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

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2015 UPPER COOK INLET SOCKEYE SALMON FORECAST

The forecast of the 2015 Upper Cook Inlet sockeye salmon run is as follows:

	Forecast Estimate (millions)	Forecast Range (millions)
TOTAL PRODUCTION:		
Total Run	5.8	4.4–7.2
Escapement	2.1	
Harvest	3.7	

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 2015: (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 Kenai River sockeye salmon in 2015 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 2014. A spawner-recruit model prediction of the age-1.2 salmon return was based upon escapement in 2011. The Kenai River return of age-2.3 salmon was forecasted using a smolt model based upon age-2 smolt abundances available after brood year 2002 and age-1 fall fry abundances available for brood years 1984-2002. The returns of Kasilof

River age-1.3 and 2.2 sockeye salmon were forecasted using sibling models based upon the abundance of age-1.2 and 2.1 salmon in 2014. A spawner-recruit model was used to forecast the return of Kasilof River age-1.2 salmon, and a smolt model was used to forecast the return of Kasilof River age-2.3 salmon.

The total run of Susitna River sockeye salmon was forecasted using mean return per spawner by age class for brood years 2006–2010. 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 17% of the aggregate forecast for the 4 monitored 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. In 2015, a forecast was not developed for the Crescent River sockeye salmon run, because the escapement for this river is no longer monitored.

The 2015 total harvest by all user groups was estimated using the average harvest rate in all fisheries from 2012-2014. The total run forecast range was calculated by multiplying the forecast by the MAPE of the actual runs from published forecast runs from 2005 through 2014.

Forecast Discussion

In 2014, the harvest of sockeye salmon by all user groups in UCI (3.2 million) was 1.1 million less than the preseason forecast of 4.3 million. In 2014, the total run was 3.3 million to the Kenai River; 1,105,000 to the Kasilof River; 201,000 to the Susitna River; 73,000 to the Crescent River; and 65,000 to Fish Creek. The 2014 run forecast was 3.8 million to the Kenai River; 1,062,000 to the Kasilof River; 264,000 to the Susitna River; 92,000 to the Crescent River; and 79,000 to Fish Creek.

A run of approximately 5.8 million sockeye salmon is forecasted to return to UCI in 2015, with a harvest by all user groups of 3.7 million. The forecasted harvest in 2015 is equal to the 20-year average harvest.

The run forecast for the Kenai River is approximately 3.6 million, which is 0.2 million less than the 20-year average run of 3.8 million. Age-1.3 salmon typically comprise about 57% of the Kenai River run. A sibling model based upon the return of age-1.2 salmon in 2014 (315,000; 411,000 20-year average) 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 2011 (11.8 million; 17.9 million 20-year average) predicted a return of 1.4 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 (46%). Age-2.3 salmon typically comprise about 18% of the Kenai River run. A sibling model based upon the return of age-2.2 salmon in 2014 (215,000; 254,000 20-year average) predicted a return of 404,000 age-2.3 salmon in 2015. A smolt model based upon the abundance of age-2 smolt emigrating from the Kenai River in spring 2012 (7.6 million) predicted a return of 1.0 million age-2.3 salmon. The smolt model was used for this forecast due to the high age-2 smolt abundance in 2012 and the failure of the sibling model to accurately predict large returns of age-2.3 salmon like those seen in 2011–2013. The forecasted age-2.3 return is 46% greater than the 20-year average return for this age class (695,000). The predominant age classes in the 2015 run should be age 1.3 (52%), age 1.2 (11%), and age 2.3 (29%). The 10-year MAPE for the set of models used for the 2015 Kenai sockeye salmon run forecast was 19%.

