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Escapement Goal Review for Select Arctic–Yukon–Kuskokwim Regional Salmon Stocks, 2025

by

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and

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October 2025

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, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	E
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	″
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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ABSTRACT

An Alaska Department of Fish and Game escapement goal review team evaluated salmon stocks in the Arctic–Yukon–Kuskokwim (AYK) Areas in advance of the November 2025 Alaska Board of Fisheries meeting. At the time of this review, there existed 47 escapement goals established by ADF&G for salmon stocks in the AYK Region, and 3 goals established by the Yukon River Panel for Yukon River transboundary stocks. The review team found that no new escapement goals were warranted. The review team revised 2 escapement goals and discontinued 5 escapement goals to better align salmon escapement goals throughout the region with current fishery management practices and the status of escapement monitoring programs. The review team decided that discontinuation of the Tubutulik River chum salmon sustainable escapement goal (SEG), revision of the Pilgrim River sockeye salmon SEG, and revision of Kwiniuk River coho salmon SEG in the Norton Sound–Port Clarence and Kotzebue Sound Management Areas were warranted. The review team also decided that discontinuation of the Middle Fork Goodnews River Chinook, chum, sockeye, and coho salmon SEGs were warranted. The review team found that no changes to existing escapement goals in the Yukon Area were warranted.

Keywords: Pacific salmon, *Oncorhynchus* spp., escapement goal, stock status, Arctic–Yukon–Kuskokwim, Kuskokwim Area, Yukon Area, Norton Sound–Port Clarence Area, Arctic–Kotzebue Sound Area

INTRODUCTION

This report presents escapement goal findings for salmon stocks of Norton Sound–Port Clarence, Arctic–Kotzebue Sound, Yukon, and Kuskokwim Management Areas (AYK Region; Figure 1). The Alaska Department of Fish and Game (ADF&G) is responsible for establishing, reviewing, and modifying escapement goals as described by the *Policy for Statewide Salmon Escapement Goals* (Escapement Goal Policy: 5 AAC 39.223) and the *Policy for the Management of Sustainable Salmon Fisheries* (SSFP: 5 AAC 39.222), which were adopted into regulation by the Alaska Board of Fisheries (BOF). ADF&G is responsible for notifying the public whenever a new escapement goal is established or an existing escapement goal is modified. Similarly, ADF&G is responsible for notifying the BOF whenever allocative effects arise from management actions necessary to achieve a new or modified escapement goal.

Since 2001, escapement goal reviews have been conducted by ADF&G every 3 years, concurrent with the BOF regulatory cycle. Escapement goals consistent with the SSFP definitions and the Escapement Goal Policy process were established by ADF&G for the first time during the 2001 regulatory cycle (Clark 2001a–c; Clark and Sandone 2001; Eggers 2001; Evenson 2002). Escapement goal reviews were conducted during the subsequent cycles (ADF&G 2004; Brannian et al. 2006; Volk et al. 2009; Conitz et al. 2012; Conitz et al. 2015; Liller and Savereide 2018; Liller and Savereide 2022). ADF&G has reported annually on the performance of existing escapement goals in the AYK Region (along with all other regions), with tabulations of the most recent 9 years' escapement estimates (Munro and Chenoweth 2025).

Beginning in 2023, AYK Region escapement goal review activities were coordinated to achieve deadlines associated with the November 2025 AYK Region Finfish BOF regulatory meeting. Review timelines were established to achieve a public release of the *AYK Escapement Goal Memorandum* by March 10, 2025. The timeline for the memo was approximately 1 month before

the April 10, 2025, regulatory proposal deadline set by the BOF. ADF&G provided public notice, through the BOF, of the *AYK Escapement Goal Memorandum* on March 5, 2025.[1]

The escapement goal review was led by a team made up of regional research coordinators and fisheries scientists from the Divisions of Commercial Fisheries and Sport Fish. The AYK Escapement Goal Review Team (EGRT) met 4 times between January 30, 2024, and December 10, 2024, to plan and review escapement goal analyses in consideration of fishery and stock status, changes in assessment methodology, and new escapement data (Table 1). Members of the EGRT met more frequently with area research staff and a statewide biometrician to facilitate escapement goal reviews as planned through consultation with fishery managers (Table 1). The 2025 review cycle focused on a detailed evaluation of the existing escapement goal structure to determine where revisions were needed to better align with current fishery management and assessment.

The result of the escapement goal review process, as outlined above, was a set of findings provided by the EGRT to the directors of the Divisions of Commercial Fisheries and Sport Fish. The EGRT did not find that any new escapement goals were warranted for the AYK Region during the 2025 cycle. The EGRT found that several existing escapement goals should be revised or discontinued. Most of the decisions made by the EGRT targeted goals that were no longer effective for informing fishery management decisions, and where alternative, higher-quality assessment options exist.

AYK Regional staff have a long history of public engagement on escapement goals before ADF&G formalized escapement goal decisions, and further improvements to the public engagement process were implemented starting in the 2023 review cycle. Prior to the 2023 review cycle, AYK Regional staff coordinated a series of public stakeholder meetings to share preliminary findings and solicit feedback. This process was, in part, intended to notify the public of potential changes to escapement goals in advance of BOF proposal deadlines. The 2023 cycle marked the first time that the AYK escapement goal review memo was released before the BOF proposal deadline, and this practice was repeated in advance of the 2025 cycle. Moving forward, AYK Regional staff will continue coordinating all public engagement on escapement goals through the BOF and related stakeholder meetings.

DEFINITIONS AND PROCESS

The SSFP provides the following definitions for biological and sustainable escapement goals discussed in this review.

> 5 AAC 39.222 (f)(3) "biological escapement goal" or "(BEG)" means the escapement that provides the greatest potential for maximum sustained yield; BEG will be the primary management objective for the escapement unless an optimal escapement or inriver run goal has been adopted; BEG will be developed from the best available biological information, and should be scientifically defensible on the basis of available biological information; BEG will be determined by the department and will be expressed as a range based on factors such as salmon stock productivity and data uncertainty; the department will seek to maintain evenly distributed salmon escapements within the bounds of a BEG.

[1] Zachary W. Liller (Regional Research Coordinator, Division of Commercial Fisheries, Region III) and James W. Savereide (Regional Research Coordinator, Division of Sport Fish, Region III). Arctic–Yukon–Kuskokwim escapement goal review memorandum. February 23, 2025, memorandum to Forest Bowers, Acting Director, Division of Commercial Fisheries; and Isreal Payton, Director, Division of Sport Fish. Prepared for the Alaska Board of Fisheries work session, October 28–29, 2025. Available from: https://www.adfg.alaska.gov/static/regulations/regprocess/fisheriesboard/pdfs/2025-2026/ws/2025_ayk-eg-memo.pdf.

> 5 AAC 39.222 (f)(36) "sustainable escapement goal" or "(SEG)" means a level of escapement, indicated by an index or an escapement estimate, that is known to provide for sustained yield over a 5 to 10 year period, used in situations where a BEG cannot be estimated or managed for; the SEG is the primary management objective for the escapement, unless an optimal escapement or inriver run goal has been adopted by the board; the SEG will be developed from the best available biological information; and should be scientifically defensible on the basis of that information; the SEG will be determined by the department and will take into account data uncertainty and be stated as either a "SEG range" or "lower bound SEG"; the department will seek to maintain escapements within the bounds of the SEG range or above the level of a lower bound SEG.

Both types of escapement goals are designed to ensure sustainable salmon fisheries. The decision by ADF&G to establish a BEG or SEG is dependent on the availability of stock-specific information and the nature of the fishery. A BEG requires information about total run, harvest, and escapement to estimate the range of escapements that will maximize yield. Furthermore, a BEG requires harvest management to achieve escapements within ranges that will maximize yield. Subsistence fisheries are particularly important in the AYK Region, and providing stable subsistence harvests large enough to provide for subsistence needs may be a higher priority management objective than maximum sustained yield (MSY). In these cases, ADF&G may establish a SEG based on a detailed stock-specific spawner–recruit analysis where the resulting SEG goal range does not have the greatest potential for maximum sustained yield. Relatively few stocks (or stock components) in the AYK Region have adequate information to establish a BEG or SEG based on a spawner–recruit analysis. Stock-specific harvest estimates are often unavailable. For this reason, most escapement goals in the AYK Region are SEGs based on good-quality escapement data, where the goal ranges have been shown to produce sustainable harvests in the past and are intended to produce similar levels of harvest in the future. ADF&G considers the management implications of escapement goals and is directed to work with the BOF to address issues in management plans and regulations that may arise from these changes to escapement goals.

During its regulatory process, the BOF reviews the BEGs and SEGs established by ADF&G. With ADF&G's assistance, the BOF may also consider establishing an optimal escapement goal, which is defined as follows.

> 5 AAC 39.222 (f)(25) "optimal escapement goal" or "(OEG)" means a specific management objective for salmon escapement that considers biological and allocative factors and may differ from the SEG or BEG; an OEG will be sustainable and may be expressed as a range with the lower bound above the level of Sustainable Escapement Threshold, and will be adopted as a regulation by the board; the department will seek to maintain evenly distributed escapements within the bounds of the OEG.

There are currently no OEGs established by the BOF for the AYK Region.

