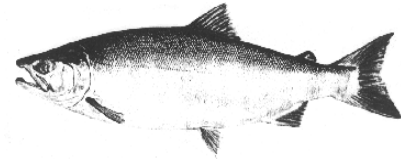


**ALASKA DEPARTMENT OF FISH AND GAME**  
**DIVISION OF COMMERCIAL FISHERIES**  
**NEWS RELEASE**



*Denby S. Lloyd, Commissioner*  
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**2011 BRISTOL BAY SOCKEYE SALMON FORECAST**

The 2011 Bristol Bay sockeye salmon forecast and harvest projection are provided below.

FORECAST AREA: **Bristol Bay**

SPECIES: **Sockeye Salmon**

FORECAST OF THE 2011 RUN:

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	Forecast (millions)	Forecast Range (millions)
<b>TOTAL PRODUCTION:</b>		
Total Run	38.50	29.17–47.82
Escapement	8.83	
Commercial Common Property Harvest	29.67	
Bristol Bay Harvest	28.52	
South Peninsula Harvest	1.15	

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**METHODS**

The forecast for the sockeye salmon run to Bristol Bay in 2011 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 1976–2007 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 also 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 2008 through 2010.

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 2010.

## RESULTS

A total of 38.50 million sockeye salmon are expected to return to Bristol Bay in 2011. This prediction is 5% higher than the previous 10-year mean of total runs (36.68 million; range of 17.83 million to 46.04 million). The forecast range is from 29.17 million to 47.82 million. All systems are expected to meet their spawning escapement goals.

A run of 38.50 million sockeye salmon can potentially produce a total harvest of 29.67 million fish if escapement goals are met for managed stocks and industry is capable of taking the surplus fish. The projected harvest includes 28.52 million fish in Bristol Bay and 1.15 million fish in the South Peninsula fisheries. A Bristol Bay harvest of 29.67 million would be 26% higher than the previous 10-year mean harvest (23.55 million; range of 10.66 million to 30.89 million).

The run forecast to each district and river system is as follows: 14.38 million to Naknek-Kvichak District (5.68 million to Kvichak River; 1.77 million to Alagnak River; 6.93 million to Naknek River); 8.74 million to Egegik District; 5.03 million to Ugashik District; 9.50 million to Nushagak District (6.51 million to Wood River; 1.64 million to Nushagak River; 1.35 million to Igushik River); and 0.86 million to Togiak District (Table 1).

The total run forecast of 38.50 million sockeye salmon is expected to be comprised of 14.47 million age-1.3 fish (38%) followed by 9.72 million age-2.2 fish (25%), 9.09 million age-1.2 fish (24%), 4.92 million age-2.3 fish (13%), 0.085 million age-0.3 fish (<1%), and 0.214 million age-1.4 fish (<1%) (Table 1).

## DISCUSSION

Similar methods have been used to produce the Bristol Bay sockeye salmon forecast since 2001. These forecast methods have performed fairly well when looking at the overall Baywide forecast. There has been a tendency for the forecasts and projected harvests to be biased low in recent years. The forecast in 2010 was 3% below the total run. The forecasts since 2001 have averaged 10% below the actual total run. The run forecast differences have ranged from 26% below actual run in 2007 to 9% above actual run in 2001. The expected harvests have averaged 3% below actual harvest since 2001. The expected harvest differences have ranged from 22% below actual harvest in 2009 to 33% above actual harvest in 2004.

There is a much greater amount of uncertainty in our forecasts of returns to individual rivers. Since 2001, we have under-forecast the returns to the Alagnak (-36%), Togiak (-19%), Nushagak (-18%), Naknek (-9%), and Wood (-9%) rivers and over-forecast returns to Igushik (24%), Egegik (23%), and Kvichak (18%) rivers. An example of the large variability can be observed in forecasts to the Kvichak River. We over-forecast returns to the Kvichak River by an average of 97% from 2001 through 2004 during an unusually unproductive period and under-forecast returns to the Kvichak River by an average of -32% from 2005 through 2010 during a higher

period of productivity. In large part, an individual river's forecast error is reflective of its current production as it relates to average historical production.

Even though there is large amount of variability around the forecasts to the individual rivers, the overall Baywide 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 Baywide forecast has been more accurate than the individual forecasts.

We anticipate the 2011 run will be dominated by age-1.3 (38%) sockeye salmon, followed by age-2.2 (25%), age-1.2 (24%), 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 2011 to be similar to what occurred in 2010. Our forecasts were close for age-1.2 (29% forecast compared to 28% observed) and age-1.3 (39% compared to 36% observed) sockeye salmon. We under-forecast age-2.2 (16% forecast compared to 25% observed) and over-forecast age-2.3 (15% forecast compared to 9% observed) sockeye salmon in 2010.

The 2011 forecast of 38.50 million is not unexpected. Recent total runs to Bristol Bay have been fairly productive and stable. Since 2004, total runs have averaged 42.8 million and ranged from 39.3 million (2005) to 46.0 million (2007). We are not sure if this recent trend of productivity and stability will continue. Historically, total runs to Bristol Bay have been highly variable. If the 2011 forecast is accurate, it would be the 8<sup>th</sup> consecutive year where total run is close to or exceeds 40 million sockeye salmon.

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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 2011.

DISTRICT	River	Millions of Sockeye Salmon					Forecasted		South Peninsula <sup>a</sup>
		Forecasted Production by Age Class				Total	Escapement	Harvest	
		1.2	2.2	1.3	2.3				
NAKNEK-KVICHAK									
	Kvichak	1.85	1.75	1.40	0.68	5.68	2.84	2.67	0.17
	Alagnak	0.54	0.20	0.96	0.07	1.77	0.88 <sup>b</sup>	0.83	0.05
	Naknek	1.61	0.86	3.28	1.18	6.93	1.10	5.62	0.21
	Total	3.99	2.81	5.64	1.93	14.38	4.82	9.12	0.43
EGEGIK									
		0.49	4.64	1.23	2.38	8.74	1.10	7.37	0.26
UGASHIK									
		0.96	1.94	1.69	0.45	5.03	0.85	4.03	0.15
NUSHAGAK <sup>c</sup>									
	Wood	3.05	0.25	3.17	0.04	6.51	1.10	5.21	0.20
	Igushik	0.22	0.02	1.08	0.04	1.35	0.23	1.08	0.04
	Nushagak	0.19	0.01	1.11	0.03	1.64 <sup>d</sup>	0.55	1.04	0.05
	Total	3.46	0.28	5.35	0.11	9.50	1.88	7.34	0.28
TOGIAK <sup>e</sup>									
		0.20	0.05	0.55	0.07	0.86	0.18	0.66	0.03
BRISTOL BAY									
		9.09	9.72	14.47	4.92	38.50	8.83	28.52	1.15
		24%	25%	38%	13%	100%			

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

<sup>a</sup> 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 3.0% of the total Bristol Bay sockeye salmon production during the last 5 years.

<sup>b</sup> The projected escapement to the Alagnak River was estimated based on exploiting the Alagnak River at the same exploitation rate as the Kvichak River.

<sup>c</sup> Forecast for Snake River system was not included (1971–1991 average escapement was 18,000).

<sup>d</sup> Nushagak River forecast includes age-0.3 (85,000) and age-1.4 (214,000) fish.

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