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

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2018 BRISTOL BAY SOCKEYE SALMON FORECAST

FORECAST AREA: Bristol Bay

SPECIES: Sockeye Salmon

FORECAST OF THE 2018 RUN:

TOTAL PRODUCTION:	Forecast (millions)	Forecast Range (millions)
Total Run	51.28	40.68–61.88
Escapement	12.20	
Commercial Common Property Harvest	39.08	
Bristol Bay Harvest	37.59	
South Peninsula Harvest	1.49	
Inshore Run	49.79	

METHODS

The 2018 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 1972–2014 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 three and five years of returns were also evaluated. In general, models chosen were those with statistically significant parameters and/or the best past performance (accuracy and precision). Performance was evaluated using absolute deviation, absolute percent error, and percent error between forecasted and observed returns. These performance metrics were calculated and considered for each model across the most recent 10 year time frame.

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 2001 through 2016.

RESULTS

A total of 51.28 million sockeye salmon (range 40.68–61.88 million) are expected to return to Bristol Bay in 2018. This is 18% greater than the most recent 10-year average of Bristol Bay total runs (42.71 million) and 41% greater than the long-term mean of 33.78 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 (Wood, Igushik, Nushagak, and Togiak rivers). Escapement is projected as the midpoint (50th quartile) of the escapement range if the forecast is in line with the historical trend (Egegik River). Escapement is projected as the 25th quartile of the escapement goal range if the forecast is below the historical trend line (Kvichak, Naknek, and Ugashik rivers in 2018; Table 1, Figures 1–9). 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 51.28 million sockeye salmon would allow for a potential total harvest of 39.08 million fish, 37.59 million fish in Bristol Bay and 1.49 million fish in the South Peninsula fisheries. A Bristol Bay harvest of this size is 35% greater than the most recent 10-year harvest of 28.91 million which has ranged from 15.43 million to 38.81 million, and is 87% greater than the long-term harvest average of 20.85 million fish (1963 to present).

The run forecast for each district and river system is as follows: 16.64 million to Naknek-Kvichak District (8.36 million to the Kvichak River, 4.41 million to the Alagnak River, and 3.87 million to the Naknek River); 9.12 million to the Egegik District; 2.87 million to the Ugashik District; 21.79 million to the Nushagak District (12.31 million to the Wood River, 7.36 million to the Nushagak River, and 2.13 million to the Igushik River); and 0.86 million to the Togiak District (Table 1).

We forecast the 2018 run will consist of 18.43 million age-1.2 fish (36% of the total run), 6.03 million age-2.2 fish (12% of the total run), 22.55 million age-1.3 fish (44% of the total run), and 4.13 million age-2.3 fish (8% 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 33.78 million from 1963 through 2017 and has averaged 42.71 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 11% and have ranged from 44% below actual run in 2014 to 19% above 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-forecasted the returns to the Alagnak (-46%), Togiak (-20%), Kvichak (-21%), Wood (-13%), Nushagak (-20%), and Naknek (-7%) rivers, and over-forecasted returns to Igushik (14%), Egegik (16%), and Ugashik (0.4%). Over-forecasting returns to some rivers while under-forecasting returns to other rivers means that the overall Bristol Bay forecast is generally more accurate than the forecast to any individual river. The Nushagak District had a record breaking run in 2017. This was largely driven by robust returns from the 2013 brood year, which manifested as very large age 1.1 returns in the Wood River in 2016 and age 1.2 returns in the Wood and Nushagak rivers in 2017. Whether or not the 2013 brood year can sustain these very large returns and produce a large age 1.3 return in the Nushagak River is a major point of uncertainty in the 2018 forecast. Returns of the 2013 brood year to multiple stocks have been impressive to date, particularly in the Nushagak District. It is unclear how much longer the 2013 brood year can over-perform relative to the historical record.

The department would like to thank the Bristol Bay Fisheries Collaborative (BBFC) for funding assistance in 2017. 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, drift and set net fishermen, processors, municipalities, villages, support industries and other stakeholders. A list of organizations that committed financial support to the BBFC in 2017, as well as additional information about this agreement can be found at https://www.bbsri.org/bbfc.

Greg Buck and Katie Sechrist
Bristol Bay Research Staff

Table 1.–Forecast of total run, escapement, and harvest of major age classes of sockeye salmon returning to Bristol Bay river systems in 2018.

