Performance Assessment of the 2023 Nushagak District King Salmon Stock of Concern Management Plan

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Nushagak River and District Fishery Stakeholders

November 3, 2025

EXECUTIVE SUMMARY

In March 2023, the Alaska Board of Fisheries adopted the **Nushagak District King Salmon Stock of Concern Management Plan** in response to the continued decline of Nushagak River king salmon. The new plan, developed through a five-year, stakeholder-driven process that involved commercial, sport, and subsistence users alongside agency and technical experts, represents a significant restructuring of management for commercial, sport, and subsistence fisheries. The plan is intended to remain in effect as long as Nushagak River king salmon are designated a Stock of Concern.

This report provides an objective evaluation of how the plan has functioned in its first three years (2023–2025), with particular attention to the conservation actions taken, their performance, and alignment with the management objectives and measures of success identified during the committee process.

Key Conservation Actions

The plan introduced three primary changes:

1. **Commercial Fishery Start Triggers:** New triggers for both the Wood and Nushagak Rivers, delay the start of the commercial salmon fishery and thereby afford king salmon additional protection while the ratio of king salmon to sockeye salmon remains relatively high in the district.
2. **Sockeye Salmon Optimal Escapement Goals (OEGs):** Larger escapement targets, scaled to sockeye run size, allow the manager to take breaks in sockeye commercial fishing for king salmon conservation and replace the need for prescriptive regulatory changes to time, area and/or gear.
3. **Sport Fishery Annual Limit:** Reduced harvest opportunity for large king salmon by limiting anglers to one fish ≥28 inches per year. Protecting large, fecund king salmon and safeguarding the reproductive potential of the stock.

Performance of the Plan

- **Commercial Fishery:**
  The plan consistently delayed the start of the commercial fishing season by 2–5 days compared with the prior plan (Table 3). The delay of the start of the commercial fishery due to the new triggers has resulted in 6.5-10.8 thousand additional king salmon and 1.2-1.5 million additional sockeye salmon passing upriver each year before exposure to harvest (Table 3). OEGs allowed longer in-season closure

windows, reducing harvest pressure and allowing more king salmon to pass through the district unharvested (Figures 1 & 2; Appendix G). While the exact split in benefits between delayed openings and in-season closures is difficult to pin down, both mechanisms played a substantial role in conserving king salmon.

- **Sport Fishery:**
  Participation continued a declining trend and regulations further limited harvest of large king salmon.

Management Objectives & Measures of Success

The plan was designed to balance conservation of king salmon with opportunity across all user groups. While escapement goals for king salmon have not yet been achieved due to continued low production, the plan demonstrably reduced harvest pressure during periods of high vulnerability. It has also provided managers with flexibility to adapt to unprecedentedly large sockeye runs while providing conservation benefits for king salmon.

Conclusions

Because king salmon lifecycles span 4–7 years, tangible improvements in run strength and long-term biological outcomes from plan actions cannot yet be expected or assessed. However, the first three years of implementation show that the **2023 management plan appears to be functioning as intended**. It has delayed fishery openings, reduced fishing time, increased escapements of both king and sockeye salmon, and enhanced protection for large king salmon in the sport fishery.

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Introduction

At its March 2023 meeting, the Alaska Board of Fisheries substantially changed how Nushagak River and District fisheries are managed to conserve Nushagak River king salmon. The board adopted a new *Nushagak District King Salmon Stock of Concern Management Plan* in effect for as long as Nushagak River king salmon remain a Stock of Concern. The board also substantially modified the pre-existing *Nushagak-Mulchatna King Salmon Management Plan*. The 2023 plans can be found in Appendix A and B.

The Nushagak King Salmon Committee, established in 2018 and facilitated by the Bristol Bay Science and Research Institute Study Team, was instrumental in development of the new plans. Efforts by the committee and board are reviewed and discussed in detail in *Summary of the 2022-2023 Alaska Board of Fisheries process and outcomes related to the Nushagak River King Salmon Committee and Nushagak River king salmon conservation* (Brookover et al. 2025).

Three fishing seasons have now passed since the plans were adopted, and the board is scheduled to again address Bristol Bay issues including Nushagak River king salmon in January 2026. Given its role in the 2023 regulatory changes, the BBSRI Study Team set out to develop an assessment of how the new plans have worked to conserve Nushagak River king salmon during their first three years for consideration in January.

The assessment is envisioned to include an objective evaluation of actions taken under the new plans, and stakeholder input on the success of the plans in achieving their objectives. This paper presents the objective assessment. The Study Team intends to subsequently use a questionnaire to gather and summarize stakeholder input. This paper will be presented to stakeholders with the questionnaire. Both will be summarized and presented to the public and board before the January meeting.

Key Plan Conservation Actions

The Stock of Concern Management Plan (Appendix A) includes three key provisions aimed at conserving Nushagak River King salmon. Other provisions in the modified NMKS Management Plan include actions that were largely either already in place or superseded by the SOC Management Plan and are not discussed here. The key provisions adopted in 2023 include new sockeye salmon Optimal Escapement Goals, modified commercial fishery start triggers, and revised king salmon annual limits in the sport fishery.

Sockeye Salmon Optimal Escapement Goals

New sockeye salmon Optimal Escapement Goals are found in SOC Management Plan Sections (c)(3) for the Wood River and (c)(5) for the Nushagak River (Appendix A). Both are designed to boost king salmon escapement into the Nushagak River by providing a larger number of sockeye salmon into the rivers than the established Sustainable Escapement Goals (SEGs) during large sockeye runs. The OEGs use a sliding scale depending on the forecasted run size for sockeye salmon to allow for king salmon conservation scaled to sockeye run strength. The OEGs allow the manager to take breaks in fishing for king salmon conservation and preclude the need for prescriptive regulatory changes to time, area and/or gear that would otherwise be needed to afford a similar level of conservation.

OEGs were established for each of the past three seasons as directed by the plan because total run forecasts exceeded the plan thresholds of 5 million sockeye salmon for Wood River and 2.5 million for Nushagak River. OEG upper bounds established for 2023-2025 are presented in Table 1 (Elison et al. (2024), Elison et al. (2025), ADF&G (2025)). The OEG lower bound is the same as the SEG lower bound.

Table 1 -Wood and Nushagak River sockeye salmon SEG and OEG (in millions of fish), 2023-2025.

	SEG				OEG Upper Bound	
Year	Lower Bound	Upper Bound	Total Run Forecast	15% Adder	Calculated	Official (Rounded)
Wood River						
2023	0.700 -	1.800	8.010	1.202	3.002	3.0
2024	0.700 -	1.800	7.840	1.176	2.976	3.0
2025	0.700 -	1.800	7.630	1.145	2.945	3.0
Nushagak River						
2023	0.370 -	0.900	6.950	1.043	1.943	2.0
2024	0.370 -	0.900	3.500	0.525	1.425	1.4
2025	0.370 -	0.900	10.580	1.587	2.487	2.5

Managers use emergency order authority to attain the larger OEGs and associated king salmon conservation by regulating commercial fishing time. The way managers regulate time can be characterized in two ways: delay the start of the commercial fishery for sockeye salmon when king salmon are more abundant, and schedule closed periods during the commercial fishery and latter portion of the king salmon run.

Commercial Fishery Start Triggers

Modified commercial fishery start triggers, including a new trigger specifically for the Nushagak River, are found in Section (d) of the plan. This section applies to the early season before 9:00 am June 28 during years when the Nushagak River inriver goal (95,000 king salmon) is not expected to be met. It directs managers to leave the commercial fishery closed until projected escapements exceed levels stated in the plan.

