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ESCAPEMENT GOAL RECOMMENDATION

Information about the range of escapements that will lead to optimal yields is summarized in the optimal yield profile (OYP; Figure 8). The steeper the limbs of the OYP, and the greater the maximum probability, the better the information about sustained yield at different levels of escapement. Compared to other Alaska Chinook salmon stocks that have been analyzed in a similar manner, the OYP for Kenai River late-run Chinook salmon (Figure 8) has better than average information content (Figure 11).

Based on the foregoing analysis, the Alaska Department of Fish and Game recommends an interim sustainable escapement goal (SEG) of 15,000–30,000 Kenai River late-run Chinook salmon. At the lower bound of the recommended range, there is a high probability of achieving near-optimal yields. For example, there is greater than 95% probability of achieving greater than 70% of MSY, and 73% probability of achieving greater than 90% of MSY on average (Figure 8). Conversely, the risk of overfishing relative to attaining 90% or more of MSY is 27%. At the upper bound of the recommended goal range there is a 68% probability of achieving greater than 80% of MSY at escapements of 30,000 fish (Figure 8). The recommended goal is based on the actual escapement needed to sustain yields, so that it must be evaluated by accounting for undetected Chinook salmon passing the RM-9 sonar site. This is accomplished by multiplying DIDSON-based estimates of passage by a correction factor to reflect Chinook salmon passage in the entire cross-section of the river. We recommend a correction factor of 1.28, which is obtained from the state-space model as the inverse of p_{MR} (point estimate 0.78), the fraction of Chinook salmon detected by sonar at RM 9. Projections of harvest and release mortality[19] above RM 9 must be subtracted from expanded DIDSON inriver passage estimates to project escapement during the fishing season.

The recommended interim escapement goal has the following attributes:

The new goal is transferable. The goal is expressed in the "currency" of actual fish, accounting for imperfect detection at the RM-9 site. Although the goal will be subject to review and revision (see below), it will not require reformulation after the planned transition to an upriver sonar site is complete.

The new goal is consistent with previous practice. Assuming perfect knowledge of the spawner–recruit relationship ($\alpha = 4.9$, $\beta = 0.000031$) an escapement goal range of 13,000 to 28,000 would provide expected yields of at least 90% of *MSY*. Alternatively, according to Eggers (1993), an escapement goal range of 16,200 ($0.8 \times S\hat{}_{MSY}$ point estimate) to 32,400 ($1.6 \times S\hat{}_{MSY}$) would provide robust yield performance. In reality, our knowledge of α, β, and S_{MSY} is uncertain, and uncertainty about the true status of the stock creates risk. Our analysis quantifies uncertainty about key parameters and begins to assess risk in an organized way. However, there is no recipe for selecting an escapement goal based on the results of such an analysis. For example, in Figure 11, optimal yield profiles from 5 other recently-reviewed Chinook salmon stocks are reproduced and rescaled for comparison with the Kenai River late-run OYP, and probabilities of achieving 90% of *MSY* are plotted versus the lower bound[20] of the escapement

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[19] Release mortality is obtained by multiplying creel survey estimates of number of fish released by 0.064 (Bendock and Alexandersdottir 1992).

[20] Given that large runs are not expected in the near future, the lower bound of the goal is currently more relevant than the upper bound for Kenai River late-run Chinook salmon.

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