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	4.30	1.05	2.61	0.40	8.36	4.00	4.12	0.24	8.12
Alagnak	1.67	0.01	2.72	0.01	4.41	2.11	2.17	0.13	4.28
Naknek	1.51	0.53	1.25	0.58	3.87	1.10	2.65	0.11	3.75
Total	7.48	1.59	6.58	0.99	16.64	7.21	8.95	0.48	16.16
EGEGIK	1.19	3.67	1.48	2.77	9.12	1.40	7.45	0.27	8.85
UGASHIK	0.42	0.62	1.54	0.29	2.87	0.73	2.06	0.08	2.78
NUSHAGAK									
Wood	8.00	0.13	4.13	0.04	12.31 [b]	1.53	10.42	0.36	11.95
Igushik	0.59	0.01	1.50	0.02	2.13	0.34	1.73	0.06	2.06
Nushagak	0.56	0.00	6.64	0.01	7.36	0.77	6.38	0.21	7.14
Total	9.16	0.14	12.28	0.07	21.79	2.63	18.53	0.63	21.16
TOGIAK	0.18	0.01	0.66	0.01	0.86	0.23	0.61 [c]	0.03	0.84
BRISTOL BAY	18.43	6.03	22.55	4.13	51.28	12.20	37.59	1.49	49.79
	36%	12%	44%	8%	100%				

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

[a] Projected harvest is based on the current 5 year running average exploitation rate of 2.9%.

[b] Nushagak River forecast includes age-0.3 (91) and age-1.4 (137,507) 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.

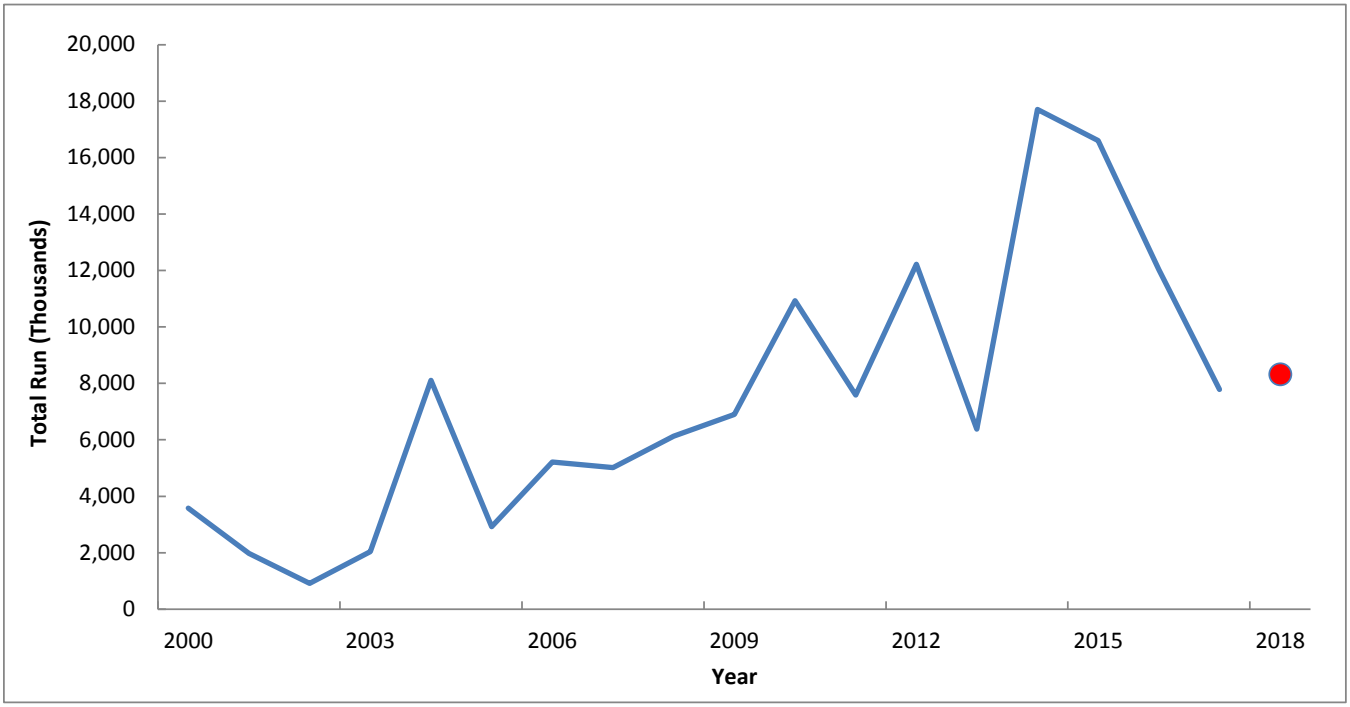

Figure 1.–Kvichak River total sockeye salmon run 2000–2017 (line) and the 2018 forecast (circle).