The 2023 plan triggers (10% of the Wood River run forecast and 6% for the Nushagak run forecast) are intended to delay the start of the commercial salmon fishery and thereby afford king salmon additional protection while the ratio of king salmon to sockeye salmon remains relatively high. For comparison, the trigger within the prior version of the NMKS Management Plan applied only during years when the king salmon escapement was projected to be less than the SEG (55,000) and directed the commercial fishery to remain closed until the projected sockeye salmon escapement into the Wood River exceeded 100,000 fish. The new triggers thus apply during more years, consider the Nushagak sockeye escapement as well as the Wood, and afford additional time early in the season when the commercial fishery remains closed.

Table 2 includes the triggers that applied in 2023, 2024 and 2025. Triggers applied for all years because the king salmon inriver run goal was not projected to be met in any year.

Table 2.- Commercial fishery start trigger projections (millions of fish), 2023-2025.

Year	Total Run Forecast	Fishery Start Trigger Projection
Wood River (10%)		
2023	8.010	0.801
2024	7.840	0.784
2025	7.630	0.763
Nushagak River (6%)		
2023	6.950	0.417
2024	3.500	0.210
2025	10.580	0.635

Sport Fishery Annual Limit

The modified annual limit is found in section (e) of the plan. Like the regulations prior to 2023, the provision implements an annual limit of four king salmon (20 inches or greater) for all anglers. Unlike the previous regulations, the new provision limits the number of large (28 inches or greater) king salmon an angler can harvest to one per year. The new regulation thereby affords additional protection to king salmon, particularly large king salmon, compared to previous regulations which allowed anglers to keep up to four large king salmon per year.

How Conservation Actions Performed the First Three Years

The Nushagak River king salmon runs in 2023 and 2024 were not large enough to meet the SEG lower bound of 55,000 fish had every fish survived to spawn (Elison et al., 2025). Data for 2025 remains partially unavailable but will likely show the same result once available. Data collected by current stock assessment projects for Nushagak River king salmon are fraught with uncertainty (Head and Hamazaki, 2022). With this data uncertainty in mind, the SEG has likely not been attained since the SOC Management Plan was adopted.

Because king salmon life cycles span 4-7 years, tangible improvements in run strength and long-term biological outcomes from plan actions cannot yet be expected or assessed. This section will describe how the new plan worked to conserve Nushagak River king salmon in the commercial and sport fisheries.

Commercial Fishery Results

This section discusses the performance of the SOC Management plan provisions pertaining to the commercial fishery in a chronological fashion. The fishery start trigger is discussed first, since it is implemented first seasonally, followed by conservation during the latter period of the king salmon run during the commercial fishery as provided by the OEG.

Opening Date

The effectiveness of the SOC Management Plan's fishery start triggers can be evaluated by comparing when commercial fishing opened in 2023-2025 under the new plan to when it would have hypothetically been opened under the previous NMKS Management Plan (Elison et al. (2024), Elison et al. (2025), Tim Sands, personal communication). Estimates of additional salmon passage afforded by the current plan's trigger provisions were derived by

identifying the daily escapement count that fell within the assumed travel windows for each stock between the previous plan's hypothetical start date and the start date that occurred under the new management plan. Assumed travel times used from the district to the Wood River tower is 12-24 hours, and 36-48 hours from the district to the Nushagak River sonar. Appendix C contains actual and hypothetical start dates and associated additional king and sockeye salmon passage estimates. For an example of how the current trigger provisions worked to conserve king salmon, a detailed review of 2025 is discussed below.

2025

In 2025, ADF&G Advisory Announcement #9, issued noon June 21, opened the commercial fishery June 22 at 9:00 am for set nets and 11:00 am for drift nets (Appendix C). Sockeye escapement counts through 10:00 am June 21 had totaled 485,000 in the Nushagak and 114,000 through 6:00 am in the Wood River. At the time (through June 20), 6,645 king salmon had been estimated past the Nushagak sonar.

Start trigger provisions in the SOC Management Plan were successfully implemented in 2025. Estimated passage at the Nushagak sonar exceeded the start trigger (635,000 sockeye salmon) June 21, after the announcement was issued and before the fishery opened; the cumulative June 21 sonar count was 756,000 sockeye salmon.

Assuming a 36- to 48-hour travel time from the district to the Nushagak River sonar means that fish passing the district before the fishery opened would continue to migrate past the sonar through the remainder of June 22 and June 23. Through June 23, 16,227 king salmon and 1,480,862 sockeye salmon were estimated past the sonar. These estimates account for nearly half of the total escapement over the season for king and sockeye salmon.

Assuming a 12- to 24-hour travel time to the Wood River counting tower means that 619,752 sockeye salmon counted past the tower by midnight June 22 had also migrated past the district before the commercial fishery opened.

Had the previous version of the plan been in effect, the fishery would have opened earlier, and fewer king (and sockeye) salmon would have passed the district before the commercial fishery opened. The total spawning escapement of king salmon at the sonar would very likely have been projected to be less than 55,000 fish, and under that scenario the previous version of the plan directed the department to close the commercial fishery until the projected Wood River sockeye escapement exceeds 100,000 fish.

This standard would likely have triggered a fishery opening four tides (two days) earlier, to begin June 20 because 113,000 sockeye salmon had passed the Wood River tower through that date. We reasoned the opening would likely have been scheduled for the morning

because over 83,000 sockeye salmon – very close to the 100,000 fish trigger - had passed the Wood River tower through midnight June 19. Assuming the same travel times as above, Nushagak River salmon counts through June 21 can be used for comparison. Through June 21, 9,766 king salmon were estimated past the sonar. In this scenario, the new trigger provision protected about 6,500 additional king salmon (16,227 - 9,766 = 6,461). Using a similar approach for sockeye salmon, the new provisions resulted in about 506,000 additional sockeye salmon in the Wood River and 725,000 in the Nushagak.

3-Year Summary

The department opened the commercial fishery as directed under the new SOC Management Plan in all three years. In 2023 and 2024, trigger levels for Wood and Nushagak River sockeye were achieved following the fishery opening and within assumed travel time windows (Appendix C). In both years, the Nushagak River trigger was achieved the day the fishery opened, and the Wood River trigger the following day. In 2025, the Nushagak River trigger was attained after the fishery announcement and before the fishery opening and the Wood River trigger the day after the fishery opening.

Hypothetical start dates under the previous version of the plan fell 2 to 5 days (average 3.3 days) earlier than the actual fishery openings in 2023-2025 (Table 3). In effect, the fishery was opened under the current plan 3 days later in 2023, 5 days later in 2024, and 2 days later in 2025.

In this scenario, the delayed openings each year resulted in an additional 6,500 – 10,800 king salmon passing the district before it was opened to fishing that otherwise would have been exposed to fishing pressure. Using estimates of total run provided in Elison et al. (2025), the additional passage represents approximately 21 percent of the total run in 2023 and 20 percent in 2024.

Table 3.- Actual vs hypothetical fishery opening dates and associated salmon passage.

