Advisory Announcement
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2025 Bristol Bay Sockeye Salmon Forecast-REVISED

FORECAST OF THE 2025 RUN:

TOTAL PRODUCTION:	Forecast (millions)	Forecast range (millions)
Total run	51.38	37.08–65.67
Escapement	14.98	
Total harvestable surplus	36.40	
Bristol Bay harvestable surplus	34.84	
South Peninsula	1.55	
Inshore Run	49.83	

The sockeye salmon total run forecast for Bristol Bay in 2025 is predicted to be **strong** with a point estimate of **51.38 million fish and a range of 37.08 to 65.67 million fish (80% confidence interval).** Categorical ranges of sockeye salmon total run strength were formulated from percentiles of total runs from 1961 to 2023 (Table 1). Since 2005, our preseason forecasts have under-forecast the actual run by 15% on average, ranging from 36% below in 2014 to 21% above in 2011 (Figure 1).

Table 1. Categorical ranges of sockeye salmon total run and this year's forecast in bold.

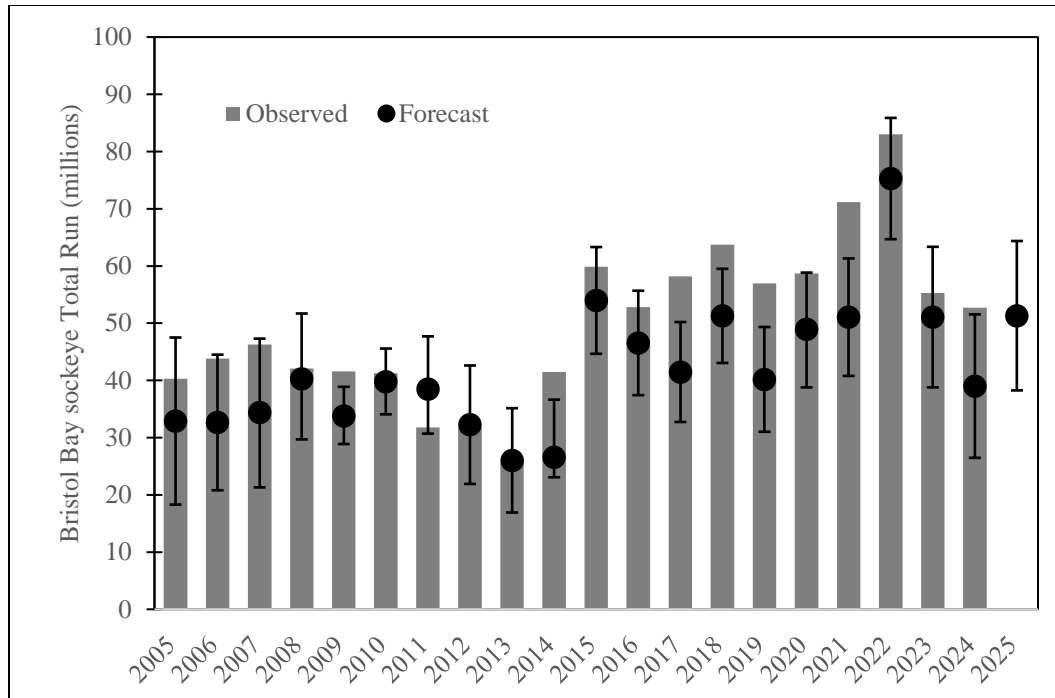| Category	Range (millions)	Percentile
Poor	Less than 20	Less than 20th
Weak	20 to 29	20th to 40th
Average	29 to 42	40th to 60th
Strong	**42 to 53**	**60th to 80th**
Excellent	Greater than 53	Greater than 80th

Figure 1. Annual observed total run of sockeye salmon in Bristol Bay compared to preseason total run forecasts, 2005–2025. Error bars represent 80% confidence intervals of forecasts.

METHODS

The 2025 Bristol Bay sockeye salmon forecast is the sum of individual predictions from 9 river systems (Kvichak, Alagnak, Naknek, Egegik, Ugashik, Wood, Igushik, Nushagak, and Togiak Rivers) and four age classes (ages 1.2, 1.3, 2.2, and 2.3). Adult escapement and return data from brood years 1972–2020 were used in the analyses for most rivers.

Forecasts for each age class returning to a river system were derived from models based on the relationship between adult returns of that age class and either total returns or sibling returns from the same brood years. The average return over the last five years was also considered as a forecast model and in certain cases, competing models were averaged in a weighted hybrid model approach. In general, models with statistically significant parameters and/or the best past performance metrics were chosen. Performance was evaluated using mean absolute deviation, mean absolute percent error, mean arctangent absolute percent error, and mean percent error between forecasted and observed returns measured across the most recent 3 and 5-year time frames.

