

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



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**2010 UPPER COOK INLET SOCKEYE SALMON FORECAST**

The preliminary forecast of the 2010 Upper Cook Inlet sockeye salmon run is as follows:

	Forecast Estimate (millions)	Forecast Range (millions)
<b>TOTAL PRODUCTION:</b>		
Total Run	3.6	2.3–5.8
Escapement	1.3	
Harvest	2.3	

**Forecast Methods**

The major sockeye salmon systems in Upper Cook Inlet (UCI) are the Kenai, Kasilof, Susitna, and Crescent Rivers, and Fish Creek. Spawner, return, sibling, fry, and smolt data, if available, were examined for each system. Four models were used to forecast the run of sockeye salmon to UCI in 2010: (1) the relationship between adult returns and spawners, (2) the relationship between adult returns and fry, (3) the relationship between adult returns and smolts, and (4) the relationship between sibling adult returns. Several forecast models were evaluated for each stock and age class. Models providing the smallest mean absolute percent error (MAPE) between the forecasts and actual runs over the past 10 years were generally used. In most cases, these were sibling models.

The returns of ages 1.3, 2.2, and 2.3 sockeye salmon to the Kenai River in 2010 were forecasted using sibling models. The sibling-model prediction for the return of age 1.3 sockeye salmon was based on the abundance of age 1.2 sockeye salmon in 2009. The reconstructed ocean abundances of Bristol Bay (BB) sockeye salmon was a significant covariate in this model. The nature of the relationship was consistent with the notion that competition for food between UCI and BB sockeye salmon during the first 2 years of ocean rearing caused more UCI sockeye salmon to return at age 1.3 when BB abundance was high. A spawner-recruit model was used to

forecast the return of age 1.2 sockeye salmon to the Kenai River. Smolt models were used to forecast the returns of age 1.2, 1.3 and 2.2 sockeye salmon to the Kasilof River, but the return of age 2.3 sockeye salmon was forecasted using a sibling model.

The return of sockeye salmon to the Susitna River was forecasted using the recent 4-year average aggregate escapement into Judd, Shell, Chelatna, and Larson lakes expanded to the entire Susitna River watershed using mark-recapture abundance estimates from 2006–2008. The total run of Susitna River sockeye salmon to UCI was forecasted using the mean harvest rate estimated from genetic stock composition of the commercial harvest in 2007–2008.

The sockeye salmon forecast for unmonitored systems in UCI was estimated as 5% of the aggregate forecast for the 5 major stocks. The fraction of the total run destined for unmonitored systems was estimated using genetic stock composition estimates from the commercial harvest. The total harvest by all user groups was estimated by subtracting the aggregate escapement from the total run forecast for all stocks. The aggregate escapement was estimated from the sum of the midpoints of the escapement goal ranges for each of the major sockeye salmon producing systems in UCI and the escapement into unmonitored systems (estimated as 5% of the aggregate escapement into monitored systems). The estimated sport harvest upstream of the sonar at river mile 19 on the Kenai River was subtracted from the aggregate escapement into monitored systems. The forecast range was calculated by multiplying the forecast times the upper and lower values of the percent error of the actual runs from published forecast runs from 2000 through 2009.

### **Forecast Discussion**

In 2009, the harvest of sockeye salmon by all user groups in UCI was 2.6 million, while the preseason forecast was 3.0 million. The lower than expected harvest in 2009 was largely due to a weak run to the Susitna River. In 2009, the total run was 2.4 million to the Kenai River, 817,000 to the Kasilof River, 196,000 to the Susitna River, 183,000 to the Crescent River, and 112,000 to Fish Creek. The forecasted run in 2009 was 2.4 million to the Kenai River, 822,000 to the Kasilof River, 669,000 to the Susitna River, 92,000 to the Crescent River, and 80,000 to Fish Creek.

A run of 3.6 million sockeye salmon is forecasted to return to UCI in 2010 with a harvest by all user groups of 2.3 million. The forecasted harvest in 2010 is about 1.7 million fish below the 20-year average harvest by all user groups of 4.0 million. The run forecast for the Kenai River is 1.7 million, which is 45% less than the 20-year average run of 3.1 million. Age 1.3 sockeye salmon typically comprise about 61% of the run to the Kenai River. The age 1.3 sockeye salmon returning in 2010 are the progeny from an overescapement (1,114,000) in 2005. A sibling model based upon the return of age 1.2 sockeye salmon in 2009 (86,000; 20-year average: 238,000) predicted a return of 1.0 million age 1.3 sockeye salmon. A fry model based upon the abundance of fry rearing in Skilak and Kenai lakes in the fall of 2006 (29.6 million; 20-year average: 18.5 million) predicted a return of 2.5 million age 1.3 sockeye salmon. The sibling model was used for this forecast because the 10-year MAPE was lower for the sibling model (27%) than the fry model (55%). Age 2.3 sockeye salmon typically comprise about 16% of the run to the Kenai River. A sibling model based upon the return of age 2.2 sockeye salmon in 2009 (179,000; 20-year average: 190,000) predicted a return of 317,000 age 2.3 sockeye salmon in 2010. The forecasted return is 42% less than the 20-year average return for this age class. The predominant age classes in the 2010 run should be age 1.3 (57%) and age 2.3 (17%). The 10-year MAPE for the set of models used for the 2010 Kenai sockeye salmon run forecast was 29%.