				Additional Salmon Passage		
Year	Actual Opening Date	Hypothetical Opening Date	# Days Difference	Nushagak King Salmon	Nushagak Sockeye Salmon	Wood River Sockeye Salmon
2023	25-Jun	22-Jun	-3	8,304	625,810	861,318
2024	26-Jun	21-Jun	-5	10,794	707,044	791,208
2025	22-Jun	20-Jun	-2	6,461	725,179	506,370

The delayed fishery also resulted in an additional 626 - 725 thousand sockeye passing into the Nushagak River and 506 – 861 thousand into the Wood River each year. These

estimates represent 9, 8 and 5 percent (average 8 percent) of the total sockeye salmon run to the district (Appendix D; Elison et al. (2025), ADF&G (2025)).

Limitations to this evaluation of the fishery opening date are substantial. There is much uncertainty with Nushagak River sonar estimates. Assumed travel times are imprecise; travel times vary among fish and throughout the season based on individual fish characteristics, weather, tides and other factors. When managers would open the fishery under the previous plan is not certain and would also vary with several factors. Estimates of additional passage due to the delayed fishery opening represent fish potentially available for harvest, as opposed to actual harvest. Nevertheless, we undertook this exercise to quantify fishery performance under the new plan provisions using existing information to the extent possible. Results should be used with these limitations in mind.

Conservation During the Latter Portion of the Run

King salmon conservation during the latter portion of the run is affected by multiple factors associated with the commercial (and other) fisheries. These include: inriver management goals (in this case OEGs); king salmon and sockeye salmon run size, abundance and distribution; fishing effort (no. of permits, boats, sites) and patterns, fishing time; weather and other factors. Most factors are dynamic and can change on a tidal basis. This assessment focused on fishing time because it is the primary factor under the manager's control used to achieve established OEGs and thereby conserve king salmon.

Commercial fishing time was assessed by comparing performance over the three years since the plan was adopted (2023-2025) with a 3-year period before the plan was adopted to understand how the SOC Management Plan conserved king salmon during the commercial fishery for sockeye and the latter portion of the king salmon run. For the latter period, we chose 2017-2019 for two reasons. One was that sockeye production had resulted in large (greater than 10 million) runs to the district beginning in 2017 and continuing to present years. So, the period 2017-2019 captured large sockeye salmon runs like those observed more recently. And two, the department began managing the commercial fishery more conservatively than plans directed for king salmon after several years of large sockeye runs (and small king salmon runs). Thus, the three early years of large sockeye runs provide a clearer contrast to the new plan's performance in comparison to the old plan than 2020, 2021 and 2022, when the department had begun managing "outside" of the existing plan.

Fishing Time

Once the fishery opened, managers scheduled periods of time open to fishing interspersed with closed periods on a tide-by-tide basis to regulate harvest and thereby achieve sockeye

salmon OEGs and allow king salmon to pass through the district without exposure to harvest.

The commercial drift net fishery opened an average of 3.7 days later from 2023-2025 when compared with 2017-2019 (Appendix E) due in large part to the start trigger provisions as discussed above.[1]

During 2023-2025, total drift fishing time between June 20 and 25 was reduced by roughly 40 hours (75%) per year compared to 2017-2019 (Table 4; Figure 1). Drift fishing was opened on only five days prior to June 26; one day in 2023 and four days in 2025 for an average of 8 hours/day. During 2017-2019 for comparison, drift fishing was opened each of the six days from June 20-June 25 except 2017, when it was opened four of the six days, and averaged about 10 hours per day.

Table 4.- Average number of hours open to commercial drift gillnet fishing per year in the Nushagak District by period, comparing 2017-2019 and 2023-2025.

Time Block	2017 - 2019 Annual (hrs)	2023-2025 Annual (hrs)	Reduction (hrs)	Reduction (%)
June 20-25	53.5	13.5	40.0	74.8%
June 26-30	86.5	49.5	37.0	42.8%
July 1-5	88.5	80.8	7.7	8.7%
June 20-July 5	228.5	143.8	84.7	37.1%

[1] Sources: Elison et al. (2018), Salomone et al, (2019), Tiernan et al. (2021), Elison et al. (2024), Elison et al. (2025), Tim Sands, personal communication.

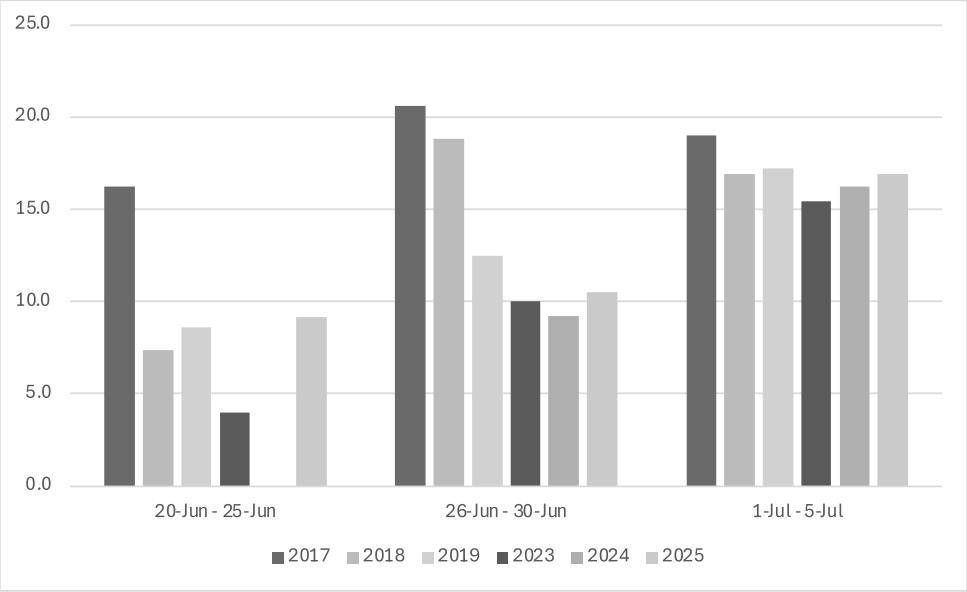

Figure 1.- Average number of hours open to commercial drift gillnet fishing per day in the Nushagak District by period.
Note: in 2023, fishing was only open for 1 day between 20 June and 25 June for 4 hours. In 2024, fishing was not opened between 20 June and 25 June. In 2025, fishing was open for 4 days between 20 June and 25 June and averaged 9 hr/day.

In addition to being open fewer days, the drift fishery was also opened for fewer total hours per year across the entire early-season (June 20-July 5): 144 hours versus 229 hours in 2017-2019, representing a 37% reduction in overall drift fishing time. These reductions were most pronounced during the early portion of the season (June 20-30), when king salmon overlap with the commercial fishery is greatest.

Trends in fishing time for setnets were similar, but the reductions were even more pronounced. The fishery opened to set nets an average of 4.3 days later per year from 2023-2025 when compared with 2017-2019 (Appendix Table F).[2] Total set-net fishing time per year between June 20 and 25 decreased by about 87 hours (83%), and across the entire June 20-July 5 period, total time open per year was reduced from 341 hours to 184 hours, a 46% decrease (Table 5).

[2] Sources: Elison et al. (2018), Salomone et al, (2019), Tiernan et al. (2021), Elison et al. (2024), Elison et al. (2025), Tim Sands, personal communication.

Table 5.- Average number of hours open to commercial set gillnet fishing per year in the Nushagak District by period, comparing 2017-2019 and 2023-2025.