Where practical, the Alaska Department of Fish and Game (department) will manage escapements proportional to the run size and relative to the historical record (5 AAC 06.355(d)(1)). In the Nushagak District, escapement goals for the Wood and Nushagak Rivers will be modified by the Nushagak District King Salmon Stock of Concern Management Plan (5AAC 06.391). Based on this regulation, the upper ends of the optimal escapement goal ranges (OEGs) in 2025 will be 2.95 and 2.49 million sockeye salmon for the Wood and Nushagak Rivers, respectively, and escapements are projected as the 75th percentile of the OEGs. For the other systems in Bristol Bay, escapements are projected as the 75th percentile of the escapement goal range if the forecast is in the upper range of historical run sizes (Ugashik, Igushik, and Togiak Rivers in 2025; Table 2) and as the 25th percentile of the escapement goal range if the forecast is in the lower range of historical run sizes (Kvichak,

Naknek, Egegik Rivers in 2025; Table 2). Because it is passively managed, the Alagnak River exploitation rate is assumed to be the same as that of the Kvichak River and therefore, the escapement is projected to be the total run forecast minus expected harvestable surplus.

Over the past five years, an average of 3% of the Bristol Bay return is thought to have been harvested in the South Peninsula fisheries in June. Preseason harvestable surplus projections are provided to aid industry in planning for the upcoming season.

RESULTS

A total of 51.38 million sockeye salmon (with a range of 37.08 to 65.67 million) are expected to return to Bristol Bay in 2025 (Table 2). This is 16% smaller than the most recent 10-year average of 61.23 million fish and 38% greater than the long-term average of 37.07 million fish (1963–2024). All systems are expected to meet their spawning escapement goals in 2025. The forecast range is the upper and lower values of the 80% confidence interval for the total run forecast. The confidence bounds were calculated from the difference between actual runs and run forecasts from 2005 through 2024.

A run of 51.38 million sockeye salmon would allow for a potential harvestable surplus of 36.40 million fish: 34.84 million fish in Bristol Bay and 1.55 million fish in the South Peninsula June fishery. A Bristol Bay inshore harvest of this size is 15% less than the most recent 10-year average harvest of 40.91 million (ranging from 31.61 to 60.23 million), and 50% greater than the long-term average harvest of 23.27 million fish (1963–2024).

Age-specific forecasts for the 2025 run consist of 14.43 million age-1.2 fish (28% of the total run), 4.69 million age-2.2 fish (9% of the total run), 30.06 million age-1.3 fish (59% of the total run), and 2.18 million age-2.3 fish (4% of the total run; Table 2).

DISCUSSION

Forecasting future salmon returns is inherently difficult and uncertain. The department has used similar methods since 2001 to produce Bristol Bay sockeye salmon forecasts, which have performed well when applied to Bristol Bay as a whole. In the last 20 years, our forecasts have on average under-forecast the run by 15%, ranging from 36% below the actual run in 2014 to 21% above the actual run in 2011. Forecasted harvestable surplus has had a mean absolute percentage error of 17% since 2005.

Individual river forecasts have greater uncertainty compared to the baywide forecast. Since 2005, we have on average under-forecast returns to the Alagnak (-15%), Togiak (-6%), Kvichak (-37%), Wood (-22%), Nushagak (-22%), Igushik (-7%), Ugashik (-11%), and Naknek (-4%) Rivers, and over-forecast returns to Egegik River (7%). Over-forecasting returns to some rivers while under-forecasting returns to other rivers means that the overall Bristol Bay forecast is often more accurate than the forecast for any individual river.

Table 2.–Forecast of total run, escapement, and harvest of major age classes of sockeye salmon returning to Bristol Bay River systems in 2025.

DISTRICT		Millions of Sockeye Salmon								
		Forecasted Production by Age Class					Forecasted		South	
	River	1.2	2.2	1.3	2.3	Total	Escapement	Surplus	Peninsula [a]	BB Inshore
NAKNEK-KVICHAK										
	Kvichak	2.12	0.78	4.14	0.34	7.38	4.00	3.16	0.22	7.16
	Alagnak	1.68	0.23	2.88	0.18	4.97	2.70	2.13	0.15	4.82
	Naknek	0.78	0.31	2.19	0.37	3.66	1.10	2.45	0.11	3.55
	Total	4.58	1.32	9.22	0.89	16.01	7.80	7.73	0.48	15.53
EGEGIK		1.00	2.42	2.20	0.83	6.46	1.10	5.16	0.20	6.26
UGASHIK		1.62	0.52	4.54	0.23	6.90	1.18	5.52	0.21	6.70
NUSHAGAK										
	Wood	3.95	0.28	3.24	0.16	7.63	2.38	5.01	0.23	7.40
	Igushik	0.73	0.02	2.02	0.01	2.79	0.34	2.37	0.08	2.70
	Nushagak	2.23	0.13	8.15	0.05	10.58 [b]	1.96	8.31	0.32	10.26
	Total	6.91	0.42	13.42	0.22	21.00	4.68	15.68	0.63	20.36
TOGIAK		0.31	0.01	0.68	0.01	1.01 [c]	0.23	0.75	0.03	0.98
BRISTOL BAY		14.43	4.69	30.06	2.18	51.38	14.98	34.84	1.55	49.83
		28%	9%	59%	4%	100%				

Note: This table is a summary. Slight differences may appear due to rounding.

[a] Projected harvest is based on the current 5-year running average exploitation rate of 3.0%.

[b] Nushagak River forecast total includes approximately 25,000 age-1.4 fish.

[c] Forecasts for Kulukak, Kanik, Osviak, and Matogak river systems are not included. These systems contribute approximately 50,000 sockeye salmon to Togiak District harvest each year.