METHODS

There are 2 primary methods that have been used to establish escapement goals for the AYK Region: the Percentile Approach and spawner–recruit analysis. The method chosen is based on the availability of stock-specific data. The review team determined that the Percentile Approach was the most appropriate for setting a SEG for fished stocks that lack stock-specific harvest information. ADF&G has used the Percentile Approach broadly across Alaska to determine ranges

of historical observed escapements that serve as a valid proxy for the range of spawners likely to produce maximum sustained yield (S_{MSY}). The recommendations as presented in Bue and Hasbrouck[2] or Clark et al. (2014) have been applied by AYK EGRTs to appropriate AYK stocks, with method-specific consideration of harvest rate, data contrast (contrast indicates the ratio of highest to lowest observed escapement), and measurement error. As per Clark et al. (2014), the Percentile Approach was not recommended in cases of high harvest rates (greater than or equal to 0.40), or a combination of very low escapement contrast (4 or less) and high measurement error (aerial or foot surveys). ADF&G has conducted spawner–recruit analyses in instances where reliable stock-specific harvest is available. Current practice within AYK escapement goal setting involves estimating management reference points (e.g., S_{MSY}) based on Ricker spawner–recruit parameters and developing optimum yield profiles within a state-space framework, which may directly incorporate a run reconstruction sub-model, often using Bayesian methods. State-space models relate unobserved process or "state" variables to observed data and incorporate specification of both stochastic fluctuation inherent in the system (process error) and observation error, allowing for a robust and realistic characterization of uncertainty (Rivot et al. 2004; Su and Peterman 2012; Fleischman et al. 2013). State-space models have been shown to provide less biased estimates of population parameters and reference points than traditional spawner–recruit methods (Su and Peterman 2012).

As part of the 2025 AYK Region escapement goal review process, area research and management staff, as directed, reviewed current information and all existing escapement goals to determine whether goal changes or in-depth analyses may be warranted. Staff obtained data, previous analyses, and estimates for all reviewed stocks primarily from published research and management reports, and the AYK database management system.[3] When necessary, staff supplemented data from internal ADF&G data sources. In nearly all cases, escapement goal reviews were based on data through the 2023 project year because 2024 data were not finalized. Data quality control measures were integral to the review process, and escapement goals were evaluated based upon the most consistent and reliable data sets that could be obtained. For example, only those aerial survey data listed as "fair" or "good" in the survey notes were used in review analyses. Similarly, estimates of missed passage at weirs and tower projects were reviewed to ensure comparability of escapement estimates throughout the time series. Historical data series, where older estimates were not comparable to newer ones due to changes in methodologies over time, were statistically adjusted if possible. Poor surveys, incomplete assessments, and non-comparable estimates were omitted from the data series because they may introduce bias, and the time series would more accurately represent escapement trends without them.

The extent of each escapement goal review for the 2025 cycle depended on the significance of new information since its last review. Central to the review was an in-depth discussion with fishery managers to evaluate how each escapement goal has been used to make management decisions, and how well it has performed as a management tool. With few exceptions, staff identified no notable changes, since the 2023 review, to escapement goal analyses, data availability, assessment programs, or fisheries that would warrant fundamental changes to the escapement goal structure within each management area. As such, the 2025 AYK EGRT focused its review efforts on (1)

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

[3] Arctic–Yukon–Kuskokwim Database Management System (AYKDBMS). 2006– . Alaska Department of Fish and Game, Division of Commercial Fisheries. Juneau, AK. https://www.adfg.alaska.gov/CF_R3/external/sites/aykdbms_website/Default.aspx (accessed October 10, 2025).

Unalakleet River Chinook salmon *Oncorhynchus tshawytscha* and Pilgrim River sockeye salmon *O. nerka* stocks for which new information suggested an updated analysis might result in a revised escapement goal; (2) Tubutulik River chum salmon *O. keta* for which an alternative escapement goal option was determined to be more aligned with current assessment and management practices; (3) Kwiniuk River coho salmon *O. kisutch* for which higher-quality data options were available; and (4) Goodnews River Chinook, chum, sockeye, and coho salmon escapement goals for which escapement assessment has been discontinued.

The remainder of this report presents the EGRT's findings and rationale for revising or discontinuing select escapement goals in each area within the AYK Region. Final approval of escapement goals will be made by the directors of the Divisions of Commercial Fisheries and Sport Fish following the 2025 BOF regulatory meeting cycle.

NORTON SOUND–PORT CLARENCE AND ARCTIC–KOTZEBUE SOUND AREAS

A total of 18 escapement goals for 17 stocks exist in the Norton Sound–Port Clarence and Kotzebue Areas: 2 Chinook salmon; 7 chum salmon; 3 coho salmon, 4 pink salmon *O. gorbuscha*; and 2 sockeye salmon (Table 2; Liller and Savereide 2022). There are no BEGs established for the Norton Sound–Port Clarence and Kotzebue Areas. All escapement goals are SEGs. The Nome River pink salmon stock has separate even-year and odd-year goals.

The following sections focus on the goals for which the EGRT found that changes were warranted. The review team finds that all other existing escapement goals for salmon stocks in the Norton Sound–Port Clarence and Kotzebue Areas should continue without revision.

UNALAKLEET RIVER CHINOOK SALMON

Summary

In 2025, the EGRT evaluated Unalakleet River Chinook salmon with the intent of developing a drainagewide escapement goal using paired data from the North River tower and Unalakleet River weir. Analyses supported an SEG of 1,500–3,500 fish, but the unexpected termination of the Unalakleet River weir program prevents this goal from being implemented at this time.

Management will continue under the existing North River tower SEG of 1,200–2,600 fish and the *Subdistricts 5 and 6 King Salmon Management Plan*. Until new assessment tools such as sonar are available, reliance on the tower index may require more conservative management.

Background and Analysis

Unalakleet River Chinook salmon (Subdistrict 6), along with Shaktoolik River Chinook salmon (Subdistrict 5), have been designated as a stock of yield concern since January 2004, and escapement goals for Chinook salmon returning to the Unalakleet River drainage have been a regular topic of discussion during AYK escapement goal review cycles. In 2005, SEG ranges were established for 2 tributaries of the Unalakleet River: the North River (1,200–2,600; tower counts) and Old Woman River (500–1,100; aerial survey counts). During the 2007 review cycle, Estensen and Evenson (2006) suggested that both SEGs be retained while continuing to collect information to develop a BEG for the entire drainage. Since that time, a multiyear radiotelemetry study was completed (Wuttig 1998, 1999; Joy and Reed 2014a, 2014b), and a weir was operated annually on the mainstem Unalakleet River from 2010 to 2024 (Bell and Leon 2018). The 2010 (Volk et al.

2009) and 2013 (Conitz et al. 2012) review cycles both indicated improvements to better align escapement goals with fishery management needs were warranted, but the data needed to establish a drainagewide goal or a Unalakleet River weir-based goal was insufficient. During the 2016 review (Conitz et al. 2015), the Old Woman River aerial survey goal was discontinued due to persistent poor survey conditions, and the review team formally signaled its long-term plan to establish a goal on the mainstem Unalakleet River as soon as the time series of weir counts was adequate. The 2019 cycle explored options to revise the North River goal using updated tower data and percentile prescriptions outlined in Clark et al. (2014), but ultimately, no revision was implemented. No action was taken during the 2023 cycle (Liller and Savereide 2022), but there was broad consensus to reallocate future effort away from routine reviews of the North River SEG and instead focus on developing a comprehensive escapement goal plan for Unalakleet River Chinook salmon. The 2023 EGRT specified that the pending 2025 review should include criteria for establishing a drainagewide escapement goal and options for establishing a weir-based goal on the mainstem Unalakleet River.

During the 2025 review, ADF&G staff conducted an extensive review of all available data for this stock. Data were inadequate to inform a spawner–recruitment analysis, due to a paucity of age-at-return information and high uncertainty of stock-specific harvest in the marine environment, where Unalakleet River-bound and Shaktoolik River-bound Chinook salmon co-occur. However, the EGRT determined that the combined escapements from North River tower and Unalakleet River weir provided a robust estimate of all spawning escapement for the entire Unalakleet River drainage, and data from both projects were adequate to inform a drainagewide percentile-based SEG.

The time series of paired data from the North River tower and Unalakleet River weir were reviewed. Escapement data from both projects were revised using Bayesian statistical techniques (Bell et al. 2025) to produce standardized estimates of total escapement, inclusive of missed passage during times when projects did not operate. Both projects operated successfully during 2010–2019, 2021, 2022, and 2024. The Unalakleet River weir did not operate in 2020, and a reliable estimate of total escapement could not be produced in 2023. The review team explored options to expand the paired dataset back to 1996, consistent with the time series for the North River tower. Empirical estimates of the proportional contribution of the North River tower to the total drainage were only available in 1997, 1998, and 2009 based on radiotelemetry experiments (Wuttig 1998, 1999; Joy and Reed 2014a). It was determined that a fixed expansion was not appropriate for this system, because the proportional contribution of the North River escapement has been highly variable, ranging between 26% and 91%.[4] As such, the EGRT opted to base the drainagewide goal on 13 years of paired tower and weir counts from 2010 to 2022, excluding 2020. The 2024 combined escapement was not considered in the percentile calculation because it was the lowest on record and outside the range for which sustainable returns have been observed.

