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of **ALASKA**
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MEMORANDUM

TO: Members
Alaska Board of Fisheries

DATE: September 20, 2023

FROM: Israel Payton, Director *IP*
Division of Sport Fish

SUBJECT: Lower Cook Inlet
Stock of Concern
Recommendations

and

Sam Rabung, Director *SR*
Division of Commercial Fisheries

The *Policy for the management of sustainable salmon fisheries* (SSFP; 5 AAC 39.222) directs the Alaska Department of Fish and Game (department) to report to the Alaska Board of Fisheries (board) on the status of salmon stocks and identify any stocks that present a concern related to yield, management, or conservation during regular board meetings. This memorandum summarizes the results of the stock of concern (SOC) evaluation for Lower Cook Inlet (LCI) salmon stocks for the 2023–2024 board regulatory cycle. The evaluation includes input from headquarters, regional, and area staff from both fishery divisions. As a result of this evaluation, the department is recommending the stock of management concern designation for McNeil River chum salmon be continued and that Mikfik Lake sockeye salmon be designated a stock of management concern.

Following the 2023 salmon season, all king, sockeye, pink, and chum salmon stocks in the LCI management area were examined for potential SOC status. Currently, there is one stock of concern listed in LCI (McNeil River chum salmon; stock of management concern). For this review, staff relied on the definition of “chronic inability” within the *Policy for the management of sustainable salmon fisheries* (5 AAC 39.222) to identify potential stocks of concern. Chronic inability means “the continuing or anticipated inability to meet escapement thresholds over a 4 to 5 year period, which is approximately the generation time of most salmon species”. Eight stocks were reviewed for SOC consideration given that recent runs were often below their sustainable escapement goal (SEG) ranges and are discussed below.

KING SALMON

Anchor River: Not recommended for stock of concern.

King salmon escapement has been indexed in the Anchor River from 1962–2008 via a single aerial survey. Since 2003, escapement has been fully enumerated using various configurations of sonar and video & livebox weirs. The aerial index based SEG was replaced with a stock-recruit based SEG in 2008.

Management Measures: Due to poor runs the department has issued emergency order restrictions and/or closures to the inriver and adjacent saltwater sport fisheries in 12 of the last 15 years. Since 2018, the largest annual inriver harvest was 364 in 2020.

Stock of Concern Recommendation: The king salmon escapement goal for the Anchor River has been achieved in 2 of the last 5 years. As escapement performance of this stock does not meet the criteria for a stock of concern, the department does not recommend listing Anchor River king salmon as a stock of concern status. The department does, however, anticipate the continuation of the trend of low runs for this stock.

Deep Creek: Not recommended for stock of concern.

King salmon escapement has been indexed in Deep Creek from 1962–2020 via a single aerial survey. King salmon escapement in Deep Creek has not been assessed in the last 3 years due to budget reductions. Escapement was also fully enumerated using sonar and a floating resistance-board video weir from 2018 to 2020.

Management Measures: The Deep Creek king salmon sport fisheries have been managed preseason and inseason based on emergency order actions in the Anchor River king salmon sport fishery. As with Anchor River king salmon, due to poor runs the department has issued emergency order restrictions and/or closures to the inriver and adjacent saltwater sport fisheries in 12 of the last 15 years. Since 2018, the largest annual inriver harvest was 373 in 2020.

Stock of Concern Recommendation: The Deep Creek SEG is generally not achieved in years when the Anchor River SEG is also not achieved (Table 1). If this trend continued in 2022 & 2023, the SEG for Deep Creek king salmon would have been achieved in 2 of the last 5 years. As escapement performance of this stock does not meet the criteria for a stock of concern, the department does not recommend listing Deep Creek king salmon as a stock of concern. The department does however anticipate the continuation of the trend of low runs for this stock.

CHUM SALMON

McNeil River: Continue stock of management concern status.

