived for a sufficient time series to construct a brood table and estimate S_{msy}.
Good	Escapement, harvest, and age estimated with reasonably good accuracy and/or precision (i.e., escapement estimated by capture-recapture experiment or multiple foot/aerial surveys); no age data or data of questionable accuracy and/or precision; data may allow construction of brood table; data time series relatively short to accurately estimate S_{msy}.
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 table.
Poor	Escapement indexed (i.e., single foot/aerial survey) such that the index provides a fairly reliable measure of escapement; no harvest and age data.

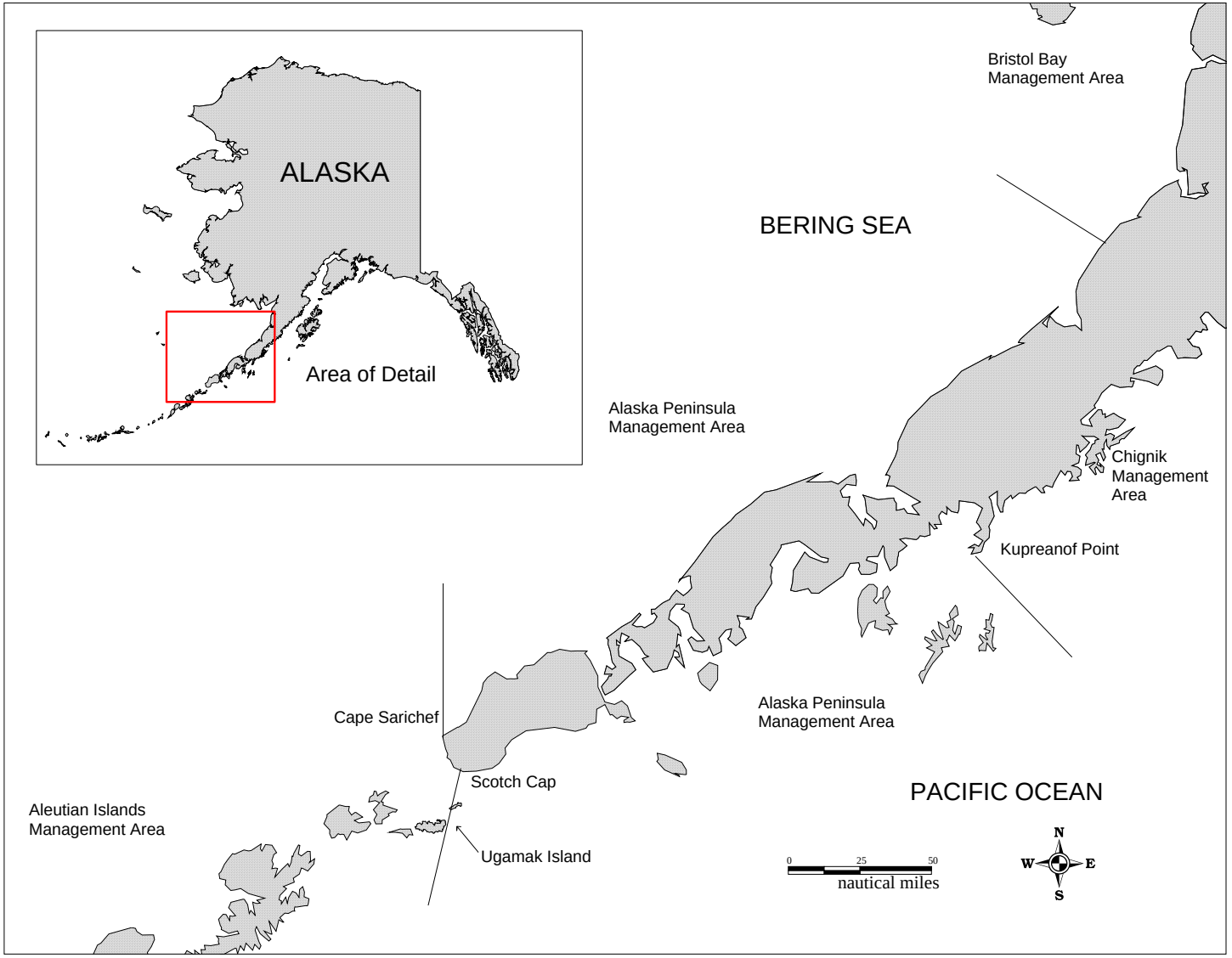


Figure 1.–Map of the Alaska Peninsula and Aleutian Islands Management areas.

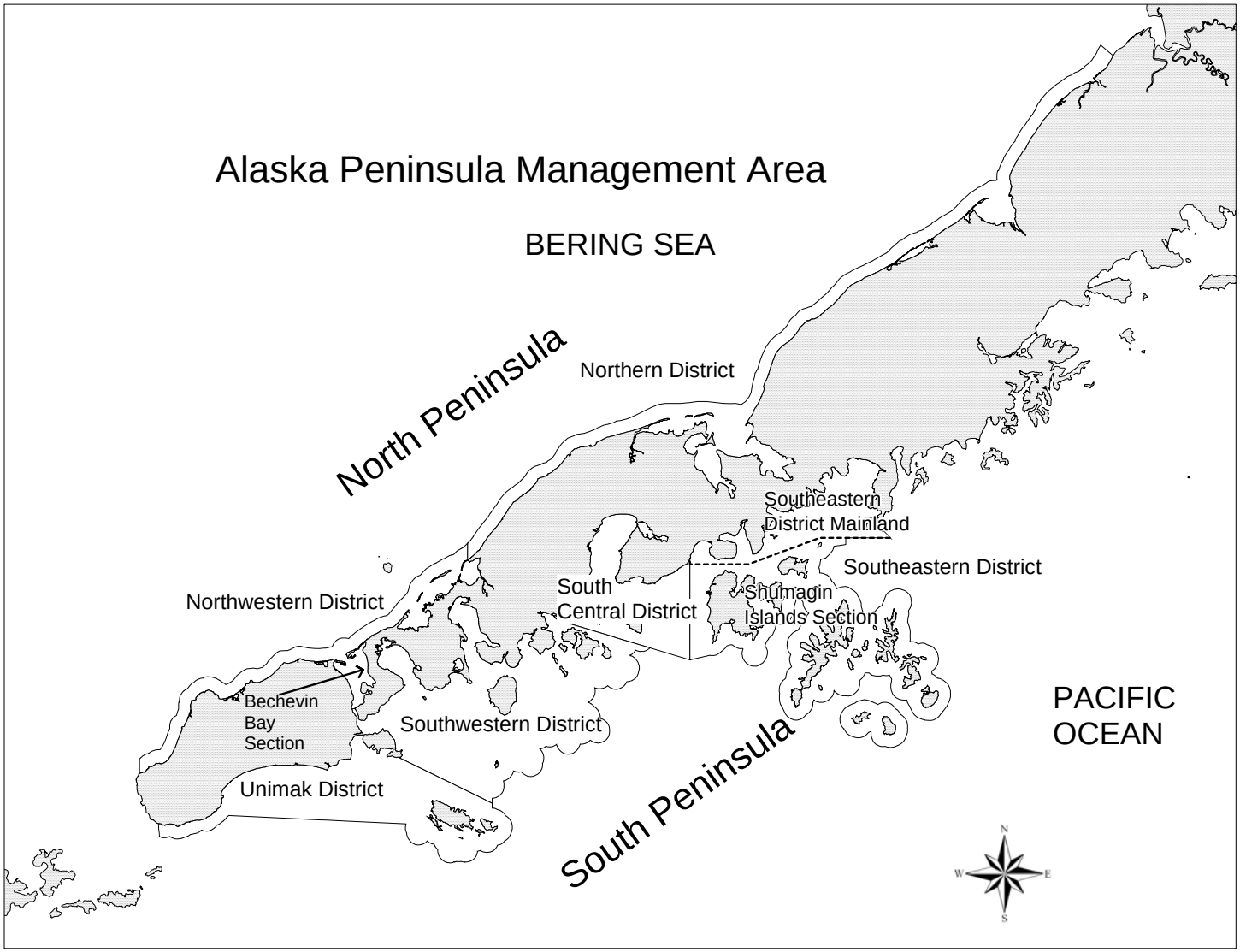


Figure 2.–Map of the Alaska Peninsula Management Area with commercial salmon fishing districts depicted.

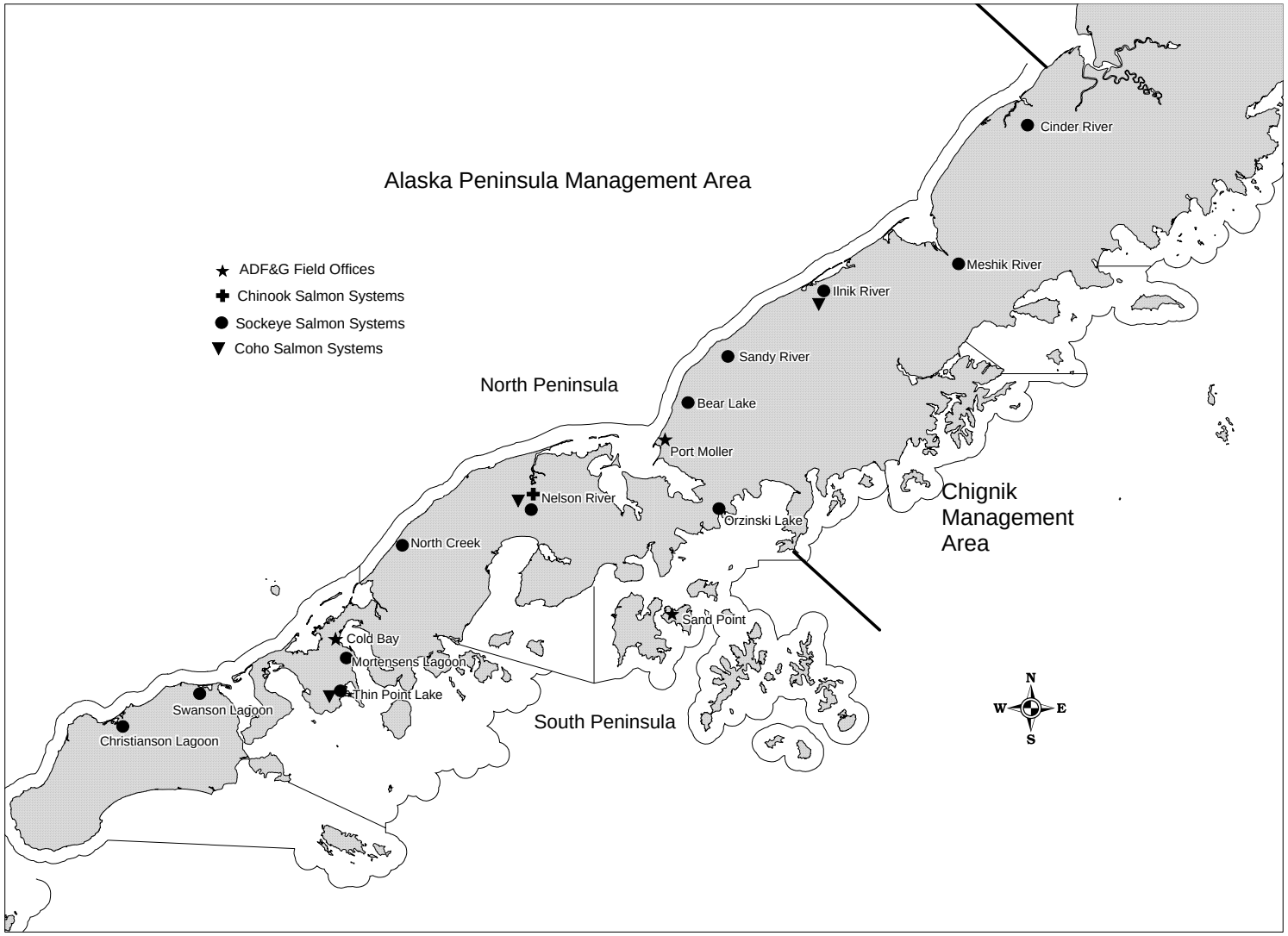


Figure 3.–Map of the Alaska Peninsula Management Area with major sockeye, coho, and Chinook salmon systems depicted.

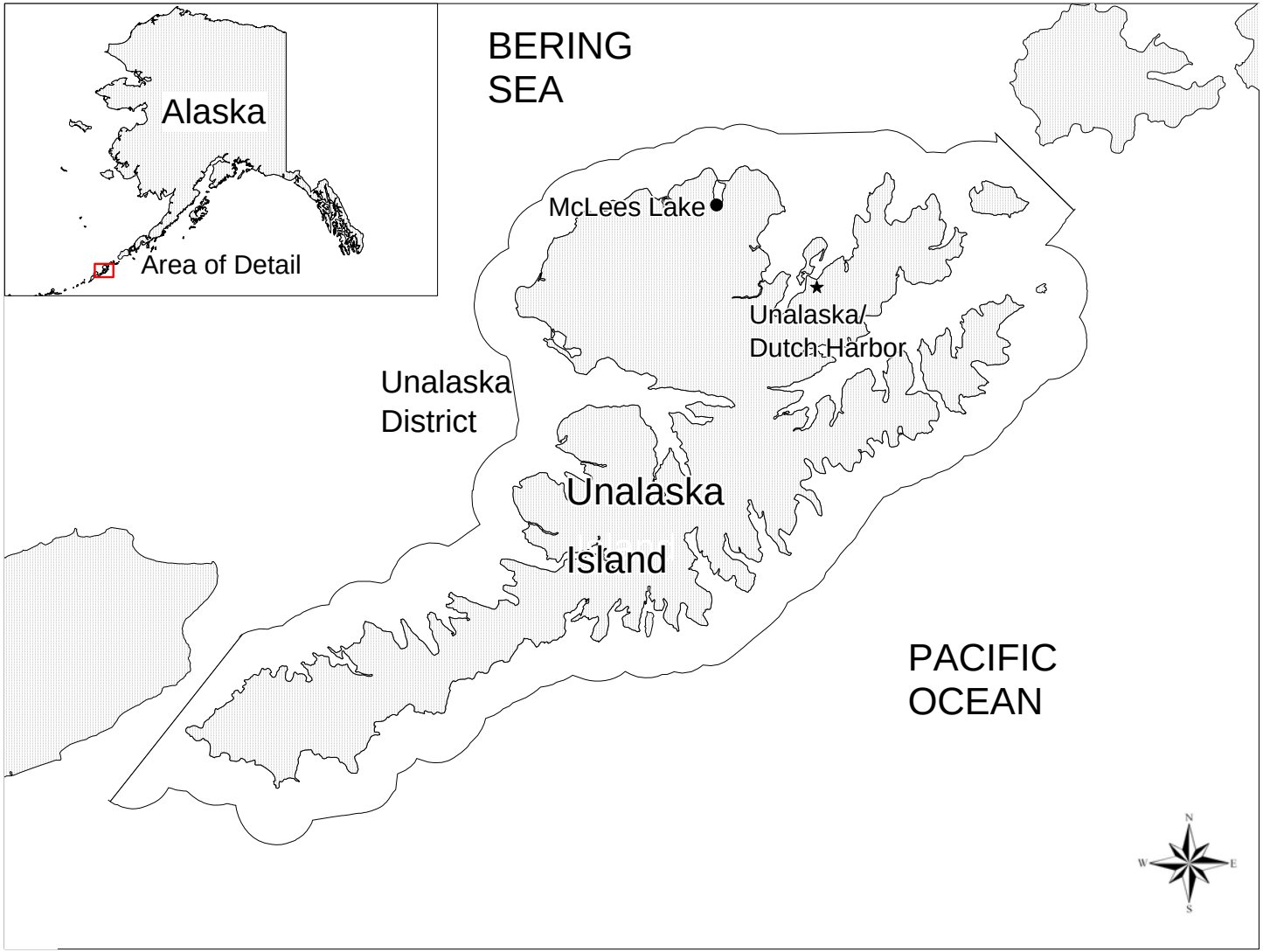


Figure 4.–Map of Unalaska Island within the Aleutian Islands Management Area with McLees Lake depicted.

APPENDIX A. SUPPORTING INFORMATION FOR THE NELSON RIVER CHINOOK SALMON ESCAPEMENT GOAL

Appendix A1.–Description of stock and escapement goal for Nelson River Chinook salmon.

System: **Nelson River.**

Species: **Chinook salmon.**

Description of stock and escapement goal.

Regulatory area:	Alaska Peninsula Management Area – Westward Region.
Management division:	Commercial Fisheries.
Primary fishery:	Commercial set and drift gillnet.
Current escapement goal:	BEG: 2,400 to 4,400.
Recommended escapement goal:	No change.
Optimal escapement goal:	None.
Inriver goal:	None.
Action points: none.	
Escapement enumeration:	Tower 1974–1988;
	Weir 1989–present.
Data summary:	
Data quality	Good.
Data type	Tower or weir projects usually pulled from system prior to the end of the Chinook salmon run. Therefore, aerial surveys are conducted to count Chinook salmon downstream of the tower or weir on the day that, or a few days after, the weir or tower is removed either final tower or weir count. Stock-specific harvest information is available from 1970 to 2003. Harvest age data are available from 1985 to 2003.
Comments	Current BEG was based on a Ricker analysis and verified with a habitat model.

Appendix A2.–Nelson River Chinook salmon escapement table.

System: **Nelson River.**

Species: **Chinook salmon.**

Data available for analysis of escapement goal.

