



# MEMORANDUM

TO: Sam Rabung, Director  
Division of Commercial Fisheries  
  
Tom Taube, Acting Director  
Division of Sport Fish

Date: 28 March, 2023

Through: Nick Sagalkin, Regional Supervisor  
Division of Commercial Fisheries, Region IV <sup>DS</sup> NS  
  
Jason Dye, Regional Supervisor <sup>DS</sup> JED  
Division of Sport Fish, Region II

Subject: Kodiak Management  
Area Escapement Goal  
Review Findings

From: Kevin Schaberg, Regional Research Supervisor <sup>DS</sup> KS  
Division of Commercial Fisheries, Region IV  
  
Timothy McKinley, Regional Research Coordinator <sup>DS</sup> TRM  
Division of Sport Fish, Region II

The purpose of this memorandum is to report our progress reviewing and revising escapement goals for Kodiak Management Area (KMA). The *Policy for Statewide Salmon Escapement Goals* (5 AAC 39.223) recognizes the establishment of salmon escapement goals as a joint responsibility of the Alaska Department of Fish and Game (department) and the Alaska Board of Fisheries (board) and describes the concepts, criteria, and procedures for establishing and modifying salmon escapement goals. Under the policy, the board recognizes the department's responsibility for establishing and modifying biological escapement goals and sustainable escapement goals. Due to changing productivity of a stock or system, escapement goals evolve over time. As a result, during the escapement goal review process, the department evaluates new methodologies and concepts and utilizes the best available data to establish or update escapement goals.

In October 2022, an interdivisional team, including staff from the divisions of Commercial Fisheries and Sport Fish, was formed to review existing Pacific salmon *Oncorhynchus* spp. escapement goals for KMA. This memorandum summarizes the preliminary results of the salmon escapement goal review and subsequent findings. The team has reached consensus on all findings outlined below.

Four important terms defined in the *Policy for the Management of Sustainable Salmon Fisheries* (5 AAC 39.222) are:

- *biological escapement goal* (BEG): the escapement that provides the greatest potential for maximum sustained yield (MSY);
- *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;
- *inriver run goal* (IRRG): a specific management objective for salmon stocks that are subject to harvest upstream of the point where escapement is estimated; the inriver run goal will be set in regulation by the board and is comprised of the SEG, BEG, or OEG, plus specific allocations to inriver fisheries; and
- *optimal escapement goal* (OEG): a specific management objective for salmon escapement that considers biological and allocative factors and may differ from the SEG or BEG; the OEG will be sustainable and will be set by the board.

The previous escapement goal review for KMA occurred in 2019 (McKinley et al. 2019). For the 2022 review, an additional 3 years of data (2019–2021) were available (Table 1). Based on the addition of these new data, the team determined if enough information was added to justify revising existing escapement goals or creating new goals for systems that do not have goals. The team did not identify any systems suitable for creating new goals, and all systems with goals currently in place were further evaluated.

For all stocks where the escapement goal was evaluated, the review team determined the appropriate goal type based on the quality and quantity of available data including the additional 3 years, and then determined the most appropriate methods to evaluate the escapement goal. If a sufficient time series of escapement and total return estimates was available and the data contained sufficient information to provide a scientifically defensible, accurate estimate of the spawning escapement with the greatest potential to produce maximum sustained yield ( $S_{MSY}$ ), then the data were considered sufficient to develop a BEG. Methods used to develop BEGs included spawner-recruit and Markov yield analyses. If return estimates were not available and/or the data were not sufficient to estimate  $S_{MSY}$ , the data were used to establish an SEG using the percentile approach (Clark et al. 2014).

Following these analyses, the team developed updated estimates of escapement goals for each stock, compared these with the current goal, and agreed on a determination to keep the current goal, revise the goal, or eliminate the goal. The methods used to evaluate KMA escapement goals as well as the rationale used to make subsequent findings on each goal are described in detail in a forthcoming report. Preliminary results are summarized below.

### **King Salmon**

There are 2 escapement goals for king salmon in the KMA (Table 1). Both goals were assessed in 2016 by fitting age-structured state-space spawner recruit models (Fleischman and McKinley 2013) to data from both stocks. The assessment resulted in a change to the Ayakulik River BEG (currently 4,800–8,400), while the existing Karluk River BEG (3,000–6,000) was deemed

appropriate (Schaberg et al. 2016). During this cycle the team assessed the recent returns for these stocks and agreed that a reevaluation of these goals was unnecessary.

### **Sockeye Salmon**

There are 12 escapement goals for sockeye salmon in the KMA (Table 1). The team conducted analyses on all sockeye salmon systems and determined that current escapement goals for all but two systems (Malina Creek and Pasagshak River) were still appropriate.

