

ESCAPEMENT GOAL RECOMMENDATION

Based on the previous information and analyses, the Alaska Department of Fish and Game recommends a sustainable escapement goal (SEG) of 21,000–31,000 Copper River Chinook salmon.

During this review, two integrated state-space models were fit to all relevant harvest, age composition, and abundance data from 1980–2018 and 1999–2018. The method simultaneously reconstructs historical abundance and fits a spawner-recruit relationship. The model accommodates missing data, measurement error, and changes in age at maturity, while accounting for the associated uncertainty. The number of spawners that provide maximum sustained yield, S_{MSY} , is the biological reference point of most interest. The state-space model using the full data set (1980–2018; $S_{MSY} = 22,844$), similar to the catch-age model ($S_{MSY} = 19,711$), estimates S_{MSY} to be lower than the current lower bound SEG of 24,000. The '99 analysis indicated a less productive population beginning in the early 2000s and produced a higher S_{MSY} estimate of 26,951. Both models were considered in selecting an escapement goal.

Ideally, an escapement goal would contain the estimate of S_{MSY} within the goal range to encompass the range of escapements expected to produce the largest harvestable surplus. However, a decrease in the number of recruits-per-spawner and age-at-maturity in recent years, strongly suggest a drop in stock production (Figures 4 and 5). A decline in productivity is further supported by the lower α estimate and higher S_{MSY} estimated in the '99 analysis. For these reasons, it may be beneficial to recommend a goal where the lower-bound starts near the full model's estimate of S_{MSY} rather than bracketing in some fashion around the full model estimate of S_{MSY} . Thus, a 21,000 fish lower bound satisfies estimates of S_{MSY} produced in both analyses (Figure 7). The upper-bound should then be set at a point where the probability of achieving at least 70%, 80%, or 90% of MSY is not too low. In this case, the recommended upper goal of 31,000 has an 61% chance of producing 90% of MSY based on the '99 analysis and a 44% chance of producing 90% of MSY based on the full analysis (1980–2018; Figure 7). The recommended goal thus contains S_{MSY} from both analyses, minimizes the chances of overfishing regardless of which analysis is considered, and allows for conservative management if the stock continues to demonstrate the low productivity seen in the last decade.