In 2016, the board designated McNeil River chum salmon run as a stock of management concern. Stock assessment information and management measures were summarized in an action plan developed at the 2016 board meeting (Otis et al. 2016a). Since that time the fishery has been closed and there has been no McNeil River chum salmon harvest. However, the McNeil River chum salmon minimum SEG has only been achieved once (2023) in the past 5 years (Table 1). Accordingly, this stock will continue to be managed under the measures outlined in the action plan until it meets the criteria for de-listing.

Port Graham River: Not recommended for stock of concern.

Port Graham River (Figure 1) has an SEG range of 1,200 to 2,700 chum salmon that was established in 2016 (Otis et al. 2016b). The goal has been achieved in 1 of the past 5 years since 2019. In 2 of the 4 years escapement was within than 200 fish of the escapement goal (Table 1). The 2023 preliminary escapement index is projected to meet the goal.

Stock Assessment: In the past 10 years, the majority of the Southern District chum salmon harvest occurred in the commercial set gillnet fishery, with the balance harvested by purse seine (Hollowell et al. 2023). Both fisheries are managed inseason through harvest monitoring, assessing chum salmon escapement, and adjusting fishing effort accordingly. All chum salmon harvested in the Southern District are presumed to be of wild origin as there are no chum salmon hatchery releases in LCI. Chum salmon escapement to the Port Graham River is monitored with ground surveys that are conducted approximately weekly throughout the run. Indices of spawning escapement are estimated using the area-under-the-curve (AUC) method with a 17.5-day stream life (Bue et al. 1998). The final escapement index for the year is the AUC index, or the peak live plus dead count, whichever is greater. This method has been employed since 1976 (Otis and Hollowell 2022).

Management Measures: The department has restricted the purse seine fishery in the Port Graham Special Harvest Area (SHA) and the Port Graham Subdistrict due to poor chum salmon runs from 2019 to 2023. In 2019, the Port Graham Subdistrict remained closed until late August to protect chum salmon and there was no harvest. In 2021, 2022, and 2023 there was no commercial or cost recovery harvest taken from the Port Graham Section. A total of 7 chum salmon were harvested in 2020.

Stock of Concern Recommendation: Escapement indices of Port Graham River chum salmon were below the SEG range in 4 of the past 10 years from 2013 to 2022 but are projected to make the goal in 2023 (Table 1). The goal has not been achieved in 4 of the past 5 years from 2019 to 2023. While this stock meets the criteria for a stock of concern, the department does not recommend designation of Port Graham River chum salmon as a stock of concern at this time. In 2 of the recent 4 years that the goal was missed, it was by a very small margin and the population is likely maintaining sustainable production levels. The department will continue to monitor escapement through the next review cycle with the anticipation that conservative management and improved production, as seen this year, will increase escapement levels.

Island Creek: Not recommended for stock of concern.

Island Creek lies in the Outer District of the Lower Cook Inlet management area (Figure 1) and has an SEG of 5,100 to 11,900 chum salmon. The escapement goal has been achieved twice since 2019 (Table 1). The 2023 preliminary escapement index is projected to exceed the upper end of the goal.

Stock Assessment: All Outer District chum salmon harvest occurs in commercial purse seine fisheries, which are managed inseason through harvest monitoring, assessing chum salmon escapement, and adjusting fishing effort accordingly. All chum salmon harvested in the Outer District are presumed to be of wild origin as there are no chum salmon hatchery releases in LCI.

Escapement to Island Creek is monitored through aerial and ground surveys, with deference given to ground surveys when survey coverage is sufficient. Two of the biggest chum salmon producers in the Outer District (Island Creek, Port Dick Creek) occur in Port Dick Bay, a long narrow embayment where the two stocks inevitably mix in marine waters where the purse seine fishery occurs (Figure 1). Hence, apportioning the harvest between these 2 major stocks, and smaller contributing stocks (e.g., Middle Creek) is challenging even though subdistrict boundaries are associated with each anadromous stream in Port Dick Bay.