Time Block	2017 - 2019 Annual (hrs)	2023-2025 Annual (hrs)	Reduction (hrs)	Reduction (%)
June 20-25	104.7	18.0	86.7	82.8%
June 26-30	120.0	65.0	55.0	45.8%
July 1-5	116.7	101.5	15.2	13.0%
June 20-July 5	341.3	184.5	156.8	45.9%

These reductions again occurred during the early portion of the run when conservation benefits for king salmon are the greatest.

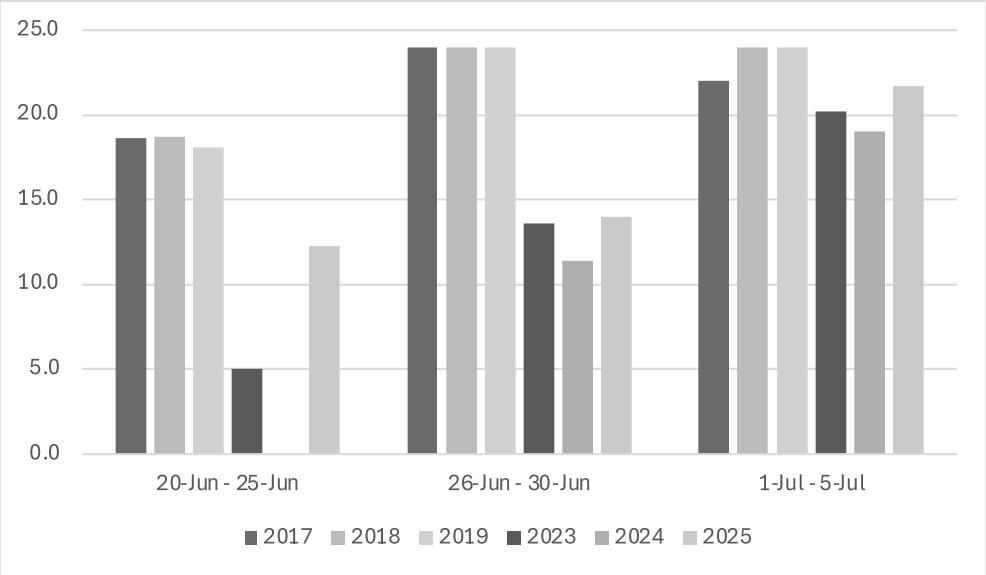

Figure 2.- Average number of hours open to commercial set gillnet fishing per day in the Nushagak District by period.
Note: in 2023, fishing was only open for 1 day between 20 June and 25 June for 5 hours. In 2024, fishing was not opened between 20 June and 25 June. In 2025, fishing was open for 4 days between 20 June and 25 June and averaged 12.3 hr/day.

Optimal Escapement Goals

New optimal escapement goals for Wood and Nushagak River sockeye salmon were met or exceeded in 2023, 2024 and 2025 (Table 6; Elison et al. (2025), ADF&G (2025)). Escapements for the Wood and Nushagak River fell within the upper portion of the OEG range in 2023. Escapements in 2024 exceeded the OEG Upper Bound for both rivers; by 1.4 million fish in the Wood and 300 thousand in the Nushagak. In 2025, Wood River escapement fell within the upper portion of the OEG range and Nushagak escapement exceeded the OEG range by about 800 thousand sockeye salmon.

Differences between actual escapements and SEG Upper Bounds represent sockeye salmon which were not available for harvest because of reduced fishing time for king conservation in accordance with the SOC Management Plan; absent the SOC Management Plan, these fish would have been available for harvest. Over the 3-yr period, 849 thousand to 2.6 million additional sockeye salmon migrated into the Wood River, and 823 thousand to 2.4 million sockeye salmon above the SEG Upper Bound migrated into the Nushagak River.

Table 6.- Sockeye escapement goals vs actual escapement estimates in millions of fish, 2023-2025.

	SEG					
Year	Lower Bound		Upper Bound	OEG Upper Bound	Estimated Escapement	Difference between Escapement and SEG UB
Wood River						
2023	0.700	-	1.800	3.002	2.649	0.849
2024	0.700	-	1.800	2.976	4.405	2.605
2025	0.700	-	1.800	2.945	2.657	0.857
Nushagak River						
2023	0.370	-	0.900	1.943	1.773	0.873
2024	0.370	-	0.900	1.425	1.723	0.823
2025	0.370	-	0.900	2.487	3.261	2.361

Both the delayed fishery starts and reduced fishing time during the season worked as intended under the OEG by reducing harvest and increasing escapement of both king and sockeye salmon. To compare the king salmon conservation benefits of delayed openings with that of the later-season closures, we can look at the estimates of additional sockeye passage in Tables 3 & 6 (Appendix G).

In 2025, the delayed opening resulted in an estimated 1.23 million additional sockeye salmon passing upriver (506,000 in the Wood River and 725,000 in the Nushagak River; Table 3). Relative to the total additional passage afforded by the OEG that year (about 3.22 million fish; Table 6; Appendix G), the delayed start accounted for roughly 38 percent. Breaks in fishing time after the season was underway contributed to the remaining 62 percent of additional conservation benefit in 2025.

Over all three years, delayed openings accounted for about 86 percent of the additional passage in 2023, 44 percent in 2024, and 38 percent in 2025. On average, the start triggers provided about 56 percent of the additional passage and corresponding king salmon conservation, while in-season breaks in fishing contributed to the other 44 percent (Appendix G).

However, it is important to recognize that this analysis rests on several assumptions. First, we likely overestimated the conservation benefits of the start triggers. If the fishery had opened earlier, not all the fish estimated to have passed would have been harvested, as they would have been subject to harvest rates lower than 100 percent. Some portion would still have escaped upriver regardless. At the same time, the analysis also assumes that under the old management plan scenario, managers could have held escapements within the SEG targets of 1.8 million sockeye salmon for the Wood River and 0.9 million for the Nushagak River. If that had not been possible, then we likely overestimated the conservation benefits attributed to later-season closure periods. In other words, there are biases in both directions. While the exact split in benefits between delayed openings and in-season closures is difficult to pin down, this comparison makes clear that both mechanisms played a substantial role in conserving king salmon, and that the combination of start triggers and later closures together are central to the effectiveness of the management plan.

Sport Fishery Results

Two trends have been observed in the sport fishery since the adoption of the SOC Management Plan in 2023.

Participation

Sport fishing effort estimated on the Nushagak River mainstem has generally declined from high levels observed in 2005 and 2006 (Alaska Sport Fishing Survey database [Internet]). This decline continued in recent years, and steepened in 2023, when an estimated 557 anglers fished on the Nushagak River from Black Point to the sonar site, and 861 from the sonar site to the Mulchatna River (Figure 3). The number of anglers fishing these sections in 2023 represent 41 percent and 67 percent of the average fishing effort from 2017-2022.

