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

Cora Campbell, Commissioner
Jeff Regnart, Director

Contacts:
Chuck Brazil, Bristol Bay Area Research Biologist
Fred West & Greg Buck, Asst. Area Research Biologists
Phone: (907) 267-2214
Fax: (907) 267-2442

Anchorage Office
333 Raspberry Road
Anchorage, AK 99518

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2013 BRISTOL BAY SOCKEYE SALMON FORECAST

The 2013 Bristol Bay sockeye salmon forecast and harvest projection are provided below.

FORECAST AREA: **Bristol Bay**

SPECIES: **Sockeye Salmon**

FORECAST OF THE 2013 RUN:

TOTAL PRODUCTION:	Forecast (millions)	Forecast Range (millions)
Total Run	26.03	17.30–34.76
Escapement	8.50	
Commercial Common Property Harvest	17.53	
Bristol Bay Harvest	16.59	
South Peninsula Harvest	0.94	

METHODS

The forecast for the sockeye salmon run to Bristol Bay in 2013 is the sum of individual predictions for nine river systems (Kvichak, Alagnak, Naknek, Egegik, Ugashik, Wood, Igushik, Nushagak-Mulchatna, 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 Nushagak River). Adult escapement and return data from brood years 1972–2009 were used in the analyses.

Predictions for each age class returning to a river system were calculated from models based on the relationship between adult returns and spawners or siblings from previous years. Tested models included simple linear regression and recent year averages. All models were evaluated for time series trends. Models chosen were those with statistically significant parameters having the

greatest past reliability (accuracy and precision) based on mean absolute deviation, mean absolute percent error, and mean percent error between forecasts and actual returns for the years 2010 through 2012.

The forecast range was the upper and lower values of the 80% confidence bounds for the total run forecast. The confidence bounds were calculated using deviations of actual runs from published predictions from 2001 through 2012.

RESULTS

A total of 26.03 million sockeye salmon are expected to return to Bristol Bay in 2013. This prediction is 33% lower than the previous 10-year mean of total runs (39.06 million; range of 24.1 million to 46.60 million), and 20% lower than the long-term mean of 32.38 million. The forecast range is from 17.30 million to 34.76 million. All systems are expected to meet their spawning escapement goals.

A run of 26.03 million sockeye salmon can potentially produce a total harvest of 17.53 million fish if escapement goals are met for managed stocks and industry is capable of taking the surplus fish. The projected harvest includes 16.59 million fish in Bristol Bay and 0.94 million fish in the South Peninsula fisheries. A Bristol Bay harvest of 16.59 million would be 40% lower than the previous 10-year mean harvest (27.63 million; range of 17.22 million to 32.01 million), and 20% lower than the long-term mean of 20.67 million.

The run forecast to each district and river system is as follows: 10.61 million to Naknek-Kvichak District (5.08 million to Kvichak River; 2.08 million to Alagnak River; 3.46 million to Naknek River); 6.06 million to Egegik District; 3.53 million to Ugashik District; 5.25 million to Nushagak District (3.42 million to Wood River; 1.31 million to Nushagak River; 0.52 million to Igushik River); and 0.59 million to Togiak District (Table 1).

The total run forecast of 26.03 million sockeye salmon is expected to be comprised of 10.12 million age-1.3 fish (39%) followed by 6.38 million age-2.2 fish (25%), 6.10 million age-1.2 fish (23%), 3.37 million age-2.3 fish (13%), 0.044 million age-1.4 fish (<1%), and 0.015 million age-0.3 fish (<1%) (Table 1).

DISCUSSION

Prediction or forecasting is very difficult, especially if it is about future salmon returns. We have used similar methods since 2001 to produce the Bristol Bay sockeye salmon forecast. These forecast methods have performed fairly well when looking at the overall Baywide forecast. The forecast in 2012 was 3% above the total run and forecasts since 2001 have averaged 7% below the actual total run. Run forecast differences have ranged from 26% below actual run in 2007 to 21% above actual run in 2011. Forecasted harvests have averaged 2% below actual harvest since 2001 and harvest differences have ranged from 24% below actual harvest in 2009 to 30% above actual harvest in 2011.