Year	Index Escapement [a]
1974	1,092
1975	1,917
1976	3,045
1977	4,844
1978	3,901
1979	10,463
1980	4,506
1981	5,046
1982	6,503
1983	12,561
1984	5,412
1985	4,500
1986	4,757
1987	3,854
1988	1,873
1989	2,500
1990	1,800
1991	4,981
1992	2,320
1993	5,160
1994	4,552
1995	2,127
1996	3,967
1997	6,902
1998	4,809
1999	3,907
2000	3,891
2001	7,088
2002	6,750
2003	5,154
2004	7,664
2005	4,993
2006	2,516
2007	2,492
2008	5,012
2009	2,048
2010	2,769
2011	1,704

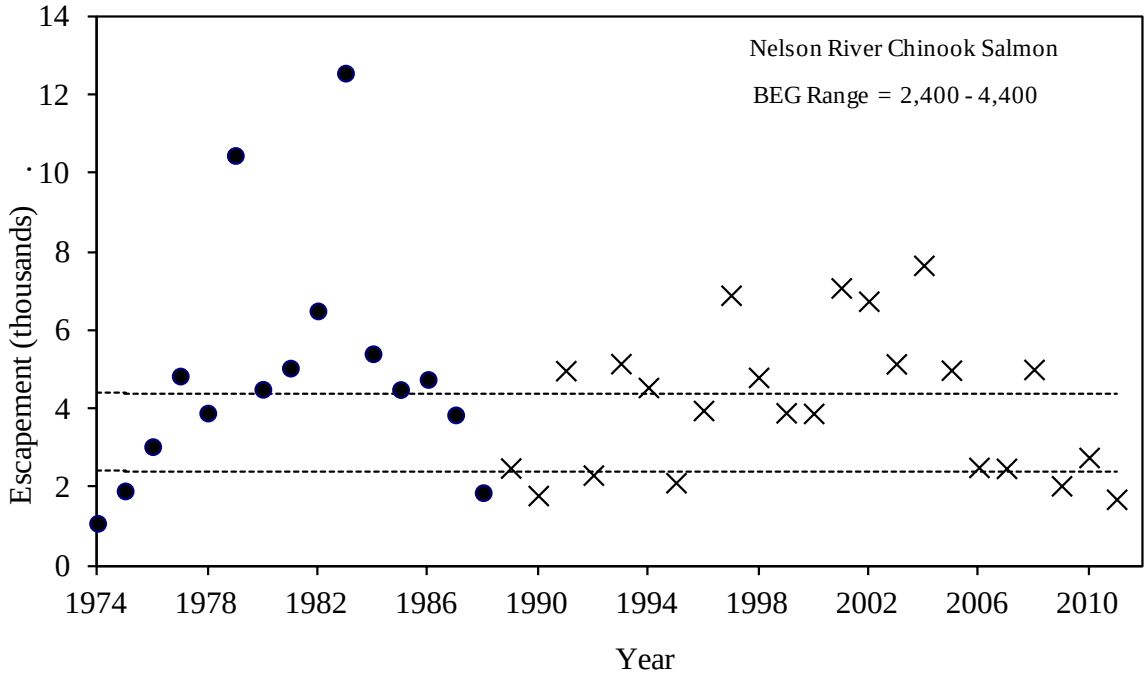
[a] The estimated total escapement represents the peak survey, enumeration of carcasses, as well as ancillary and qualitative data.

Appendix A3.–Nelson River Chinook salmon escapement graph.

System: **Nelson River.**

Species: **Chinook salmon.**

Solid circles tower counts, X-symbols represent weir counts, and dashed lines are the current BEG.



APPENDIX B. SUPPORTING INFORMATION FOR THE ORZINSKI LAKE SOCKEYE SALMON ESCAPEMENT GOAL

Appendix B1.–Description of stock and escapement goal for Orzinski Lake sockeye salmon.

System: Orzinski Lake.

Species: Sockeye salmon.

Description of stock and escapement goal.

Regulatory area:	Alaska Peninsula Management Area – Westward Region.
Management division:	Commercial Fisheries.
Primary fishery:	Commercial set gillnet and purse seine.
Current escapement goal:	SEG: 15,000 to 20,000 (1992).
Recommended escapement goal:	No change.
Optimal escapement goal:	None.
Inriver goal:	None.
Action points:	None.
Escapement enumeration:	Aerial survey, 1970–1989; weir 1990–present.
Data summary:	
Data quality	Fair for aerial surveys; good for weir enumeration.
Data type	Escapement age date 1990–present. No stock-specific harvest information is available.
Comments	SEG estimate based on percentile method reasonably supports current goal.

Appendix B2.–Orzinski sockeye salmon escapement table.

System: **Orzinski Lake.**

Species: **Sockeye salmon.**

Data available for analysis of escapement goal.

Year	Index Escapement[a]	Weir Counts
1970	4,450	
1971	11,100	
1972	6,500	
1973	1,200	
1974	61,500	
1975	22,500	
1976	24,600	
1977	17,000	
1978	22,000	
1979	20,000	
1980	12,100	
1981	14,000	
1982	9,000	
1983	21,300	
1984	19,300	
1985	14,000	
1986	10,300	
1987	11,400	
1988	19,500	
1989	16,700	
1990		15,000
1991		40,000
1992		25,000
1993		24,700
1994		38,000
1995		30,000
1996		30,000
1997		35,000
1998		25,000
1999		15,000
2000		21,500
2001		31,200
2002		42,849
2003		70,690
2004		75,450
2005		44,797
2006		18,000
2007		10,643
2008		36,839
2009		21,457
2010		18,039
2011		16,764

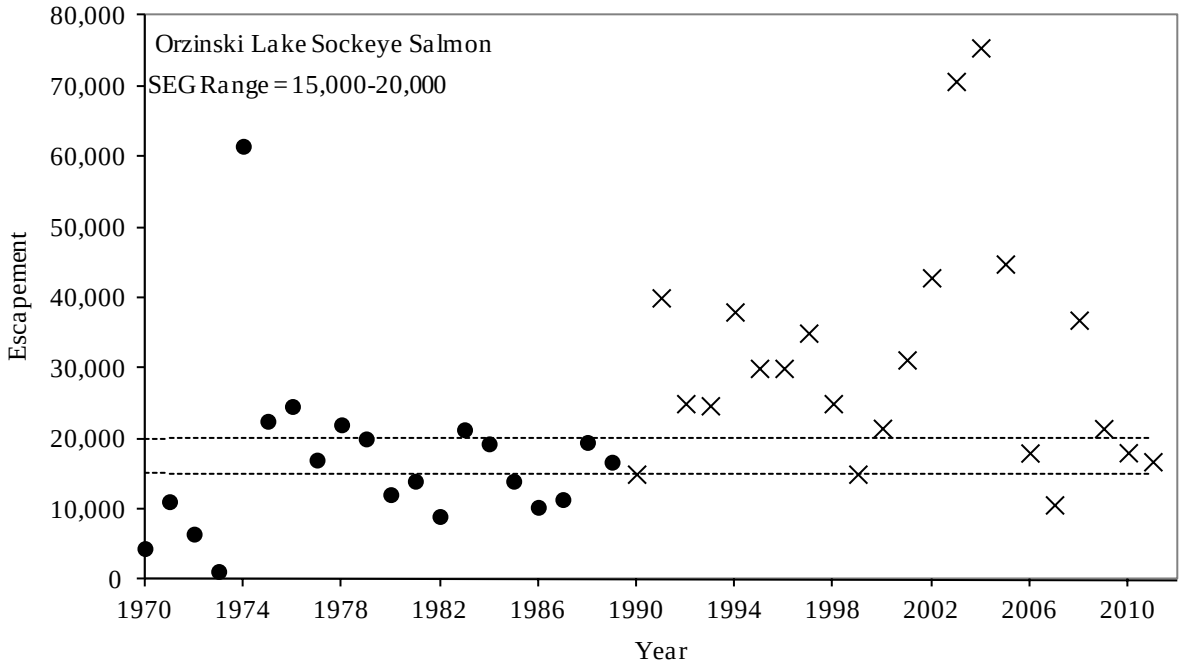
[a] The estimated total escapement represents the peak survey, enumeration of carcasses, as well as ancillary and qualitative data.

Appendix B3.–Orzinski sockeye salmon escapement graph.

System: **Orzinski Lake.**

Species: **Sockeye salmon.**

Solid circles aerial survey data, X-symbols represent weir counts, and lines are the current SEG.



APPENDIX C. SUPPORTING INFORMATION FOR THE THIN POINT LAKE SOCKEYE SALMON ESCAPEMENT GOAL

Appendix C1.–Description of stock and escapement goal for Thin Point Lake sockeye salmon.

System: Thin Point Lake.

Species: Sockeye salmon.

Description of stock and escapement goal.

Regulatory area:	Alaska Peninsula Management Area – Westward Region.
Management division:	Commercial Fisheries.
Primary fishery:	Commercial purse seine and set and drift gillnet.
Current escapement goal:	SEG: 14,000 to 28,000 (late 1980s).
Recommended escapement goal:	No change.
Optimal escapement goal:	None.
Inriver goal:	None.
Action points:	None.
Escapement enumeration:	Aerial survey, 1968–present; Weir counts, 1994–1998.
Data summary:	
Data quality	Fair for aerial surveys; poor for weir counts.
Data type	Due to prolonged milling behavior in Thin Point Lagoon below the weir site, most of the yearly escapement was not counted past the weir; therefore, aerial survey counts are considered more accurate. No stock-specific harvest information is available.
Comments	Percentile method supports current SEG.

Appendix C2.–Thin Point Lake sockeye salmon escapement table.

System: **Thin Point Lake.**

Species: **Sockeye salmon.**

Data available for analysis of escapement goal.

Year	Index Escapement[a]
1970	1,100
1971	1,300
1972	1,300
1973	700
1974	16,000
1975	6,100
1976	20,500
1977	17,700
1978	7,400
1979	6,900
1980	12,000
1981	7,500
1982	8,800
1983	6,500
1984	5,000
1985	7,500
1986	12,400
1987	8,700
1988	23,500
1989	21,500
1990	15,000
1991	35,800
1992	32,600
1993	22,600
1994	25,000
1995	31,700
1996	9,000
1997	10,000
1998	21,000
1999	20,500
2000	12,000
2001	47,900
2002	51,000
2003	40,000
2004	34,500
2005	21,000
2006	11,510
2007	21,550
2008	18,900
2009	33,500
2010	12,400
2011	14,500

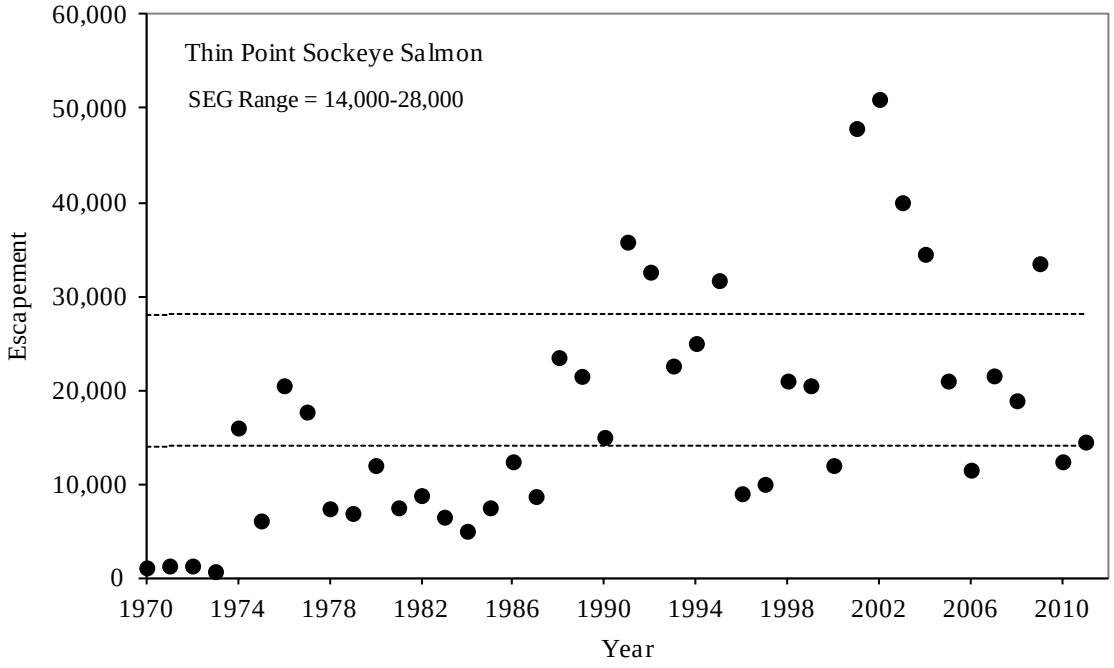
[a] The estimated total escapement represents the peak survey, enumeration of carcasses, as well as ancillary and qualitative data.

Appendix C3.–Thin Point Lake sockeye salmon escapement graph.

System: **Thin Point Lake.**

Species: **Sockeye salmon.**

Observed escapement by year (solid circles) and current SEG (dashed line).



APPENDIX D. SUPPORTING INFORMATION FOR THE MORTENSENS LAGOON SOCKEYE SALMON ESCAPEMENT GOAL

Appendix D1.–Description of stock and escapement goal for Mortensens Lagoon sockeye salmon.

System: **Mortensens Lagoon.**

Species: **Sockeye salmon.**

Description of stock and escapement goal.

Regulatory area:	Alaska Peninsula Management Area – Westward Region.
Management division:	Commercial Fisheries.
Primary fishery:	Commercial purse seine and set gillnet.
Current escapement goal:	SEG: 3,200 to 6,400 (late 1980s).
Recommended escapement goal:	No change.
Optimal escapement goal:	None.
Inriver goal:	None.
Action points:	None.
Escapement enumeration:	Aerial survey, 1970–present; Weir counts, 2001–2006.
Data summary:	
Data quality	Poor for aerial surveys; good for weir counts.
Data type	Fixed aerial surveys from 1970 to present, and weir counts from 2001 to 2006, with escapement age data during weir counts. No stock-specific harvest information is available.
Comments	Percentile method supports current SEG.

Appendix D2.–Mortensens Lagoon sockeye salmon escapement table.

System: **Mortensens Lagoon.**

Species: **Sockeye salmon.**

Data available for analysis of escapement goal.

Year	Index Escapement[a]	Weir Counts
1970	800	
1971	800	
1972	1,000	
1973	1,250	
1974	3,070	
1975	4,000	
1976	3,400	
1977	5,700	
1978	13,000	
1979	5,900	
1980	2,600	
1981	3,800	
1982	1,800	
1983	5,750	
1984	4,700	
1985	4,400	
1986	1,620	
1987	4,000	
1988	6,000	
1989	4,300	
1990	6,200	
1991	7,100	
1992	9,100	
1993	6,400	
1994	4,300	
1995	8,300	
1996	2,200	
1997	5,200	
1998	5,300	
1999	3,600	
2000	3,800	
2001	9,100	
2002		5,200
2003		16,804
2004		7,215
2005		21,703
2006		14,688
2007	6,200	
2008	5,600	
2009	25,000	
2010	6,600	
2011	500	

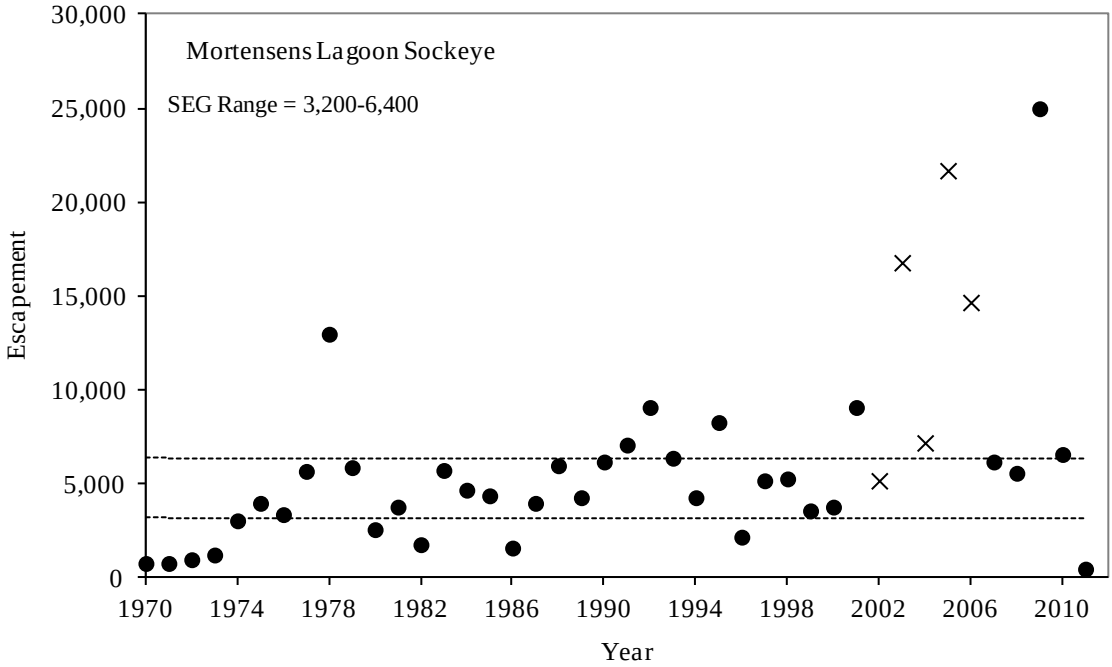
[a] The estimated total escapement represents the peak survey, enumeration of carcasses, as well as ancillary and qualitative data.

Appendix D3.–Mortensens Lagoon sockeye salmon escapement graph.

System: **Mortensens Lagoon.**

Species: **Sockeye salmon.**

Solid circles aerial survey data, X-symbols represent weir counts, and lines are the current SEG.



APPENDIX E. SUPPORTING INFORMATION FOR THE CHRISTIANSON LAGOON SOCKEYE SALMON ESCAPEMENT GOAL

Appendix E1.–Description of stock and escapement goal for Christianson Lagoon sockeye salmon.