The EGRT determined that an SEG range of 1,500–3,500 should be established for the entire Unalakleet River Chinook salmon stock based on the 15th–65th percentiles of historical escapements for the combined North River tower and Unalakleet River weir (Appendix A1). Percentile range was based on recommendations in Clark et al. (2014) for stocks with high contrast (>8), low measurement error, and low to moderate harvest rates (<0.40). Both the North River

[4] The range of proportional contribution of North River to the total Unalakleet River drainage is based on paired tower and weir escapement counts for years 2010–2024, plus telemetry results from 1997, 1998, 2009, and 2010.

tower and Unalakleet River weir have low measurement error, and the escapement contrast is 10 for the years considered in this analysis. The exploitation rate is not known with certainty, but the long-term average (1996–2024) is estimated to be about 40%, with average exploitation near 30% since 2010. The sensitivity of the SEG range was explored, given our decisions not to expand the time series back to 1996 and the exclusion of 2024 data. Cursory statistical procedures were implemented to simulate realistic annual expansion factors for the North River tower for 1996 and 1999–2008 based on observed proportions from telemetry or paired tower or weir data. Observed data were used for all other years. A total of 5,000 simulations were explored, and the median outcome for the 15th and 65th percentiles of the expanded time series was not appreciably different (1,500–3,700) from results from the truncated data set. The exclusion of the 2024 data resulted in a more conservative (i.e., 100 fish) lower bound SEG.

Evaluation of the drainagewide SEG requires that both the North River tower and Unalakleet River weir operate annually; however, new developments since the *AYK Escapement Goal Memo* was released have made it currently impossible to implement this new goal. The Unalakleet River weir was a collaborative venture between ADF&G and Norton Sound Economic Development Corporation (NSEDC), with land lease support from the Unalakleet Native Corporation (UNC). In March of 2025, the UNC voted to suspend its support of the weir program, citing concerns for Chinook salmon conservation and logistical difficulties experienced by community members traveling past the weir to access upriver areas. Nome Area ADF&G staff worked closely with UNC to discuss options, but concerns surrounding the weir program were irreconcilable. UNC informed ADF&G that the existing land lease could not be used for weir operations. No alternative weir sites were available, and weir operations were discontinued by ADF&G prior to the 2025 season. UNC expressed support for ADF&G to transition to low-impact assessment methods, such as sonar. ADF&G has initiated sonar feasibility evaluations, and those efforts will be ongoing through at least the 2028 season.

At this time, the drainagewide SEG proposed by ADF&G is not actionable. Upon being notified of the discontinuation of the Unalakleet River weir, the EGRT did not have adequate time to consider alternative options. As such, no changes will be made to the existing escapement goal structure for this stock during this review cycle. The result will be continued management based on the North River tower goal of 1,200–2,600 and the *Subdistricts 5 and 6 King Salmon Management Plan* (5 AAC 04.395). Improved understanding that the North River tower provides an inconsistent index of drainagewide escapement may result in more conservative fishery management until alternative drainagewide options are available.

PILGRIM RIVER (SALMON LAKE) SOCKEYE SALMON

Summary

The Pilgrim River (Salmon Lake) sockeye salmon SEG of 6,800–36,000 was established in 2019 using historical weir counts. Since then, concerns have been raised that the upper bound was set unnecessarily high, particularly given the effects of long-term lake fertilization and new stock assessment data.

During the 2025 review, the EGRT used 22 years of run and age data (2003–2024) in a spawner–recruitment analysis. Results showed that the median escapement that produced maximum sustained yield (S_{MSY}) was about 8,900 fish and that carrying capacity (S_{EQ}) was about 25,300, indicating that sustainable production occurs only within the lower half of the current SEG range.

Based on these findings, the team determined that revising the SEG to a lower bound threshold of ≥6,400 fish is warranted. This decision is consistent with the biological productivity of the stock and supports management objectives focused on maximizing subsistence harvest opportunities while ensuring conservation.

Background and Analysis

The Pilgrim River (Salmon Lake) sockeye salmon SEG of 6,800–36,000 was established in 2019 based on the 15th–65th percentiles of historical weir-based escapement estimates (Liller and Savereide 2018). Prior to the 2019 AYK BOF meeting, the Northern Norton Sound Fish and Game Advisory Committee submitted proposal 127[5] that aimed to replace the guideline harvest range for Port Clarence District (5 AAC 04.362) with a management plan for Port Clarence District salmon and Pilgrim River sockeye salmon. The proposed management plan was tied to the escapement goal. Public comments during the meeting included concerns that the upper bound of the SEG established by ADF&G was unnecessarily high, in part, because the analysis did not consider additional information from multiyear lake fertilization and smolt outmigration studies. The BOF directed ADF&G to work with the proponents to discuss available information for informing the Pilgrim River (Salmon Lake) sockeye salmon escapement goal. ADF&G confirmed its commitment to working with the proponents during the BOF Work Session on October 23–24, 2019.[6]

During the 2023 review, the EGRT conducted reviews of available Pilgrim River and Salmon Lake datasets that may help inform escapement goal revisions in future cycles. Pilgrim River drains Salmon Lake, and the lake has been fertilized by NSEDC since 1997, except for 4 years in the early 2000s. The only published review of the efficacy of the lake fertilization efforts on enhanced production of sockeye salmon was completed in 2012 (Hamazaki et al. 2012). At the request of NSEDC, ADF&G's Kodiak Island Limnology Laboratory conducted an updated review of available information and provided summaries of their preliminary findings in 2020 (Heather Finkle, Commercial Fisheries Biologist, Kodiak Island Limnology Laboratory, ADF&G, Division of Commercial Fisheries, Kodiak; data on file). No action was taken during the 2023 review cycle, but there was broad consensus that future discussion pertaining to the Pilgrim River (Salmon Lake) escapement goal should seek to clarify fishery management objectives for this enhanced stock and consider any new insights from the ongoing review of the long-term lake fertilization and monitoring program.

During the 2025 review, the EGRT determined that high-quality ground-based escapement, harvest, and age composition data were available, which could be used to inform a spawner–recruit analysis. Inriver abundance data were available from the Pilgrim River weir for years 2003–2024.[7] Weir-based escapement data were reviewed, and Bayesian statistical techniques (Bell et al. 2025) were used to produce standardized estimates, inclusive of all missed passage that occurred between

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[5] Northern Norton Sound Fish and Game Advisory Committee. Proposal 127 (HQ-F18-013): Repeal the Guideline Harvest Range for the Port Clarence District and replace with the Port Clarence District and Pilgrim River Salmon Management Plan. Alaska Board of Fisheries 2018–2019 Cycle. https://www.adfg.alaska.gov/static/regulations/regprocess/fisheriesboard/pdfs/2018-2019/proposals/127.pdf (accessed October 14, 2025).

[6] Alaska Board of Fisheries Work Session: October 23–24, 2019. Meeting Information. https://www.adfg.alaska.gov/index.cfm?adfg=fisheriesboard.meetinginfo&date=10-23-2019&meeting=anchorage (accessed October 14, 2025).

[7] Ground-based escapement data were also available from the Pilgrim River counting tower for the years 1997, 1999, 2000, and 2002. The AYK EGRT decided not to use the tower data because the number of missed passage days was high in 1997 and 1999, and age data were lacking for all years, except for a small sample size (n = 19) in 2022.

June 23–September 14, annually. Harvest data was from Menard et al. (2022) and included subsistence, commercial, and test fishery harvests. Nearly all harvest was from the subsistence fishery, which occurs in both marine and freshwater environments. All marine subsistence harvest of sockeye salmon was assumed to be Pilgrim River origin. Subsistence harvest occurring in fresh water, upriver from the Pilgrim River weir, was subtracted from the weir count to produce an escapement estimate. Total escapement plus total harvest was considered a robust estimate of total run size. Total annual run was apportioned to run-at-age based on scale samples collected each year at the weir. Sample sizes ranged from 158 to 935 (average 379) and were used to generate age-specific run and brood table estimates (Appendices A2 and A3) for this analysis.

The EGRT conducted a spawner–recruitment analysis to evaluate if the percentile-based SEG should be revised. The 2025 analysis was conducted using an online application developed by ADF&G.[8] The application is fully customizable and supports standardized implementation of a broad range of analytical methods useful for escapement goal evaluation. For the Pilgrim River sockeye salmon stock, the Ricker state-space model variant was used with no additions.[9] A total of 22 run years (2003–2024) of relevant abundance and age data were used, representing 17 full brood years (2003–2017) for this stock. Ideally, the existing percentile-based SEG would contain the estimate of S_{MSY} within the goal range to optimize the potential to produce the largest harvestable surplus, and the upper bound of the SEG would be well below the carrying capacity to avoid negative density-dependent implications on future run sizes. As such, the biological reference points of interest were the spawning abundance associated with S_{MSY} and S_{EQ}.

