ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF COMMERCIAL FISHERIES
NEWS RELEASE

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2020 BRISTOL BAY SOCKEYE SALMON FORECAST

FORECAST AREA: Bristol Bay

SPECIES: Sockeye salmon

FORECAST OF THE 2020 RUN:

TOTAL PRODUCTION:	Forecast (millions)	Forecast range (millions)
Total run	48.95	36.42–61.49
Escapement	12.04	
Commercial common property harvest	36.91	
Bristol Bay harvest	34.56	
South Peninsula harvest	2.35	
Inshore run	46.60	

METHODS

The 2020 Bristol Bay sockeye salmon forecast is the sum of individual predictions of nine 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, plus ages 0.3 and 1.4 for the Nushagak River). Adult escapement and return data from brood years 1972–2016 were used in the analyses.

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. Models based on the most recent five years of returns were also evaluated. In general, models with statistically significant parameters and/or the best past performance (accuracy and precision) 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. These performance metrics were calculated and considered for each

model across the most recent 5-year time frames. In certain cases, competing models were averaged in a weighted hybrid model approach.

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 deviation of actual runs and run forecasts from 2002 through 2019.

RESULTS

A total of 48.95 million sockeye salmon (range 36.42–61.49 million) are expected to return to Bristol Bay in 2020. This is 6% larger than the most recent 10-year average of Bristol Bay total runs (45.9 million) and 29% greater than the long-term (1963–2019) average of 34.6 million fish. All systems are expected to meet their spawning escapement goals.

Where practical, the department will manage escapements proportional to the run size and relative to the historical record (5AAC 06.355(d)(1)). Escapement is projected as the 75th quartile of the escapement range if the forecast is above the historical trend line (Egegik and Wood Rivers), as the midpoint (50th quartile) of the escapement range if the forecast is in line with the historical trend (Ugashik, Igushik and Togiak Rivers), and as the 25th quartile of the escapement goal range if the forecast is below the recent historical trend line (Kvichak, Naknek, and Nushagak Rivers in 2020; Table 1). Because it is passively managed, the Alagnak River exploitation rate is assumed to be the same as the Kvichak River exploitation rate and therefore the escapement is projected to be the total run forecast minus expected harvest. Preseason harvest projections are provided to aid industry in planning. Once the run begins to develop, the department relies on catch and escapement data for management decisions.

A run of 48.95 million sockeye salmon would allow for a potential total harvest of 36.91 million fish—34.56 million fish in Bristol Bay and 2.35 million fish in the South Peninsula fisheries. A Bristol Bay harvest of this size is 11% greater than the most recent 10-year harvest of 31.1 million which has ranged from 15.4 million to 42.0 million, and 38% greater than the long-term average harvest of 21.5 million fish (1963 to present).

The run forecast for each district and river system is as follows: 19.97 million to Naknek-Kvichak District (10.42 million to the Kvichak River, 4.08 million to the Alagnak River, and 5.47 million to the Naknek River); 10.75 million to the Egegik District; 4.67 million to the Ugashik District; 12.63 million to the Nushagak District (8.66 million to the Wood River, 2.90 million to the Nushagak River, and 1.07 million to the Igushik River); and 0.93 million to the Togiak District (Table 1).

We forecast that the 2020 run will consist of 19.14 million age-1.2 fish (39% of the total run), 7.06 million age-2.2 fish (14% of the total run), 21.04 million age-1.3 fish (43% of the total run), and 1.68 million age-2.3 fish (3% of the total run; Table 1).

DISCUSSION

Historically, sockeye salmon runs to Bristol Bay have been highly variable. The Bristol Bay total run has averaged 34.6 million from 1963 through 2019 and has averaged 45.9 million fish during the most recent 10-year period. Forecasting future salmon returns is inherently difficult and uncertain. We have used similar methods since 2001 to produce the Bristol Bay sockeye salmon forecast which have performed well when applied to Bristol Bay as a whole. Since 2001, our forecasts have, on average, under-forecast the run by 14% and have ranged from 44% below the

actual run in 2014 to 19% above the actual run in 2011. Forecasted harvests have had a mean absolute percent error of 14% since 2001.

Individual river forecasts have greater uncertainty compared to bay-wide forecasts. Since 2001, on average, we have under-forecast returns to the Alagnak (-33%), Togiak (-12%), Kvichak (-22%), Wood (-17%), Nushagak (-20%), Ugashik (-0.5%), and Naknek (-14%) Rivers, and over-forecast returns to the Igushik (13%) and Egegik Rivers (14%). 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 to any individual river. In 2019, the Nushagak District exceeded 200% of the long-term average return for the third year in a row. This is not expected to continue in 2020. Another notable feature of the 2019 run was the presence of record setting numbers of age-1.2 sockeye to the Egegik River (11.6 million) and Naknek River (5.3 million).

The department would like to thank the Bristol Bay Fisheries Collaborative (BBFC) for funding assistance in 2019. The BBFC began in 2016 and is an agreement between ADF&G and the Bristol Bay Science and Research Institute (BBSRI) to work together with stakeholders to restore a world-class fishery management system and raise funds to support and maintain management. This agreement is supported by ADF&G, BBSRI, Bristol Bay Regional Seafood Development Association (BBRSDA), set net fishermen, processors, municipalities, villages, support industries and other stakeholders. BBFC provided $750,000 towards Bristol Bay management in 2019. A list of organizations that committed financial support to the BBFC, as well as additional information about this agreement can be found at https://www.bbsri.org/bbfc.

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Table 1.–Forecast of total run, escapement, and harvest of major age classes of sockeye salmon returning to Bristol Bay river systems in 2020.

DISTRICT	Millions of Sockeye Salmon								
	Forecasted Production by Age Class					Forecasted		South	
River	1.2	2.2	1.3	2.3	Total	Escapement	Harvest	Peninsula [a]	BB Inshore
NAKNEK-KVICHAK									
Kvichak	5.07	2.23	3.04	0.07	10.42	4.00	5.92	0.50	9.92
Alagnak	1.94	0.48	1.61	0.06	4.08	1.57	2.32	0.20	3.89
Naknek	0.78	0.17	4.19	0.33	5.47	1.10	4.11	0.26	5.21
Total	7.80	2.88	8.84	0.46	19.97	6.67	12.34	0.96	19.01
EGEGIK	1.88	3.13	4.66	1.08	10.75	1.70	8.53	0.52	10.23
UGASHIK	2.31	0.87	1.46	0.04	4.67	1.18	3.28	0.22	4.45
NUSHAGAK									
Wood	5.81	0.14	2.68	0.04	8.66	1.53	6.72	0.42	8.25
Igushik	0.37	0.00	0.68	0.01	1.07	0.28	0.74	0.05	1.02
Nushagak	0.67	0.03	2.12	0.06	2.90 [b]	0.50	2.26	0.14	2.77
Total	6.85	0.18	5.47	0.10	12.63	2.30	9.72	0.61	12.03
TOGIAK	0.30	0.01	0.61	0.01	0.93	0.20	0.69 [c]	0.04	0.88
BRISTOL BAY	19.14	7.06	21.04	1.68	48.95	12.04	34.56	2.35	46.60
	39%	14%	43%	3%	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 4.8%.

[b] Nushagak River forecast total includes age-0.3 and 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.