System: **Christianson Lagoon.**

Species: **Sockeye salmon.**

Description of stock and escapement goal.

Regulatory area:	Alaska Peninsula Management Area – Westward Region.
Management division:	Commercial Fisheries.
Primary fishery:	Commercial purse seine and set gillnet.
Current escapement goal:	SEG: 25,000 to 50,000 (late 1980s).
Recommended escapement goal:	No change.
Optimal escapement goal:	None.
Inriver goal:	None.
Action points:	None.
Escapement enumeration:	Aerial survey, 1971–present.
Data summary:	
Data quality	Poor.
Data type	Fixed aerial surveys from 1971 to present; intermittent in 1960s. No stock-specific harvest information is available.
Comments	Percentile method supports current SEG.

Appendix E2.–Christianson Lagoon sockeye salmon escapement table.

System: **Christianson Lagoon.**

Species: **Sockeye salmon.**

Data available for analysis of escapement goal.

Year	Index Escapement[a]
1971	29,500
1972	3,900
1973	4,100
1974	3,100
1975	10,400
1976	19,400
1977	13,700
1978	10,200
1979	25,600
1980	75,300
1981	59,100
1982	25,500
1983	13,500
1984	63,000
1985	25,800
1986	36,800
1987	24,200
1988	29,700
1989	46,700
1990	45,600
1991	64,900
1992	28,000
1993	30,600
1994	37,800
1995	41,800
1996	25,600
1997	33,200
1998	38,600
1999	48,000
2000	49,400
2001	36,400
2002	42,700
2003	52,200
2004	75,400
2005	54,500
2006	41,505
2007	48,075
2008	114,000
2009	48,100
2010	27,900
2011	35,200

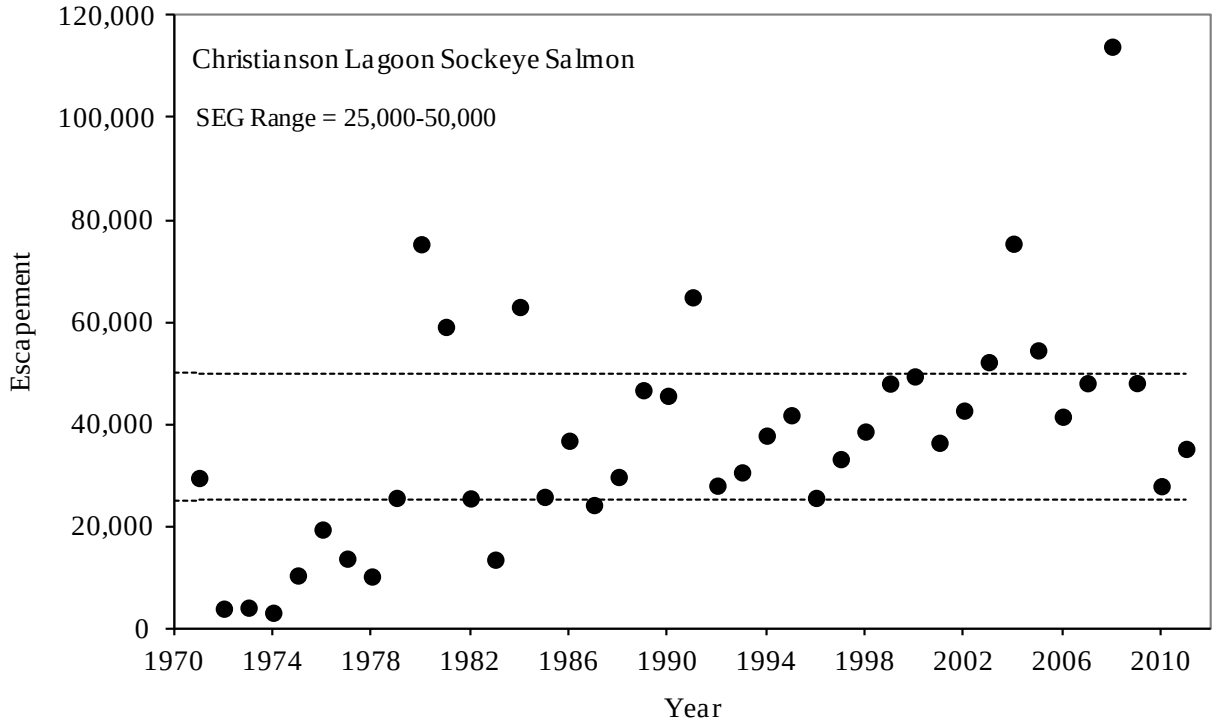
[a] The estimated total escapement represents the peak survey, enumeration of carcasses, as well as ancillary and qualitative data.

Appendix E3.–Christianson Lagoon sockeye salmon escapement graph.

System: **Christianson Lagoon.**

Species: **Sockeye salmon.**

Solid circles aerial survey data and lines are the current SEG.



APPENDIX F. SUPPORTING INFORMATION FOR THE SWANSON LAGOON SOCKEYE SALMON ESCAPEMENT GOAL

Appendix F1.–Description of stock and escapement goal for Swanson Lagoon sockeye salmon.

System: **Swanson Lagoon.**

Species: **Sockeye salmon.**

Description of stock and escapement goal.

Regulatory area:	Alaska Peninsula Management Area – Westward Region.
Management division:	Commercial Fisheries.
Primary fishery:	Commercial purse seine and set and drift gillnet.
Current escapement goal:	SEG: 6,000 to 16,000 (2007).
Recommended escapement goal:	No change.
Optimal escapement goal:	None.
Inriver goal:	None.
Action points:	None.
Escapement enumeration:	Aerial survey, 1960–present.
Data summary:	
Data quality	Poor.
Data type	Fixed aerial surveys from 1960 to present. No stock-specific harvest information is available.
Comments	Current SEG is based on percentile method.

Appendix F2.–Swanson Lagoon sockeye salmon escapement table.

System: **Swanson Lagoon.**

Species: **Sockeye salmon.**

Data available for analysis of escapement goal.

Year	Index Escapement[a]
1970	700
1971	300
1972	200
1973	100
1974	500
1975	1,400
1976	2,600
1977	12,000
1978	8,100
1979	8,400
1980	9,700
1981	600
1982	1,800
1983	300
1984	5,500
1985	3,400
1986	7,400
1987	9,600
1988	5,700
1989	5,500
1990	32,900
1991	11,200
1992	15,400
1993	7,600
1994	9,700
1995	10,300
1996	9,300
1997	7,800
1998	5,000
1999	7,900
2000	5,700
2001	10,600
2002	10,000
2003	16,100
2004	24,300
2005	3,500
2006	376
2007	9,200
2008	5,500
2009	1,000
2010	1,700
2011	1,000

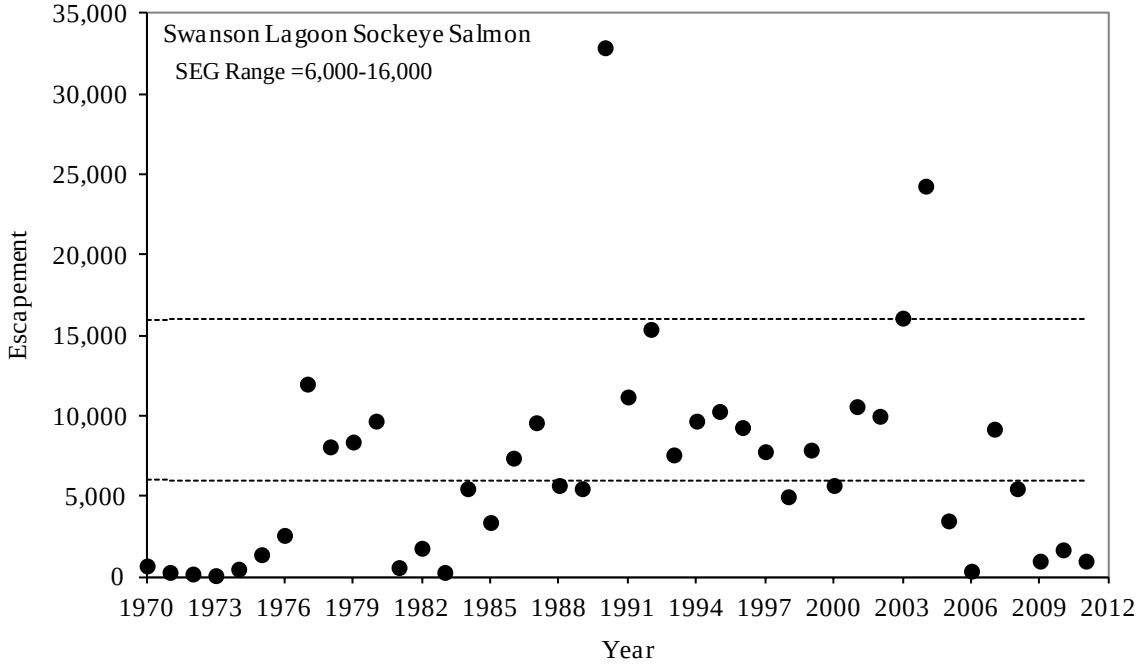
[a] The estimated total escapement represents the peak survey, enumeration of carcasses, as well as ancillary and qualitative data.

Appendix F3.–Swanson Lagoon sockeye salmon escapement graph.

System: **Swanson Lagoon.**

Species: **Sockeye salmon.**

Solid circles aerial survey data and lines are the current SEG.



APPENDIX G. SUPPORTING INFORMATION FOR THE NORTH CREEK SOCKEYE SALMON ESCAPEMENT GOAL

Appendix G1.–Description of stock and escapement goal for North Creek sockeye salmon.

System: North Creek.

Species: Sockeye salmon.

Description of stock and escapement goal.

Regulatory area:	Alaska Peninsula Management Area – Westward Region.
Management division:	Commercial Fisheries.
Primary fishery:	Commercial set and drift gillnet.
Current escapement goal:	SEG: 4,400 to 8,800 (late 1980s).
Recommended escapement goal:	No change.
Optimal escapement goal:	None.
Inriver goal:	None.
Action points:	None.
Escapement enumeration:	Aerial survey, 1960–present.
Data summary:	
Data quality	Poor.
Data type	Fixed aerial surveys from 1960 to present. No stock-specific harvest information is available.
Comments	Percentile method supports current SEG.

Appendix G2.–North Creek sockeye salmon escapement table.

System: **North Creek.**

Species: **Sockeye salmon.**

Data available for analysis of escapement goal.

Year	Index Escapement[a]
1970	600
1971	
1972	
1973	
1974	1,800
1975	1,700
1976	7,100
1977	3,300
1978	500
1979	2,100
1980	3,400
1981	
1982	5,800
1983	2,000
1984	500
1985	3,600
1986	2,100
1987	8,300
1988	6,300
1989	7,000
1990	4,300
1991	9,000
1992	15,700
1993	9,700
1994	4,600
1995	3,400
1996	8,000
1997	5,700
1998	6,700
1999	10,900
2000	8,100
2001	8,000
2002	10,100
2003	10,200
2004	15,000
2005	45,000
2006	7,530
2007	16,800
2008	38,000
2009	8,000
2010	18,500
2011	10,200

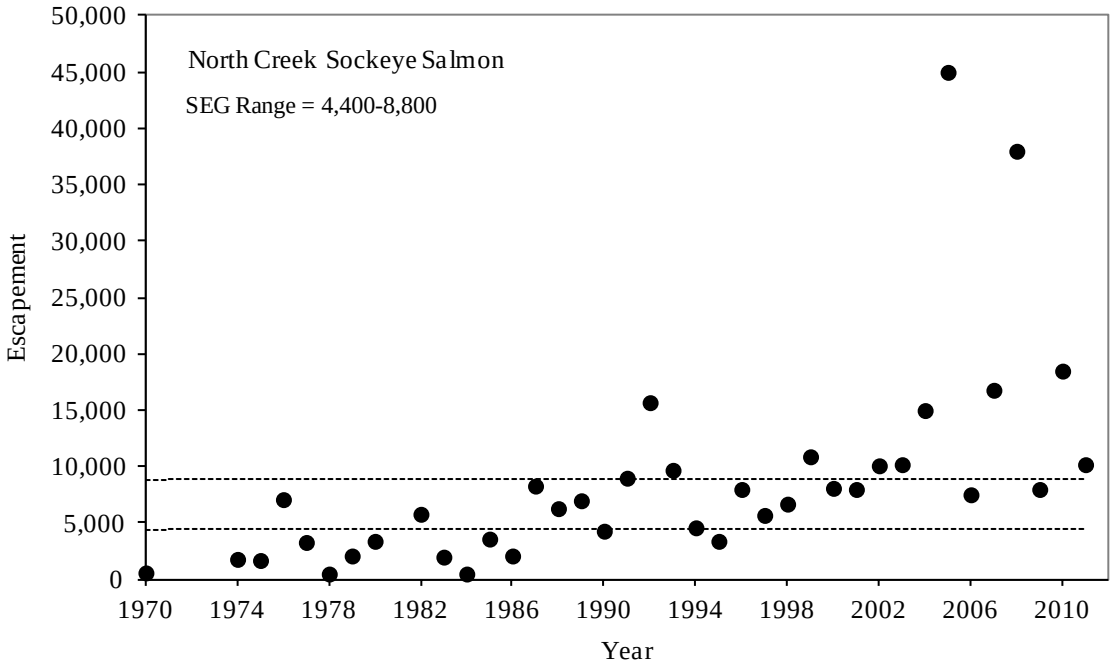
[a] The estimated total escapement represents the peak survey, enumeration of carcasses, as well as ancillary and qualitative data. Missing values are years when surveys were not conducted due to poor survey conditions.

Appendix G3.–North Creek sockeye salmon escapement graph.

System: **North Creek.**

Species: **Sockeye salmon.**

Solid circles aerial survey data and lines are the current SEG.



APPENDIX H. SUPPORTING INFORMATION FOR THE NELSON RIVER SOCKEYE SALMON ESCAPEMENT GOAL

Appendix H1.–Description of stock and escapement goal for Nelson River sockeye salmon.

System: Nelson River.

Species: Sockeye salmon.

Description of stock and escapement goal.

Regulatory area:	Alaska Peninsula Management Area – Westward Region.
Management division:	Commercial Fisheries.
Primary fishery:	Commercial set and drift gillnet.
Current escapement goal:	BEG: 97,000 to 219,000 (2004).
Recommended escapement goal:	No change.
Optimal escapement goal:	None.
Inriver goal:	None.
Action points:	None.
Escapement enumeration:	Tower counts, 1962–1988; Weir counts, 1989–present.
Data summary:	
Data quality	Good for tower counts; excellent for weir counts.
Data type	Tower counts from 1962 to 1988 and weir counts from 1989 to present. Escapement age data are available from 1985 to present. Stock-specific harvest information is available from 1970 to present.
Comments	Current BEG was based on Ricker spawner-recruit model.

Appendix H2.–Nelson River sockeye salmon escapement table.

System: **Nelson River.**

Species: **Sockeye salmon.**

Data available for analysis of escapement goal.

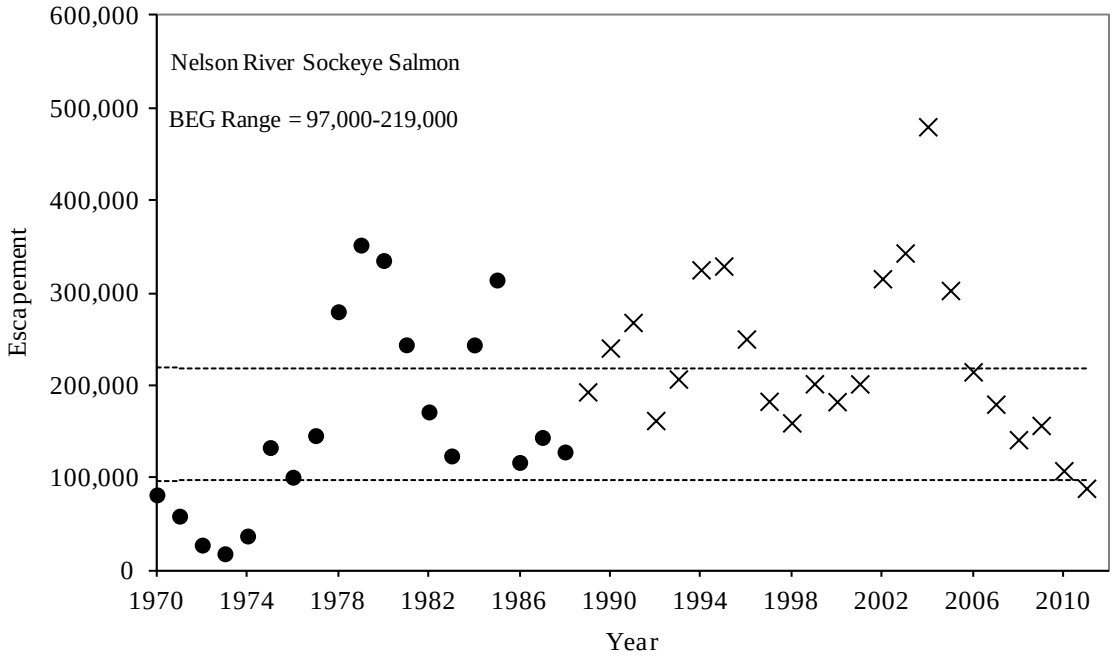
Year	Tower Escapement	Weir Escapement
1970	81,900	
1971	58,900	
1972	27,600	
1973	18,200	
1974	37,400	
1975	133,100	
1976	101,000	
1977	146,000	
1978	280,000	
1979	352,100	
1980	335,400	
1981	244,200	
1982	171,600	
1983	124,000	
1984	244,100	
1985	314,300	
1986	117,000	
1987	144,000	
1988	128,300	
1989		193,300
1990		240,700
1991		268,400
1992		162,300
1993		207,200
1994		325,300
1995		329,400
1996		250,500
1997		183,100
1998		159,800
1999		202,067
2000		182,700
2001		201,962
2002		315,693
2003		343,511
2004		480,097
2005		303,000
2006		215,000
2007		180,000
2008		141,600
2009		157,000
2010		108,000
2011		89,000

Appendix H3.–Nelson River sockeye salmon escapement graph.