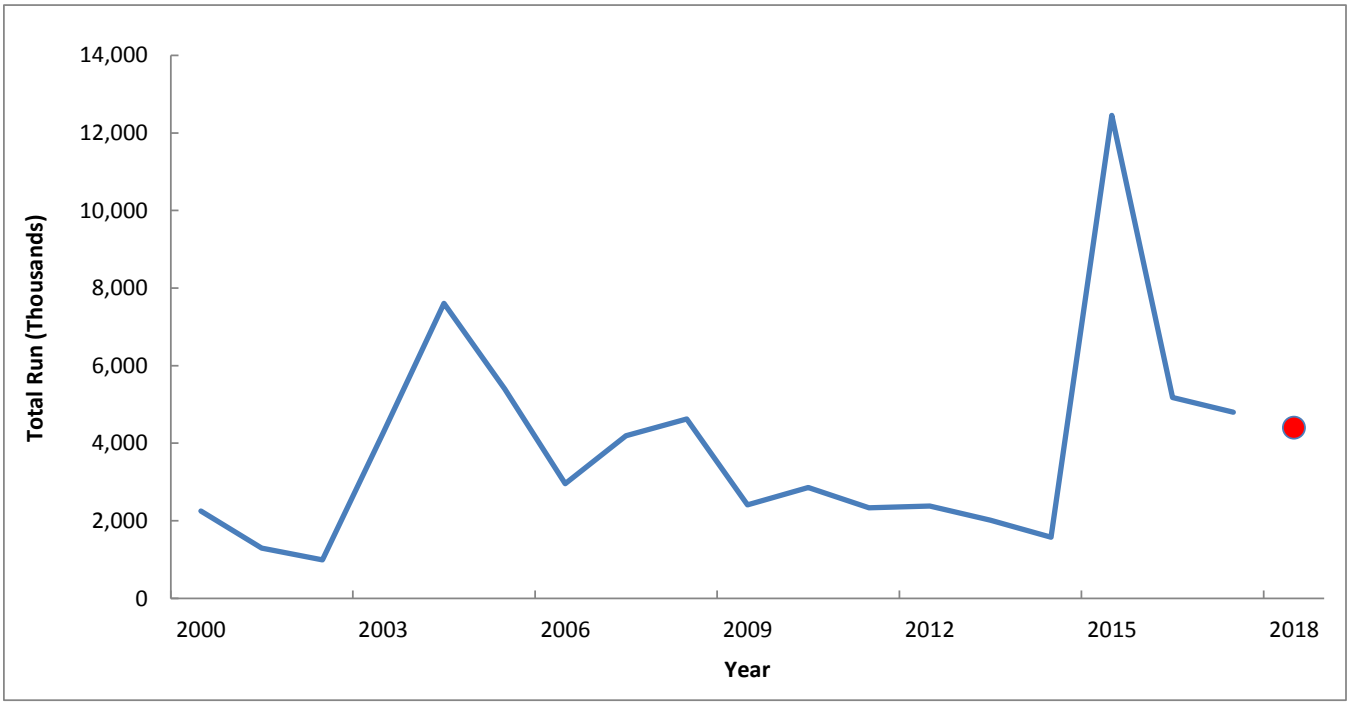

Figure 2.–Alagnak River total sockeye salmon run 2000–2017 (line) and the 2018 forecast (circle).