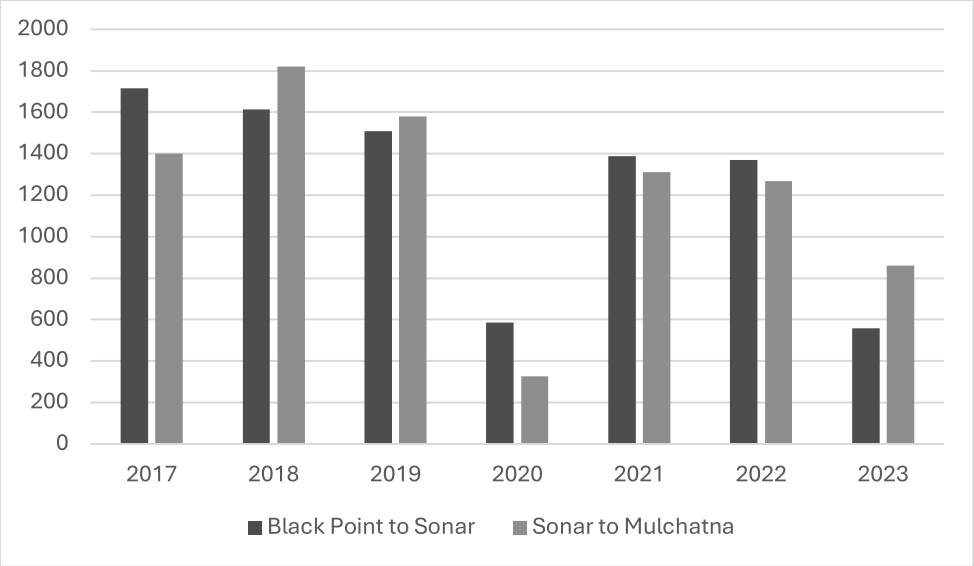

Figure 3.- Number of anglers sport fishing on two Nushagak River sections, 2017-2023.

Reasons for the general decline include factors such as economic conditions, expectations of fishing success and, in 2020, impacts from Covid. Angler uncertainty over the ability to harvest fish given the possibility of inseason catch-and-release restrictions is a likely factor contributing to both the longer-term decline and the reduced effort in 2023. Specific causes of the steep reduction in effort observed in 2023 are unknown. However, the reduced ability to harvest large fish under the annual limit provisions in the SOC Management Plan likely contributed to reduced effort in 2023 (Lee Borden, personal communication).

Biological Characteristics of Fish Harvested

The size, sex and age composition of king salmon harvested in the sport fishery exhibited similar declining trends. King salmon harvest sampled during ADF&G creel surveys conducted in 2023 and 2024 were 21 and 28 percent smaller than king salmon sampled in 2007 based on mean length (Table 7).[3]

King salmon 28 inches or greater in length, of which one is allowed per angler per year, comprised 27 percent and 14 percent of the sampled harvest in 2023 and 2024. Although the percentage of king salmon 28 inches or larger was not reported from the 2007 creel surveys, mean fish size reported that year was nearly 30 inches in length, indicating fish 28 inches or larger comprised over half of the harvest. Therefore, the percent of fish 28 inches or greater as sampled in 2023 and 2024 was less than half that sampled in 2007. Applying these percentages to available Nushagak River harvest estimates for 2023 (2,327 king

[3] Sources: Dye (2012), Hayden-Pless (2024a), Hayden-Pless (2024b).

salmon; Alaska Sport Fishing Survey database [Internet]) results in an estimate of 507 king salmon 28 inches or greater. For comparison, king salmon 28 inches or greater comprised over half of the Nushagak River harvest estimated for 2006 (7,429 king salmon).

The percentage of females in the harvest samples was also lower in 2023 and 2024.

Table 7.- Biological sampling results from ADF&G creel surveys conducted on the Nushagak River. Fish length measured mid-eye to tail fork.

			>28 inches		Females	
Year	Sample Size	Mean Length (mm)	Number	Percent	Number	Percent
2007	231	752				36%
2023	179	597	49	27%	39	22%
2024	202	542	28	14%	38	19%

Samples collected from harvested fish in 2023 and 2024 were comprised of younger age classes when compared with king salmon harvest sampled in 2007 (Figure 4). In 2007, age 1.3 and 1.4 fish were dominant and age 1.5 fish were present. Age 1.5 fish were absent, and age 1.4 fish comprised the weakest class in the samples in 2023 and 2024 indicating more older fish, which tend to be comprised mostly of females, were available to spawn.

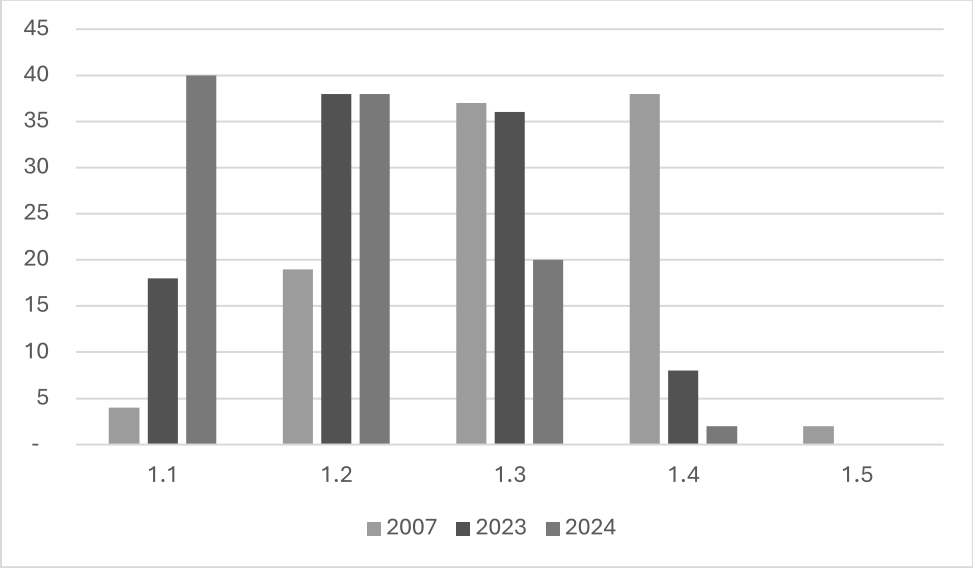

Figure 4.- Percent king salmon sampled from sport harvests by ADF&G creel surveys.

Based on creel survey results, sport harvests since the plan was adopted in 2023 are comprised of smaller king salmon, fewer females, and younger age fish. These trends,

likely due in part to the new annual limit provisions, are also likely due to differences in run composition and other factors in addition to harvest regulations.

Measures of Success

To conclude the assessment, the BBSRI Study Team will use a questionnaire to gather and summarize stakeholder input. Stakeholders may be asked to consider the Management Objectives developed by the Nushagak King Salmon Committee and adopted by the board in the 2023 NMKS Management Plan, as well as Measures of Success developed by the Committee. Both are presented here for reference and can be found in more detail in Brookover et al. (2022).

Management Objectives

(1) to provide consistent sport fishing opportunity within and among seasons, including a level of inriver abundance as a given year's run timing allows, and a predictably open season.

(2) to provide a directed commercial king salmon fishery when surplus is available.

(3) to minimize disruptions to the commercial sockeye salmon fishery.

(4) to provide reasonable opportunity for subsistence harvest of king salmon.

(5) to ensure the subsistence fishery is the last fishery restricted or closed.

(6) to achieve escapement goals for all species in the district.

(7) to maintain a representation of age classes in the escapement similar to the run.

Measures of Success

Sport fishery

(1) Inriver abundance and catch opportunity.
(2) Predicably open season.
(3) Harvest opportunity.

Commercial fishery

(4) Access to a directed king salmon fishery when a harvestable surplus of king salmon exists.
(5) Access to available surplus sockeye salmon subject to addressing other concerns, including but not limited to: sustaining the king salmon population, avoiding a line fishery, obtaining escapement throughout the season, attaining allocation goals among

gear groups, and ensuring annual harvest rates do not reach excessively high rates (e.g. >85-90%).

(6) The fishery is kept to the traditional area.

(7) Achieve sustainable escapement goals among salmon stocks in the district.