#### *Pasagshak River*

Pasagshak River currently has an aerial survey-based lower bound SEG (LB SEG) of >3,000 fish for sockeye salmon. A weir has been operated at the outlet of Lake Rose Tead, which drains into the Pasagshak River. This weir has operated since 2011 to count sockeye salmon. The data now constitutes 11 years, and we evaluated the weir-based counts using the percentile approach. The team determined that a weir-based SEG of 2,000–8,000 fish would be appropriate for this system.

#### *Malina Creek*

Malina Creek has an aerial survey based SEG for sockeye salmon. This system was previously enhanced with back stocking and fertilization and supported a directed fishery for several years around that time. Malina Creek has not received recent or consistent stocking or fertilization, and the directed effort on the system has gone away. The system is hard to assess with aerial methods for sockeye salmon and is currently surveyed for pink salmon with sockeye salmon counts being incidental to those efforts. The team determined that this goal should be discontinued.

### **Coho Salmon**

There are 4 escapement goals for coho salmon in the KMA. The American, Olds, and Pasagshak Rivers are LB SEGs, and the Buskin River is an SEG. The Buskin and Olds River goals were revised in 2020 (McKinley et al. 2019). The team reviewed the most recent escapement data available for KMA coho salmon stocks and concluded that no changes were necessary.

### **Pink Salmon**

There are 3 aggregate goals for KMA pink salmon that include even- and odd-year specific SEGs for the Kodiak Archipelago. All three SEGs were revised in 2011 and recent escapements were within historical ranges; therefore, there was no compelling reason to adjust the goals in 2022.

### **Chum Salmon**

There is one aggregate LB SEG for chum salmon in the KMA. The Kodiak Archipelago aggregate LB SEG was revised in 2017 (Schaberg et al. 2016). Because it was recently revised and the recent escapement indices were within the range of historical observations, the team determined that no change was necessary.

In summary, this comprehensive review of the 22 existing escapement goals in the KMA resulted in 20 goals remaining unchanged, the revision of 1 goal (Pasagshak River sockeye

salmon weir-based SEG 2,000–8,000), and the removal of 1 goal (aerial survey based SEG for Malina Creek). Neither of these changes are anticipated to have management or allocative implications to the subsistence, commercial, or sport fisheries.

Staff are preparing a report to document this escapement goal review in more detail, including all changes to escapement goals, as well as detailed descriptions of the analyses performed. This report will be published prior to the January 2024 Kodiak finfish board meeting. A brief oral report will be given to the board at the October 2023 Work Session. A more detailed oral report concerning escapement goals will be presented to the board in January 2024.

Salmon stock of concern recommendations will be finalized after the 2023 salmon season to include the most recent year's escapements. These recommendations will be formalized in a memo and presented at the board Work Session in October 2023.

## **REFERENCES CITED**

- Clark, R. A., D. M. Eggers, A. R. Munro, S. J. Fleischman, B. G. Bue, and J. J. Hasbrouck. 2014. An evaluation of the percentile approach for establishing sustainable escapement goals in lieu of stock productivity information. Alaska Department of Fish and Game, Fishery Manuscript No. 14-06, Anchorage.
- Fleischman, S. J., and T. R. McKinley. 2013. Run reconstruction, spawner–recruit analysis, and escapement goal recommendation for late-run Chinook salmon in the Kenai River. Alaska Department of Fish and Game, Fishery Manuscript Series No. 13-02, Anchorage.
- McKinley, T. R., K. L. Schaberg, M. J. Witteveen, M. B. Foster, M. L. Wattum, and T. L. Vincent. 2019. Review of salmon escapement goals in the Kodiak Management Area, 2019. Alaska Department of Fish and Game, Fishery Manuscript No. 19-07, Anchorage.
- Schaberg, K. L., M. B. Foster, M. Wattum, and T. R. McKinley. 2016. Review of salmon escapement goals in the Kodiak Management Area, 2016. Alaska Department of Fish and Game, Fishery Manuscript Series No. 16-09, Anchorage.

**Table 1.**—Escapement goals and escapements observed from 2012 through 2021 for king, sockeye, coho, pink, and chum salmon stocks of the Kodiak Management Area.