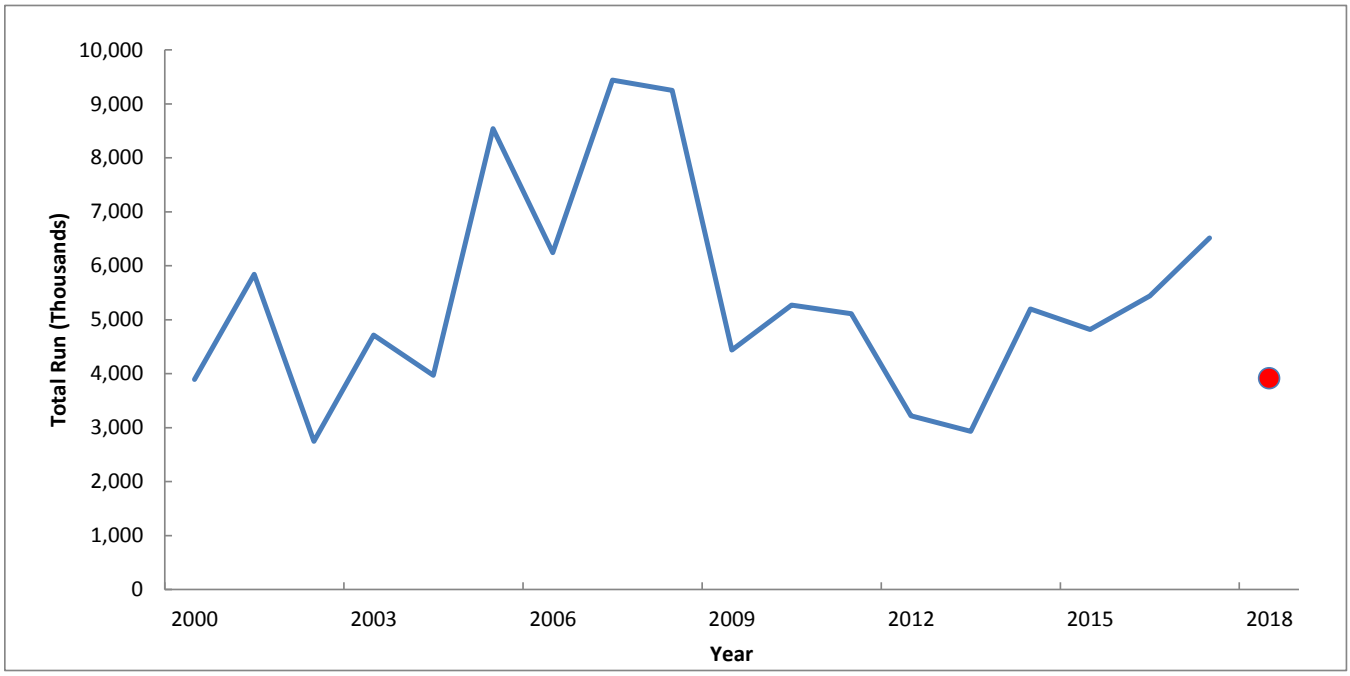

Figure 3.–Naknek River total sockeye salmon run 2000–2017 (line) and the 2018 forecast (circle).