Subsistence fishery

(8) Reasonable opportunity.

(9) Amounts necessary for subsistence.

(10) Subsistence priority over other uses.

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Appendices

Appendix A – 2023 Stock of Concern Management Plan.

5 AAC 06.391 - Nushagak District King Salmon Stock of Concern Management Plan

(a) The purpose of this management plan is to provide management tools and guidelines to the department for the management of Nushagak District salmon fisheries, while Nushagak River king salmon are listed as a stock of management concern, which will result in the sustained yield of king salmon stocks large enough to meet sustainable escapement goals, while allowing for harvest opportunity in the subsistence, sport, and commercial fisheries.

(b) While the Nushagak River king salmon are listed as a stock of management concern, it is the intent of the board that all Nushagak District salmon stocks are managed conservatively through June 28 to protect Nushagak River king salmon, consistent with 5 AAC 39.222 (policy for the management of sustainable salmon fisheries).

(c) The department shall manage commercial fisheries in the Nushagak District as follows:

(1) to achieve an inriver run goal of 95,000 king salmon in the Nushagak River consistent with the Nushagak-Mulchatna King Salmon Management Plan as described in 5 AAC 06.361(b)(1).

(2) when the Wood River sockeye salmon forecast or in season projection is less than 5,000,000 fish the department shall manage for the current sustainable escapement goal (SEG) of 700,000 to 1,800,000 fish;

(3) when the Wood River sockeye salmon forecast or inseason assessment of run size is greater than five million fish the department shall manage to achieve a Wood River sockeye salmon optimal escapement goal (OEG) of 700,000 fish to an upper bound that is up to 15 percent of the Wood River run size above the 1,800,000 fish upper bound of the SEG, based on the preseason forecast and in season assessment of run size;

(4) when the Nushagak River sockeye salmon forecast or inseason projection is less than 2,500,000 fish, the department shall manage for the current SEG of 370,000 to 900,000 fish;

(5) when the Nushagak River sockeye salmon forecast or inseason assessment of run size is greater than 2,500,000 fish the department shall manage to achieve a Nushagak River sockeye salmon OEG of 370,000 fish to an upper bound that is up to 15 percent of the Nushagak run size above the 900,000 fish upper bound of the SEG, based on the preseason forecast and in season assessment of run size.

(d) Before 9:00 a.m. June 28, if the Nushagak king salmon inriver run size is projected to be less than 95,000 fish, the commissioner shall close, by emergency order, the sockeye salmon commercial drift gillnet fishery in the Nushagak District, and the sockeye salmon commercial set net fishery in the Nushagak Section of the Nushagak

District until

(1) the sockeye salmon sonar estimate in the Nushagak River is projected to exceed six percent of the Nushagak River sockeye salmon run based on the Nushagak River sockeye salmon preseason forecast and inseason assessment of run size; or

(2) the sockeye salmon count past the Wood River counting tower is projected to exceed 10 percent of the Wood River sockeye salmon run size based on the Wood River sockeye salmon preseason forecast and inseason assessment of run size.

(e) The department shall manage the sport fishery in the Nushagak River drainage, excluding the Wood River drainage, as follows:

(1) the annual limit for king salmon 20 inches or greater in length is four fish, of which only one fish may be 28 inches or greater in length;

(2) if the total inriver king salmon run return in the Nushagak River is projected to exceed 95,000 fish, the commissioner may, by emergency order, increase the annual limit for king salmon to four king salmon, 20 inches or greater in length, with no restrictions for fish over 28 inches in length.

(f) Subsistence fisheries will be managed in accordance with the rest of this title.

Notes

5 AAC 06.391
E!. 6/25/2023, Register 246, July 2023
Authority: AS 16.05.060
AS 16.05.251

Appendix B – 2023 Nushagak-Mulchatna King Salmon Management Plan.

5 AAC 06.361 – Nushagak-Mulchatna King Salmon Management Plan

(a) The purpose of this management plan is to ensure biological spawning escapement requirements of king salmon into the Nushagak-Mulchatna river systems. It is the intent of the Alaska Board of Fisheries (board) that Nushagak-Mulchatna king salmon be harvested in the fisheries that have historically harvested them. This management plan provides guidelines to the department to preclude allocation conflicts between the various users of this resource. The department shall manage Nushagak-Mulchatna king salmon stocks in a conservative manner consistent with sustained yield principles and the subsistence priority. Additionally, the department shall manage the Nushagak fisheries for the following management measures:

(1) to provide consistent sport fishing opportunity within and among seasons, including a level of inriver abundance as a given year's run timing allows, and a predictably open season;

(2) to provide a directed commercial king salmon fishery when surplus is available;

(3) to minimize disruptions to the commercial sockeye salmon fishery;

(4) to provide reasonable opportunity for subsistence harvest of king salmon;

(5) to ensure the subsistence fishery is the last fishery restricted or closed;

(6) to achieve escapement goals for all species in the district;

(7) to maintain a representation of age classes in the escapement similar to the run.

(b) The department shall manage the commercial and sport fisheries in the Nushagak District as follows:

(1) to achieve an inriver goal of 95,000 king salmon present in the Nushagak River upstream from the department sonar counter; the inriver goal provides for

(A) a biological escapement goal of 55,000 - 120,000 fish;

(B) reasonable opportunity for subsistence harvest of king salmon; and

(C) a king salmon sport fishery guideline harvest level of 5,000 fish, 20 inches or greater in length;

(2) in order to maintain a natural representation of age classes in the escapement, the department shall attempt to schedule commercial openings to provide pulses of fish into the river that have not been subject to harvest by commercial gear;

(3) the department may close the commercial drift or set gillnet fishery if the harvest in the directed commercial king salmon fishery for either gear group is more than two sockeye salmon for every one king salmon;

(4) consistent with 5 AAC 06.367 (Nushagak District Commercial Set and Drift Gillnet Sockeye Salmon Fisheries Management and Allocation Plan), to conserve king salmon the department shall manage for sockeye escapements in the Nushagak District to fall within

(A) the lower half of each river's sockeye salmon escapement goal range when the Wood River sockeye salmon run is 5,000,000 fish or less and the Nushagak sockeye salmon run is 2,500,000 fish or less; or

(B) the upper half of each river's sockeye salmon escapement goal range when the Wood River sockeye salmon run is greater than 5,000,000 fish or the Nushagak sockeye salmon run is greater than 2,500,000 fish based on the preseason forecast and inseason assessment of run size;

(5) beginning June 25, the department shall consider when evaluating the total run of sockeye salmon to the Nushagak District all possible data sources including the preseason forecast, Port Moller test fishery indices, including stock and age composition, total catch and effort to date, age composition of catch and effort data, and district test fishing;

(6) from June 1 through June 30, the department shall, in an attempt to conserve king salmon and to the extent practicable, conduct a gillnet test fishery to assess the abundance of sockeye and king salmon before opening by emergency order a fishing period directed at sockeye salmon.

(c) If the total inriver king salmon return in the Nushagak River is projected to exceed 95,000 fish, the guideline harvest level described in (b)(1)(C) of this section does not apply and the department shall consider opening a directed commercial king salmon fishery.