The spawner–recruitment analysis provided estimates of key biological reference points for the Pilgrim River sockeye salmon stock (Appendix A4), which indicated that a revision to the existing SEG was warranted. The median value of S_{MSY} was estimated to be 8,906 (95% CI: 7,246–10,862), which was within the current SEG range (6,800–36,000). However, the existing upper bound of the SEG was well above the median model estimate for S_{EQ} of 25,319 (95% CI: 18,105–31,991). These results indicate that sustainable yields can only be expected from escapement levels consistent with the lower half of the existing SEG range, and escapement levels near the upper end of the range should be avoided.

The EGRT decided to revise the goal range for Pilgrim River (Salmon Lake) sockeye salmon based on the results of the spawner–recruitment analysis and current management needs. Optimum yield analysis indicated that maintaining annual spawning abundance within the range of 6,400–11,300 would result in a high probability (i.e., 90%) of producing long-term average harvestable surpluses of at least 90% of maximum sustainable yield (Appendix A5). Currently, there is no commercial fishery interest in this stock.[10] ADF&G manages the Pilgrim River sockeye salmon to ensure that the lower end of the escapement goal is attained before allowing for maximum subsistence opportunity. In regulation (5 AAC 01.180), household subsistence permits are limited to 25 Pilgrim River sockeye salmon, unless modified by emergency order. In years when ADF&G

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[8] Hamazaki, T. 2025. Pacific salmon escapement goal analyses. Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage. available from https://hamachan.shinyapps.io/Spawner_Recruit_Bayes/ (cited October 29, 2024; accessed October 14, 2024).

[9] Auto-regressive and time varying alpha model additions were explored but not used for the final analysis.

[10] 5 AAC 04.358 establishes a guideline harvest range for the Port Clarence District, such that 0–10,000 sockeye salmon may be harvested for commercial purposes if ADF&G projects that the inriver run goal of at least 30,000 fish will be achieved. Commercial fishing has occurred in 3 years since statehood: 1966, 2007, and 2008. Harvests from these commercial fishing openings were small, with fewer than 1,400 sockeye salmon caught. Since the last commercial fishing opening in 2008, the Pilgrim River inriver run goal of 30,000 sockeye salmon has been surpassed in 5 years (2015, 2017–2019, and 2024), and there was no commercial market for Port Clarence salmon. Currently, no commercial salmon permits are registered to individuals who reside in the 2 villages located in Port Clarence: Teller and Brevig Mission.

anticipates the lower end of the escapement goal may not be met, subsistence net fishing is closed to allow fish to escape. In years when ADF&G anticipates escapement will exceed the lower bound of the SEG, household subsistence limits may be increased, or waived, to provide maximum opportunity. Given the focus on maximizing subsistence opportunity, EGRT determined that a lower bound SEG threshold of ≥6,400 Pilgrim River sockeye salmon was most appropriate for this stock.

The sensitivity of the lower bound SEG threshold was explored using other model variants. The EGRT recognized that a standard Ricker model would be adequate and more parsimonious given that there was little uncertainty in the input data. The standard Ricker model produced similar estimates to the state-space model with an analogous, but slightly higher, lower bound SEG of 6,600. Both model options provided substantial evidence for density dependence and a clear signal of overcompensation at escapement levels more than about 30,000 fish. However, there was extremely high recruitment variability at low to moderate spawning escapements. Poor model fit to observed data suggested that, perhaps, observed recruitment has been a result of broods produced under more than 1 production regime. A Regime Transition Model was explored (Cunningham et al. 2015), and biological reference points were calculated for both high and low productivity regimes. The Regime Transition Model provided evidence that an escapement of 6,400 has less than a 0.90 probability of maximizing future yield, but that the ≥6,400 lower bound SEG threshold is a reasonable compromise when selecting a lower bound which maximizes sustained yield across low and high regimes. The lower bound SEG option of ≥6,400 produced from the state-space model is desirable given the management intent to increase subsistence fishing opportunity as soon as possible each year.

TUBUTULIK RIVER CHUM SALMON

Summary

The EGRT determined that discontinuing the Tubutulik River chum salmon SEG (3,100–9,000) due to lack of reliable assessment, is warranted. Management will continue to be based on the Kwiniuk River chum salmon SEG (9,100–32,600) that adequately supports Subdistrict 3 harvest management. This change will not alter current fishery practices, though postseason Tubutulik River aerial surveys may still be conducted when feasible.

Background and Analysis

The *Subdistricts 2 and 3 of the Norton Sound District Salmon Management Plan* (5 AAC 04.390) directs ADF&G to manage commercial, subsistence, and personal use fisheries to achieve escapement goals established on salmon spawning tributaries. Tubutulik River and Kwiniuk River are the primary chum salmon spawning tributaries that support fisheries in Norton Sound Subdistrict 3. Historically, assessment programs have produced chum salmon escapement information for both the Tubutulik and Kwiniuk Rivers. Chum salmon SEGs were revised for both systems in 2019 (Liller and Savereide 2018). The Tubutulik River chum salmon SEG of 3,100–9,000 was based on the 20th–60th percentiles of unexpanded peak aerial surveys, and the Kwiniuk River SEG of 9,100–32,600 was based on the 15th–65th percentile of historical tower counts. Tubutulik River chum salmon escapement has been indexed infrequently with 1-time peak aerial surveys on 41[11] occasions beginning in 1963. Due to logistical constraints, aerial surveys have not

[11] Of the 41 annual surveys archived by ADF&G, 37 were rated fair or good, and 4 were rated poor.

been flown on the Tubutulik River since 2015, and the SEG has not been assessed since it was revised. Meanwhile, chum salmon escapement to Kwiniuk River has been reliably estimated each year using a counting tower since 1981.

The EGRT determined that the Tubutulik River chum salmon peak aerial survey SEG of 3,100–9,000 should be discontinued due to an inability to reliably assess the goal. Removal of the Tubutulik River chum salmon SEG will not change how fisheries are prosecuted in Subdistrict 3. Given the history of chum salmon escapement assessment within Subdistrict 3, fishery management has developed to rely primarily on Kwiniuk River tower to inform harvest management decisions. The Tubutulik and Kwiniuk Rivers are in proximity with the 2 systems being connected by a slough near their respective outlets. Both rivers are assumed to have a relatively similar annual abundance of chum salmon, and marine harvests are a mixture of chum salmon returning to both systems. The Kwiniuk River tower is the longest-running ground-based assessment project in Norton Sound and has, therefore, provided a long history of high-quality chum salmon escapement counts, both inseason and postseason. ADF&G will continue to look for opportunities to fly postseason aerial surveys within the Tubutulik River as staff capacity, funding, and aircraft charter options are available.

KWINIUK RIVER COHO SALMON

Summary

The EGRT determined that the Kwiniuk River aerial survey-based coho salmon SEG (650–1,300) should be replaced with a tower-based lower bound SEG of ≥4,400. This change represents a shift to a more reliable method for indexing coho salmon escapement performance within the Kwiniuk River and is consistent with current management practices.

Background and Analysis

The Kwiniuk River is 1 of 2 salmon producing tributaries draining into Subdistrict 3,[12] and the only system in which coho salmon escapement is monitored. Escapement monitoring has included both intermittent aerial surveys (1987–2024) and a ground-based counting tower (2001–2024). A SEG of 650–1,300 was established for Kwiniuk River coho salmon based on 0.8 and 1.6 times the average of 6 unexpanded aerial survey counts.[13] The goal range was adopted in 2005 and was consistent with the 15th–85th percentiles of historical aerial surveys through 2002 (ADF&G 2004). The SEG has only been assessed in 7 of 20 years since 2005,[14] due to logistical challenges of conducting successful aerial surveys. Given the history of coho salmon aerial survey assessment, fishery management has developed to rely primarily on Kwiniuk River tower counts to inform harvest management decisions. The Kwiniuk River tower is the longest continuously running escapement project in Norton Sound and has produced reliable annual estimates of coho salmon escapement since 2001. The EGRT determined that the Kwiniuk River coho salmon aerial-based SEG should be replaced with an SEG based on higher-quality tower data.

[12] The Tubutulik River also drains into Norton Sound Subdistrict 3, and supports coho salmon spawning, but is not monitored.

[13] Lowell Fair (Division of Commercial Fisheries, Fisheries Biologist, Region III), Charlie Lean (Division of Commercial Fisheries, Area Management Biologist, Region III), Fred DeCicco (Division of Sport Fish, Area Management Biologist, Region III), Jim Magdanz (Division of Subsistence, Resource Specialist, Region III), and Robert McLean (Habitat Division, Habitat Biologist, Region III). Alaska Department of Fish and Game, Division of Commercial Fisheries. Proposed Salmon BEGs for Norton Sound and Kotzebue Sound, March 24, 1999 memorandum.

[14] Aerial surveys were flown in 2007, 2008, 2010, 2011, 2016, 2022, and 2024.