System: **Nelson River.**

Species: **Sockeye salmon.**

Solid circles tower count data, X-symbols represent weir counts, and lines are the current escapement goal range.



APPENDIX I. SUPPORTING INFORMATION FOR THE BEAR LAKE SOCKEYE SALMON ESCAPEMENT GOALS

Appendix I1.–Description of stock and escapement goals for Bear Lake sockeye salmon.

System: **Bear Lake.**

Species: **Sockeye salmon.**

Description of stock and escapement goals.

Regulatory area	Alaska Peninsula Management Area – Westward Region.
Management division:	Commercial Fisheries.
Primary fishery:	Commercial purse seine and drift gillnet.
Previous escapement goal:	SEG: Early Run: 176,000 to 293,000.
	SEG: Late Run: 117,000 to 195,000.
	SEG: Total Run: 293,000 to 488,000.
Recommended escapement goal:	No change.
Optimal escapement goal:	None.
Inriver goal:	None.
Action points:	None.
Escapement enumeration:	Tower counts, 1964–1985;
	Weir counts, 1986–present.
Data summary:	
Data quality:	Good for tower counts; excellent for weir counts.
Data type:	Tower counts from 1964 to 1985; weir counts from 1986 to present. Escapement age data are available from 1985 to present and harvest age data are available from 1985 to present for the late run (after July 31). Stock-specific harvest information is available for the late run from 1970 to present. No-stock specific harvest information is available for the early run (prior to August 1).
Comments:	The Bear Lake system is considered spawner-limited and therefore, the spawning habitat model was used to estimate the SEG.

Appendix I2.–Bear Lake early-run sockeye salmon escapement table.

System: **Bear Lake early run.**

Species: **Sockeye salmon.**

Data available for analysis of escapement goal.

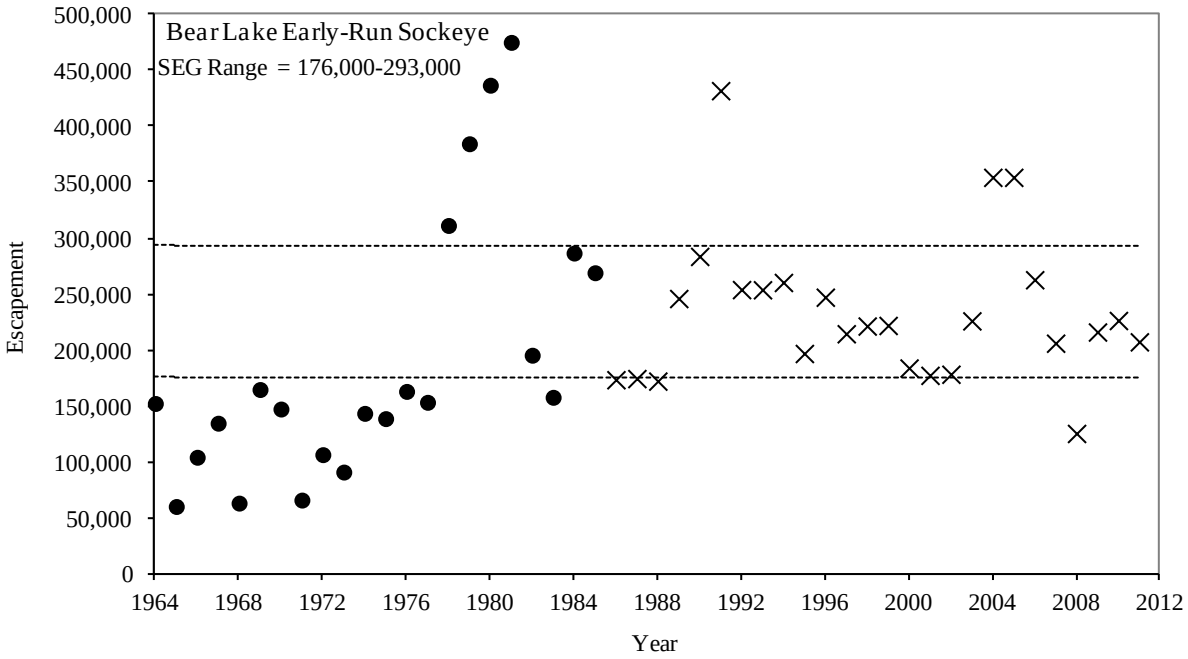
Year	Tower Counts	Weir Counts
1964	152,336	
1965	60,211	
1966	104,237	
1967	134,696	
1968	63,235	
1969	164,820	
1970	147,367	
1971	65,950	
1972	106,571	
1973	90,998	
1974	143,505	
1975	138,793	
1976	163,135	
1977	153,383	
1978	311,528	
1979	384,613	
1980	436,962	
1981	475,272	
1982	195,497	
1983	157,857	
1984	286,849	
1985	269,261	
1986		173,579
1987		174,605
1988		172,340
1989		246,196
1990		283,854
1991		432,087
1992		254,170
1993		254,012
1994		260,559
1995		197,039
1996		247,371
1997		214,689
1998		221,580
1999		222,110
2000		184,053
2001		177,495
2002		178,480
2003		226,201
2004		354,565
2005		354,565
2006		262,995
2007		206,233
2008		125,526
2009		216,237
2010		226,534
2011		207,451

Appendix I3.–Bear Lake early-run sockeye salmon escapement graph.

System: **Bear Lake early run.**

Species: **Sockeye salmon.**

Solid circles tower count data, X-symbols represent weir counts, and lines are the current SEG.



Appendix I4.–Bear Lake late-run sockeye salmon table.

System: **Bear Lake late run.**

Species: **Sockeye salmon.**

Data available for analysis of escapement goal.

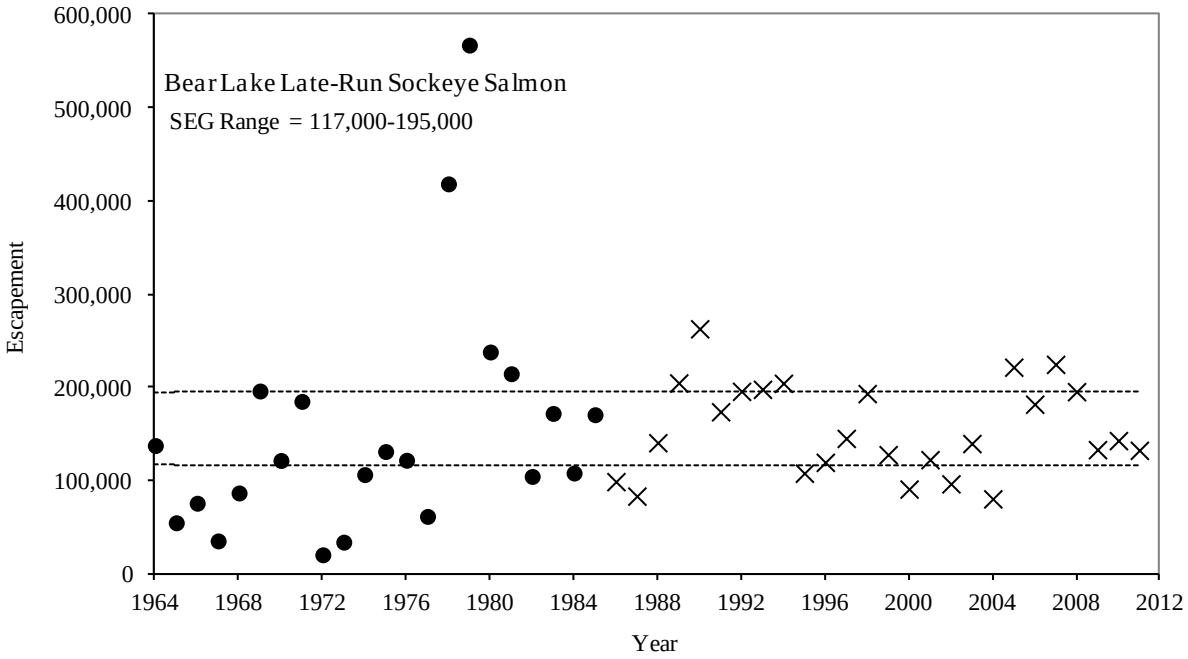
Year	Tower Counts	Weir Counts
1964	137,664	
1965	54,789	
1966	75,763	
1967	35,304	
1968	86,765	
1969	196,180	
1970	121,633	
1971	185,050	
1972	20,429	
1973	34,002	
1974	106,495	
1975	131,207	
1976	121,865	
1977	61,617	
1978	418,472	
1979	567,387	
1980	238,038	
1981	214,728	
1982	104,503	
1983	172,143	
1984	108,151	
1985	170,739	
1986		98,921
1987		83,395
1988		140,660
1989		204,804
1990		262,946
1991		173,913
1992		195,830
1993		197,988
1994		204,441
1995		107,961
1996		119,629
1997		145,311
1998		193,420
1999		127,890
2000		90,947
2001		122,505
2002		96,520
2003		139,799
2004		80,435
2005		221,752
2006		182,005
2007		224,767
2008		195,474
2009		133,263
2010		142,966
2011		132,549

Appendix I5.–Bear Lake late-run sockeye salmon escapement graph.

System: **Bear Lake late run.**

Species: **Sockeye salmon.**

Solid circles tower count data, X-symbols represent weir counts, and lines are the current SEG.



APPENDIX J. SUPPORTING INFORMATION FOR THE SANDY RIVER SOCKEYE SALMON ESCAPEMENT GOAL

Appendix J1.–Description of stock and escapement goal for Sandy River sockeye salmon.

System: **Sandy River.**

Species: **Sockeye salmon.**

Description of stock and escapement goals.

Regulatory area	Alaska Peninsula Management Area – Westward Region.
Management division:	Commercial Fisheries.
Primary fishery:	Commercial purse seine and drift gillnet.
Previous escapement goal:	SEG: 34,000 to 74,000 (2007).
Recommended escapement goal:	No change.
Optimal escapement goal:	None.
Inriver goal:	None.
Action points:	None.
Escapement enumeration:	Aerial survey, 1960–1993; Tower counts, 1962–1964; Weir counts, 1994–present.
Data summary:	
Data quality:	Fair for aerial survey/tower count; good for weir counts.
Data type:	Weir counts from 1994 to 2011 are available and escapement age information is available during weir counts. No stock-specific harvest information is available.
Comments:	SEG based on percentile method.

Appendix J2.–Sandy River sockeye salmon escapement table.

System: **Sandy River.**

Species: **Sockeye salmon.**

Data available for analysis of escapement goal.

Year	Total Escapement [a]	Peak Aerial Survey	Weir Counts
1970	25,000	21,800	
1971	30,000	30,000	
1972	8,400	8,400	
1973	5,100	10,000	
1974	16,500	16,500	
1975	40,000	38,350	
1976	43,000	43,050	
1977	100,000	100,000	
1978	64,000	64,000	
1979	61,000	61,000	
1980	76,000	76,000	
1981	51,500	51,700	
1982	61,300	57,200	
1983	28,000	28,000	
1984	19,000	19,000	
1985	11,500	11,000	
1986	6,900	14,000	
1987	8,900	8,900	
1988	34,500	34,500	
1989	36,000	36,000	
1990	17,500	17,500	
1991	75,200	75,200	
1992	21,200	8,900	
1993	49,300	46,300	
1994			115,000
1995			125,000
1996			64,000
1997			38,000
1998			52,000
1999			58,000
2000			40,000
2001			51,000
2002			49,000
2003			66,000
2004			32,000
2005			101,000
2006			48,000
2007			44,700
2008			32,200
2009			36,000
2010			37,000
2011			37,500

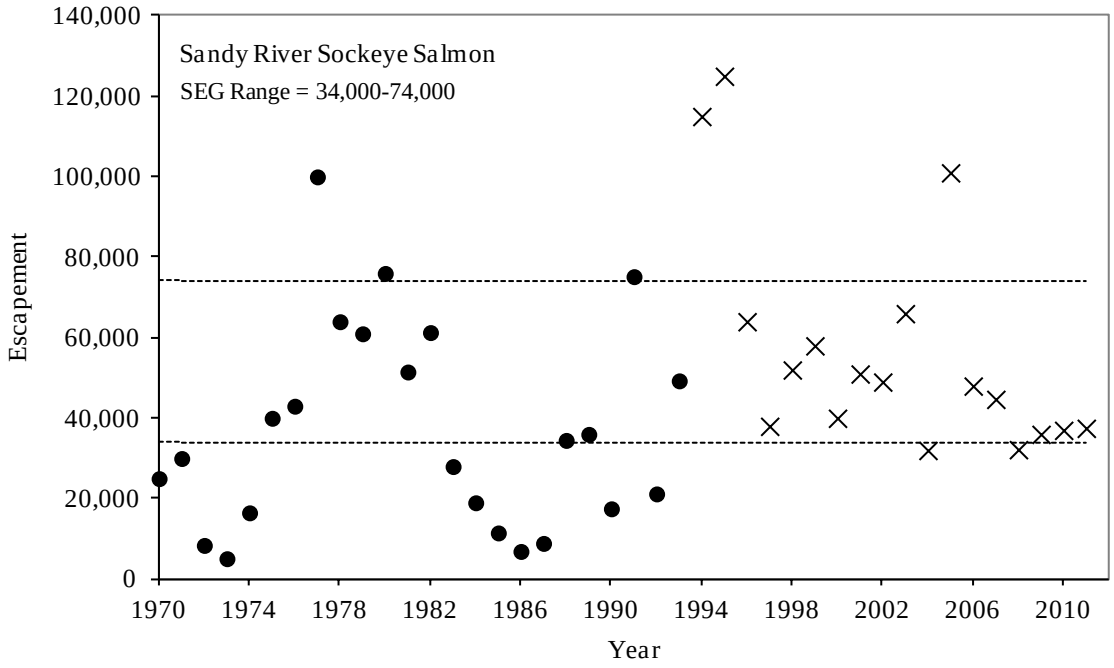
[a] The estimated total escapement represents the peak survey, enumeration of carcasses, as well as ancillary and qualitative data.

Appendix J3.–Sandy River sockeye salmon escapement graph.

System: **Sandy River.**

Species: **Sockeye salmon.**

Solid circles aerial survey data, X-symbols represent weir counts, and lines are the current SEG.



APPENDIX K. SUPPORTING INFORMATION FOR THE ILNIK RIVER SOCKEYE SALMON ESCAPEMENT GOAL

Appendix K1.–Description of stock and escapement goal for Ilnik River sockeye salmon.

System: **Ilnik River.**

Species: **Sockeye salmon.**

Description of stock and escapement goals.

Regulatory area	Alaska Peninsula Management Area – Westward Region.
Management division:	Commercial Fisheries.
Primary fishery:	Commercial drift and set gillnet.
Previous escapement goal:	SEG: 40,000 to 60,000 (1991).
Recommended escapement goal:	No change.
Optimal escapement goal:	None.
Inriver goal:	None.
Action points:	None.
Escapement enumeration:	Aerial survey, 1960–1990; Weir count, 1991–present.
Data summary:	
Data quality:	Fair for aerial surveys; good for weir counts.
Data type:	Fixed-wing aerial surveys from 1970 to 1990; intermittent during 1960s. Weir counts from 1991 to present, with escapement age data available during weir counts. No stock-specific harvest information is available.
Comments:	Current escapement based on percentile, euphotic volume analysis, smolt biomass as a function of zooplankton biomass, and lake surface area methods.

Appendix K2.–Ilnik River sockeye salmon escapement table.

System: **Ilnik River.**

Species: **Sockeye salmon.**

Data available for analysis of escapement goal.

Year	Index Escapement[a]	Weir Counts
1970	15,300	
1971	26,100	
1972	13,100	
1973	16,000	
1974	14,500	
1975	40,500	
1976	37,500	
1977	30,000	
1978	23,100	
1979	97,200	
1980	97,600	
1981	97,500	
1982	42,500	
1983	28,600	
1984	29,500	
1985	27,000	
1986	66,800	
1987	30,700	
1988	26,900	
1989	16,500	
1990	35,700	
1991		135,000
1992		45,000
1993		70,000
1994		75,000
1995		39,000
1996		62,000
1997		82,000
1998		50,000
1999		75,000
2000		95,000
2001		58,000
2002		43,000
2003		69,000
2004		82,000
2005		154,000
2006		75,000
2007		79,000
2008		44,300
2009		66,000
2010		59,000
2011		43,000

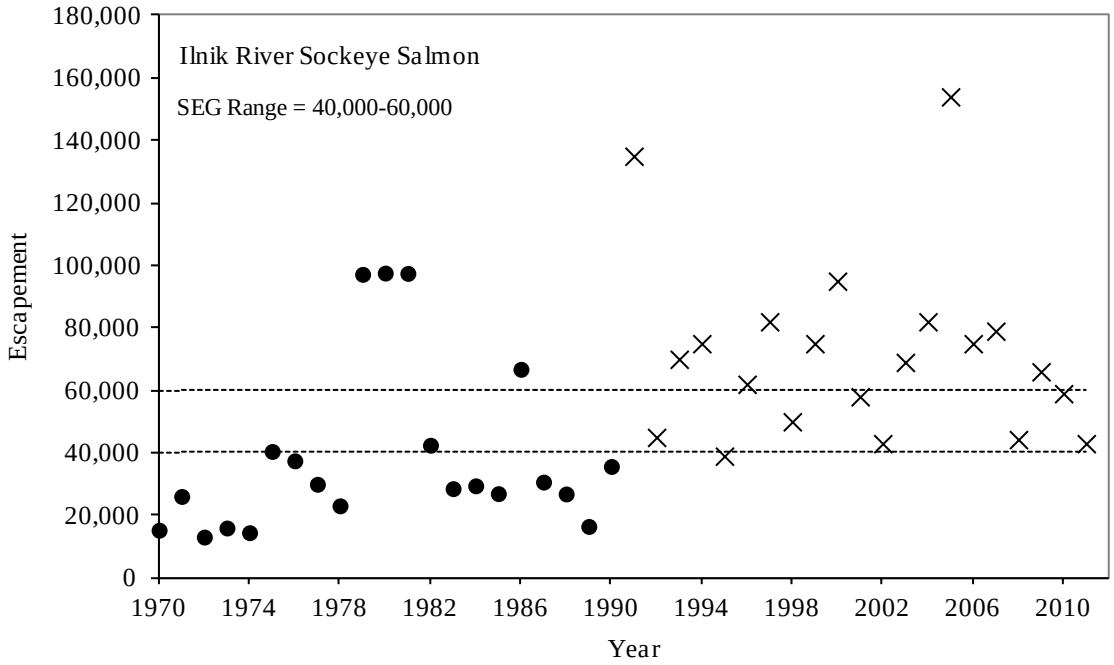
[a] The estimated total escapement represents the peak survey, enumeration of carcasses, as well as ancillary and qualitative data.

