Submitted by the Alaska Department of Fish and Game

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Background information regarding the ADF&G sustainable escapement goal for Copper River king salmon.

1. The 24,000 lower bound SEG set in 2004 used primarily aerial survey escapement data from 1980-2000 and was set conservatively just below the average escapement of 25,800 despite the state of the art catch-age model which indicated the lower bound of the goal could be much lower with an estimated Smsy of 19,700.

2. Assessment methods made significant improvements beginning with the mark-recapture to estimate inriver run in 1999, development of genetic methods to estimate stock-specific harvest in the commercial fishery, and radio telemetry to better understand spawner distribution.

3. The escapement goal was reviewed every board cycle since that point with updated data and methods; each time it was not changed and held at the conservative level.

4. In 2017, a state-space model was used to combine multiple types of data across the whole period 1980-2016 which provided a Smsy estimate of 18,595. Again, the goal was kept at 24,000, but with increasing evidence that a larger harvestable surplus could result from lower escapements.

5. In 2020, the state-space model was used on all the data for two time periods (Copper king EG report, Table 4 and Figure 6).
    a. Time period 1980-2018 is the full dataset and best represents the measured production of the stock.
        i. Model estimated median productivity: alpha=5.58
        ii. Model estimated Smsy = 22,844
    b. Time period 1999-2018 is the last half of the dataset but contains better data (more accurate and precise information about production) and doesn't include the high productivity period from the 1980s and 1990s.
        i. Model estimated median productivity lower alpha=3.44
        ii. Model estimated Smsy=26,951
        iii. Consistent with lower production since 2003 (Copper king EG report; Figure 4d).
        iv. Cause(s) of lower production are unknown, but consistent with production trends of kings statewide. This is not due to density-dependent effects from large escapements, but likely caused by lower marine growth and survival, a potential cause of decreasing age-at-maturity. Changes in size and age of returning salmon may reduce production (Copper king EG report, page 18)

6. The data and the analytical methods available are sufficient to change the goal from a lower bound SEG based on minimal scientific support to an escapement goal range to provide better management capabilities.

7. Using the analytical results and considering the apparent reduced productivity of the system, the department recommended an unusually conservative goal range with the lower-bound (21,000) just below the 1980-2018 model's estimate of *Smsy* and within the normal range for setting a lower bound based on the 1999-2018 model. With an upper bound of 31,000, the midpoint of the range is close to the estimate of Smsy based on the recent low-productivity period (1999-2018).

8. The only Chinook salmon stock in Alaska with a more conservative escapement goal is the Kuskokwim River (Copper king EG report; Page 56).