The EGRT reviewed coho salmon escapement data from the Kwiniuk River tower and reviewed fishery performance to inform a percentile-based SEG for this stock. All historical tower counts were reviewed and updated as needed. Bayesian statistical methods were used to estimate missed passage and standardize tower counts to an operational end date of September 15. In some cases, it was apparent that the annual coho salmon run may have continued past the September 15 end date, but the passage estimates are germane to the portion of the coho salmon run that is subject to harvest in marine and freshwater areas downriver from the tower. Total annual escapement was calculated as the tower count minus upriver harvest. Harvest exploitation is assumed to be about 30% on average.[15] The small-scale nature of the fisheries limits the utility of an upper bound for the escapement goal. The EGRT determined that a lower bound SEG of ≥4,400 based on the 15th percentile of the 2001–2024 Kwiniuk River coho salmon tower estimates is the most appropriate for this stock (Appendix A5). The choice of the 15th percentile was based on recommendations outlined in Clark et al. (2014) for stocks with high contrast (>8), low measurement error, and low to moderate harvest rates (<0.40). The Kwiniuk River coho salmon tower-based escapement estimates have low measurement error, and the escapement contrast is 8 for years considered in this analysis. Exploitation rate is not known with certainty, but the worst case[16] long-term average (2001–2024) is estimated to be about 36%.

KWINIUK RIVER CHINOOK SALMON

During the 2025 review, the EGRT discussed the Kwiniuk River Chinook salmon escapement goal extensively. An SEG range of 300–500, assessed using a counting tower, was in place from 2005 to 2015 (ADF&G 2004), and the escapement goal was revised to a lower bound SEG of ≥250 in 2016 (Conitz et al. 2015). The EGRT discussed the limited utility of this goal as a fishery management tool and entertained perspectives that the goal should be discontinued. The Kwiniuk River Chinook salmon run is, and historically has been, very small and there are no directed commercial or subsistence fisheries for this stock. Kwiniuk River Chinook salmon represent a small population at the northern extent of the species range. Conitz et al. (2015) noted "Anecdotal information provided by stakeholders indicates there is little overwintering habitat in this system and that Chinook salmon have established themselves in this system in relatively recent human history…." Small numbers of Kwiniuk River Chinook salmon are harvested incidentally in chum and coho salmon fisheries throughout Subdistrict 3. Long-term average (1965–2024) harvest from the commercial and subsistence fishery, combined, is only 150 fish (range: 0–750).[17] Escapement goal performance for this stock has been poor. The lower bound SEG has only been met once (year 2020) since the goal was revised in 2016 and in only 4 of 11 years when the prior goal range was in place. The historical escapement goal performance for this stock would not have been meaningfully different even if all Chinook salmon harvest was eliminated, which would have required considerable forgone harvest of chum and coho salmon. Ultimately, the EGRT decided the existing goal has utility because it keeps BOF and ADF&G attention focused on the Kwiniuk River Chinook salmon stock while recognizing management options to attain the goal are limited.

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[15] Commercial and subsistence harvest occurs in marine waters of Subdistrict 3 and is assumed to consist of 50% Kwiniuk River coho salmon and 50% Tubutulik River coho salmon. Additional subsistence harvest occurs within the Kwiniuk River, both downstream and upstream of the counting tower.

[16] The worst case scenario was based on the unrealistic assumption that all marine harvest of coho salmon in Subdistrict 3 was 100% Kwiniuk River stock.

[17] Harvest values are rounded. The total harvest of Kwiniuk River Chinook salmon is highly uncertain. Commercial and subsistence marine harvests are assumed to be 50% Kwiniuk River Chinook salmon and 50% Tubutulik River Chinook salmon. Information about subsistence harvest within the Kwiniuk River has been available since 2004, and harvests have averaged 54 fish (range: 0–197).

YUKON AREA

In the Yukon Area, which includes the portion of the Yukon River drainage within Alaska, there are currently 12 established escapement goals: 6 Chinook salmon, 3 summer chum salmon, and 3 fall chum salmon (Table 3; Liller and Savereide 2022). Of these escapement goals, 4 are BEGs and 8 are SEGs. Not included in this listing are 3 escapement goals for Canadian stocks that were established as part of the *Yukon River Salmon Agreement*. Escapement goals for these Canadian stocks (mainstem Yukon River Chinook salmon, mainstem Yukon River fall chum salmon, and Fishing Branch River fall chum salmon) are set annually by the Yukon River Panel (JTC 2025). The 2025 escapement goal review did not include goals set by the Yukon River Panel; however, performance of these goals is reported annually by ADF&G (e.g., Munro and Chenowith 2025).

The AYK EGRT finds that all existing escapement goals for salmon stocks in the Yukon Area should continue without revision. The following text includes updated considerations for Yukon River summer chum salmon and Yukon River Chinook salmon since the 2023 review was completed.

SUMMER CHUM SALMON

Summary

The EGRT conducted a comprehensive review of Yukon River summer chum salmon, following earlier recommendations to reevaluate the existing escapement goal structure. Although a drainagewide BEG of 500,000–1,200,000 was established in 2016, tributary goals remain in regulation despite limited utility. Current management and stock of concern evaluations rely exclusively on the drainagewide goal.

The East Fork Andreafsky River SEG (≥40,000) is no longer critical for management following the establishment of the drainagewide BEG, and its assessment is uncertain given the U.S. Fish and Wildlife Service's (FWS) discontinuation of weir operations in 2025. Similarly, the Anvik River BEG (350,000–700,000), once central to a directed commercial fishery, has limited relevance today following the end of the commercial roe fishery in 1997, very small subsistence harvests, and recent declines in relative productivity.

The EGRT concluded that Yukon River summer chum salmon should continue to be managed under the existing drainagewide BEG, and that tributary goals should be reconsidered for discontinuation in future review cycles if assessment challenges persist.

Background and Analysis

Liller and Savereide (2022) provide an overview of the challenges associated with the current escapement goal structure for Yukon River summer chum salmon and recommended that future cycles include a holistic review. The 2025 EGRT conducted a comprehensive review of this stock and entertained perspectives that all tributary escapement goals should be discontinued in lieu of the drainagewide BEG. Yukon River summer chum salmon spawn in numerous tributaries, but annual runs are managed as a single stock. Harvest of summer chum salmon occurs primarily in the mainstem Yukon River, such that a single drainagewide escapement goal is appropriate. In 2016, a drainagewide BEG of 500,000–1,200,000 was established for the Yukon River summer chum salmon stock based on a statistical run reconstruction model and consideration of historical drainagewide harvest and escapement levels (Conitz et al. 2015; Hamazaki and Conitz 2015). Drainagewide escapement levels are explicitly linked to fishery management precautions outlined

in the *Yukon River Summer Chum Salmon Management Plan* (5 AAC 05.362). Existing tributary escapement goals were retained following the establishment of the drainagewide goal. However, annual management and tri-annual stock of concern evaluations of the summer chum salmon fisheries have since evolved to focus exclusively on the drainagewide goal. The shift to a drainagewide stock assessment and management approach has highlighted the inherent conflict imposed by the resulting escapement goal structure that still includes, arguably outdated, tributary goals established for a subset of spawning populations.

A tributary escapement goal was established for the East Fork Andreafsky River (SEG; ≥40,000) in 2010 (Volk et al. 2009). There are no large-scale summer chum salmon fisheries that operate within the Andreafsky River, limiting the utility of this goal to inform fishery management. ADF&G used annual escapement estimates from the East Fork Andreafsky River weir to assess this goal. Weir operations had been led by FWS. During the 2025 goal review meetings, the EGRT was notified that FWS planned to discontinue operations of the weir prior to the 2025 season and redirect assessment capacity to other priorities for the foreseeable future (Shane Ransbury, Fishery Biologist, FWS, Fairbanks, personal communication). At the time, it was premature for the EGRT to recommend this goal be discontinued on the sole basis of an inability to assess the goal. However, the EGRT acknowledged that the goal should be discontinued in a future cycle if assessment options are not resolved.

The Anvik River chum salmon BEG (350,000–700,000) was developed in 2005 (ADF&G 2004). The BEG was designed to maximize sustainable yield, which was appropriate given this system historically supported a directed roe fishery outlined in the *Anvik River Chum Salmon Fishery Management Plan* (5 AAC 05.368). The commercial roe fishery has not operated since 1997, and the number of summer chum salmon harvested for subsistence within the Anvik River is very small.[18] ADF&G relies on the Anvik River sonar (Jackson 2025) to assess this goal. Escapement goal performance has been mixed. Between 2005 and 2015, the BEG was achieved in all but 2 years. Beginning in 2016, annual escapement has fallen below the BEG in all years except 2017,[19] even though Yukon River drainagewide escapements during 2016–2019 averaged nearly 2,000,000 fish. Sonar assessment and radiotelemetry studies (Larson et al. 2017) have demonstrated that the relative productivity of the Anvik River summer chum salmon populations declined around the year 2000 and remained at this lower level since then. Given the current nature of the Anvik River chum salmon fishery, potential for very small inriver harvests, and documented production shifts, the BEG has limited utility for informing fishery management and may no longer be appropriate. Future review cycles should consider options to discontinue the Anvik River summer chum salmon BEG in lieu of the Yukon River drainagewide BEG.

CHINOOK SALMON

Liller and Savereide (2022) provided a summary of recently completed data review, genetic baseline, run reconstruction, and stock assessment efforts that could prove useful for establishing drainagewide and stock-specific escapement goals for Yukon River Chinook salmon. Since that time, all review products have been finalized and published: Lee et al. (2021) presents revised

[18] The community of Anvik is located at the confluence of the Anvik and Yukon Rivers, and community residents are the most likely to participate in subsistence activities within the Anvik River. Comprehensive surveys and traditional knowledge interviews document Anvik residents' preference for subsistence salmon fishing in the mainstem Yukon River and no documented effort within the Anvik River (Ikuta et al. 2014; Trainor et al. 2019). Total harvest of summer chum salmon by Anvik residents has averaged 943 fish from 2014–2018 and 117 fish from 2019 to 2023.