Appendix K3.–Ilnik River sockeye salmon escapement graph.

System: **Ilnik River.**

Species: **Sockeye salmon.**

Solid circles aerial survey data, X-symbols represent weir counts, and lines are the current SEG.



APPENDIX L. SUPPORTING INFORMATION FOR THE MESHIK RIVER SOCKEYE SALMON ESCAPEMENT GOAL

Appendix L1.–Description of stock and escapement goal for Meshik River sockeye salmon.

System: **Meshik River.**

Species: **Sockeye salmon.**

Description of stock and escapement goals.

Regulatory area:	Alaska Peninsula Management Area – Westward Region.
Management division:	Commercial Fisheries.
Primary fishery:	Commercial drift and set gillnet.
Current escapement goal:	SEG: 25,000 to 100,000 (2010).
Recommended escapement goal:	No change.
Optimal escapement goal:	None.
Inriver goal:	None.
Action points:	None.
Escapement enumeration:	Aerial survey, 1970–present.
Data summary:	
Data quality	Poor.
Data type	Fixed-wing aerial surveys from 1960 to present; missing data points throughout time period. 1990 to present includes increased aerial survey effort. No stock-specific harvest information is available.
Comments	SEG based on percentile method.

Appendix L2.–Meshik River sockeye salmon escapement.

System: **Meshik River.**

Species: **Sockeye salmon.**

Data available for analysis of escapement goal.

Year	Meshik Mainstem Index Escapement[a]	Yellow Bluff & Red Bluff Index Escapement[a]	Combined Meshik system Index Escapement[a]
1970	13,100		
1971	29,300		
1972	3,700		
1973	6,500		
1974	1,200		
1975	4,800		
1976	25,500		
1977	15,100		
1978	17,900		
1979	93,100		
1980	15,000		
1981	23,700		
1982	13,725		
1983	8,850		
1984	25,500		
1985	26,500		
1986	28,050		
1987	26,300		
1988	27,000		
1989	5,700		
1990	22,550	3,650	26,200
1991	19,480	5,300	24,780
1992	21,100	11,300	32,400
1993[b]			
1994	35,700	10,000	45,700
1995	67,600	18,000	85,600
1996	59,850	100	59,950
1997	14,600	500	15,100
1998	51,400	6,300	57,700
1999	62,200	12,500	74,700
2000	157,700	26,000	183,700
2001	100,500	11,500	112,000
2002	36,150		36,150
2003	94,000	20,000	114,000
2004	82,200	20,000	102,200
2005	96,100	15,000	111,100
2006	114,010	24,000	138,010
2007	45,400	11,500	56,900
2008	61,250	22,000	83,250
2009	63,700	24,500	88,200
2010	46,200	17,500	63,700
2011	79,700	7,100	86,800

[a] The estimated total escapement represents the peak survey, enumeration of carcasses, as well as ancillary and qualitative data.

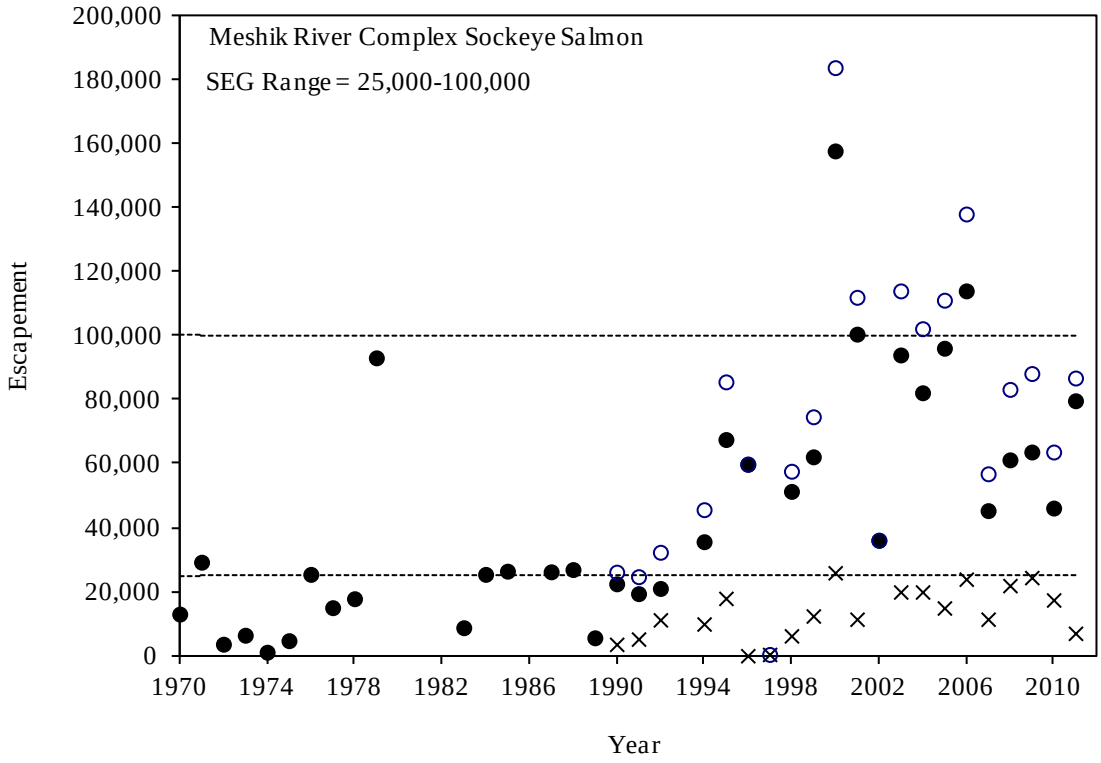
[b] No survey was conducted in 1993.

Appendix L3.–Meshik River sockeye salmon escapement graph.

System: **Meshik River.**

Species: **Sockeye salmon.**

Observed escapement by year (solid circles for Meshik mainstem only; Xs for Red Bluff and Yellow Bluff creeks; open circles for combined Meshik, Red Bluff, and Yellow Bluff creeks) and current SEG range (dashed lines).



APPENDIX M. SUPPORTING INFORMATION FOR THE CINDER RIVER SOCKEYE SALMON ESCAPEMENT GOAL

Appendix M1.–Description of stock and escapement goal for Cinder River sockeye salmon.

System: **Cinder River.**

Species: **Sockeye salmon.**

Description of stock and escapement goals.

Regulatory area:	Alaska Peninsula Management Area – Westward Region.
Management division:	Commercial Fisheries.
Primary fishery:	Commercial drift and set gillnet.
Current escapement goal:	SEG: 12,000 to 48,000 (2007).
Recommended escapement goal:	No change.
Optimal escapement goal:	None.
Inriver goal:	None.
Action points:	None.
Escapement enumeration:	Aerial survey, 1970–present.
Data summary:	
Data quality	Poor.
Data type	Fixed-wing aerial surveys from 1960 to present; missing data points throughout time period. 1990 to present includes increased aerial survey effort. No stock-specific harvest information is available.
Comments:	Current SEG based on the percentile method.

Appendix M2.–Cinder River sockeye salmon escapement table.

System: **Cinder River.**

Species: **Sockeye salmon.**

Data available for analysis of escapement goal.

Year	Cinder River Index Escapement [a]	Mud Creek Index Escapement [a]	Combined Index Escapement [a, b]
1970	950		
1971	2,300		
1972	450		
1973	2,250		
1974	1,300		
1975	300		
1976	8,500		
1977			
1978	3,300		
1979	5,000		
1980	23,400		
1981	100,750		
1982			
1983			
1984	10,350		
1985	11,650		
1986	25,650		
1987	127		
1988	1,800		
1989	3,950		
1990	11,850		
1991	39,300	8,100	47,400
1992	11,300	1,200	12,500
1993			
1994	83,400		83,400
1995	47,500		47,500
1996			
1997	44,000		44,000
1998	57,000		57,000
1999	12,400		12,400
2000	51,000		51,000
2001	51,204		51,204
2002	11,500		11,500
2003	88,700	14,000	102,700
2004	55,050	3,000	58,050
2005	96,100	45,000	141,000
2006	52,100	49,000	101,100
2007	123,000	19,000	142,000
2008	96,800	33,000	129,800
2009	102,600	31,000	133,600
2010	90,900	18,000	108,900
2011	94,500	11,500	106,000

[a] The estimated total escapement represents the peak survey, enumeration of carcasses, as well as ancillary and qualitative data.

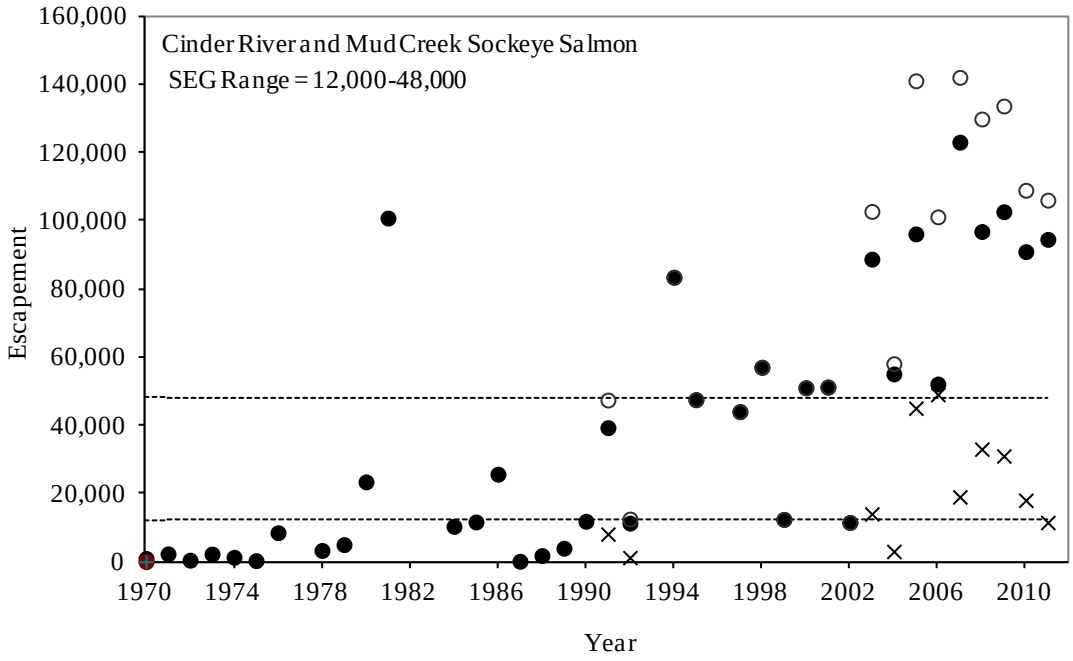
[b] Missing values are years when surveys were incomplete.

Appendix M3.–Cinder River sockeye salmon escapement graph.

System: **Cinder River.**

Species: **Sockeye salmon.**

Observed escapement by year (solid circles for Cinder River only; Xs for Mud Creek only; open circles for combined) and current SEG range (dashed lines).



APPENDIX N. SUPPORTING INFORMATION FOR THE MCLEES LAKE SOCKEYE SALMON ESCAPEMENT GOAL

Appendix N1.–Description of stock and escapement goal for McLees Lake sockeye salmon.

System: **McLees Lake.**

Species: **Sockeye salmon.**

Description of stock and escapement goal.

Regulatory area	Aleutian Islands – Westward Region.
Management division:	Commercial Fisheries.
Primary fishery:	Commercial purse seine.
Current escapement goal:	SEG: 10,000 to 60,000 (weir only).
Recommended escapement goal:	None.
Optimal escapement goal:	None.
Inriver goal:	None.
Action points:	None.
Escapement enumeration:	Aerial survey, 1974–2003;
	Weir counts, 2001–present.
Data summary:	
Data quality	Fair for aerial survey counts; good for weir counts.
Data type	No stock-specific harvest information is available.
Comments	The SEG of 10,000 to 60,000 sockeye salmon is only used during years that the weir is in place.

Appendix N2.–McLees Lake sockeye salmon escapement table.

System: **McLees Lake.**

Species: **Sockeye salmon.**

Data available for analysis of escapement goal.

Year	Peak Aerial Survey[a]	Weir Counts
1974	2,500	
1975	5,600	
1976		
1977	900	
1978	2,020	
1979	1,100	
1980	3,400	
1981		
1982	291	
1983		
1984	300	
1985		
1986	1,900	
1987	1,500	
1988		
1989		
1990	2,500	
1991		
1992	6,500	
1993		
1994	16,500	
1995	2,850	
1996	2,700	
1997	11,000	
1998	5,800	
1999	1,025	
2000	4,400	
2001	34,000	45,866
2002	58,000	97,780
2003	14,500	101,793
2004		40,328
2005		12,097
2006		12,936
2007		21,428
2008		8,661
2009		10,120
2010		32,842
2011		36,602

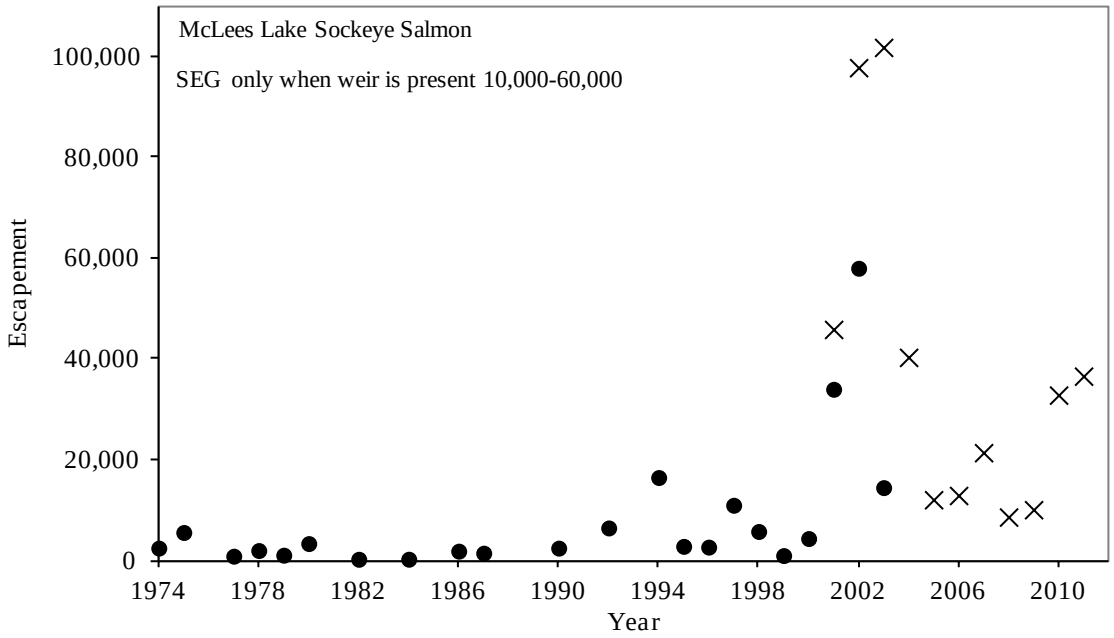
[a] The estimated total escapement represents the peak survey, enumeration of carcasses, as well as ancillary and qualitative data. Missing values are years when surveys were not completed.

Appendix N3.–McLees Lake sockeye salmon escapement graph.

System: **McLees Lake.**

Species: **Sockeye salmon.**

Solid circles aerial survey data; X-symbols represent weir counts.



APPENDIX O. SUPPORTING INFORMATION FOR THE THIN POINT LAKE COHO SALMON ESCAPEMENT GOAL

Appendix O1.–Description of stock and escapement goal for Thin Point Lake coho salmon.

System: Thin Point Lake.

Species: Coho salmon.

Description of stock and escapement goal.

Regulatory area:	Alaska Peninsula Management Area – Westward Region.
Management division:	Commercial Fisheries.
Primary fishery:	Commercial purse seine and set and drift gillnet.
Current escapement goal:	SEG: 3,000.
Recommended escapement goal:	Eliminate goal.
Optimal escapement goal:	None.
Inriver goal:	None.
Action points:	None.
Escapement enumeration:	Aerial survey, 1968–present.
Data summary:	
Data quality	Poor.
Data type	Fixed-wing aerial surveys from 1968 to present. No stock-specific harvest information is available.
Comments	Current SEG was based on percentile method.