Management Measures: From 2020–2023 the department implemented incremental restrictions on the purse seine fishery in the Island (232-13) and Middle Creek (232-12) subdistricts of Port Dick Bay in response to poor chum salmon runs. In 2021 the regulatory closed waters area in the Island Creek Section was substantially expanded. However, the minimum SEG was not met that year, so the following year the entire Island Creek section was closed for the whole season. Escapement again fell below the SEG range that year. In 2023, both the Island and Middle Creek sections were kept closed until a ground survey on August 19 counted 13,556 chum salmon in Island Creek, which is above the upper bound of the SEG range (5,100–11,900), so both sections were subsequently opened to commercial harvest.

Stock of Concern Recommendation: Escapement indices of Island Creek chum salmon were below the SEG range 3 of the last 5 years from 2019–2023. The 2023 escapement index calculation is preliminary, but it will exceed the upper end of the SEG range (Table 1). Given the successful management strategy implemented in 2023, staff are confident harvest of Island Creek chum salmon can be controlled to consistently achieve this SEG. This stock does not meet the stock of concern criteria and the department does not recommend it be designated a stock of concern.

PINK SALMON

China Poot Creek: Not recommended for stock of concern.

China Poot Creek lies in the Southern District of the Lower Cook Inlet management area (Figure 1). The SEG range of 2,500 to 6,300 fish was established for China Poot Creek pink salmon in 2016 (Otis et al. 2016b) based on the 3-tier percentile approach (Clark et al. 2014). The China Poot Creek pink salmon escapement goal was last achieved in 2015 (Table 1).

Stock Assessment: Most of the Southern District pink salmon harvest occurs in purse seine fisheries, with the balance harvested in set gillnet fisheries (Hollowell et al. 2023). Both fisheries are managed inseason through harvest monitoring, assessing pink salmon escapement, and adjusting fishing effort accordingly. Pink salmon are harvested in mixed-stock fisheries in the Southern District that are primarily targeting hatchery sockeye salmon returning to China Poot Creek and Hazel Lake and hatchery pink salmon returning to Tutka Bay Lagoon. Hence, it is not possible to allocate what portion of the district’s pink salmon harvest derives from China Poot Creek. Hatchery-produced pink salmon have contributed an average 51% of the annual commercial harvest in the Southern District during years in which thermal mark recovery data are available (Otis and Hollowell 2023). Since 1976, pink salmon escapements to China Poot Creek have been assessed with bi-weekly ground surveys using the methodologies described for Port Graham and Island Creek chum salmon.

Management Measures: In 2016, the China Poot SHA was assigned its own statistical reporting area which allowed harvests of enhanced sockeye and China Poot Creek pink salmon to be more precisely monitored. Every year since 2018, the China Poot SHA has been closed to commercial harvest beginning in late July. Initially these closures occurred in the last week of July, but for the past two years have occurred in the third week. This was done to protect returning pink salmon, at the cost of purse seine harvest opportunity targeting hatchery sockeye salmon returning to China Poot Creek. However, as yet these restrictions have not been sufficient to increase escapement of pink salmon to China Poot Creek.

Stock of Concern Recommendation: Except for 2013 and 2015, escapement indices of China Poot Creek pink salmon were below the escapement goal range from 2013 to 2023 (Table 1). Escapement in 2023 is much improved over the parent year (2021), but the final escapement index (1,071) is below the escapement goal (Table 1). Under the most common guideline for “chronic inability” to meet escapement goals in the sustainable salmon fishery policy, this stock qualifies for designation as a stock of concern. However, in the past, the department has typically not recommended pink salmon runs as stocks of concern for the following reasons: 1) the 2-year life cycle leads to genetically separate odd- and even-year brood lines of pink salmon spawning in the same streams but in alternate years and under varying conditions; 2) unlike other salmon species, pink salmon all return at the same age, making survival rates substantially more variable than exhibited by other species with multiple age classes; 3) this also enables pink salmon to respond dramatically to changes in the marine environment, reducing the relationship between the number of spawners and subsequent adult return; 4) population genetic structure of pink salmon is very shallow compared to other salmon, thus pink salmon stock groups are not as well defined as in other salmon; and 5) the short life history and highly variable productivity requires flexible management to respond inseason as understanding of abundance improves and allows managers to balance harvest opportunity with escapement. In addition, the department is transitioning from discrete-stock SEGs to aggregated district SEGs for LCI pink salmon beginning in 2024. This broader strategy addresses points 4 and 5 above and should provide managers with the flexibility to target large hatchery runs while ensuring aggregate escapement levels to index streams in the Southern District are sustainable. For these reasons, the department does not recommend China Poot Creek pink salmon be designated a stock of concern.

