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

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2014 UPPER COOK INLET SOCKEYE SALMON FORECAST

The preliminary forecast of the 2014 Upper Cook Inlet sockeye salmon run is as follows:

	Forecast Estimate (millions)	Forecast Range (millions)
TOTAL PRODUCTION:		
Total Run	6.1	4.4–7.8
Escapement	1.8	
Harvest	4.3	

Forecast Methods

The major sockeye salmon systems in Upper Cook Inlet (UCI) are the Kenai, Kasilof, Susitna, and Crescent rivers, and Fish Creek. Escapement (spawner abundance), return, sibling, fry, and smolt data, if available, were examined for each system. Four models were evaluated to forecast the run of sockeye salmon to UCI in 2014: (1) the relationship between adult returns and spawners, (2) the relationship between adult returns and fall 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 forecast and actual runs over the past 10 years were generally used. Forecast model predictions based on spawners, fry, smolt, or siblings were compared to evaluate uncertainty.

The return of age-1.3 sockeye salmon to the Kenai River in 2014 was forecasted using a sibling model. For example, the sibling-model prediction of the return of age-1.3 salmon was based on the abundance of age-1.2 salmon in 2013. A spawner-recruit model prediction of the age-1.2 salmon return was based upon escapement in 2010. The return of age-2.3 salmon to the Kenai River was forecasted using a smolt model based upon age-2 smolt data available after brood year 2002. The returns of age-1.3 and 2.3 sockeye salmon to the Kasilof River were forecasted using

sibling models based upon the abundance of age-1.2 and 2.2 salmon in 2013. A spawner-recruit model was used to forecast the return of age-2.2 salmon, and a smolt model was used to forecast the return of age-1.2 salmon to the Kasilof River.

The total run of Susitna River sockeye salmon was forecasted using mean return per spawner by age class for brood years 2006–2009. Mark–recapture estimates of inriver run and genetic estimates of commercial harvest were available for these brood years.

The sockeye salmon forecast for unmonitored systems in UCI was estimated as 15% of the aggregate forecast for the 5 major stocks. The fraction of the total run destined for unmonitored systems was estimated using genetic estimates of the stock composition of offshore test fishery harvests.

The 2014 total harvest by all user groups was estimated by subtracting the aggregate escapement from the total run forecast for all stocks. Aggregate escapements were 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 15% 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 total run forecast range was calculated by multiplying the forecast by the MAPE of the actual runs from published forecast runs from 2004 through 2013.

Forecast Discussion

In 2013, the harvest of sockeye salmon by all user groups in UCI (3.5 million) was 1.4 million less than the preseason forecast of 4.9 million. In 2013, the total run was 3.5 million to the Kenai River; 1,080,000 to the Kasilof River; 461,000 to the Susitna River; 80,000 to the Crescent River; and 25,000 to Fish Creek. The sockeye salmon escapement into Crescent River was estimated using a harvest rate model, because the sonar was not operated in 2013. The 2013 run forecast was 4.4 million to the Kenai River; 903,000 to the Kasilof River; 363,000 to the Susitna River; 110,000 to the Crescent River; and 61,000 to Fish Creek.

A run of 6.1 million sockeye salmon is forecasted to return to UCI in 2014, with a harvest by all user groups of 4.3 million. The forecasted harvest in 2014 is 0.6 million fish above the 20-year average harvest of 3.7 million by all user groups.

The run forecast for the Kenai River is approximately 3.8 million, which is equal to the 20-year average run. Age-1.3 salmon typically comprise about 57% of the run to the Kenai River. A sibling model based upon the return of age-1.2 salmon in 2013 (307,000; 20-year average is 369,000) predicted a return of 1.8 million age-1.3 salmon. A fry model based upon the abundance of age-0 fry rearing in Skilak and Kenai lakes in the fall of 2010 (17.8 million; 20-year average is 17.7 million) predicted a return of 1.9 million age-1.3 salmon. The sibling model was used for this forecast, because the 10-year MAPE was lower for the sibling model (24%) than the fry model (49%). Age-2.3 salmon typically comprise about 18% of the run to the Kenai River. A sibling model based upon the return of age-2.2 salmon in 2013 (194,000; 20-year average is 252,000) predicted a return of 389,000 age-2.3 salmon in 2014. A smolt model based upon the abundance of age-2 smolt emigrating from the Kenai River in spring 2011 (4.8 million) predicted a return of 1.1 million age-2.3 salmon. The smolt model was used for this forecast due to the high age-2 smolt abundance in 2011 and the failure of the sibling model to accurately predict large returns of age-2.3 salmon like that seen in 2011–2013. The forecasted age-2.3

return is 150% greater than the 20-year average return for this age class (705,000). The predominant age classes in the 2014 run should be age 1.3 (47%), age 1.2 (11%), and age 2.3 (28%). The 5-year MAPE for the set of models used for the 2014 Kenai sockeye salmon run forecast was 11%. The 5-year MAPE was used for the Kenai sockeye salmon run forecast, because smolt data used for the age-2.3 forecast is only available for the past 5 brood years.

