Department of Fish and Game





DIVISIONS OF SPORT FISH & COMMERCIAL FISHERIES

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MEMORANDUM

TO:	Sam Rabung, Director Division of Commercial Fisheries	Date:	28 March, 2023		
	Tom Taube, Acting Director Division of Sport Fish				
Through:	Nick Sagalkin, Regional Supervisor Division of Commercial Fisheries, Region IV NS				
	Jason Dye, Regional Supervisor Division of Sport Fish, Region II JED	Subject:	Kodiak Management		
From:	Kevin Schaberg, Regional Research Supervisor		Area Escapement Goal Review Findings		
	Timothy McKinley, Regional Research Coordinator Division of Sport Fish, Region II	RM			

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.
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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 Lower Upper Type Yee 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 Findings KNG SALMON 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 4.000 8.000 BEG 2001 4.740 2.392 4.574 3.712 2.149 1.948 2.402 2.901 No Change SOCKEYE SALMON Halina Creek 1.000 10.000 SEG 2005 4.105 3.6345 38.151 33.167 22.151 17.601 26.817 25.838 1.58.461 31.775 No Change Karlak River Law Run 200.00 250.000 BEG 2011 214.962 210.647 218.78 182.598 204.471 189.008 162.430 220.935 265.766 No Change Ayakulik Kiver Law 60.000 120.0000 SEG 2011 2		Current Go	oal Range		Initial		Escapement							2023			
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Saltery Lake ^d 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 1,000 NA 1,200 4,537 3,922 8,551 2,000-8,000 NA 1,312 1,484 4,934 1,700 7,37 701 3,186 488 2,031 4,721 No Change NA 1,500 1,500 1,634 1,054 878 NA 779 2923 No Change NA 1,500 1,634 1,054 878																	
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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 ⁶ 4,700 9,600 SEG 2020 4,906 4,401 6,730 NA ^f 2,134 5,091 4,218 4,878 NA ^f 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 Olds River 400 LB 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 PINK SALMON 2,000,000 5,000,000 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 2,000,000 5,000,000 SEG 2011 4,450,711 5,614,531 5,079,016 4,874,342 9,429,396 No Change Kod		2,000	0,000	DLO	2011	0,505	10,109	15,570	0,717	11,001	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	1,201	12,297	,,, 11	2,000 110	, chunge	
Buskin River ⁶ 4,700 9,600 SEG 2020 4,906 4,401 6,730 NA ^f 2,134 5,091 4,218 4,878 NA ^f 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 1,595 530 500 410 878 NA 794 923 No Change PINK SALMON Mainland District 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 Voidak Archipelago (odd 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 CHUM SALMON K	COHO SALMON																
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 794 923 No Change PINK SALMON Mainland District 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 Mainland District 2000,000 5,000,000 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 2,000,000 5,000,000 SEG 2011 5,111,049 2,733,282 1,699,281 5,079,016 4,688,688 9,429,396 No Change CHUM SALMON Kit Kodiak Archipelago <th< td=""><td>Pasagshak River</td><td>1,200</td><td></td><td>LB SEG</td><td>2011</td><td>3,132</td><td>1,648</td><td>4,934</td><td>1,790</td><td>737</td><td>701</td><td>3,186</td><td>488</td><td>2,031</td><td>4,721 No</td><td>o Change</td></th<>	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	o Change	
American River 400 LB SEG 2011 427 841 1,595 530 500 410 78 NA 279 297 No Change PINK SALMON 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 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 2,000,000 7,000,000 SEG 2011 5,111,049 2,733,282 1,699,281 4,874,342 9,429,396 No Change CHUM SALMON VIIII SALMON VIIII SALMON VIIII SALMON VIIII SALMON VIIII SALMON VIIII SALMON	Buskin River ^e	4,700	9,600	SEG	2020	4,906	4,401	6,730	NA ^f	2,134	5,091	4,218	4,878	NA ^f	7,500 No	o Change	
PINK SALMON 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 2,000,000 5,000,000 5,000,000 SEG 2011 4,450,711 5,614,531 5,079,016 4,688,688 4,562,998 No Change 2,000,000 7,000,000 SEG 2011 5,111,049 2,733,282 1,699,281 4,874,342 9,429,396 No Change CHUM SALMON SEG SEG 2011 S111,049 2,733,282 1,699,281 4,874,342 9,429,396 No Change	Olds River	500		LB SEG	2020	624	2,145	1,320	1,357	1,634	1,054	878	NA	794	923 No	o Change	
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 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 CHUM SALMON V V V V V V V V V V	American River	400		LB SEG	2011	427	841	1,595	530	500	410	78	NA	279	297 No	o Change	
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 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 CHUM SALMON V V V V V V V V V V	DINK GALMON																
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(odd 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 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 CHUM SALMON V		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) 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 CHUM SALMON No Change		2 000 000	5 000 000	SEC	2011		4 450 711		5 614 521		5 070 016		1 600 600		4 562 008 No Charas		
(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 CHUM SALMON		2,000,000	3,000,000	SEG	2011		4,430,711		3,014,331		3,079,010		4,000,000		4,302,998 No Change		
CHUM SALMON		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	
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	CHUM SALMON																
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	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	o Change	

^a 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

^b Afognak (Litnik) River sockeye salmon escapement does not

incorporate egg take removals.

^c 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.

^d Saltery Lake sockeye salmon escapements are weir counts minus fish

removed for egg-takes.

^e Buskin River coho salmon escapements include estimated weir

counts due to flooding.

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