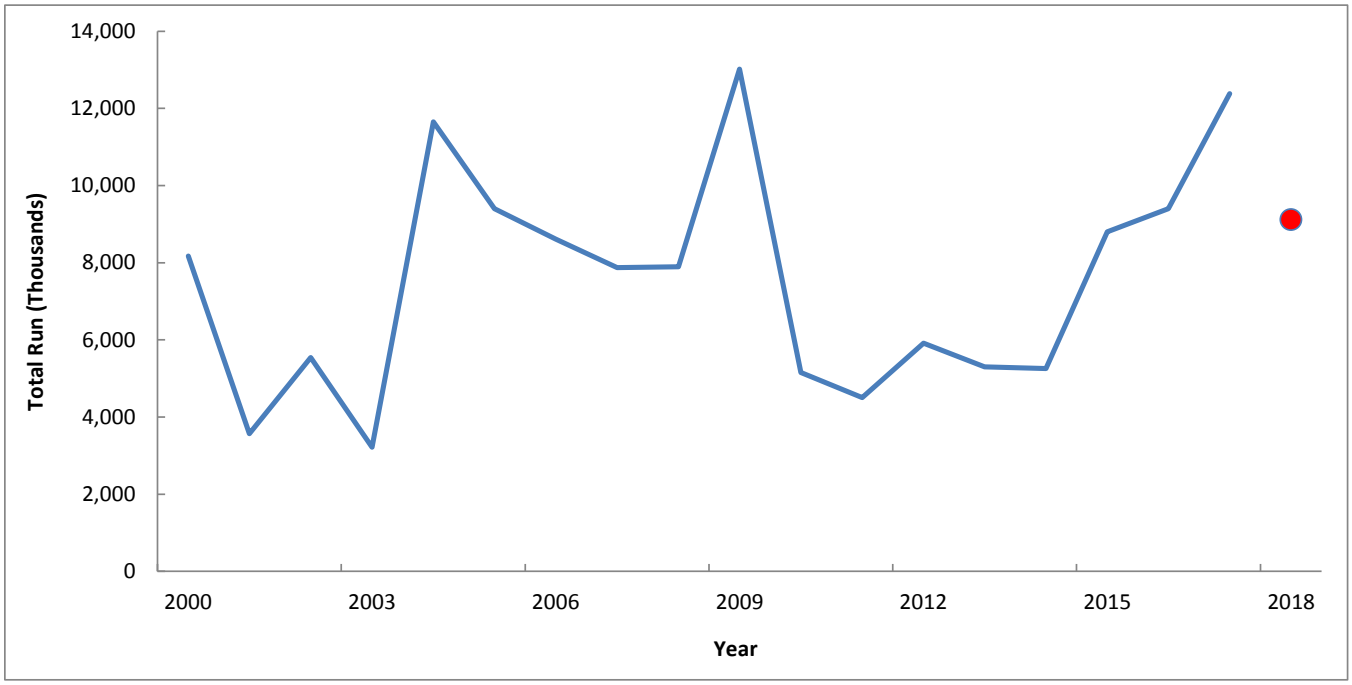

Figure 4.–Egegik River total sockeye salmon run 2000–2017 (line) and the 2018 forecast (circle).

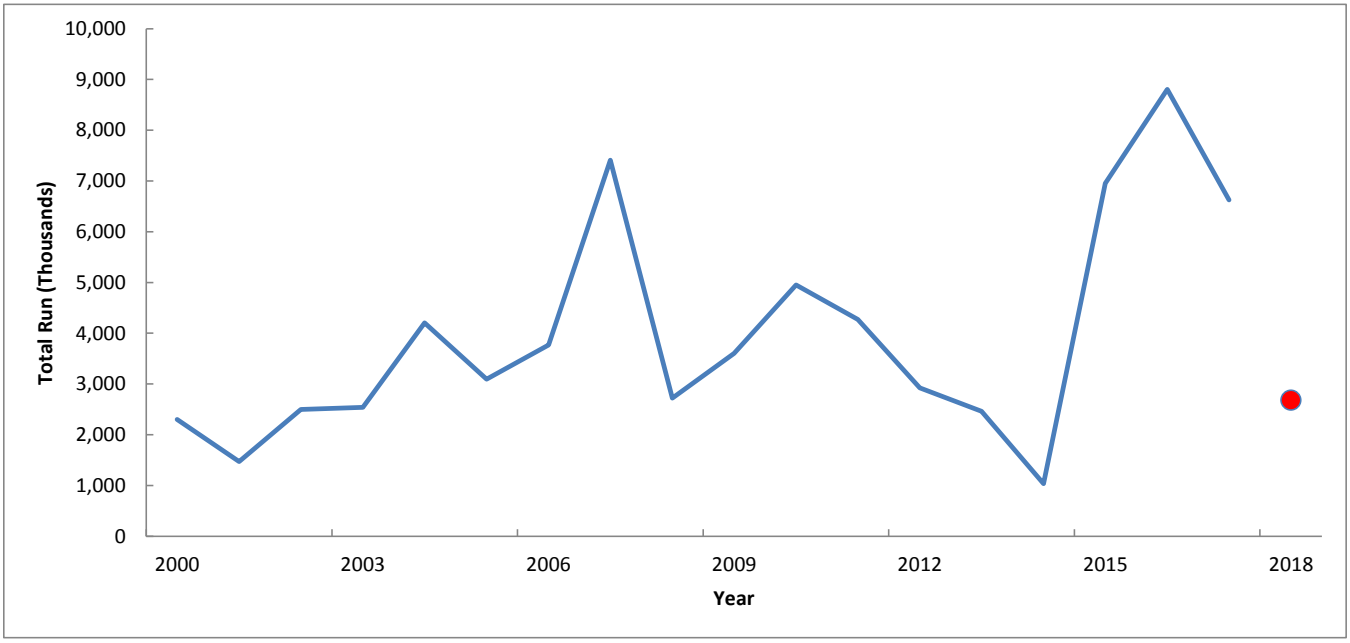

Figure 5.–Ugashik River total sockeye salmon run 2000–2017 (line) and the 2018 forecast (circle).