The sockeye salmon run forecast for the Kasilof River is 1,062,000, which is 11% greater than the 20-year average run of 953,000. Age-1.3 salmon typically comprise about 34% of the run to the Kasilof River. The forecast for age-1.3 salmon is 376,000, which is 17% greater than the 20-year average return (321,000) for this age class. A sibling model based upon the abundance of age-1.2 salmon in 2013 was used to forecast the return of age-1.3 salmon in 2014. The abundance of age-1.2 salmon in 2013 was 417,000, which is 39% greater than the 20-year average abundance (300,000) for this age class. A spawner-recruit model predicted a return of 370,000 age-1.3 salmon. The sibling model was used for this forecast because the 10-year MAPE was lower for the sibling model (36%) than the spawner-recruit model (81%). Age-1.2 salmon typically comprise about 31% of the run. The forecast for age-1.2 salmon is 279,000, which is 7% less than the 20-year average return (300,000) for this age class. A smolt model based upon age-1 smolt abundance (5.3 million) in 2012 was used to forecast the return of age-1.2 salmon in 2014. A sibling model based upon the abundance of age-1.1 salmon (6,600) in 2013 forecasted a return of 313,000 age-1.2 salmon. The smolt model was used for this forecast because the 10-year MAPE was lower for the smolt model (55%) than the sibling model (96%). Age-2.2 salmon typically comprise about 24% of the run. The forecast for age-2.2 salmon is 268,000, which is 17% greater than the 20-year average return (229,000) for this age class. A spawner-recruit model based upon spawner abundance in 2009 was used to forecast the return of age-2.2 salmon in 2014. The sibling model forecast for age-2.2 salmon was 219,000. The spawner-recruit model was used for this forecast, because the 10-year MAPE was lower for the spawner-recruit model (28%) than the sibling model (35%). The predominant age classes in the 2014 run should be age 1.2 (26%), age 1.3 (35%), and age 2.2 (25%). The 10-year MAPE for the set of models used for the 2014 Kasilof sockeye salmon run forecast was 24%.

The sockeye salmon run forecast for the Susitna River is 264,000, which is 39% less than the 7-year average run of 430,000. This forecast was derived using mean return per spawner by age class for brood years 2006–2009 and mark–recapture estimates of spawner abundance in 2006-2010. Sonar and age composition catch allocation models were not used, because mark-recapture studies have shown that the Yentna sonar project underestimated sockeye salmon escapement, causing estimates of adult returns to also be underestimated. This is the second year this forecast method has been used, so MAPE is not available. The 7-year average run (2006–2012) was calculated using mark–recapture estimates of inriver run and genetic estimates of commercial harvests.

The sockeye salmon run forecast for Fish Creek is 79,000, which is 26% less than the 20-year average run of 107,000. Age-1.2 and -1.3 salmon typically comprise 72% of the run to Fish Creek. A smolt model based upon the abundance of age-1 smolt emigrating from Fish Creek in 2012 (178,000; 9-year average: 229,000) predicted a return of 40,000 age-1.2 salmon. A smolt model based upon the abundance of age-1 smolt in 2011 (269,000) predicted a return of 20,000 age-1.3 salmon in 2014. The age-1.2 forecast is 23% less than the 20-year average return (52,000) for this age class, while the age-1.3 forecast is 21% less than the 20-year average return

(26,000) for this age class. The predominant age classes in the 2014 run should be age 1.2 (50%) and age 1.3 (25%).

The sockeye salmon run forecast for Crescent River is 92,000, which is 17% less than the 20-year average run. Age-1.3 and -2.3 salmon typically comprise 75% of the run to Crescent River. Sibling models based upon returns of age-1.2 and -2.2 salmon in 2013 were used to forecast returns of age-1.3 (38,000) and -2.3 (33,000) salmon in 2014. The predominant age classes in the 2014 run should be age 1.3 (42%) and age 2.3 (36%). The sockeye salmon run forecast for Crescent River was pooled with unmonitored systems, because the Crescent River sonar project is no longer funded, and the department has recommended that the escapement goal for this stock be removed.

Run forecasts to individual freshwater systems are as follows:

System	Run	Goals[1]
Kenai River	3,792,000	1,000,000–1,200,000[2]
Kasilof River	1,062,000	160,000–340,000
Susitna River	264,000	NA[3]
Larson Lake	NA	15,000–50,000
Chelatna Lake	NA	20,000–65,000
Judd Lake	NA	25,000–55,000
Fish Creek	79,000	20,000–70,000
Unmonitored Systems	885,000	NA
Total	6,082,000	

[1] Goals listed here are as follows, Kenai River: Inriver; Kasilof River: BEG; Sustina River: SEG (weir goals); and Fish Creek: SEG.

[2] This is the inriver sockeye salmon goal measured using sonar at river mile 19 on the Kenai River.

[3] Susitna sockeye salmon are managed to achieve escapement goals at Larson, Chelatna, and Judd lakes.

OTHER SALMON SPECIES

The preliminary forecast of the 2014 commercial harvest of other salmon species is as follows:

	Commercial Harvest Forecasts
Natural Production:	
Pink Salmon	338,000
Chum Salmon	170,000
Coho Salmon	165,000
Chinook Salmon	7,600

Forecast Methods

The recent 5-year average commercial harvest was used to forecast the harvest of chum, coho, and Chinook salmon in 2014. 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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