SOCKEYE SALMON

Mikfik Creek: Recommend as stock of management concern.

Mikfik Lake is located within the McNeil River Bear Sanctuary in the Kamishak District of the Lower Cook Inlet (Figure 1). The current SEG range of 3,400 to 11,000 spawners was established in 2016 (Otis et al. 2016b) using the 3-tier percentile approach (Clark et al. 2014). The Mikfik Lake salmon escapement goal has been achieved once in the past 5 years from 2018 to 2022 (Table 1). The preliminary 2023 escapement index (2,900) is under the SEG range but does not represent a complete index due to technical difficulties with the monitoring system.

Stock Assessment:

All Mikfik Lake sockeye salmon harvest occurs in a purse seine fishery targeting this stock in the McNeil River Subdistrict (249-50), which is managed inseason through harvest monitoring,

assessing sockeye salmon escapement, and adjusting fishing effort accordingly. All sockeye salmon harvested in the McNeil River Subdistrict are presumed to be of wild origin as the nearest release site for hatchery sockeye salmon is Kirschner Lake, over 20 miles away. Since 1998, the department has deployed a remote video system at the outlet of Mikfik Lake that captures images of fish as they enter the lake to estimate escapement (Otis 2023). However, video counts are not a complete census of the run because power limitations have precluded the use of lighting to monitor passage at night.

Management Measures: In 2022 and 2023, the department kept the McNeil River and Paint River subdistricts closed from June 1 throughout the entire season. Prior to this, from 2009 through 2021, the department closed the McNeil and Paint River subdistricts after around June 20 to conserve chum salmon stocks returning to McNeil River. Since 2009, there was only harvest in one year (2014) when 1,700 sockeye salmon were harvested, and the final escapement (18,062) exceeded the upper bound of the SEG range in place that year.

Stock of Concern Recommendation:

Escapement indices of Mikfik Lake sockeye salmon were below the SEG range in 5 of the past 10 years from 2013 to 2022, including 4 of the past 5 years from 2019 to 2023. The 2023 escapement index of 2,900 fish is an incomplete estimate. The video system experienced a failure that resulted in 1 month of lost footage from 3-July to 3-August. Given the early run timing for this stock, in many years, the entire run is in the lake by July 1. However, run timing was much later in 2023 and fish were still entering the lake when video was restored on 3 August. While it is possible enough fish entered the lake to achieve the goal when the video was down, concluding that is speculative. Since this stock did not achieve the goal in 4 of the past 5 years prior to 2023, and given the extremely low escapement in 2020, one of the primary brood years that will contribute to next year's return, it is likely that Mikfik Lake may experience another poor run in 2024. The department therefore recommends Mikfik Lake sockeye salmon be designated as a stock of management concern. Given the proximity of this stock to the existing McNeil River chum salmon stock of concern, an action plan for this stock will be appended to the existing McNeil River chum salmon action plan as most actions will affect both stocks.

Aialik Lake: Not recommended for stock of concern.

The Aialik Lake sockeye escapement was below the 3,200 to 5,400 SEG range in 2 of the past 5 years from 2019 to 2023 (Table 1).

Stock Assessment:

All Aialik Lake sockeye salmon harvest occurs in a purse seine fishery targeting this stock in the Aialik Bay Subdistrict (231-05), which is managed inseason through harvest monitoring, assessing sockeye salmon escapement, and adjusting fishing effort accordingly. All the sockeye salmon harvested in the Aialik Bay Subdistrict are presumed to be of wild origin as the nearest release site for hatchery-produced sockeye salmon is at the head of Resurrection Bay, over 60 miles away. Since 1976, Aialik Lake escapements have been monitored using bi-weekly aerial surveys, with the peak stream-wide count serving as the final escapement index (Otis and Hollowell 2022). Survey timing can impact escapement counts because fish often are not visible to surveyors in this turbid lake until they move up onto the shallow shoreline to spawn. Aialik

Lake is the only significant sockeye salmon run in the Aialik Subdistrict, consequently, purse seine harvest from that subdistrict accurately represents exploitation of this stock.