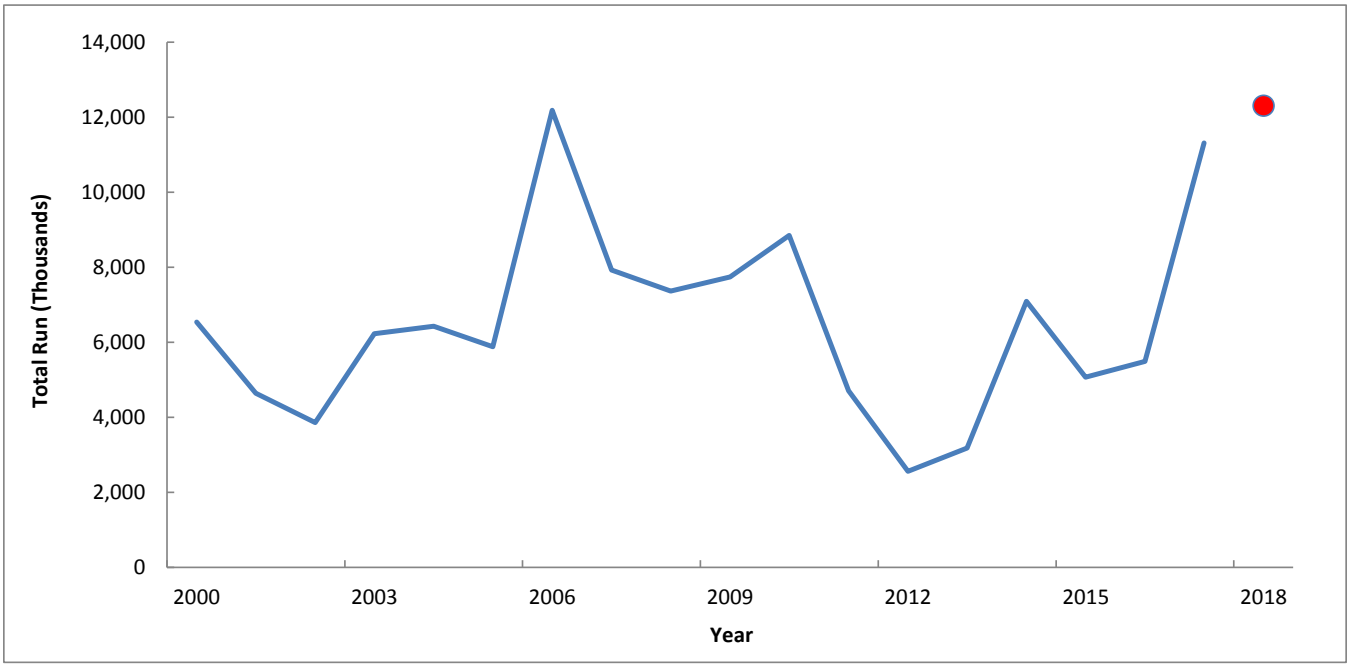

Figure 6.–Wood River total sockeye salmon run 2000–2017 (line) and the 2018 forecast (circle).

