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RE: Kenai River King Salmon Target Strength Equivalent Escapement Estimates

Interested Upper Cook Inlet Salmon Resource User:

On Wednesday August 1, 2012 during the Alaska Board of Fisheries meeting I stated that we would immediately begin developing transitional DIDSON-based Kenai River king salmon escapement goals for both the early and late runs. The resulting numerical sonar based escapement goals will be compared or grounded with several years of mark-recapture escapement estimates that will be generated as well. These goals will be prepared, externally peer reviewed, discussed with the public and employed for fisheries management during the 2013 season. Once completed, we will be prepared to discuss the technical details, data and analyses with interested parties or users.

During preseason meetings, I had committed to generating a target strength (TS) estimate for the 2012 late-run king salmon escapement (postseason) so that interested parties and organizations could have a basis for comparing the 2012 estimate to previous years' escapements, and to the established codified late-run king salmon minimum escapement goal of 17,800 fish, which is expressed in TS-based units. In July, I instructed our Chief Fisheries Scientists to evaluate the model used to generate TS estimates, while specifically asking what influence or impact the loss of fishery information (catch per unit effort-CPUE) from both the sport and eastside set net (ESSN) indices would have on the estimation process.

This letter is intended to provide some clarity and basis for my decision to not provide TS estimates for the 2012 late-run Kenai king salmon escapement. Additionally, I hope to offer insight regarding the estimates generated for 2010–2011 in light of what we learned during the 2012 season and the analytical work completed by our fisheries scientists.

Background

As many of you are aware, we have developed and employed multiple sources of information specific to gauging inseason king salmon abundance for fishery management of both the early and late Kenai River king salmon runs. These include: catch rates from gillnets deployed at the king salmon sonar site, lower river sport angler catch rates, commercial fishery catch rates in the ESSN, and net catch rate species apportionment of sonar counts . The necessity to do so stems from the importance of these stocks to so many users, but also from recognition, both internally and externally, that TS-based estimates had myriad shortcomings, the most important being these estimates were subject to a high degree of influence by sockeye salmon misclassified as king salmon. It is also important to note that this problem of misclassified sockeye has increased in the last several years, further magnifying the disparity and

contradicting all other data, including DIDSON counts, which were confirming the poor king salmon runs we have experienced the last several years.

Justification for not generating a TS-equivalent estimate in 2012

The simple mathematical model used to convert fishery management index data into TS-based equivalent escapement estimates is based on the theoretical assumption that the true abundance of king salmon is a multiple of each of the index values. The foundation being, that when abundance of king salmon doubles, so should the index values (on average) and vice versa, such that when true abundance is zero, the index values should be zero. Another way to express this assumption is that the relationship should be a straight line initiating at zero-zero or the origin. In applying this to the TS-based sonar estimates, however, the intercept is not zero, but rather is a large positive number which reflects the misclassified sockeye salmon that are imbedded in the historical data. Stated simply, you could be starting with no king salmon in the river as reflected by each of the indices, while the model output in TS-based units would be incorrectly estimating that there were upwards of 20,000 fish or greater. The more technical details of the model and performance are available if folks are interested.

The essence of this exercise is that TS-based estimates are highly insensitive to the number of king salmon in the river. This is certainly troubling regardless of true king salmon escapements; however, it becomes a very serious flaw when king salmon abundance is low, as we have observed in recent years. As an example, if king salmon abundance declined by 50%, as detected by any of the fishery management index programs or as suggested by the DIDSON sonar in 2010 (first year of operation), the TS-based estimate from the model would only decline by 14%, providing only weak evidence of the decline and offering nothing but confounding information to fishery managers, as was the case in both the 2009 and 2010 fishing seasons.

For another illustration of this point, the estimates for 2010 and 2011 that were generated and cataloged in RC 7 presented to the Alaska Board of Fisheries in October 2011 were re-analyzed after setting each of the indexes (CPUE for sport and ESSN, inriver netting below sonar, and sonar net apportioned) to zero, to simulate an extreme scenario of no king salmon being caught in the ESSN, sport or inriver test nets. Despite the complete absence of king salmon in the index data, the model predicted that the TS-based estimates for 2010 and 2011 would have been 28.5 and 28.6 thousand, respectively, and that there was 61% and 65% probability that the lower end of the escapement goal was met. This further confirms that the modeled TS-based estimates (which reflect the behavior of the TS-based estimates themselves) are not capable of detecting or accurately characterizing small king salmon runs when average or above sockeye salmon runs are simultaneously being experienced inriver. As you can assume from this exercise and the results offered, the two indices (inriver sport angler and ESSN CPUE), both of which could not be used in the model owing to regulatory actions on July 19, 2012 would offer no improvement in the final estimates if we proceeded to generate a TS-based estimate in 2012.

It is largely because of these observations that the TS-based estimates were discontinued in 2011 and that the split beam sonar was not deployed in 2012. We feel confident that this is the correct decision moving forward and the 2012 index data and DIDSON sonar estimates confirm this course of action.

We certainly recognize that the course of action we have outlined for developing interim early and late run Kenai River king salmon escapement goals is a departure from our standard process and timelines. However, we feel there is simply no other viable option which reflects the magnitude of the importance of these escapement goals to so many users. It is also the primary reason we submitted an agenda change request to the Alaska Board of Fisheries to notify them of our intent and welcome the forthcoming discussions on this topic.

Respectfully,

Charles O. Swanton
Director

cc: Cora Campbell, Commissioner
Monica Wellard, Executive Director, Boards Support Section
Jeff Regnart, Director, Division of Commercial Fisheries
Kelly Hepler, Assistant Commissioner
Bob Clark, Chief Fisheries Scientist, Division of Sport Fish
Eric Volk, Chief Fisheries Scientist - Anadromous, Division of Commercial Fisheries
Karl Johnstone, Chairman, Alaska Board of Fisheries