The Kasilof River sockeye salmon run forecast is 1,092,000, which is 12% greater than the 20-year average of 953,000. Age-1.3 salmon typically comprise about 34% of the Kasilof River run. The forecast for age-1.3 salmon is 374,000, 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 2014 was used to forecast the return of age-1.3 salmon in 2015. The abundance of age-1.2 salmon in 2014 was 419,000, which is 36% greater than the 20-year average abundance (308,000) for this age class. A smolt model predicted a return of 322,000 age-1.3 salmon. The sibling model was used for this forecast, because the 10-year MAPE was lower for the sibling model (33%) than the smolt model (58%). Age-1.2 salmon typically comprise about 32% of the run. The forecast for age-1.2 salmon is 328,000, which is 6% greater than the 20-year average return (308,000) for this age class. A spawner-recruit model based upon spawner abundance (244,000) in 2011 was used to forecast the return of age-1.2 salmon in 2015. A smolt model based upon the abundance of age-1 smolt (4.0 million) in 2013 forecasted a return of 248,000 age-1.2 salmon. The spawner-recruit model was used for this forecast because the 10-year MAPE was lower for the spawner-recruit model (42%) than the smolt model (50%). Age-2.2 salmon typically comprise about 24% of the run. The forecast for age-2.2 salmon is 250,000, which is 9% greater than the 20-year average return (230,000) for this age class. A sibling model based upon the abundance of age-2.1 salmon in 2014 was used to forecast the return of age-2.2 salmon in 2015. The spawner-recruit model forecast for age-2.2 salmon was 314,000. The sibling model was used for this forecast, because the 5-year MAPE was lower for the sibling model (7%) than the spawner-recruit model (19%). The predominant age classes in the 2015 run should be age 1.2 (30%), age 1.3 (34%), and age 2.2 (23%). The 10-year MAPE for the set of models used for the 2015 Kasilof sockeye salmon run forecast was 19%.

The Susitna River sockeye salmon run forecast is 276,000, which is 31% less than the 9-year average of 402,000. This forecast was derived using mean return per spawner by age class for brood years 2006–2010 and mark–recapture estimates of spawner abundance in 2009-2011. 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 third year this forecast method has been used, so MAPE is not available. The 9-year average run (2006–2014) was calculated using mark–recapture estimates of inriver run and genetic estimates of commercial harvests.

The Fish Creek sockeye salmon run forecast is 61,000, which is 38% less than the 20-year average of 98,000. Age-1.2 and -1.3 salmon typically comprise 87% of the Fish Creek run. A smolt model based upon the abundance of age-1 smolt emigrating from Fish Creek in 2013 (422,000; 419,000 14-year average) predicted a return of 46,000 age-1.2 salmon. A smolt model based upon the abundance of age-1 smolt in 2012 (178,000) predicted a return of 6,500 age-1.3 salmon in 2015. The age-1.2 forecast is 7% less than the 20-year average return (50,000) for this age class, while the age-1.3 forecast is 73% less than the 20-year average return (24,000) for this age class. The predominant age classes in the 2015 run should be age 1.2 (76%) and age 1.3 (11%).

Run forecasts to individual freshwater systems are as follows:

System	Run	Goals[a]
Kenai River	3,550,000	1,000,000–1,200,000[b]
Kasilof River	1,092,000	160,000–340,000
Susitna River	276,000	NA[c]
Larson Lake	NA	15,000–50,000
Chelatna Lake	NA	20,000–65,000
Judd Lake	NA	25,000–55,000
Fish Creek	61,000	20,000–70,000
Unmonitored Systems	851,000	NA
Total	5,830,000	

Note: BEG = Biological Escapement Goal, SEG = Sustainable Escapement Goal.

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

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

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

OTHER SALMON SPECIES

The preliminary forecast of the 2015 commercial harvest of other salmon species is as follows:

	Commercial Harvest Forecasts
Natural Production:	
Pink Salmon	98,000
Chum Salmon	176,000
Coho Salmon	161,000
Chinook Salmon	6,700

Forecast Methods

The recent 5-year average commercial harvest was used to forecast the harvest of chum, coho, and Chinook salmon in 2015. The forecast for pink salmon was based upon the average harvest during the past 5 odd-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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