[19] Escapement was not assessed in 2020 due to local community concerns during the COVID-19 pandemic.

genetic baseline and reporting groups; Pestal et al. (2022) presents a comprehensive data review of all abundance, age-sex-length, and stock identification data; and Connors et al. (2023) presents the results of a multistock run reconstruction model and spawner–recruitment analysis for the Canadian stock component. ADF&G has extended this work to include spawner–recruitment analyses for the Alaska stock components and is drafting summary reports for future consideration. Consideration of these new products is warranted during future escapement goal review cycles.

An SEG is established for East Fork Andreafsky River Chinook salmon, but it may not be possible to assess the goal in future years. The East Fork Andreafsky Chinook salmon SEG has been monitored using a weir operated by FWS. The weir was discontinued in 2025. It was premature for the EGRT to recommend this goal be discontinued during the 2025 review cycle. However, the EGRT acknowledged that the goal should be discontinued in a future cycle if assessment options are not resolved.

KUSKOKWIM AREA

The Kuskokwim Area, which includes the Kuskokwim River and Kuskokwim Bay drainages, currently has 17 established escapement goals for 8 Chinook salmon, 2 chum salmon, 3 coho salmon, and 4 sockeye salmon stocks, or stock components (Table 4; Liller and Savereide 2022). All escapement goals are SEGs.

The AYK EGRT found discontinuation of the Middle Fork Goodnews River (MFGR) Chinook, chum, sockeye, and coho salmon escapement goals is warranted. The review team finds that all other existing escapement goals for salmon stocks in the Kuskokwim Area should continue without revision.

MIDDLE FORK GOODNEWS RIVER ESCAPEMENT GOALS

Liller and Savereide (2022) provided a summary of MFGR escapement goal evaluation challenges due to progressively restrictive funding to operate the weir. The coho salmon escapement goal has not been assessed since 2011 (except 2015), and no escapement goals have been evaluated since 2019. During the 2023 review cycle, ADF&G signaled its plan to retain SEGs for MFGR salmon while evaluating alternative funding options to reinitiate assessment. The 2023 report indicated that ADF&G would discontinue goals as early as the 2025 cycle if efforts to reinitiate the weir were unsuccessful. Since that time, ADF&G has pursued competitive grants, but dedicated funding has yet to be secured. The EGRT determined that the MFGR SEGs for Chinook, chum, sockeye, and coho salmon be discontinued. ADF&G anticipates maintaining the weir and field camp facilities for additional years with the hope that adequate funding or partnerships to operate the weir will be identified. If weir operations resume in the future, these escapement goals may be reestablished. In the meantime, Chinook and sockeye salmon escapements to the MFGR will continue to be monitored through 1-time peak aerial surveys. Furthermore, aerial survey-based SEGs established for Chinook and sockeye salmon within the North Fork Goodnews River will continue to be assessed.

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TABLES AND FIGURES

Table 1.–Escapement goal planning meetings facilitated by the Alaska Department of Fish and Game (ADF&G) during the 2025 review cycle.

Date	Meeting	Description
1/30/2024	Escapement Goal Review Team [a]	A series of four 1-hr. meetings to establish escapement goal review objectives, staff assignments, and timelines for Arctic–Kotzebue Sound Area, Yukon Area summer season, Yukon Area fall season, and Kuskokwim Area
1/31/2024	Yukon Area	Discussion between the Divisions of Commercial Fisheries and Sport Fish on Yukon Area chum salmon escapement goals
9/12/2024	Arctic–Kotzebue Sound Area	Discussion between the Divisions of Commercial Fisheries and Sport Fish on Norton Sound–Port Clarence Chinook, chum, sockeye, and coho salmon escapement goals
9/17/2024	Escapement Goal Review Team [a]	Norton Sound–Port Clarence Chinook, chum, sockeye, and coho salmon escapement goals
10/31/2024	Escapement Goal Review Team [a]	Kuskokwim Area Chinook, chum, sockeye, and coho salmon escapement goals, Norton Sound–Port Clarence Area Chinook, chum, sockeye, and coho salmon escapement goals, and Yukon Area summer chum salmon escapement goals
11/5/2024	Arctic–Kotzebue Sound Area	Discussion between the Divisions of Commercial Fisheries and Sport Fish on Norton Sound–Port Clarence Chinook, chum, sockeye, and coho salmon escapement goals
12/10/2024	Escapement Goal Review Team [a]	Norton Sound–Port Clarence Area Chinook, chum, sockeye, and coho salmon escapement goals

[a] Included regional research coordinators and fishery scientists from ADF&G Divisions of Commercial Fisheries and Sport Fish. Meetings were attended by area research and management staff as needed.

Table 2.–Summary of 2025 salmon escapement goal changes for Norton Sound–Port Clarence and Kotzebue Areas.

Stock unit	Assessment method	Current escapement goal			Action for 2025		
		Goal	Type	Year established or last revised	Action	New or revised goal	Type
Norton Sound–Port Clarence Area							
Chinook salmon							
Kwiniuk River	Tower	≥250	SEG	2016	No change	NA	NA
North River [a]	Tower	1,200–2,600	SEG	2005	No change	NA	NA
Chum salmon							
Eldorado River	Weir	4,400–14,200	SEG	2019	No change	NA	NA
Nome River	Weir	1,600–5,300	SEG	2019	No change	NA	NA
Snake River	Tower/weir	2,000–4,200	SEG	2019	No change	NA	NA
Kwiniuk River	Tower	9,100–32,600	SEG	2019	No change	NA	NA
Tubutulik River	Peak aerial survey	3,100–9,900	SEG	2019	Discontinue change	NA	NA
Coho salmon							
Kwiniuk River	Peak aerial survey	650–1,300	SEG	2005	Revise assessment method	≥4,400	SEG
Niukluk River/Ophir Creek [b]	Peak aerial survey	750–1,600	SEG	2016	No change	NA	NA
North River [a]	Peak aerial survey	550–1,100	SEG	2005	No change	NA	NA
Pink salmon							
Kwiniuk River (all years)	Tower	≥8,400	SEG	2005	No change	NA	NA
Nome River (even year)	Weir	≥13,000	SEG	2005	No change	NA	NA
Nome River (odd year)	Weir	≥3,200	SEG	2005	No change	NA	NA
North River [a] (all years)	Tower	≥25,000	SEG	2005	No change	NA	NA
Sockeye salmon							
Pilgrim River (Salmon Lake)	Weir	6,800–36,000	SEG	2019	Revise	≥6,400	SEG
Glacial Lake	Peak aerial survey	800–1,600	SEG	2005	No change	NA	NA
Kotzebue Area							
Chum salmon							
Noatak / Eli / Kelly Rivers	Peak aerial survey	43,000–121,000	SEG	2019	No change	NA	NA
Upper Kobuk / Selby Rivers	Peak aerial survey	12,000–32,100	SEG	2019	No change	NA	NA

Note: NA stands for not applicable.

[a] Unalakleet River drainage.

[b] Fish River drainage.

Table 3.–Summary of 2025 salmon escapement goal changes for the Yukon Area.

Stock unit	Assessment method	Current escapement goal			Action for 2025		
		Goal	Type	Year established or last revised	Action	New or revised goal	Type
Chinook salmon							
Andreafsky River (East Fork)	Weir	2,100–4,900	SEG	2010	No change	NA	NA
Andreafsky River (West Fork)	Peak aerial survey	640–1,600	SEG	2005	No change	NA	NA
Nulato River (forks combined)	Peak aerial survey	940–1,900	SEG	2005	No change	NA	NA
Anvik River	Peak aerial survey	1,100–1,700	SEG	2005	No change	NA	NA
Chena River	Tower/sonar	2,800–5,700	BEG	2001	No change	NA	NA
Salcha River	Tower/sonar	3,300–6,500	BEG	2001	No change	NA	NA
Chum salmon, summer							
Yukon River Drainage	Reconstruction [a]	500,000–1,200,000	BEG	2016	No change	NA	NA
East Fork Andreafsky River	Weir	≥40,000	SEG	2010	No change	NA	NA
Anvik River	Sonar	350,000–700,000	BEG	2005	No change	NA	NA
Chum salmon, fall							
Yukon River Drainage	Reconstruction[a,b]	300,000–600,000	SEG	2010	No change	NA	NA
Delta River	Foot surveys	7,000–20,000	SEG	2019	No change	NA	NA
Teedriinjik (Chandalar) River	Sonar	85,000–234,000	SEG	2019	No change	NA	NA

Note: NA stands for not applicable. Not included in this table are goals set by the Yukon River Panel for Canadian-origin mainstem Chinook salmon (42,500–55,000), mainstem fall chum salmon (70,000–104,000), and Fishing Branch fall chum salmon (22,000–49,000).

[a] Run reconstruction is conducted postseason and uses a model to estimate total return from a variety of harvest and escapement monitoring projects.

[b] This goal includes all Alaska and Canadian stocks.