(d) If the spawning escapement of king salmon in the Nushagak River is projected to be more than 55,000 fish and the projected inriver return is less than 95,000 fish, the commissioner

(1) shall close, by emergency order, the directed king salmon commercial fishery in the Nushagak District; during a closure under this paragraph, the use of a commercial gillnet with webbing larger than five and one-half inches in another commercial salmon fishery is prohibited;

(2) repealed 5/31/2019;

(3) repealed 5/31/2019;

(e) If the spawning escapement of king salmon in the Nushagak River is projected to be less than 55,000 fish, the commissioner

(1) shall close, by emergency order, the sockeye salmon commercial fishery in the Nushagak District until the projected sockeye salmon escapement into the Wood River exceeds 100,000 fish;

(2) shall restrict to catch-and-release, by emergency order, the sport fishery directed for king salmon in the Nushagak River and prohibit the use of bait for fishing for all species of fish until the end of the king salmon season specified in 5 AAC 67.020 and 5 AAC 67.022(g); and

(3) may establish, by emergency order, fishing periods during which the time or area is reduced for the inriver king salmon subsistence fishery in the Nushagak River.

(f) Notwithstanding 5 AAC 06.200, in a directed king salmon commercial fishery, the southern boundary of the Nushagak District is a line from an ADF&G regulatory marker located at Etolin Point at 58º 39.37' N. lat., 158º 19.31' W. long., to 58º 33.92' N. lat., 158º 24.94' W. long. to Protection Point at 58º 29.27' N. lat., 158º 41.78' W. long.

(g) During a directed king salmon commercial fishery in the Nushagak District, drift gillnet and set gillnet fishing periods will be of equal length, but do not have to be open concurrently.

Notes

5 AAC 06.361

Eff. 6/19/92, Register 122; am 4/9/95, Register 134; am 5/14/98, Register 146; am 6/3/2001, Register 158; am 7/8/2001, Register 159; am 4/9/2004, Register 170; am 3/30/2007, Register 181; am 4/4/2013, Register 206; am 8/27/2016, Register 219, October 2016; am 5/31/2019, Register 230, May 2019; am 6/25/2023, Register 246, July 2023

Authority: AS 16.05.060

AS 16.05.251

Appendix C – Actual vs hypothetical fishery opening dates and key cumulative escapement estimates, 2023-2025.

	Actual (Current Plan)					Hypothetical (Previous Plan)				
			Cumulative Escapement Estimates					Cumulative Escapement Estimates		
			Nushagak River		Wood River			Nushagak River		Wood River
Date	Fishery Announce-ment (Time)	Fishery Opening (Time)	King Salmon	Sockeye Salmon	Sockeye Salmon	Fishery Announce-ment (Time)	Fishery Opening (Time)	King Salmon	Sockeye Salmon	Sockeye Salmon
2023			**Start Triggers:**	**417,000**	**801,000**					**100,000**
21-Jun			10,426	31,365	11,682			10,426	31,365	11,682
22-Jun			10,677	126,504	103,506	AM	PM	10,677	126,504	103,506
23-Jun			10,698	198,580	192,108			10,698	198,580	**192,108**
24-Jun			12,720	261,405	279,564			**12,720**	**261,405**	279,564
25-Jun	9:00	19:00	18,038	517,698	623,370			18,038	517,698	623,370
26-Jun			18,690	768,872	**1,053,426**			18,690	768,872	1,053,426
27-Jun			**21,024**	**887,215**	1,378,728			21,024	887,215	1,378,728
2024			**Start Triggers:**	**210,000**	**784,000**					**100,000**
20-Jun			7,209	51,170	88,890	PM		7,209	51,170	88,890
21-Jun			8,864	72,514	122,220		AM	8,864	72,514	**122,220**
22-Jun			8,984	88,347	142,116			**8,984**	**88,347**	142,116
23-Jun			9,723	92,389	153,684			9,723	92,389	153,684
24-Jun			10,236	93,149	156,852			10,236	93,149	156,852
25-Jun			10,997	100,524	190,602			10,997	100,524	190,602
26-Jun	9:00	16:30	12,454	392,765	435,024			12,454	392,765	435,024
27-Jun			15,248	639,670	**913,428**			15,248	639,670	913,428
28-Jun			**19,778**	**795,391**	1,485,138			19,778	795,391	1,485,138
2025			**Start Triggers:**	**635,000**	**763,000**					**100,000**
19-Jun			6,529	402,272	83,454	PM		6,529	402,272	83,454
20-Jun			6,645	457,559	113,382		AM	6,645	457,559	**113,382**
21-Jun	12:00		9,766	755,683	308,556			**9,766**	**755,683**	308,556
22-Jun		9:00	15,517	1,227,017	**619,752**			15,517	1,227,017	619,752
23-Jun			**16,227**	**1,480,862**	797,922			16,227	1,480,862	797,922

Key:

1. Shaded cells represent actual and hypothetical fishery announcement and opening dates for visual reference.
2. **Bolded** escapement estimates represent the best estimate of cumulative passage above the district at the fishery opening time. These were identified by adding assumed travel time (12-24 hours for Wood River and 36-48 hours for Nushagak River stocks) to the fishery opening time.
3. Outlined cells represent the escapement that met or exceeded the start trigger for that year and stock, based on the 2023 SOC Management Plan and annual Bristol Bay Salmon Forecast.

Sources: Elison et al. (2024), Elison et al. (2025), Tim Sands, personal communication.

Appendix D - Inshore catch, escapement, total run and harvest rate for sockeye salmon in the Nushagak District, 2007-2025.

Year	Catch	Escapement	Total Run	Harvest Rate
2007	8,404,532	2,461,579	10,866,111	77%
2008	6,903,367	3,271,926	10,175,293	68%
2009	7,731,518	2,317,569	10,049,087	77%
2010	8,424,702	2,818,215	11,242,917	75%
2011	4,887,305	1,968,744	6,856,049	71%
2012	2,663,014	1,392,410	4,055,424	66%
2013	3,163,805	2,466,552	5,630,357	56%
2014	6,447,650	3,723,681	10,171,331	63%
2015	5,593,702	3,389,294	8,982,996	62%
2016	8,886,077	2,459,450	11,345,527	78%
2017	12,322,519	7,705,230	20,027,749	62%
2018	24,230,150	9,525,486	33,755,636	72%
2019	14,755,905	3,038,699	17,794,604	83%
2020	8,860,302	3,795,759	12,656,061	70%
2021	18,283,479	9,986,407	28,269,886	65%
2022	22,718,969	7,581,652	30,300,621	75%
2023	11,967,229	4,963,788	16,931,017	71%
2024	12,300,233	6,820,614	19,120,847	64%
2025	16,596,415	6,585,886	23,182,301	72%
2007 - 2016	6,310,567	2,626,942	8,937,509	69%
2017 - 2019	17,102,858	6,756,472	23,859,330	72%
2023 - 2025	13,621,292	6,123,429	19,744,722	69%

Sources: Elison et al. (2025); ADF&G (2025).

Appendix E – Number of hours per day opened to drift net fishing for selected years.