Appendix O2.–Thin Point Lake coho salmon escapement table.

System: **Thin Point Lake.**

Species: **Coho salmon.**

Data available for analysis of escapement goal.

Year	Escapement Index[a, b]
1968	700
1969	5,000
1970	600
1971	
1972	
1973	100
1974	
1975	100
1976	200
1977	4,700
1978	600
1979	
1980	2,000
1981	1,300
1982	900
1983	
1984	
1985	3,500
1986	1,000
1987	400
1988	5,000
1989	4,800
1990	4,200
1991	1,200
1992	15,000
1993	3,200
1994	13,000
1995	13,000
1996	11,000
1997	3,500
1998	4,400
1999	5,000
2000	20,000
2001	28,000
2002	18,000
2003	25,000
2004	9,600
2005	17,500
2006	9,750
2007	9,000
2008	3,200
2009	900
2010	
2011	200

[a] The estimated total escapement represents the peak survey, enumeration of carcasses, as well as ancillary and qualitative data.

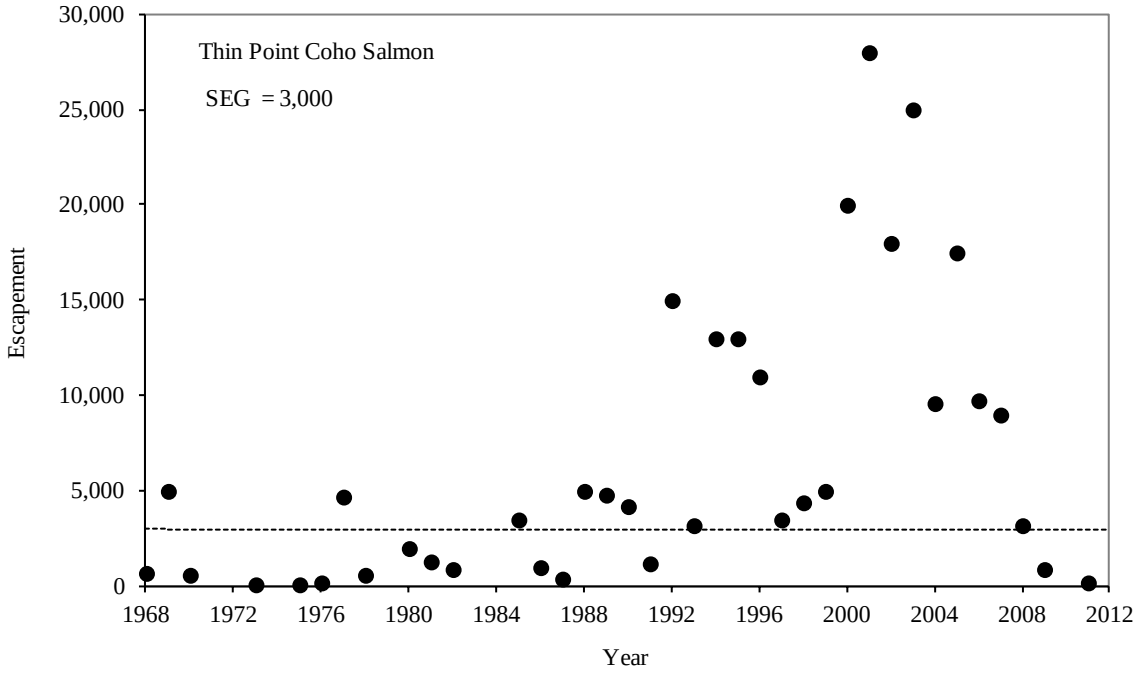
[b] Missing values are years when surveys were incomplete.

Appendix O3.–Thin Point Lake coho salmon escapement graph.

System: **Thin Point Lake.**

Species: **Coho salmon.**

Observed escapement by year (solid circles) and current SEG threshold (dashed line).



APPENDIX P. SUPPORTING INFORMATION FOR THE NELSON RIVER COHO SALMON ESCAPEMENT GOAL

Appendix P1.–Description of stock and escapement goal for Nelson River coho salmon.

System: Nelson River.

Species: Coho salmon.

Description of stock and escapement goal.

Regulatory area:	Alaska Peninsula Management Area – Westward Region.
Management division:	Commercial Fisheries.
Primary fishery:	Commercial set and drift gillnet.
Current escapement goal:	SEG: 18,000 (2004).
Recommended escapement goal:	No change.
Optimal escapement goal:	None.
Inriver goal:	None.
Action points:	None.
Escapement enumeration:	Aerial survey, 1968–present.
Data summary:	
Data quality	Fair for aerial survey counts.
Data type	Fixed-wing aerial surveys from 1968 to present. No stock-specific harvest information is available.
Comments	Current SEG was based on risk analysis.

Appendix P2.–Nelson River coho salmon escapement table.

System: **Nelson River.**

Species: **Coho salmon.**

Data available for analysis of escapement goal.

Year	Index Escapement [a, b]
1968	22,000
1969	11,000
1970	3,900
1971	3,400
1972	1,210
1973	1,500
1974	1,200
1975	1,200
1976	5,700
1977	13,000
1978	1,425
1979	17,000
1980	26,700
1981	30,000
1982	
1983	13,000
1984	28,630
1985	17,500
1986	23,000
1987	27,500
1988	17,000
1989	32,000
1990	30,000
1991	33,000
1992	20,000
1993	14,600
1994	18,000
1995	22,500
1996	20,500
1997	18,000
1998	20,000
1999	16,000
2000	18,000
2001	36,000
2002	38,000
2003	28,000
2004	52,500
2005	24,000
2006	19,000
2007	19,000
2008	24,000
2009	22,000
2010	15,000
2011	21,000

[a] The estimated total escapement represents the peak survey, enumeration of carcasses, as well as ancillary and qualitative data.

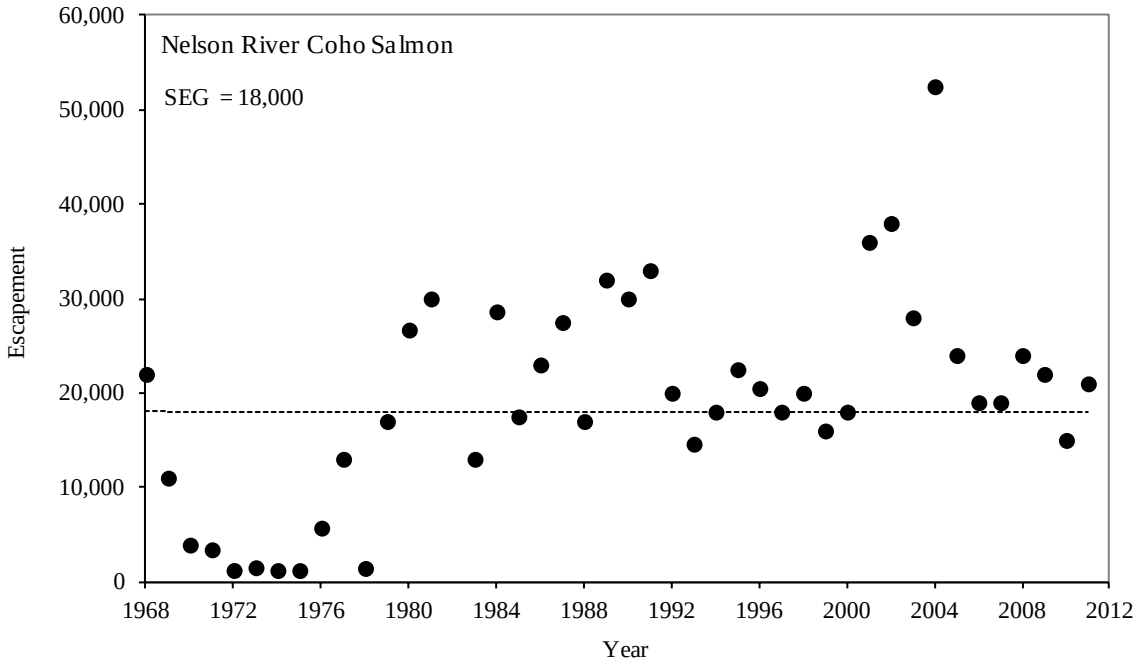
[b] Missing values are years when surveys were incomplete.

Appendix P3.–Nelson River coho salmon escapement graph.

System: **Nelson River.**

Species: **Coho salmon.**

Observed escapement by year (solid circles) and current SEG threshold (dashed line).



APPENDIX Q. SUPPORTING INFORMATION FOR THE ILNIK RIVER COHO SALMON ESCAPEMENT GOAL

Appendix Q1.–Description of stock and escapement goals for Ilnik River coho salmon.

System: South Peninsula.

Species: Coho salmon.

Description of stock and escapement goal.

Regulatory area:	Alaska Peninsula Management Area – Westward Region.
Management division:	Commercial Fisheries.
Primary fishery:	Commercial set and drift gillnet.
Current escapement goal:	SEG: 9,000 (2009).
Recommended escapement goal:	No change.
Optimal escapement goal:	None.
Inriver goal:	None.
Action points:	None.
Escapement enumeration:	Aerial survey, 1968–present.
Data summary:	
Data quality	Poor.
Data type	Fixed-wing aerial surveys sporadically 1968 to 1985; consistently surveyed 1985 to present. No stock-specific harvest information is available.
Comments	Current SEG was based on risk analysis.

Appendix Q2.–Ilnik River coho salmon escapement table.

System: **South Peninsula.**

Species: **Coho salmon.**

Data available for analysis of escapement goal.

Year	Index Escapement [a, b]
1985	35,000
1986	25,000
1987	8,000
1988	8,500
1989	25,300
1990	24,000
1991	27,000
1992	20,900
1993	28,000
1994	6,000
1995	12,000
1996	2,100
1997	19,000
1998	9,000
1999	1,000
2000	3,000
2001	37,000
2002	45,000
2003	37,000
2004	40,000
2005	
2006	27,000
2007	19,000
2008	22,000
2009	24,000
2010	19,600
2011	22,000

[a] The estimated total escapement represents the peak survey, enumeration of carcasses, as well as ancillary and qualitative data.

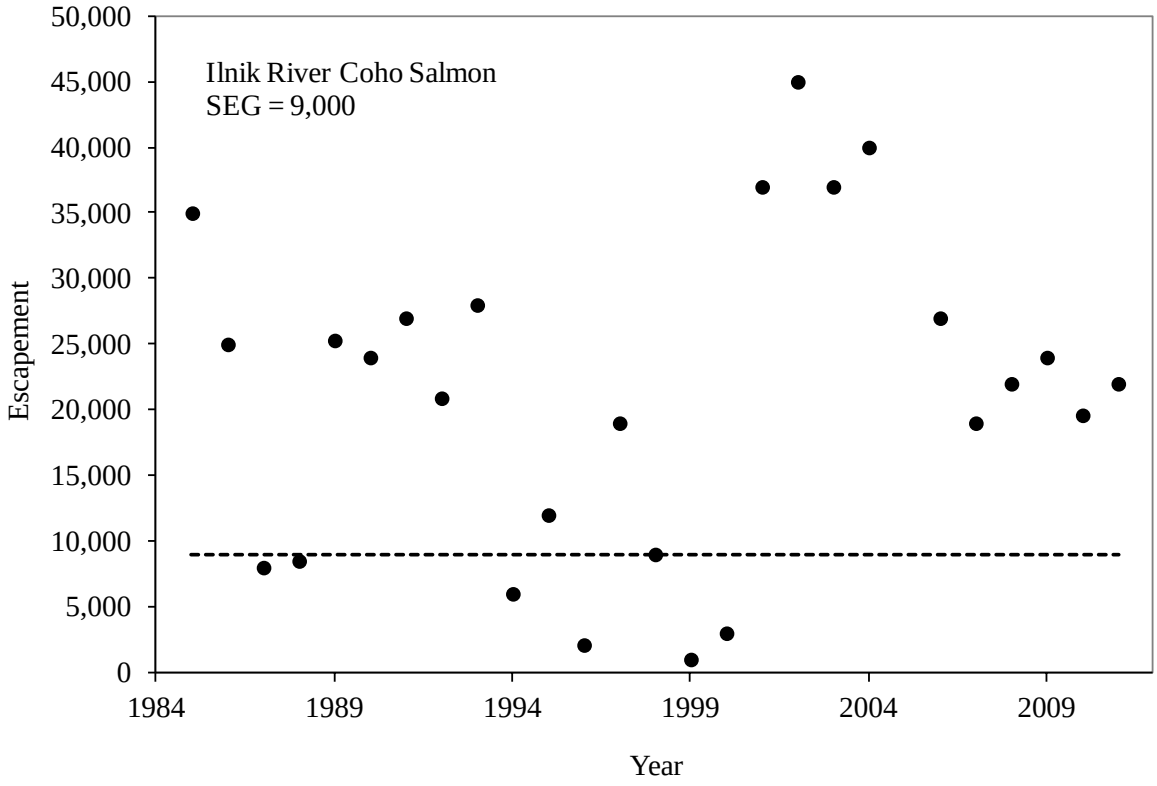
[b] An aerial survey was not conducted in 2005.

Appendix Q3.–Ilnik River coho salmon escapement graph.

System: **Ilnik River.**

Species: **Coho salmon.**

Observed escapement by year (solid circles) and current SEG threshold (dashed line).



APPENDIX R. SUPPORTING INFORMATION FOR THE SOUTH PENINSULA PINK SALMON ESCAPEMENT GOALS

Appendix R1.–Description of stock and escapement goals for South Peninsula pink salmon.

System: South Peninsula.

Species: Pink salmon.

Description of stock and escapement goal.

Regulatory area:	Alaska Peninsula Management Area – Westward Region.
Management division:	Commercial Fisheries.
Primary fishery:	Commercial purse seine and set and drift gillnet.
Current escapement goal:	SEG: Even year: 1,864,600 to 3,729,300 (2007).
	SEG: Odd year: 1,637,800 to 3,275,700 (2007).
Recommended escapement goal:	No change.
Optimal escapement goal:	None.
Inriver goal:	None.
Action points:	None.
Escapement enumeration:	Aerial survey, 1968–present.
Data summary:	
Data quality	Fair.
Data type	Fixed-wing aerial surveys for most years 1960 to present. No stock-specific harvest information is available.
Comments	Current SEG was based on Ricker stock recruitment analysis.

Appendix R2.–South Peninsula pink salmon escapement table.

System: **South Peninsula.**

Species: **Pink salmon.**

Data available for analysis of escapement goal.

Year	Index Escapement[a]
1968	823,300
1969	2,474,900
1970	1,298,900
1971	702,700
1972	111,400
1973	110,800
1974	284,400
1975	552,100
1976	1,456,400
1977	2,677,800
1978	2,858,700
1979	2,629,500
1980	2,641,600
1981	2,307,500
1982	2,293,000
1983	851,200
1984	3,811,600
1985	1,614,100
1986	1,716,700
1987	1,540,500
1988	2,839,600
1989	1,870,900
1990	1,598,400
1991	2,946,800
1992	2,834,400
1993	2,990,140
1994	3,071,725
1995	6,406,300
1996	3,647,550
1997	5,243,275
1998	4,668,065
1999	5,015,000
2000	2,792,985
2001	2,965,120
2002	3,762,800
2003	5,511,220
2004	8,311,410
2005	6,165,634
2006	2,862,250
2007	2,680,213
2008	3,338,370
2009	3,067,000
2010	742,912
2011	2,494,950

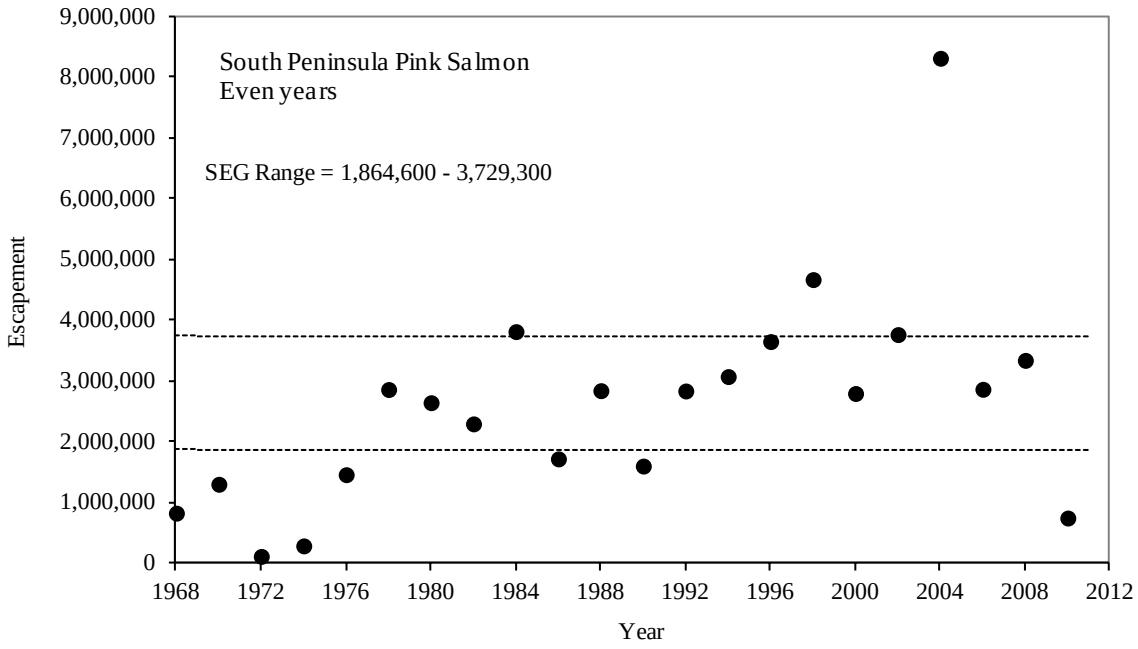
[a] The estimated total escapement represents the peak survey, enumeration of carcasses, as well as ancillary and qualitative data.