There is a much greater amount of uncertainty in our forecasts of returns to individual rivers. Since 2001, on average, we have under-forecast the returns to the Alagnak (-37%), Togiak (-19%), Wood (-9%), Kvichak (-5%), and Naknek (-2%) rivers and over-forecast returns to Igushik (73%), Egegik (35%), Ugashik (11%), and Nushagak (3%) rivers.

Even though there is large amount of variability around the forecasts to the individual rivers, the overall Bristol Bay forecasts have been fairly accurate since 2001. This appears to have been the result of over-forecasting returns to some rivers and under-forecasting returns to other rivers. The forecasts to individual rivers have been offsetting each other such that the overall Bristol Bay forecast has been more accurate than the individual forecasts.

We anticipate the 2013 run will be dominated by age-1.3 sockeye salmon (39%), followed by age-2.2 (25%), age-1.2 (23%), and age-2.3 (13%). There is always some uncertainty in our forecast of returns by age class. However, we expect the overall uncertainty in 2013 to be similar to what occurred in 2012. Our forecasts were close for age-1.2 (19% forecast compared to 23% observed) and age-2.3 (13% forecast compared to 9% observed) sockeye salmon. We over-forecast age-1.3 (41% compared to 28% observed) and under-forecast age-2.2 (26% forecast compared to 39% observed) sockeye salmon in 2012.

Historically, total runs of sockeye salmon to Bristol Bay have been highly variable. The 2013 forecast of 26.03 million is below the long-term historical average of 32.38 million from 1963 to 2012, and below the more recent historical average of 39.06 million from 2003 to 2012. We had seven consecutive years from 2004–2010 where total run was close to or exceeded 40 million sockeye salmon. In 2011, total run dropped to 31.91 million sockeye salmon. We expect the 2013 run to be less than the total run in 2012.

Chuck Brazil, Fred West, and Greg Buck
Alaska Department of Fish and Game
Division of Commercial Fisheries
Bristol Bay Research Staff
Anchorage

Table 1.–Forecast of total run, escapement, and harvest of major age classes of sockeye salmon returning to Bristol Bay river systems in 2013.

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]
NAKNEK-KVICHAK								
Kvichak	1.31	1.65	1.39	0.74	5.08	2.54	2.36	0.18
Alagnak	0.50	0.19	1.29	0.10	2.08	1.04 [b]	0.96	0.07
Naknek	0.77	0.52	1.61	0.55	3.46	1.10	2.23	0.12
Total	2.57	2.35	4.30	1.39	10.61	4.68	5.55	0.38
EGEGIK	0.16	3.22	1.18	1.49	6.06	1.10	4.74	0.22
UGASHIK	1.59	0.59	1.00	0.35	3.53	0.80	2.60	0.13
NUSHAGAK [c]								
Wood	1.49	0.15	1.70	0.08	3.42	1.00	2.30	0.12
Igushik	0.15	0.02	0.34	0.02	0.52	0.25	0.25	0.02
Nushagak	0.03	0.00	1.20	0.02	1.31 [d]	0.50	0.76	0.05
Total	1.67	0.17	3.24	0.11	5.25	1.75	3.31	0.19
TOGIAK [e]	0.11	0.04	0.41	0.03	0.59	0.18	0.39	0.02
BRISTOL BAY	6.10	6.38	10.12	3.37	26.03	8.50	16.59	0.94
	23%	25%	39%	13%	100%			

Note: This table summarizes the forecast of sockeye salmon in millions of fish. Any differences in addition are due to rounding.

[a] The projected harvest accounts for the harvest of Bristol Bay sockeye salmon in the South Peninsula commercial salmon fisheries. The South Peninsula harvest has averaged 3.6% of the total Bristol Bay sockeye salmon production during the last 5 years.

[b] The projected escapement to the Alagnak River was estimated based on exploiting the Alagnak River at the same exploitation rate as the Kvichak River.

[c] Forecast for Snake River system was not included (1971–1991 average escapement was 18,000).

[d] Nushagak River forecast includes age-0.3 (15,000) and age-1.4 (44,300) fish.

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