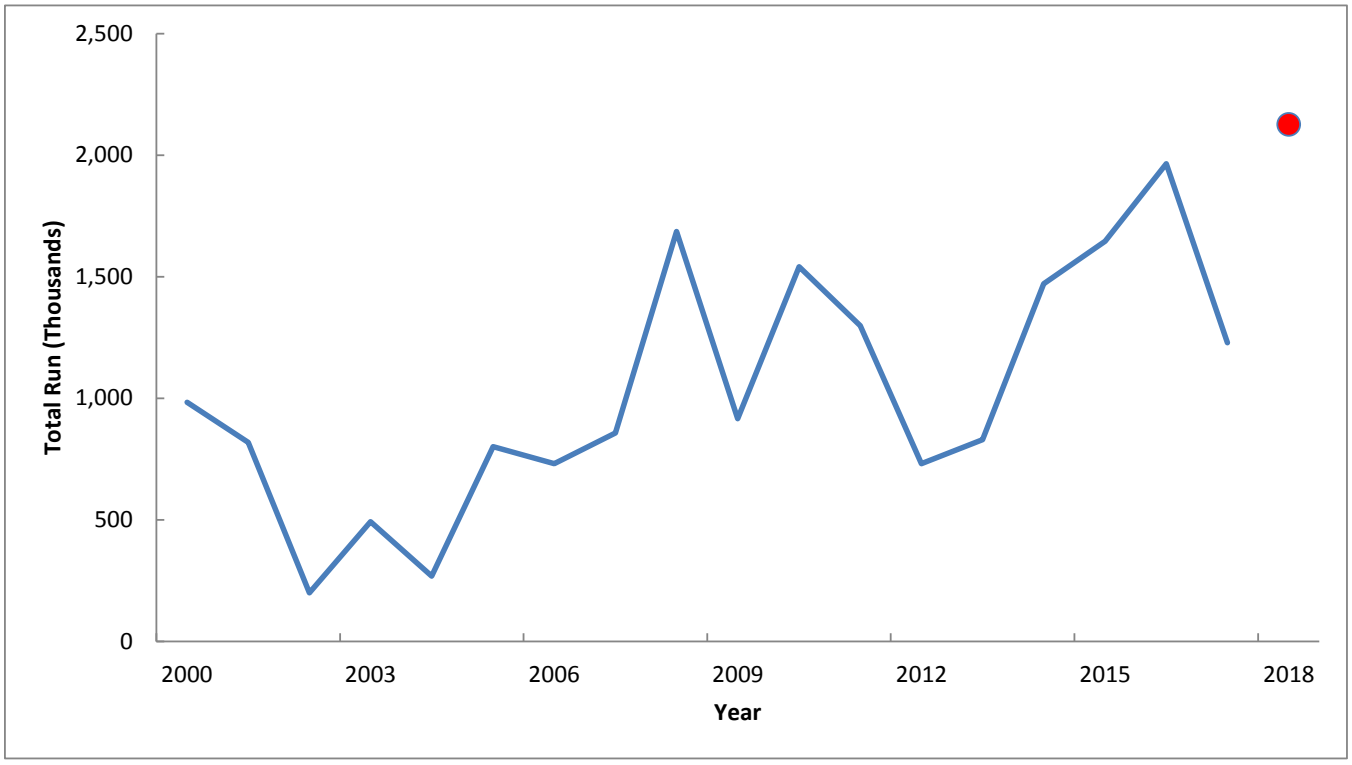

Figure 7.–Igushik River total sockeye salmon run 2000–2017 (line) and the 2018 forecast (circle).