System	Current Goal Range		Type	Initial Year	Escapement										2023 Findings
	Lower	Upper			2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
<b>KING SALMON</b>															
Karluk River	3,000	6,000	BEG	2011	3,197	1,824	1,182	2,777	3,434	2,600	3,155	3,898	3,344	2,796	No Change
Ayakulik River <sup>a</sup>	4,800	8,400	BEG	2017	4,740	2,349	897	2,392	4,574	3,712	2,149	1,948	2,402	2,961	No Change
<b>SOCKEYE SALMON</b>															
Malina Creek	1,000	10,000	SEG	2005	4,100	3,800	4,900	1,000	2,000	1,000	500	100	NA	1,450	Discontinue
Afognak (Litnik) River <sup>b</sup>	20,000	50,000	BEG	2020	41,553	42,153	36,345	38,151	33,167	22,151	17,601	26,817	25,383	31,997	No Change
Karluk River Early Run	150,000	250,000	BEG	2017	188,085	234,880	252,097	260,758	178,874	242,599	205,054	190,168	158,846	131,775	No Change
Karluk River Late Run	200,000	450,000	BEG	2017	314,605	336,479	543,469	368,896	314,935	385,896	428,225	317,381	293,147	376,209	No Change
Ayakulik River Early Run	140,000	280,000	SEG	2011	213,501	214,969	210,040	218,178	182,589	204,497	189,008	162,430	220,935	265,756	No Change
Ayakulik River Late Run	60,000	120,000	SEG	2011	114,753	67,195	87,671	108,257	71,978	120,361	77,325	117,209	81,660	118,418	No Change
Upper Station River Early Run <sup>c</sup>	43,000	93,000	BEG	2011	25,487	27,712	36,823	54,473	48,047	83,614	61,732	49,517	56,190	108,225	No Change
Upper Station River Late Run	120,000	265,000	SEG	2020	149,325	125,573	181,411	132,864	145,013	209,298	235,669	165,146	195,147	355,507	No Change
Frazer Lake	75,000	170,000	BEG	2008	148,884	136,059	200,296	219,093	122,585	129,227	201,161	169,627	138,570	186,632	No Change
Saltery Lake <sup>d</sup>	15,000	35,000	BEG	2011	25,155	35,939	29,047	39,920	54,377	35,218	19,299	20,783	22,637	61,824	No Change
Pasagshak River (aerial)	3,000		LB SEG	2011	2,600	9,750	350	600	3,200	4,800	1,100	NA	1,000	700	Discontinue Weir SEG
Pasagshak River (weir)					4,585	11,421	1,582	2,077	7,053	11,021	2,019	4,537	3,922	8,551	2,000–8,000
Buskin Lake	5,000	8,000	BEG	2011	8,565	16,189	13,976	8,719	11,584	7,222	4,284	12,297	7,741	2,330	No Change
<b>COHO SALMON</b>															
Pasagshak River	1,200		LB SEG	2011	3,132	1,648	4,934	1,790	737	701	3,186	488	2,031	4,721	No Change
Buskin River <sup>e</sup>	4,700	9,600	SEG	2020	4,906	4,401	6,730	NA <sup>f</sup>	2,134	5,091	4,218	4,878	NA <sup>f</sup>	7,500	No Change
Olds River	500		LB SEG	2020	624	2,145	1,320	1,357	1,634	1,054	878	NA	794	923	No Change
American River	400		LB SEG	2011	427	841	1,595	530	500	410	78	NA	279	297	No Change
<b>PINK SALMON</b>															
Mainland District Kodiak Archipelago (odd year)	250,000	1,000,000	SEG	2011	413,325	620,680	254,650	754,600	65,305	1,010,100	280,400	904,400	1,484,000	478,250	No Change
Kodiak Archipelago (even year)	2,000,000	5,000,000	SEG	2011		4,450,711		5,614,531		5,079,016		4,688,688		4,562,998	No Change
Kodiak Archipelago (even year)	3,000,000	7,000,000	SEG	2011	5,111,049		2,733,282		1,699,281		4,874,342		9,429,396		No Change
<b>CHUM SALMON</b>															
Kodiak Archipelago	101,000		LB SEG	2017	94,900	NA	84,700	171,800	89,700	184,500	115,100	99,400	64,200	113,300	No Change

<sup>a</sup> Final escapements include estimated weir counts due to flooding at the weir during the king salmon run. King salmon escapement estimated for Ayakulik includes an estimated 20 king salmon harvested above the weir when a fishery has occurred as harvest estimates are typically not available for Ayakulik River sport harvest. King salmon sport harvest since 2011 is assumed to be zero as the fishery was closed to retention. All years include fish counts from post-weir aerial surveys.

## 2023 Kodiak Management Area Escapement Goal Memo

<sup>b</sup> Afognak (Litnik) River sockeye salmon escapement does not incorporate egg take removals.

<sup>c</sup> OEG for Upper Station River early run sockeye salmon was 25,000 from 1999–2013, the OEG was increased to 30,000 from 2014–2016 and managed for only if the department determined that the upper end of the Frazer Lake escapement goal would be exceeded. The OEG was eliminated in 2017.

<sup>d</sup> Saltery Lake sockeye salmon escapements are weir counts minus fish removed for egg-takes.

<sup>e</sup> Buskin River coho salmon escapements include estimated weir counts due to flooding.

<sup>f</sup> Buskin River coho salmon escapement in 2015 and 2020 was incomplete as the weir was washed out for much of the season.