The sockeye salmon run forecast for the Kasilof River is 901,000, which is 6% less than the 20-year average run of 958,000. Age 1.3 sockeye salmon typically comprise about 36% of the run to the Kasilof River. The forecast for age 1.3 sockeye salmon is 324,000, which is 7% less than the 20-year average return (348,000) for this age class. A smolt model based upon the abundance of age-1 sockeye salmon smolts in 2007 was used to forecast the return of age 1.3 sockeye salmon in 2010. The abundance of age-1 smolts in 2007 was 3.1 million, which is 28% less than the 20-year average abundance (4.3 million) for this age class. A sibling model predicted a return of 282,000 age 1.3 sockeye salmon. The smolt model was used for this forecast because the 10-year MAPE was lower for the smolt model (19%) than the sibling model (22%). Age 1.2 sockeye salmon typically comprise about 29% of the run. The forecast for age 1.2 sockeye salmon is 281,000, which is equal to the 20-year average return for this age class. A smolt model based upon the abundance of age-1 smolts (3.3 million) in 2008 was used to forecast the return of age 1.2 sockeye salmon in 2010. However, there is uncertainty in the age 1.2 forecast because the sibling model forecasted a return of 558,000. The smolt model was used for this forecast because the 10-year MAPE was lower for the smolt model (43%) than the sibling model (50%). Age 2.2 sockeye salmon typically comprise about 22% of the run. The forecast for age 2.2 sockeye salmon is 169,000, which is 21% less than the 20-year average return (213,000) for this age class. A smolt model based upon the abundance of age-2 smolts in 2008 was used to forecast the return of age 2.2 sockeye salmon in 2010. The abundance of age-2 smolts in 2008 was 1.1 million, which is 35% less than the 20-year average abundance (1.7 million) for this age class. The predominant age classes in the 2010 run should be age 1.2 (31%), age 1.3 (36%), and age 2.2 (19%). The 10-year MAPE for the set of models used for the 2010 Kasilof sockeye salmon run forecast was 22%.

The sockeye salmon run forecast for the Susitna River is 542,000, which is 41% less than the 20-year average run of 913,000. This forecast was derived from historical aggregate weir counts rather than sonar and age composition allocation models, because recent mark-recapture studies have shown that the Yentna sonar project underestimated sockeye salmon escapement causing estimates of adult returns to also be underestimated. Since this is the first year a weir-based method has been used, no MAPE can be estimated. The 20-year average run was calculated by expanding sonar abundance estimates using mark-recapture and genetic stock composition estimates.

The sockeye salmon run forecast for Fish Creek is 142,000, which is 2% greater than the 20-year average run of 139,000. Age 1.2 and 1.3 sockeye salmon typically comprise 77% of the run to Fish Creek. Sibling models based upon the abundances of age 1.1 and 1.2 sockeye salmon in 2009 were used to forecast the runs of age 1.2 (90,000) and 1.3 (26,000) sockeye salmon in 2010. The age 1.2 forecast is 31% greater than the 20-year average return (68,000) for this age class, while the age 1.3 forecast is 33% less than the 20-year average return (38,000). The predominant age classes in the 2010 run should be age 1.2 (63%), age 1.3 (18%), and age 2.2 (13%).

The sockeye salmon run forecast for Crescent River is 148,000, which is 47% greater than the 20-year average run of 101,000. Age 1.3 and 2.3 sockeye salmon typically comprise 76% of the run to Crescent River. Sibling models based upon returns of age 1.2 and 2.2 sockeye salmon in 2009 were used to forecast returns of age 1.3 (82,000) and 2.3 (48,000) sockeye salmon in 2010. The predominant age classes in the 2010 run should be age 1.3 (55%) and age 2.3 (32%).

Run forecasts to individual freshwater systems are as follows:

System	Run	Inriver Goals
Crescent River	148,000	30,000–70,000
Fish Creek	142,000	20,000–70,000
Kasilof River	901,000	150,000–250,000
Kenai River	1,672,000	650,000–850,000
Susitna River	542,000	
Larson Lake	NA	15,000–50,000
Chelatna Lake	NA	20,000–65,000
Judd Lake	NA	20,000–55,000
Minor Systems	170,000	NA
<b>Total</b>	<b>3,575,000</b>	

### Other Salmon Species

The preliminary forecast of the 2010 commercial harvest of other salmon species is as follows:

Commercial Harvest Forecasts	
Natural Production:	
Pink Salmon	305,000
Chum Salmon	70,000
Coho Salmon	179,000
Chinook Salmon	17,000

### Forecast Methods

The recent 5-year average commercial harvest was used to forecast the harvest of chum, coho, and Chinook salmon in 2010. The forecast for pink salmon was based upon the average harvest during the past 5 even-numbered years.

### Forecast Discussion

The recent 5-year average commercial harvest was used in the forecast, because regulatory changes have substantially restricted harvests of these species in recent years.

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