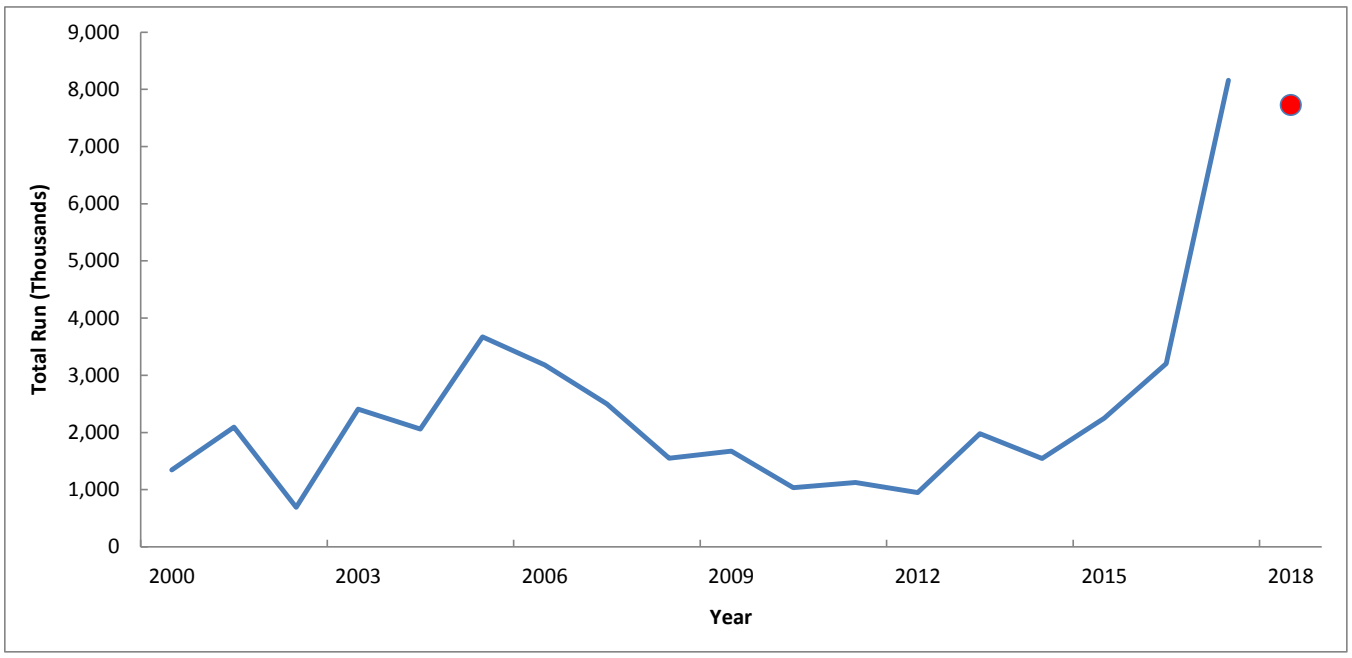

Figure 8.–Nushagak River total sockeye salmon run 2000–2017 (line) and the 2018 forecast (circle).

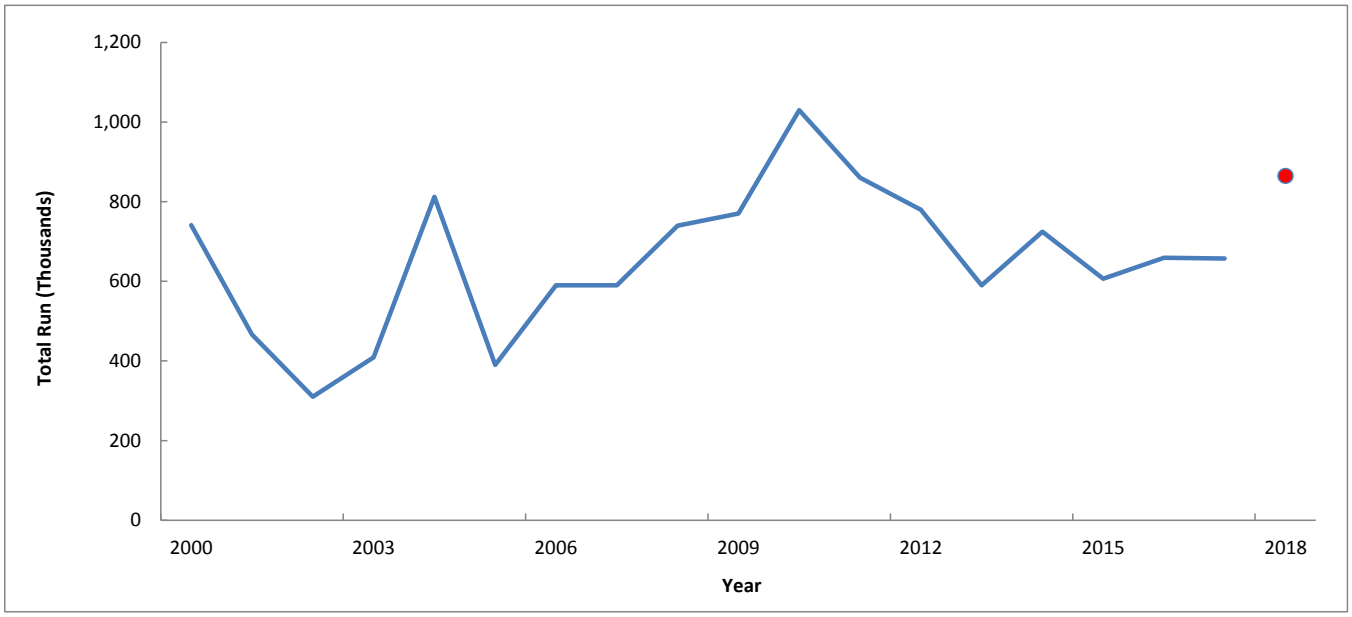

Figure 9.–Togiak River total sockeye salmon run 2000–2017 (line) and the 2018 forecast (circle).