Date	2017	2018	2019	2023	2024	2025
18-Jun						
19-Jun						
20-Jun		5	1			
21-Jun		5	8.5			
22-Jun	10	4.5	10.5			4
23-Jun	14	5	10			9
24-Jun	17	8.5	10			7.5
25-Jun	24	16	11.5	4		16
26-Jun	24	24	12	8.5	6	7
27-Jun	24	22.5	13	6.5	8	9.5
28-Jun	24	16.5	10	14.5	10	10
29-Jun	19	15	12	10.5	10	14.5
30-Jun	12	16	15.5	10	12	11.5
1-Jul	15	16.5	17	13	11.5	24
2-Jul	14	16.5	16	14.5	9.5	16.5
3-Jul	24	16.5	18.5	8	12.5	14
4-Jul	18	17.5	16.5	17.5	23.5	15
5-Jul	24	17.5	18	24	24	15
6-Jul	24	18	14.5	23	23	15.5
7-Jul	24	17.5	16	15	15.5	16.5
8-Jul	24	21.5	13	19.5	15.5	17
9-Jul	24	21	11	24	19	17.5
10-Jul	24	18	11	24	24	17.5
11-Jul	24	18	11.5	24	24	22.5
12-Jul	24	21	15.5	24	24	24
13-Jul	24	19	16	24	24	24
14-Jul	24	19	16	24	24	24
15-Jul	24	19	16	24	24	24
16-Jul	24	20.5	17.5	24	24	24
17-Jul	24	24	24	24	24	24
18-Jul	24	24	24	24	24	24
19-Jul	24	24	24	24	24	24
20-Jul	24	24	24	24	24	24
Means						
20-Jun - 25-Jun	16.3	7.3	8.6	4.0		9.1
26-Jun - 30-Jun	20.6	18.8	12.5	10.0	9.2	10.5
1-Jul - 5-Jul	19.0	16.9	17.2	15.4	16.2	16.9
6-Jul - 10-Jul	24.0	19.2	13.1	21.1	19.4	16.8

Sources: Elison et al. (2018), Salomone et al, (2019), Tiernan et al. (2021), Elison et al. (2024), Elison et al. (2025), Tim Sands, personal communication.

Appendix F – Number of hours per day opened to set net fishing for selected years.

Date	2017	2018	2019	2023	2024	2025
18-Jun						
19-Jun		6				
20-Jun		18.25	8.5			
21-Jun	1.5	18	19.5			
22-Jun	19.5	17.5	19.5			8
23-Jun	24	17.75	13			11
24-Jun	24	17	24			10
25-Jun	24	24	24	5		20
26-Jun	24	24	24	13	7.5	8.5
27-Jun	24	24	24	9	11	13.5
28-Jun	24	24	24	16	12.5	13.5
29-Jun	24	24	24	17	12	20.5
30-Jun	24	24	24	13	14	14
1-Jul	24	24	24	19	14	24
2-Jul	24	24	24	24	15	17.5
3-Jul	24	24	24	11	18	19
4-Jul	14	24	24	23	24	24
5-Jul	24	24	24	24	24	24
6-Jul	24	24	24	24	24	24
7-Jul	24	24	24	24	24	24
8-Jul	24	24	24	24	24	24
9-Jul	24	24	24	24	24	24
10-Jul	24	24	24	24	24	24
11-Jul	24	24	24	24	24	24
12-Jul	24	24	24	24	24	24
13-Jul	24	24	24	24	24	24
14-Jul	24	24	24	24	24	24
15-Jul	24	24	24	24	24	24
16-Jul	24	24	24	24	24	24
17-Jul	24	24	24	24	24	24
18-Jul	24	24	24	24	24	24
19-Jul	24	24	24	24	24	24
20-Jul	24	24	24	24	24	24
Means						
20-Jun - 25-Jun	18.6	18.8	18.1	5.0		12.3
26-Jun - 30-Jun	24.0	24.0	24.0	13.6	11.4	14.0
1-Jul - 5-Jul	22.0	24.0	24.0	20.2	19.0	21.7
6-Jul - 10-Jul	24.0	24.0	24.0	24.0	24.0	24.0

Sources: Elison et al. (2018), Salomone et al, (2019), Tiernan et al. (2021), Elison et al. (2024), Elison et al. (2025), Tim Sands, personal communication.

Appendix G – Comparison of Actual Vs. Hypothetical management objectives under the New SOC Management Plan vs. the old NMKS Management Plan (All Numbers are in Millions of Sockeye).

		Wood River			Nushagak River			Combined (Wood & Nushagak)			
		2023	2024	2025	2023	2024	2025	2023	2024	2025	Ave. 23-25
Hypothetical (Managed under old plan)	Fishing Start Date							22-Jun	21-Jun	20-Jun	21-Jun
	Fish past District at Start of Fishing	0.19	0.12	0.11	0.26	0.09	0.76	0.45	0.21	0.87	0.51
	Season Total Escapement [1]	1.8	1.8	1.8	0.9	0.9	0.9	2.70	2.70	2.70	2.70
	Escapement after Start of Fishing [2]	1.61	1.68	1.69	0.64	0.81	0.15	2.25	2.49	1.83	2.19
Actual (Managed under SOC plan)	Fishing Start Date							25-Jun	26-Jun	22-Jun	24-Jun
	Fish past District at Start of Fishing	1.05	0.91	0.62	0.89	0.80	1.48	1.94	1.71	2.10	1.92
	Season Total Escapement	2.649	4.405	2.657	1.773	1.723	3.261	4.42	6.13	5.92	5.49
	Escapement after Start of Fishing [2]	1.60	3.49	2.04	0.89	0.93	1.78	2.48	4.42	3.82	3.57
Comparison (Managed under Old Plan Vs. SOC Management Plan)	Difference In Start Date (Delay)							-3 days	-5 days	-2 days	-3.3 days
	Additional Sockeye Esc. due to Triggers [3]	0.86	0.79	0.51	0.63	0.71	0.73	1.49	1.50	1.23	1.41
	Additional Sockeye Esc. After Start of Fishing [4]	(0.01)	1.81	0.35	0.25	0.12	1.64	0.23	1.93	1.99	1.38
	Total Extra Sockeye Escapement [5]	0.85	2.61	0.86	0.87	0.82	2.36	1.72	3.43	3.22	2.79
	% of Additional Esc. Resulting from Triggers [6]	101%	30%	59%	72%	86%	31%	86%	44%	38%	56%
	% of Additional Esc. Resulting from Late Season [7]	-1%	70%	41%	28%	14%	69%	14%	56%	62%	44%

[1] For the Hypothetical Scenario the top end of the SEG was used as the escapement number as to assume the manager hit the objectives of the plan of meeting the escapement goal.

[2] Escapement after start of fishing represents the total escapement minus the fish past the district when fishing started.

[3] This is the difference in the fish past the district between the actual start date using the SOC plan and the hypothetical start date under the old management plan.

[4] Difference between Escapement after start of fishing from the actual fishery managed under the SOC management plan and the hypothetical escapement after start of fishing if the fishery had been managed according to the old plan and stayed within the top end of the SEG.

[5] This is the total sockeye escapement that went above the top end of the SEG.

[6] This represents the percent of additional sockeye escapement above the SEG that likely was a result of the delayed start to fishing due to the Triggers in the SOC Management Plan. It was calculated by dividing the additional sockeye due to triggers by the total extra sockeye escapement.

[7] This represents the percent of additional sockeye escapement above the SEG that likely was a result of management actions taken after the commercial fishery was open. It was calculated by dividing the additional sockeye esc. after start of fishing by the total extra sockeye escapement.

NOTE: it is important to recognize that this analysis rests on several assumptions. First, we likely overestimated the conservation benefits of the start triggers. If the fishery had opened earlier, not all of the fish estimated to have passed would have been harvested, since harvest rates are always less than 100 percent; some portion of those fish would have escaped upriver regardless. At the same time, the analysis also assumes that under the old management plan scenario, managers could have held escapements within the SEG targets. If that had not been possible, then we likely overestimated the conservation benefits attributed to later-season closure periods.