Table 4.–Summary of 2025 salmon escapement goal changes for the Kuskokwim Area.

Stock unit	Assessment method	Current escapement goal			Action for 2025		
		Goal	Type	Year established or last revised	Action	New or revised goal	Type
Chinook salmon							
Kuskokwim River drainage							
Kuskokwim River	Reconstruction[a]	65,00–120,000	SEG	2013	No change	NA	NA
George River	Weir	1,800–3,300	SEG	2013	No change	NA	NA
Kogrukluk River	Weir	4,800–8,800	SEG	2013	No change	NA	NA
Kwethluk River	Weir	4,100–7,500	SEG	2013	No change	NA	NA
Pitka Fork Salmon River	Peak aerial survey	470–1,600	SEG	2005	No change	NA	NA
Kanektok River	Peak aerial survey	3,900–12,000	SEG	2016	No change	NA	NA
Middle Fork Goodnews River[b]	Weir	1,500–3,600	SEG	2019	Discontinue	NA	NA
North Fork Goodnews River[b]	Peak aerial survey	640–3,300	SEG	2005	No change	NA	NA
Chum salmon							
Kogrukluk River	Weir	15,000–49,000	SEG	2005	No change	NA	NA
Middle Fork Goodnews River[b]	Weir	≥12,000	SEG	2005	Discontinue	NA	NA
Coho salmon							
Kogrukluk River	Weir	13,000–28,000	SEG	2005	No change	NA	NA
Kwethluk River	Weir	≥19,000	SEG	2010	No change	NA	NA
Middle Fork Goodnews River[b]	Weir	≥12,000	SEG	2005	Discontinue	NA	NA
Sockeye salmon							
Kogrukluk River	Weir	4,400–17,000	SEG	2010	No change	NA	NA
Kanektok River	Peak aerial survey	15,300–41,000	SEG	2016	No change	NA	NA
North Fork Goodnews River[b]	Peak aerial survey	9,600–18,000	SEG	2016	No change	NA	NA
Middle Fork Goodnews River[b]	Weir	22,000–43,000	SEG	2019	Discontinue	NA	NA

Note: NA stands for not applicable.

[a] Run reconstruction is conducted postseason and uses a model to estimate total return from a variety of harvest and escapement monitoring projects.

[b] Kuskokwim Bay. All other stock units are within the Kuskokwim River drainage.

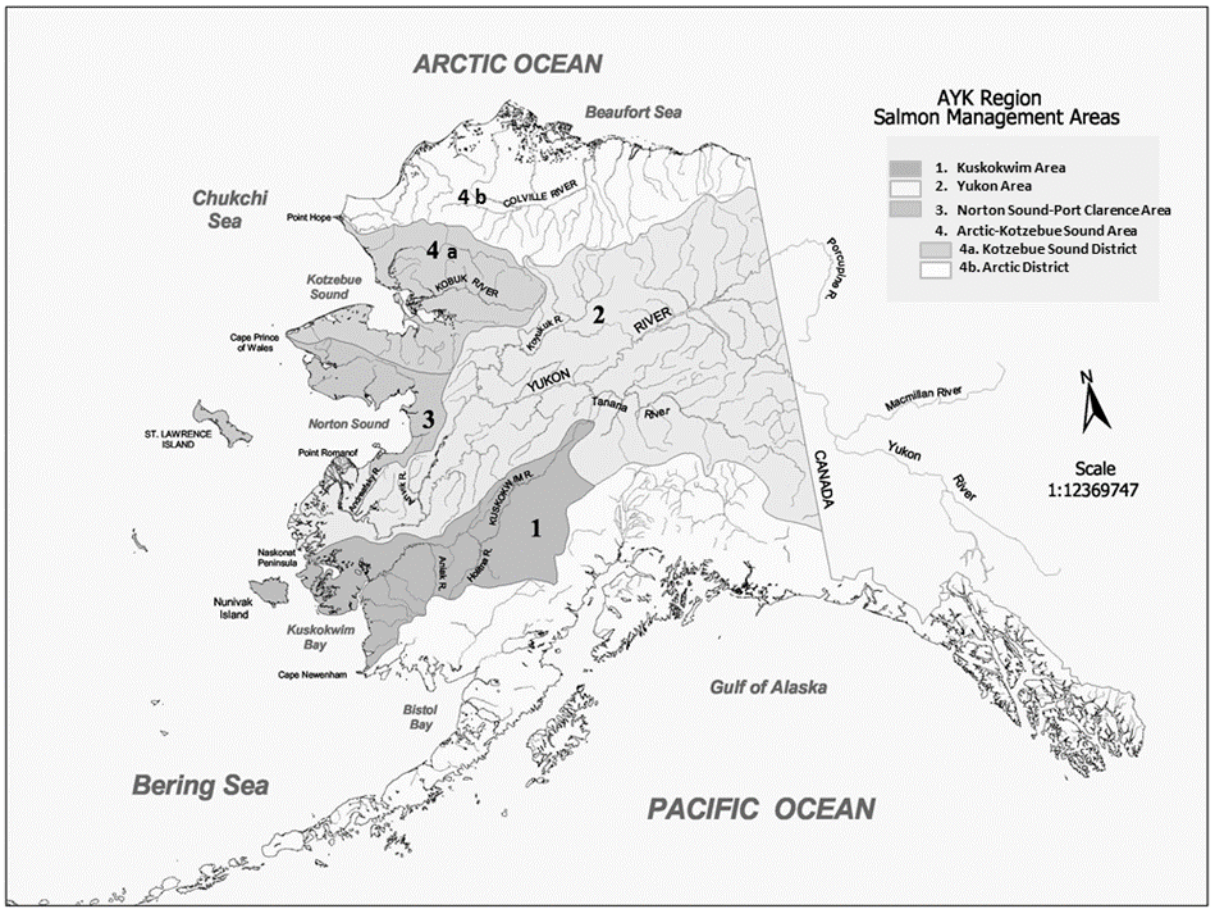


Figure 1.–Arctic–Yukon–Kuskokwim Region salmon management areas for the Division of Commercial Fisheries, ADF&G.

APPENDIX A: ESCAPEMENT DATA AND ESCAPEMENT GOAL REVISION SUMMARIES

Appendix A1.–Escapement data used to inform a drainagewide percentile-based sustainable escapement goal (SEG) for Unalakleet River Chinook salmon.

Year	North River tower	Unalakleet River weir	Total drainage[a]
1996	1,059	ND	–
1997	3,051	ND	–
1998	2,093	ND	–
1999	1,513	ND	–
2000	1,057	ND	–
2001	1,126	ND	–
2002	1,532	ND	–
2003	1,410	ND	–
2004	1,104	ND	–
2005	1,041	ND	–
2006	853	ND	–
2007	1,962	ND	–
2008	946	ND	–
2009	2,766	ND	–
2010	1,386	1,031	2,417
2011	883	1,078	1,961
2012	972	812	1,784
2013	585	941	1,526
2014	2,241	1,128	3,369
2015	1,944	2,789	4,733
2016	520	455	975
2017	1,044	2,968	4,012
2018	2,583	3,359	5,942
2019	3,315	6,641	9,956
2020	1,068	ND	–
2021	924	499	1,423
2022	1,338	119	1,457
2023	552	–	–
2024	462	320	782

Summary of goal findings

Number of years	12
Min. escapement	975
Max. escapement	9,956
Contrast[b]	10
Assessment type	Weir/tower
Data uncertainty	Low
Harvest rate	Moderate
Tier[c]	2
15th percentile	1,445
65th percentile	3,465
Goal range	1,500–3,500
Goal type	SEG

Note: ND means no data are available because the project did not operate. En dash (–) means the value could not be calculated.

[a] Total drainage escapement was calculated as the sum of the North River tower and the Unalakleet River weir passage estimates.

[b] Contrast is the maximum observed escapement divided by the minimum. Value is rounded.

[c] Tier recommendation is based on Clark et al. (2014) for stocks with high contrast (>8), lower measurement error (weirs, towers), with low to moderate average harvest rates (<0.40).

Appendix A2.–Pilgrim River sockeye salmon spawning abundance, harvest, total run, and age composition, 2003–2024.