Appendix R3.–South Peninsula pink salmon escapement graph.

System: **South Peninsula (even years).**

Species: **Pink salmon.**

Observed escapement by year (solid circles) and current SEG (dashed line).

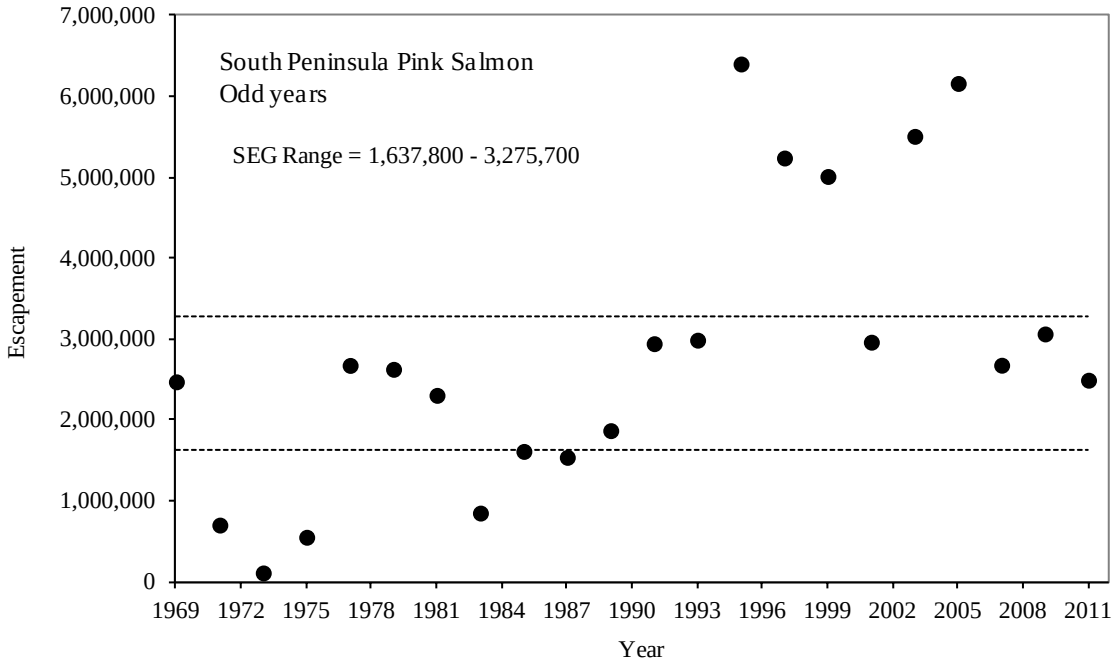


Appendix R4.–South Peninsula pink salmon escapement graph.

System: **South Peninsula (odd years).**

Species: **Pink salmon.**

Observed escapement by year (solid circles) and current SEG (dashed line).



APPENDIX S. SUPPORTING INFORMATION FOR THE BECHEVIN BAY PINK SALMON ESCAPEMENT GOALS

Appendix S1.–Description of stock and escapement goals for South Peninsula pink salmon.

System: Bechevin Bay.

Species: Pink salmon.

Description of stock and escapement goal.

Regulatory area:	Alaska Peninsula Management Area – Westward Region.
Management division:	Commercial Fisheries.
Primary fishery:	Commercial purse seine.
Current escapement goal:	
Even Years	SEG: 31,000.
Odd Years	SEG: 1,600.
Recommended escapement goal:	Eliminate goals.
Optimal escapement goal:	None.
Inriver goal:	None.
Action points:	None.
Escapement enumeration:	Aerial survey, 1960–present.
Data summary:	
Data quality	Poor.
Data type	Fixed-wing aerial surveys from 1960 to present. Since 1987, a total of 5 streams used as an index. No stock-specific harvest information is available.
Comments	Current SEG was based on risk analysis.

Appendix S2.–Bechevin Bay pink salmon escapement table.

System: **Bechevin Bay.**

Species: **Pink salmon.**

Data available for analysis of escapement goal.

Year	Index Escapement[a]
1987	1,100
1988	26,700
1989	1,900
1990	21,800
1991	1,200
1992	49,400
1993	700
1994	93,700
1995	5,000
1996	197,400
1997	4,000
1998	120,500
1999	14,500
2000	35,900
2001	6,100
2002	10,700
2003	800
2004	84,300
2005	8,720
2006	116,075
2007	16,800
2008	11,900
2009	72,000
2010	13,600
2011	2,400

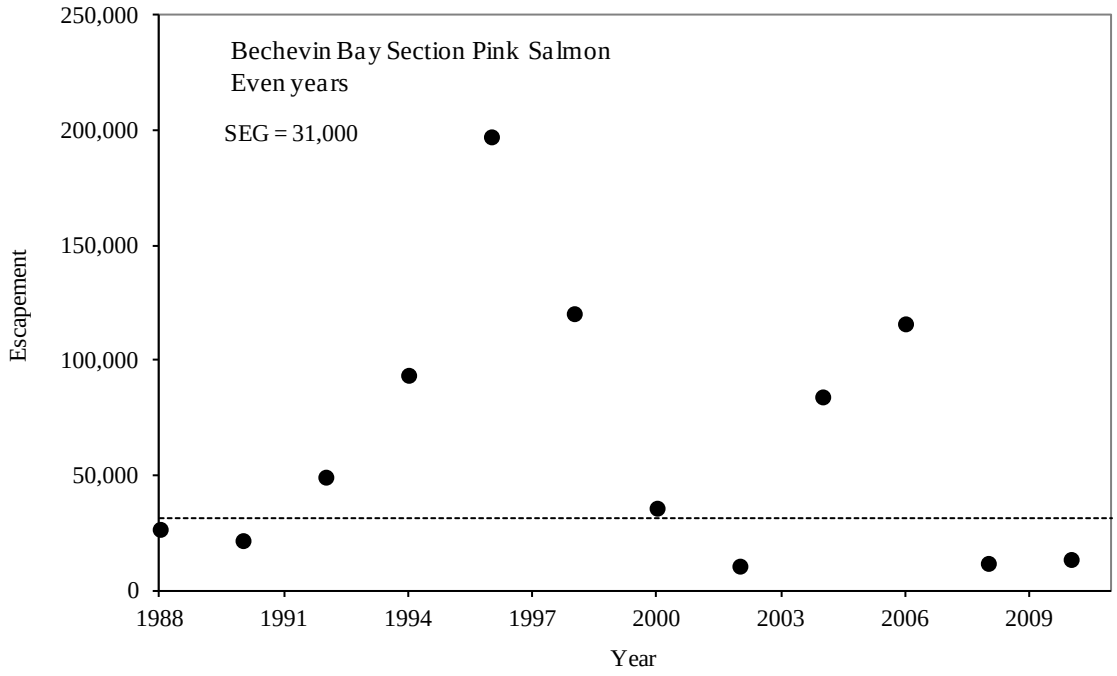
[a] The estimated total escapement represents the peak survey, enumeration of carcasses, as well as ancillary and qualitative data.

Appendix S3.–Bechevin Bay pink salmon even-year escapement.

System: **Bechevin Bay.**

Species: **Pink salmon (even year).**

Observed escapement by year (solid circles) and current SEG threshold (dashed line).

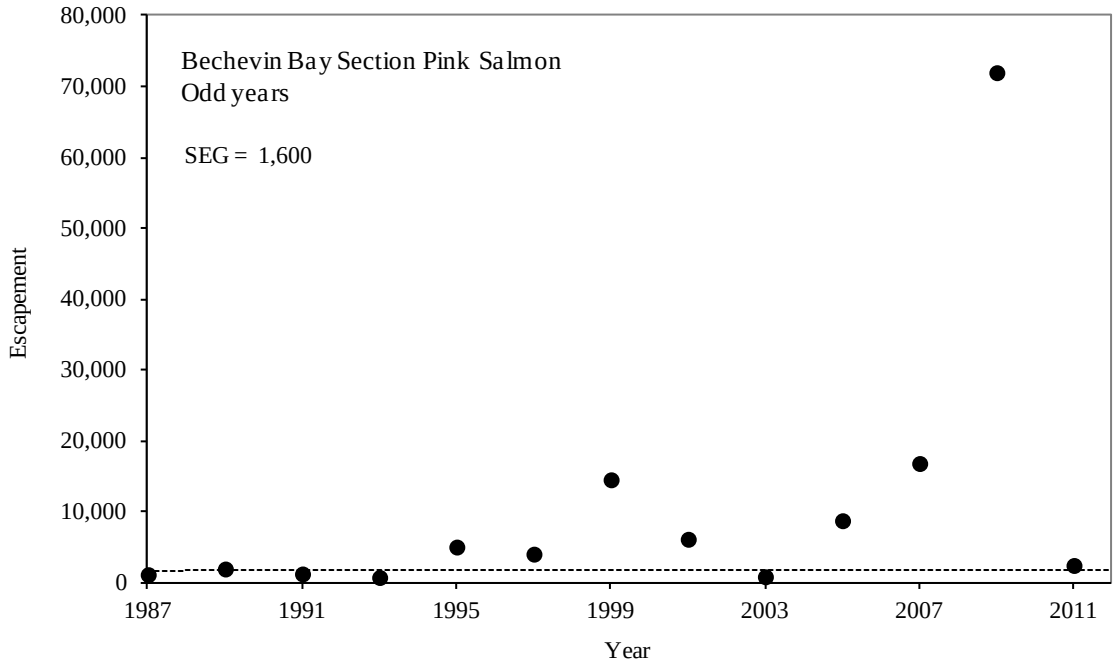


Appendix S4.–Bechevin Bay pink salmon odd-year escapement.

System: **Bechevin Bay.**

Species: **Pink salmon (odd year).**

Observed escapement by year (solid circles) and current SEG threshold (dashed line).



APPENDIX T. SUPPORTING INFORMATION FOR THE SOUTHEASTERN DISTRICT CHUM SALMON ESCAPEMENT GOAL

Appendix T1.–Description of stock and escapement goal for Southeastern District chum salmon.

System: Southeastern District.

Species: Chum salmon.

Description of stock and escapement goal.

Regulatory area:	Alaska Peninsula Management Area – Westward Region.
Management division:	Commercial Fisheries.
Primary fishery:	Commercial purse seine and set gillnet.
Current escapement goal:	SEG: 106,400 to 212,800 (1992).
Recommended escapement goal:	No change.
Optimal escapement goal:	None.
Inriver goal:	None.
Action points:	None.
Escapement enumeration:	Aerial survey, 1960–present.
Data summary:	
Data quality	Fair.
Data type	Fixed-wing aerial surveys from 1960 to present. Since 1987, a total of 28 streams used as an index. No-stock specific harvest information is available.
Comments	Current SEG was based on percentile method.

Appendix T2.–Southeastern District chum salmon escapement table.

System: **Southeastern District.**

Species: **Chum salmon.**

Data available for analysis of escapement goal.

Year	Index Escapement[a]
1987	167,300
1988	85,700
1989	99,650
1990	114,595
1991	181,365
1992	83,450
1993	45,550
1994	59,800
1995	137,650
1996	133,600
1997	267,650
1998	246,025
1999	82,550
2000	179,950
2001	318,300
2002	204,150
2003	218,810
2004	367,200
2005	412,500
2006	405,300
2007	201,451
2008	277,450
2009	106,500
2010	62,612
2011	145,300

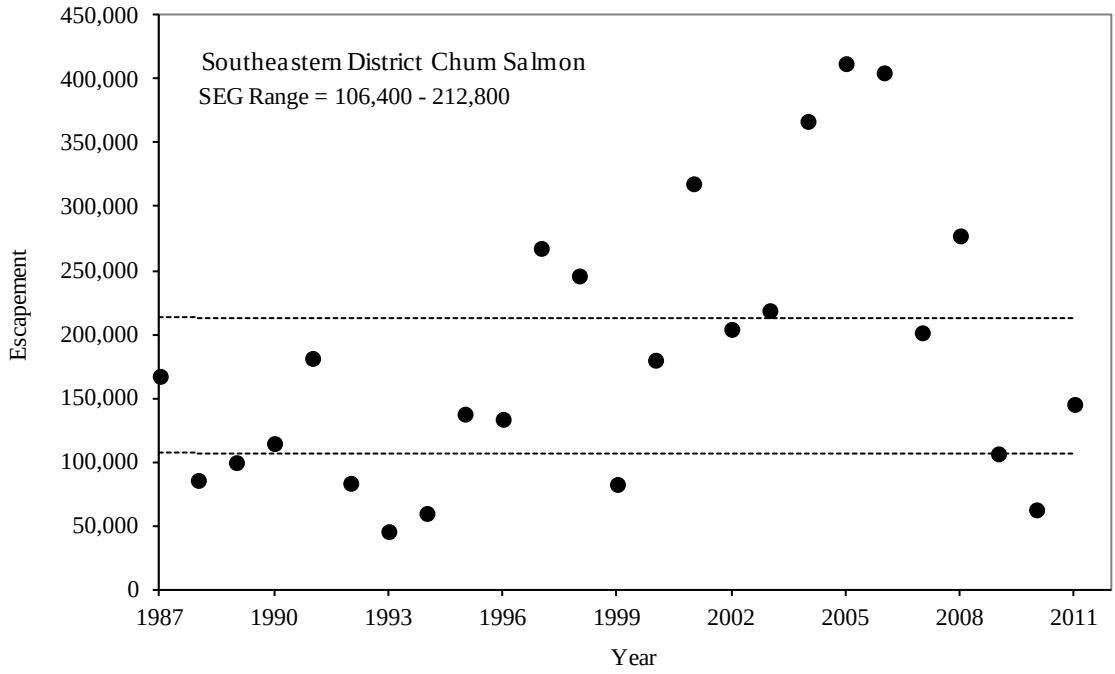
[a] The estimated total escapement represents the peak survey, enumeration of carcasses, as well as ancillary and qualitative data.

Appendix T3.–Southeastern District chum salmon escapement graph.

System: **Southeastern District.**

Species: **Chum salmon.**

Observed escapement by year (solid circles) and current SEG (dashed line).



APPENDIX U. SUPPORTING INFORMATION FOR THE SOUTH CENTRAL DISTRICT CHUM SALMON ESCAPEMENT GOAL

Appendix U1.–Description of stock and escapement goal for South Central District chum salmon.

System: South Central District.

Species: Chum salmon.

Description of stock and escapement goal.

Regulatory area:	Alaska Peninsula Management Area – Westward Region.
Management division:	Commercial Fisheries.
Primary fishery:	Commercial purse seine and set gillnet.
Current escapement goal:	SEG: 89,800 to 179,600 (1992).
Recommended escapement goal:	No change.
Optimal escapement goal:	None.
Inriver goal:	None.
Action points:	None.
Escapement enumeration:	Aerial survey, 1960–present.
Data summary:	
Data quality	Fair.
Data type	Fixed-wing aerial surveys from 1960 to present. Indexed total escapement 1987 to present. No stock-specific harvest information is available.
Comments	Current SEG was based on percentile method.

Appendix U2.–South Central District chum salmon escapement table.

System: **South Central District.**

Species: **Chum salmon.**

Data available for analysis of escapement goal.

Year	Index Escapement[a]
1987	161,900
1988	183,400
1989	89,530
1990	96,280
1991	163,990
1992	110,640
1993	126,800
1994	151,900
1995	187,100
1996	173,800
1997	274,400
1998	144,300
1999	253,500
2000	84,100
2001	155,500
2002	129,400
2003	79,000
2004	184,800
2005	235,700
2006	119,600
2007	126,000
2008	140,450
2009	18,600
2010	85,600
2011	169,000

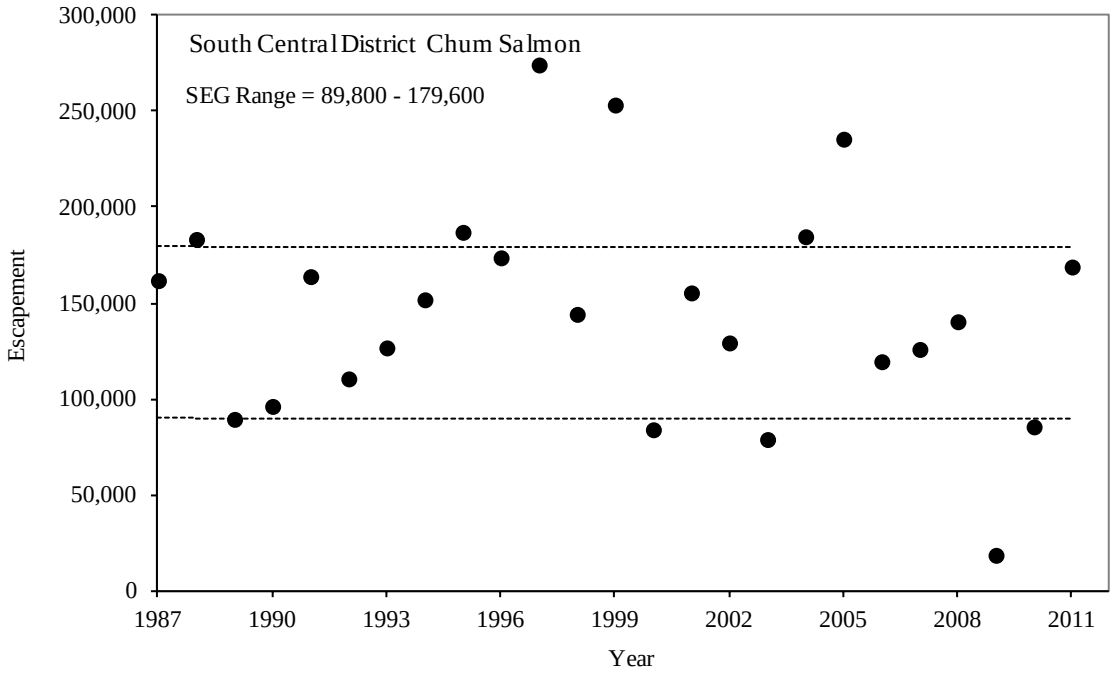
[a] The estimated total escapement represents the peak survey, enumeration of carcasses, as well as ancillary and qualitative data.