Management Measures: Sockeye salmon aerial survey indices have been inconsistent over the past decade. Peak counts have ranged from a few hundred fish to well over the upper bound of the SEG. Some of the lower counts occurred in years where silt and algae levels in the lake were high, possibly biasing counts low. Additionally, many of the larger counts have occurred too late in the season to have a fishery. As a result, fishing time was not assigned in those larger years and the Aialik Lake Subdistrict has remained closed since 2006.

Stock of Concern Recommendation:

Escapement indices of Aialik Lake sockeye salmon were below the escapement goal range 2 of the past 5 years from 2019 to 2023 (Table 1). The department recommends Aialik Lake sockeye salmon not be designated a stock of management concern.

SUMMARY

The department is recommending the stock of management concern designation for McNeil River chum salmon be continued and that Mikfik Lake sockeye salmon be designated a stock of management concern.

As part of the LCI regulatory meeting in November 2023, staff will provide the board an update on stocks of concern and review the department's recommendations for stock of concern.

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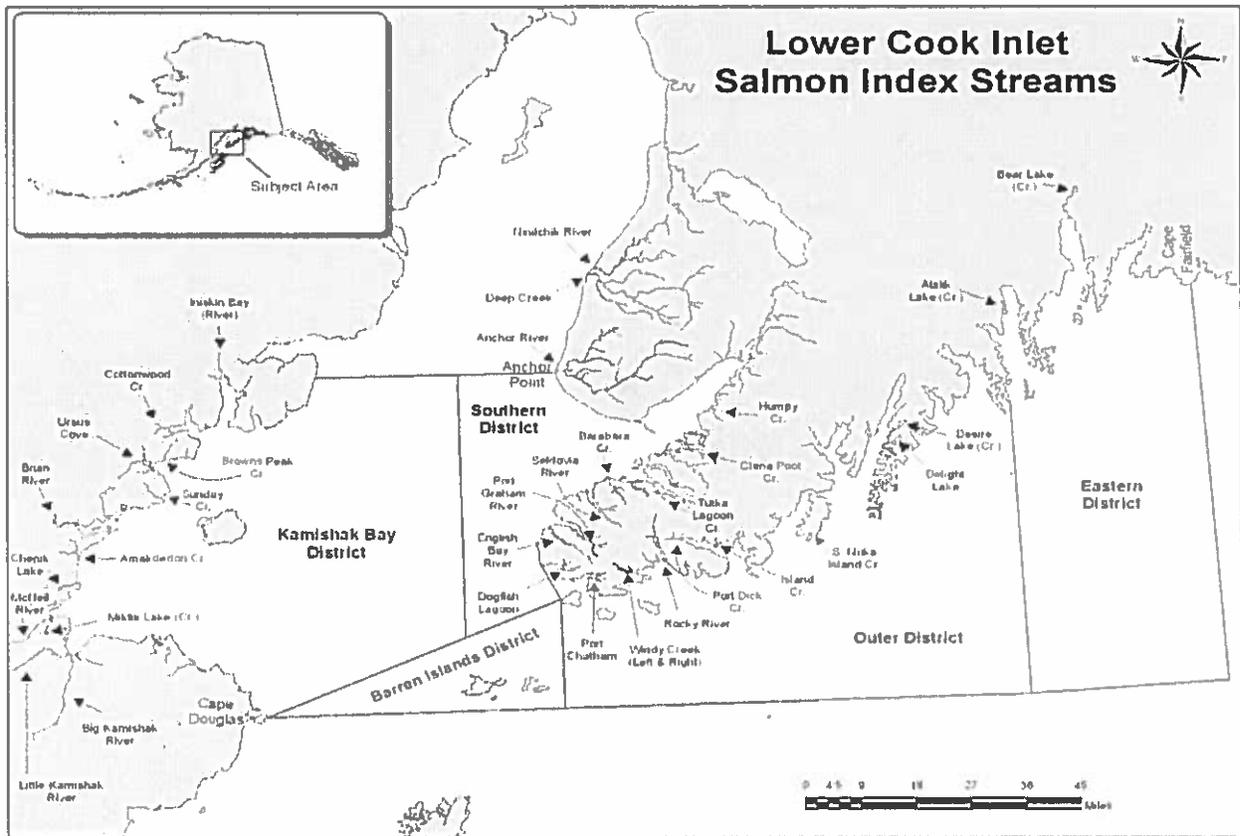