				Age proportions				
Year	Spawner abundance	Harvest	Run	Age-3	Age-4	Age-5	Age-6	Age-7
2003	42,729	1,407	44,136	0.00	0.04	0.67	0.29	0.00
2004	84,130	8,032	92,162	0.00	0.06	0.59	0.34	0.00
2005	54,842	8,444	63,286	0.00	0.06	0.58	0.35	0.00
2006	50,894	10,376	61,270	0.00	0.15	0.39	0.46	0.00
2007	41,354	10,596	51,950	0.00	0.04	0.78	0.18	0.00
2008	19,363	5,187	24,550	0.00	0.00	0.49	0.51	0.00
2009	948	1,643	2,591	0.00	0.02	0.23	0.67	0.08
2010	1,630	824	2,454	0.00	0.06	0.10	0.82	0.01
2011	9,117	1,610	10,727	0.00	0.01	0.80	0.19	0.00
2012	7,810	1,422	9,232	0.00	0.07	0.58	0.34	0.01
2013	11,621	5,230	16,851	0.00	0.01	0.42	0.55	0.02
2014	9,203	2,917	12,120	0.00	0.41	0.22	0.34	0.03
2015	32,123	13,843	45,966	0.00	0.08	0.62	0.30	0.00
2016	12,195	12,140	24,335	0.00	0.11	0.80	0.09	0.00
2017	53,830	12,424	66,254	0.00	0.02	0.22	0.67	0.09
2018	36,334	12,381	48,715	0.00	0.15	0.56	0.28	0.00
2019	30,149	12,309	42,458	0.00	0.02	0.67	0.30	0.00
2020	13,679	7,754	21,433	0.00	0.03	0.19	0.74	0.04
2021	4,504	1,893	6,397	0.01	0.14	0.52	0.29	0.05
2022	1,486	661	2,147	0.00	0.01	0.40	0.55	0.03
2023	1,686	396	2,082	0.00	0.26	0.45	0.28	0.01
2024	34,670	5,983	40,653	0.00	0.03	0.87	0.10	0.00

[a] Harvest is almost exclusively subsistence, with minimal test fish harvest in 2006 and commercial harvest occurring in 2007 and 2008.

Appendix A3.–Pilgrim River sockeye salmon brood table, 2003–2024.

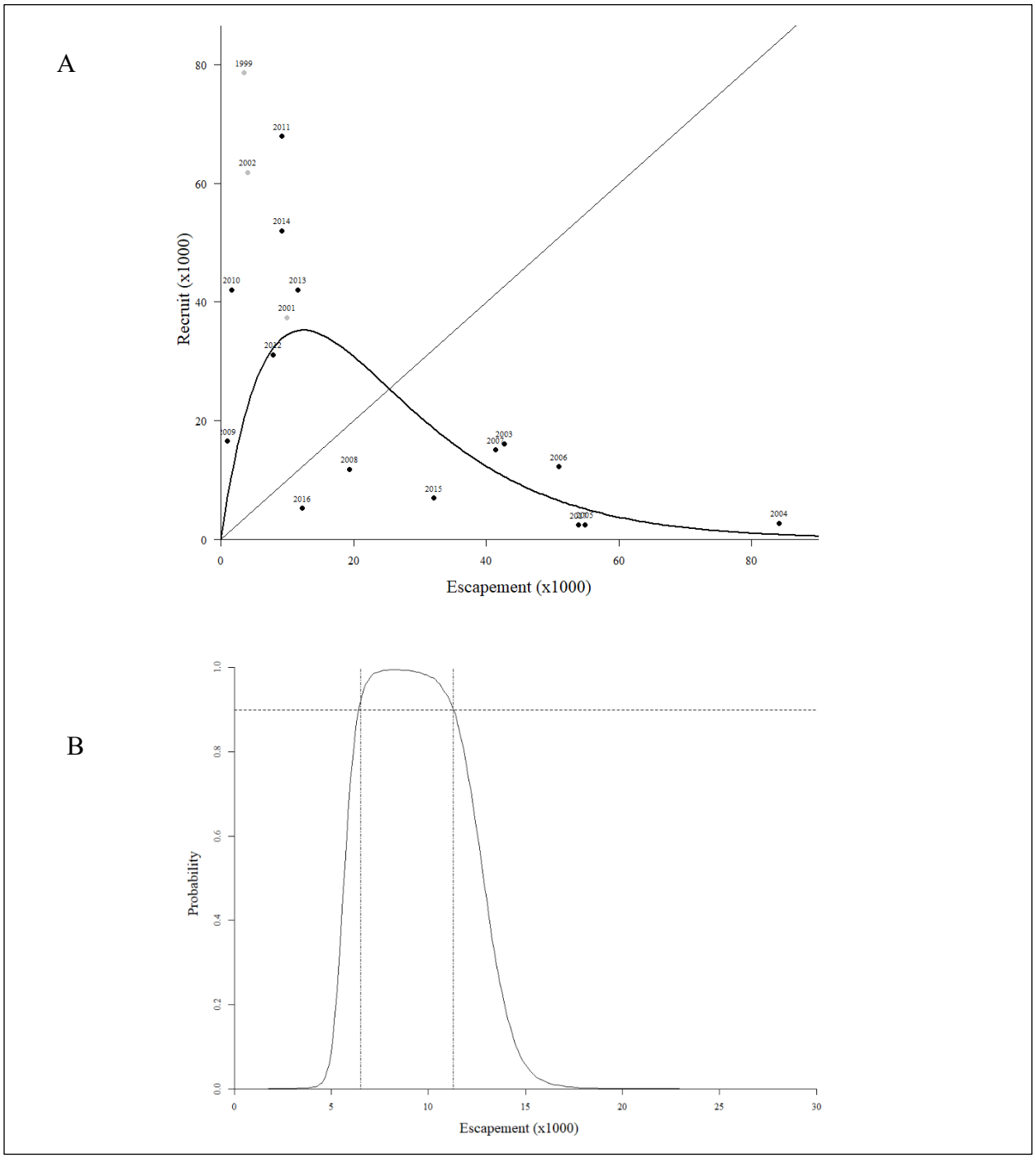
Year	Spawner abundance	Return by age					Recruits	Recruits per spawner
		Age-3	Age-4	Age-5	Age-6	Age-7		
2003	42,729	86	2,187	12,054	1,725	36	16,088	0.38
2004	84,130	0	0	605	2,024	51	2,679	0.03
2005	54,842	0	52	242	2,034	116	2,445	0.04
2006	50,894	0	151	8,541	3,142	366	12,201	0.24
2007	41,354	0	102	5,353	9,231	359	15,045	0.36
2008	19,363	0	621	7,033	4,130	0	11,784	0.61
2009	948	0	220	2,648	13,643	0	16,511	17.42
2010	1,630	0	4,983	28,545	2,281	6,187	41,996	25.76
2011	9,117	0	3,778	19,391	44,599	167	67,935	7.45
2012	7,810	0	2,662	14,437	13,847	168	31,115	3.98
2013	11,621	0	1,031	27,360	12,805	847	42,044	3.62
2014	9,203	0	7,341	28,474	15,926	291	52,032	5.65
2015	32,123	0	1,011	3,982	1,828	74	6,894	0.21
2016	12,195	0	678	3,323	1,191	13	5,205	0.43
2017	53,830	0	914	868	586	0	2,367	0.04
2018	36,334	42	15	937	4,065	–	–	–
2019	30,149	0	547	35,368	–	–	–	–
2020	13,679	0	1,220	–	–	–	–	–
2021	4,504	0	–	–	–	–	–	–
2022	1,486	–	–	–	–	–	–	–
2023	1,686	–	–	–	–	–	–	–
2024	34,670	–	–	–	–	–	–	–

Note: En dash (–) means no data.

Appendix A4.–Ricker model estimates of key biological reference points for the Pilgrim River sockeye salmon stock.

	alpha	beta x 10^{-4}	S_{EQ}	S_{MSY}
Min	1.30	0.36	5,496	2,631
2.5%	3.21	0.56	18,105	7,246
Mean	8.49	0.81	25,282	8,947
Median	7.73	0.81	25,319	8,906
97.5%	18.04	1.05	31,991	10,862
Max	78.35	1.32	43,800	16,064
SD	4.02	0.12	3,566	947

Appendix A5.–Ricker spawner–recruit relationship (A) and optimum yield profile (B) used to inform the lower bound sustainable escapement goal of ≥6,400 for Pilgrim River sockeye salmon.



Note: In panel (A), the heavy black line is the Ricker spawner–recruit relationship, and recruits equal (i.e., replace) spawners along the thin diagonal line. In panel (B) the solid black line shows the probability that a specified escapement will result in 90% of maximum sustained yield. The dashed horizontal line aligns with a probability of 0.90, and the vertical dashed lines identify the range of escapements that have at least a 0.90 probability of producing 90% of maximum sustainable yield.

Appendix A6.–Escapement data used to inform the lower bound (LB) sustainable escapement goal (SEG) for Kwiniuk River coho salmon.

Year	Kwiniuk River tower
2001	9,098
2002	6,781
2003	5,502
2004	10,740
2005	12,960
2006	22,390
2007	9,554
2008	10,492
2009	8,602
2010	8,411
2011	3,352
2012	2,755
2013	3,750
2014	14,617
2015	7,592
2016	9,072
2017	14,029
2018	17,172
2019	6,064
2020	5,488
2021	4,953
2022	6,570
2023	6,086
2024	3,856

Summary of goal findings

Number of years	24
Min. escapement	2,755
Max. escapement	22,390
Contrast[a]	8
Assessment type	Tower
Data uncertainty	Low
Harvest rate[b]	<0.4
Tier[c]	2
15th percentile	4,350
LB SEG	≥4,400
Goal type	SEG

[a] Contrast is the maximum observed escapement divided by the minimum. Value is rounded.

[b] Harvest rate is not known with certainty. Best estimates suggest a harvest rate of approximately 0.27 on average (2001–2024), with the worst case being 0.36, if it is assumed that all Subdistrict 3 marine harvest is 100% Kwiniuk origin.

[c] Tier recommendation is based on Clark et al. (2014) for stocks with high contrast (>8), lower measurement error (weirs, towers) with low to moderate average harvest rates (<0.40).