MEMORANDUM

TO:       Tom Karier
FROM:     FPC Staff
DATE:     February 19, 2020
RE:       The use of combined C0 and C1 SARs to characterize in-river SARs

The use of an average of the C0 and C1 SARs to characterize the overall in-river SAR is not recommended for wild Snake River spring/summer Chinook at this time. The C1 group, as presented in Table A.11 of the 2019 CSS Annual Report would not represent any of the unmarked population prior to 2006 and, from 2006 and beyond, would represent bypassed fish prior to the start of transportation. As such, it would be hard to determine the weight that should be given to that portion of the PIT-tag population relative to the C0 population.

The SARs by study category shown in the table you referenced (Table A.11 of the 2019 CSS Annual Report) represent data collected under different methodologies. Prior to 2006, PIT-tags were not preassigned to either transport (T) or return to river (R). During those years the C1 group was necessary for survival estimation, but not useful beyond survival estimation because it generally did not represent the migrant fish population that was unmarked. After 2006, the C1 fish used to estimate the C1 SAR and shown in Table A.11 were part of the T group (destined for transport during transport operations), which represent a portion of the in-river population until transportation begins. The C0 group, by contrast, is representative of in-river fish throughout the season both prior to and after 2006.

Prior to 2006, the C1 fish were generally only used for estimating the survival of migrating juvenile fish and did not represent the unmarked population. Therefore, it would not be appropriate to average the C0 and C1 SARs. In the years 2006 and beyond, averaging the C0 and C1 SARs would be problematic for different reasons discussed below.

In recent years, with the advent of later transportation, there is a portion of the unmarked population that is bypassed early in the season, so that the C1 fish would represent only a portion of the in-river fish. However, once transportation begins, the only C1 fish are those PIT-tags from the R group (return to river all season long), not represented in Table A.11 and not
representative of the unmarked population. Thus, the C1 SAR only represents bypassed fish from early in the season, prior to transport. Once transport begins all the T group fish are transported.

For the more recent years (2006 and beyond), combining the C0 and C1 is theoretically appropriate, but it is problematic. A simple mean of the two SARs would not be appropriate. Some sort of weighting would be necessary to account for the fact that the proportions of C0 and C1 fish varies greatly from year to year. Any combined SAR would have to account for those proportions. These proportions can be estimated from seasonal survival and detection probabilities but may still have a small bias, due to the fact that operations are not static (i.e. transport off/on) throughout the season.

In conclusion, we would not consider a simple mean of C0 and C1 SARs as an estimate of the overall in-river SAR for the reasons stated.

Please contact us if you have further questions.