Appendix U3.–South Central District chum salmon escapement graph.

System: **South Central District.**

Species: **Chum salmon.**

Observed escapement by year (solid circles) and current SEG (dashed line).



APPENDIX V. SUPPORTING INFORMATION FOR THE SOUTHWESTERN DISTRICT CHUM SALMON ESCAPEMENT GOAL

Appendix V1.–Description of stock and escapement goal for Southwestern District chum salmon.

System: Southwestern District.

Species: Chum salmon.

Description of stock and escapement goal.

Regulatory area:	Alaska Peninsula Management Area – Westward Region.
Management division:	Commercial Fisheries.
Primary fishery:	Commercial purse seine and set and drift gillnet.
Current escapement goal:	SEG: 133,400 to 266,800 (1992).
Recommended escapement goal:	No change.
Optimal escapement goal:	None.
Inriver goal:	None.
Action points:	None.
Escapement enumeration:	Aerial survey, 1960–present.
Data summary:	
Data quality	Fair.
Data type	Fixed-wing aerial surveys from 1960 to present. Indexed total escapement 1987 to present. No stock-specific harvest information is available.
Comments	Current SEG was based on percentile method.

Appendix V2.–Southwestern District chum salmon escapement table.

System: **Southwestern District.**

Species: **Chum salmon.**

Data available for analysis of escapement goal.

Year	Index Escapement[a]
1987	291,100
1988	226,200
1989	120,830
1990	142,770
1991	241,600
1992	141,000
1993	224,080
1994	365,900
1995	401,150
1996	302,100
1997	263,700
1998	351,410
1999	388,130
2000	257,225
2001	277,021
2002	268,000
2003	193,030
2004	180,000
2005	317,910
2006	231,935
2007	398,010
2008	171,250
2009	385,730
2010	142,650
2011	176,425

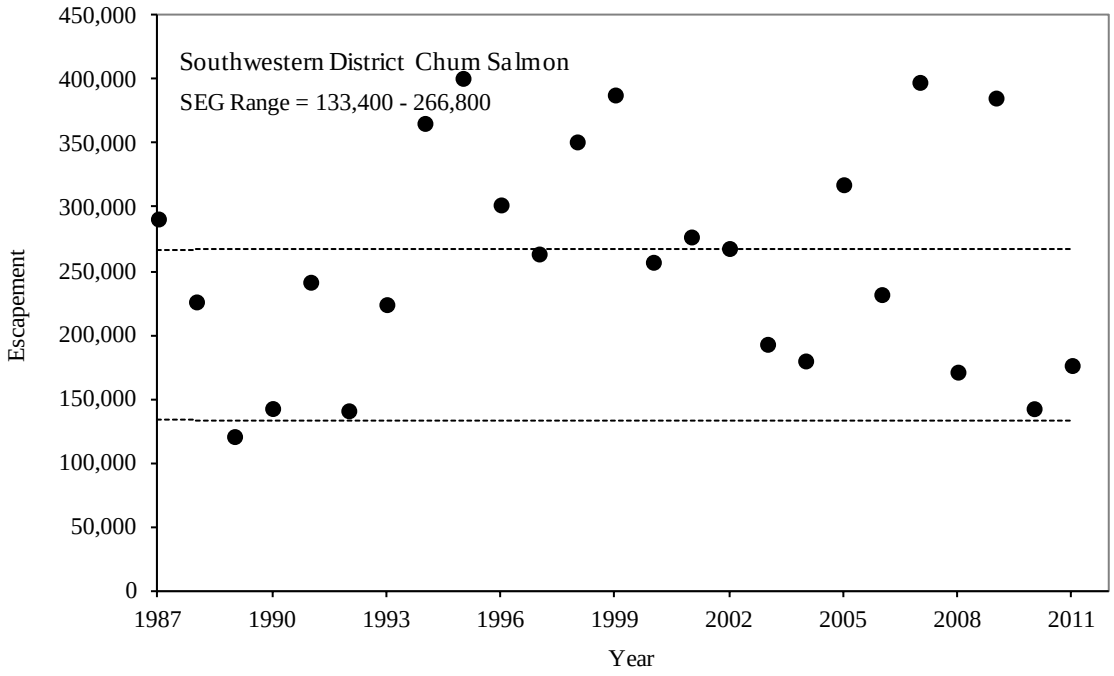
[a] The estimated total escapement represents the peak survey, enumeration of carcasses, as well as ancillary and qualitative data.

Appendix V3.–Southwestern District chum salmon escapement graph.

System: **Southwestern District.**

Species: **Chum salmon.**

Observed escapement by year (solid circles) and current SEG (dashed line).



APPENDIX W. SUPPORTING INFORMATION FOR THE UNIMAK DISTRICT CHUM SALMON ESCAPEMENT GOAL

Appendix W1.–Description of stock and escapement goal for Unimak District chum salmon.

System: **Unimak District.**

Species: **Chum salmon.**

Description of stock and escapement goal.

Regulatory area:	Alaska Peninsula Management Area – Westward Region.
Management division:	Commercial Fisheries.
Primary fishery:	Commercial purse seine and drift gillnet.
Current escapement goal:	SEG: 800.
Recommended escapement goal:	Eliminate SEG.
Optimal escapement goal:	None.
Inriver goal:	None.
Action points:	None.
Escapement enumeration:	Aerial survey, 1987–present.
Data summary:	
Data quality	Fair.
Data type	Fixed-wing aerial surveys from 1987 to present. No stock-specific harvest information is available.
Comments	Current SEG was based on risk analysis.

Appendix W2.–Unimak District chum salmon escapement table.

System: **Unimak District.**

Species: **Chum salmon.**

Data available for analysis of escapement goal.

Year	Index Escapement [a]
1987	400
1988	1,100
1989	450
1990	800
1991	600
1992	400
1993	600
1994	1,500
1995	500
1996	800
1997	3,300
1998	500
1999	1,000
2000	800
2001	400
2002	1,200
2003	200
2004	400
2005	4,200
2006	7,915
2007	1,200
2008	2,800
2009	1,400
2010	1,050
2011	7,000

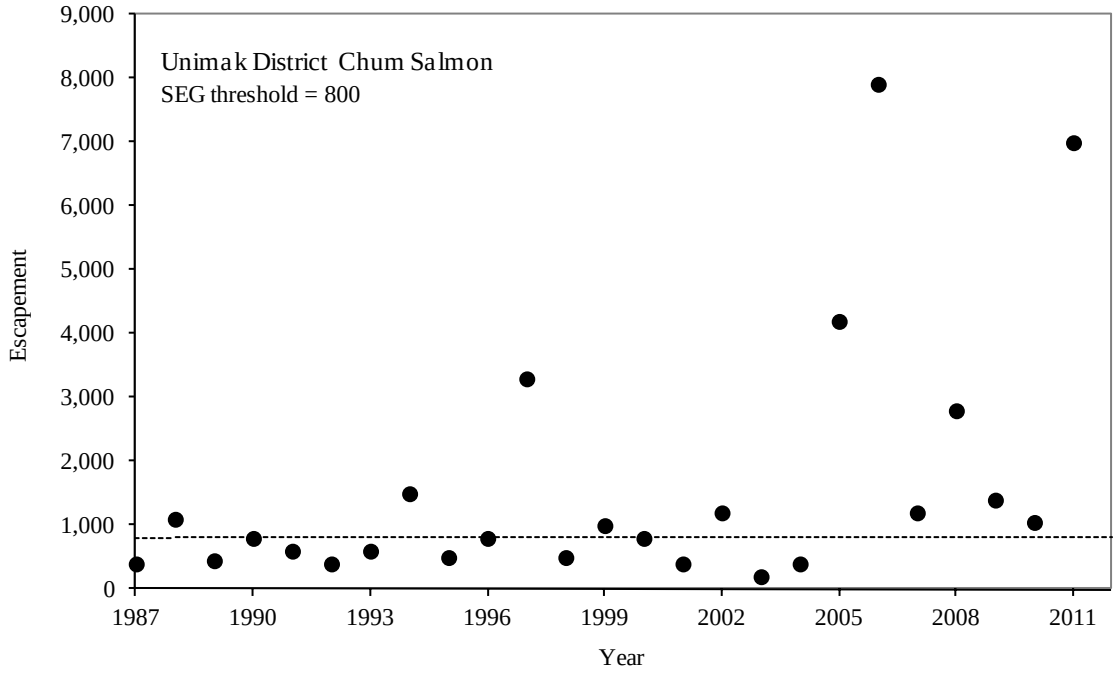
[a] The estimated total escapement represents the peak survey, enumeration of carcasses, as well as ancillary and qualitative data.

Appendix W3.–Unimak District chum salmon escapement graph.

System: **Unimak District.**

Species: **Chum salmon.**

Observed escapement by year (solid circles) and current SEG threshold (dashed line).



APPENDIX X. SUPPORTING INFORMATION FOR THE NORTHWESTERN DISTRICT CHUM SALMON ESCAPEMENT GOAL

Appendix X1.–Description of stock and escapement goal for Northwestern District chum salmon.

System: **Northwestern District.**

Species: **Chum salmon.**

Description of stock and escapement goal.

Regulatory area:	Alaska Peninsula Management Area – Westward Region.
Management division:	Commercial Fisheries.
Primary fishery:	Commercial purse seine and set and drift gillnet.
Current escapement goal:	SEG: 100,000 to 215,000 (2007).
Recommended escapement goal:	No change.
Optimal escapement goal:	None.
Inriver goal:	None.
Action points:	None.
Escapement enumeration:	Aerial survey, 1980–present.
Data summary:	
Data quality	Fair.
Data type	Fixed-wing aerial surveys from 1980 to present. Indexed total escapement 1987 to present. No stock-specific harvest information is available.
Comments	Current SEG was based on Ricker analysis.

Appendix X2.–Northwestern District chum salmon escapement table.

System: **Northwestern District.**

Species: **Chum salmon.**

Data available for analysis of escapement goal.

Year	Index Escapement[a]
1980	405,300
1981	264,600
1982	190,200
1983	193,500
1984	460,900
1985	220,400
1986	165,700
1987	341,500
1988	356,200
1989	212,300
1990	110,905
1991	221,800
1992	215,300
1993	219,030
1994	249,420
1995	408,300
1996	386,730
1997	227,200
1998	349,000
1999	366,800
2000	255,800
2001	406,812
2002	417,100
2003	236,000
2004	295,600
2005	192,965
2006	193,460
2007	335,450
2008	241,750
2009	84,460
2010	144,100
2011	151,400

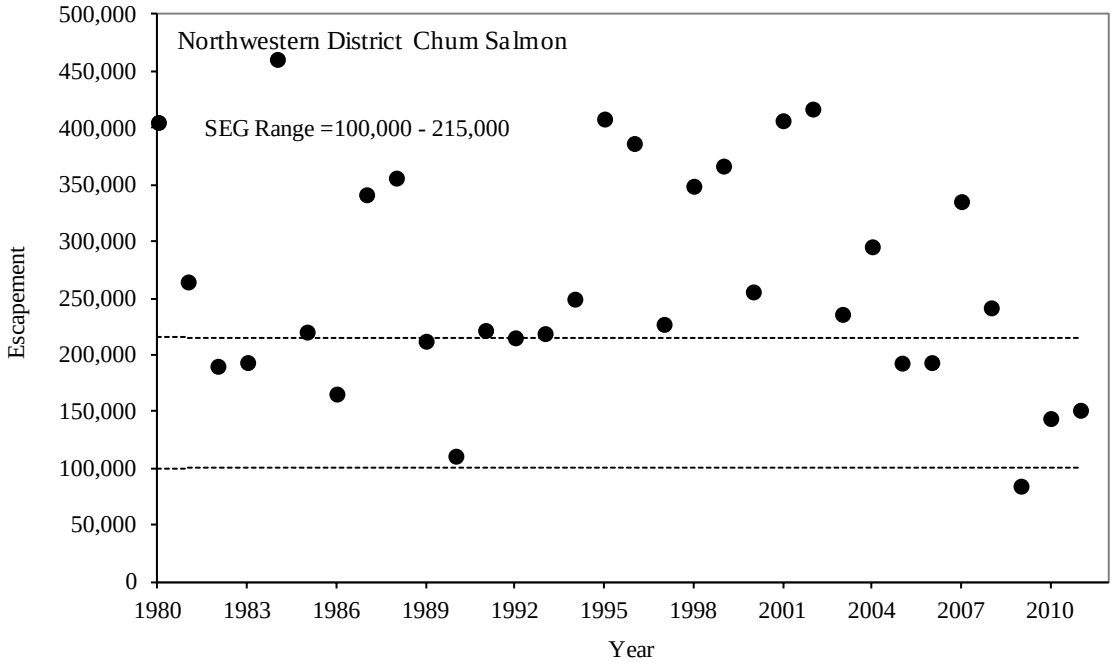
[a] The estimated total escapement represents the peak survey, enumeration of carcasses, as well as ancillary and qualitative data.

Appendix X3.–Northwestern District chum salmon escapement graph.

System: **Northwestern District.**

Species: **Chum salmon.**

Observed escapement by year (solid circles) and current SEG (dashed line).



APPENDIX Y. SUPPORTING INFORMATION FOR THE NORTHERN DISTRICT CHUM SALMON ESCAPEMENT GOAL

Appendix Y1.–Description of stock and escapement goal for Northern District chum salmon.

System: **Northern District.**

Species: **Chum salmon.**

Description of stock and escapement goal.

Regulatory area:	Alaska Peninsula Management Area – Westward Region.
Management division:	Commercial Fisheries.
Primary fishery:	Commercial purse seine and set and drift gillnet.
Current escapement goal:	SEG: 119,600 to 239,200 (2007).
Recommended escapement goal:	No change.
Optimal escapement goal:	None.
Inriver goal:	None.
Action points:	None.
Escapement enumeration:	Aerial survey, 1982–present.
Data summary:	
Data quality	Fair.
Data type	Fixed-wing aerial surveys from 1982 to present. Indexed total escapement 1987 to present. No stock-specific harvest information is available.
Comments	Current SEG was based on Ricker analysis.

Appendix Y2.–Northern District chum salmon escapement table.

System: **Northern District.**

Species: **Chum salmon.**

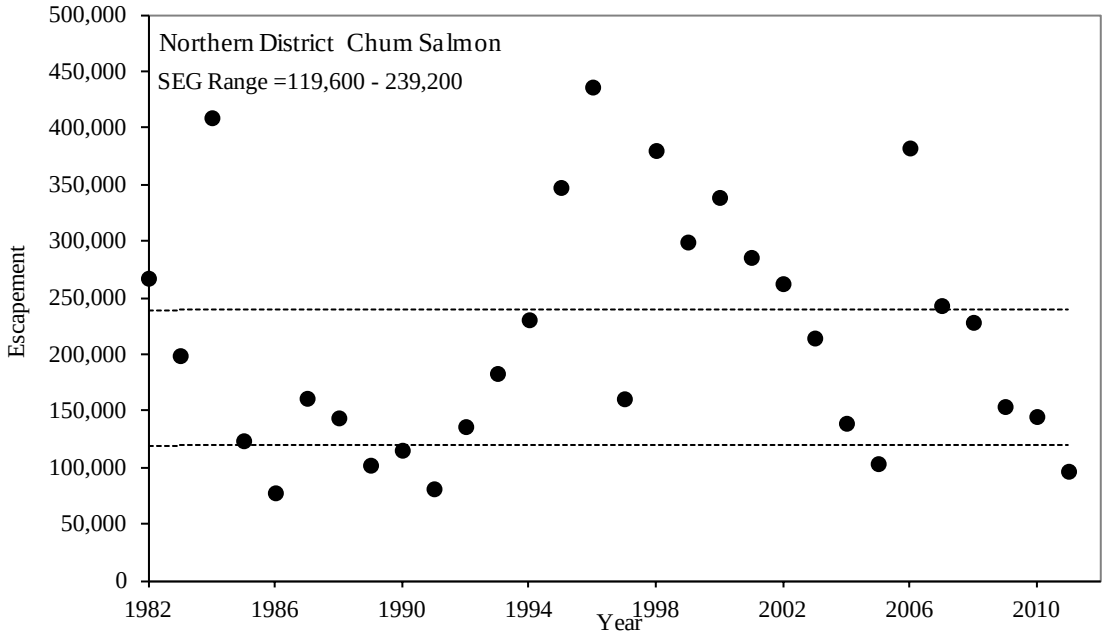
Data available for analysis of escapement goal.

Year	Index Escapement [a]
1982	267,500
1983	199,100
1984	409,300
1985	123,900
1986	77,900
1987	161,400
1988	144,100
1989	102,300
1990	115,530
1991	81,450
1992	136,400
1993	183,350
1994	230,800
1995	347,700
1996	436,400
1997	160,985
1998	380,350
1999	299,475
2000	338,900
2001	285,900
2002	262,710
2003	214,660
2004	139,350
2005	103,675
2006	382,583
2007	243,334
2008	228,537
2009	154,131
2010	145,310
2011	96,952

[a] The estimated total escapement represents the peak survey, enumeration of carcasses, as well as ancillary and qualitative data.

Appendix Y3.–Northern District chum salmon escapement graph.

System: **Northern District.**

Species: **Chum salmon.**

Observed escapement by year (solid circles) and current SEG (dashed line).