Figure 1.—Lower Cook Inlet fishery management area, illustrating locations of salmon-producing streams with escapement goals, by district.

Table 1.— Lower Cook Inlet king, chum, coho, pink, and sockeye salmon escapement goals and escapements, 2013 to 2023. Escapements in shaded cells were below the escapement goal in place that year for that stock.

System	2023 Goal Range		Initial Year	Escapement											
	Lower	Upper		Type	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023 ^a
					2017	2017	2017	2017	2017	2017	2017	2017	2017	2017	2017
KING SALMON															
Anchor River	3,800	7,600	SEG	4,401	2,499	10,241	7,142	5,700	3,129	5,603	3,624	4,300	3,123	2,338	
Deep Creek	350		LB SEG	475	601	535	No Survey	753	182	751	327	No survey	No survey	No Survey	
Ninitchik River	750	1,300	SEG	571	891	874	572	855	979	1,092	835	772	687	330	
CHUM SALMON															
Port Graham River	1,200	2,700	SEG	1,944	3,735	4,030	2,391	5,765	3,725	1,074	660	1,029	606	1,216	
Dogfish Lagoon	3,500	8,600	SEG	9,300	11,205	13,312	11,260	13,191	7,615	3,640	1,246	4,030	3,319	2,732	
Rocky River	1,500	4,400	SEG	8,148	6,863	3,138	4,620	6,922	5,620	6,569	5,010	6,542	5,580	4,260	
Port Dick Creek	1,900	4,300	SEG	4,133	1,829	13,230	9,323	2,633	724	2,000	1,040	3,261	2,817	4,906	
Island Creek	5,100	11,900	SEG	8,772	2,699	18,479	8,210	5,522	1,368	5,482	1,399	3,112	2,822	14,396	
Big Kamishak River	6,800	15,600	SEG	3,280	5,676	6,990	9,104	32,290	7,694	51,030	19,391	15,987	13,013	7,720	
Little Kamishak River	8,000	16,800	SEG	6,744	15,069	14,370	11,991	19,275	14,417	22,611	38,591	35,046	22,330	29,270	
McNeil River	24,000	48,000	SEG	9,498	17,475	20,494	26,262	38,679	37,331	9,205	8,850	15,219	17,739	25,142	
Bruin River	5,200	10,000	SEG	8,942	3,583	11,006	26,598	38,536	28,497	25,283	22,206	29,655	3,948	10,500	
Ursus Cove	5,900	10,100	SEG	10,339	5,308	14,783	7,032	22,025	3,718	13,400	4,367	7,500	6,977	14,380	
Cottonwood Creek	5,200	12,200	SEG	5,206	7,079	16,962	1,850	6,150	1,326	3,908	679	5,690	6,588	7,140	
Iniskin Bay	5,900	13,600	SEG	5,928	13,020	7,513	1,089	15,591	9,149	15,294	8,804	15,024	12,740	14,400	
COHO SALMON															
There are no coho salmon stocks with escapement goals in Lower Cook Inlet															
PINK SALMON															
Humpy Creek	17,500	51,400	SEG	6,749	44,369	38,025	89,673	71,073	54,816	25,667	No survey	3,125	2,055	15,000	
China Foot Creek	2,500	6,300	SEG	7,119	1,409	7,366	698	2,379	2,280	1,575	235	79	145	1,071	
Tutka Creek	6,500	17,000	SEG	9,541	10,152	81,584	33,242	61,369	60,691	53,732	114,986	50,911	22,908	59,521	
Barabara Creek	2,000	5,600	SEG	17,377	3,558	25,203	2,813	25,002	7,236	9,462	6,633	5,451	3,492	8,951	
Seldovia Creek	21,800	37,400	SEG	36,824	35,895	108,793	15,694	27,025	50,827	18,337	39,297	21,849	16,999	23,357	
Port Graham River	7,700	19,700	SEG	11,893	32,295	82,356	14,629	20,642	33,419	29,588	34,784	12,824	9,193	15,104	
Dogfish Lagoon Creeks	800	7,100	SEG	26,448	8,848	50,058	2,307	13,331	8,398	22,043	18,387	29,205	11,596	34,000	
Port Chatham	7,800	18,100	SEG	57,447	10,290	42,613	1,140	44,291	18,122	39,585	17,291	20,673	7,126	11,770	
Windy Creek Right	3,400	11,200	SEG	11,704	5,710	17,009	1,400	5,053	8,925	13,744	16,720	12,400	17,380	4,900	
Windy Creek Left	5,400	27,100	SEG	47,849	10,147	33,640	500	17,381	14,043	25,580	74,944	16,133	39,094	27,000	
Rocky River	11,700	54,800	SEG	75,791	17,114	107,931	4,300	31,189	2,088	75,412	8,310	41,446	12,542	26,300	
Port Dick Creek	17,900	49,800	SEG	55,828	48,732	98,002	4,819	62,098	94,585	93,157	108,219	115,740	30,411	46,000	
Island Creek	9,600	32,500	SEG	26,004	50,402	50,387	1,735	22,579	5,558	63,691	9,888	99,199	8,550	38,000	
S. Nuka Island Creek	2,800	11,200	SEG	8,442	11,000	8,900	10	540	545	2,453	3,943	6,567	2,300	3,480	
Desire Lake Creek	1,500	18,000	SEG	56,921	443	46,290	169	4,364	2,547	12,070	1,357	13,705	3,820	3,500	
Bruin River	17,800	103,000	SEG	15,020	121,569	40,801	86,632	71,100	94,715	43,800	57,320	78,374	330	23,200	
Sunday Creek	4,400	24,900	SEG	6,132	7,665	60,385	2,130	22,211	3,400	21,801	4,715	38,976	3,208	57,400	
Brown's Peak Creek	2,600	17,500	SEG	4,061	4,048	29,141	1,378	39,197	1,341	43,420	21,034	74,976	541	37,310	

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Table 1. --Page 2 of 2.

System	2023 Goal Range		Initial Year	Escapement											
	Lower	Upper		Type	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023 ^a
					2002	2017	2002	2017	2002	2017	2002	2017	2002	2017	2002
SOCKEYE SALMON															
English Bay	6,000	13,500	SEG	2002	2017	2002	2017	2002	2017	2002	2017	2002	2017	2002	2017
Delight Lake	5,100	10,600	SEG	2017	2017	2002	2017	2002	2017	2002	2017	2002	2017	2002	2017
Desire Lake	4,800	11,900	SEG	2017	2017	2002	2017	2002	2017	2002	2017	2002	2017	2002	2017
Bear Lake	700	8,300	SEG	2002	2017	2002	2017	2002	2017	2002	2017	2002	2017	2002	2017
Atalik Lake	3,200	5,400	SEG	2017	2017	2002	2017	2002	2017	2002	2017	2002	2017	2002	2017
Mikfik Lake	3,400	11,000	SEG	2017	2017	2002	2017	2002	2017	2002	2017	2002	2017	2002	2017
Chenik Lake	2,900	13,700	SEG	2017	2017	2002	2017	2002	2017	2002	2017	2002	2017	2002	2017
Anakdedori Creek	1,200	2,600	SEG	2017	2017	2002	2017	2002	2017	2002	2017	2002	2017	2002	2017

Note: LB SEG = lower-bound SEG.

^a Preliminary data. Some surveys not completed at time of publication.

^b Incomplete count for Mikfik: lost video for 30 days beginning 3 July 2023.