

# Proposal to amend Assessment of Two Methods for Estimating the Composition of Chinook Encounters Early in the Fishing Season Draft

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## Proposal

Amend the adequate sample size definition for the in-season test fishing (TF) / voluntary trip report (VTR) programs from a  $\leq 20\%$  coefficient of variation of the proportion of legal-size and marked encounters to 1 encounter of legal-size and marked (LM) in the TF or VTR programs.

## Summary

In Assessment of Two Methods for Estimating the Composition of Chinook Encounters Early in the Fishing Season (Conrad, Garber and Rose 2020) an adequate sample size was defined as  $\leq 20\%$  coefficient of variation (CV) of the proportion of legal-size and marked encounters. The threshold of  $\leq 20\%$  CV of the proportion LM encounters has been long in-use for evaluating TF and VTR sample sizes post-season. However, the 20% CV criteria presents challenges when the proportion of LM encounters is low in either the TF or VTR programs. When there are lower proportions of LM encounters ( $<10\%$ ), the sample size needed to achieve the 20% CV exponentially increases.

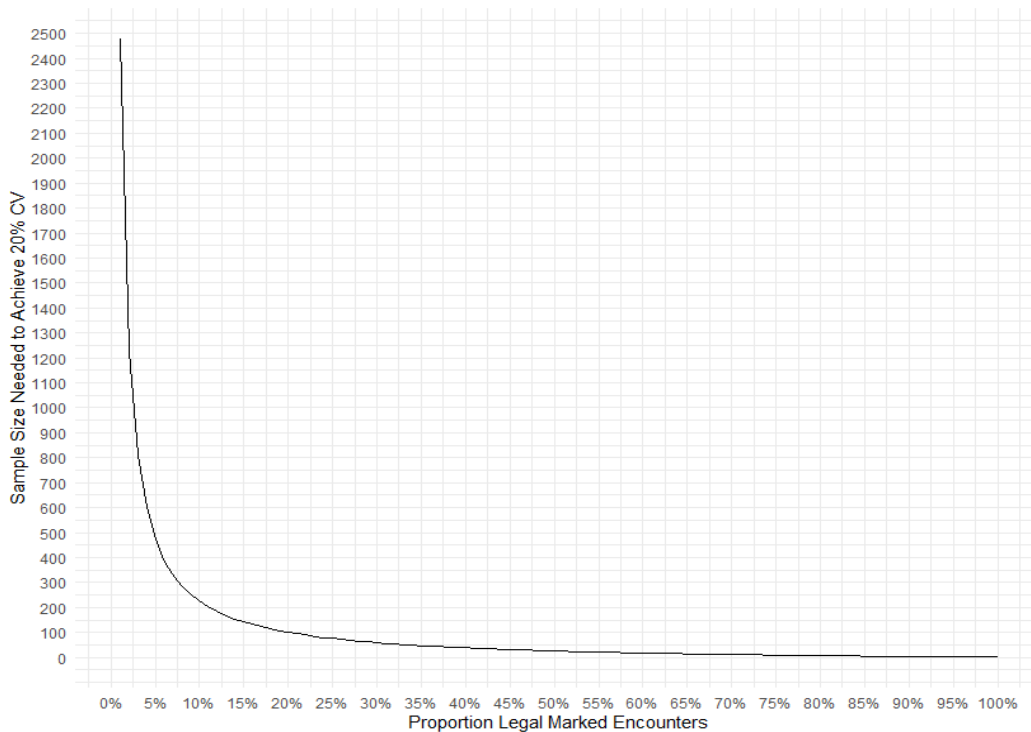


Figure 1 Graph of the relationship between sample size and LM% to achieve 20% coefficient of variation

In situations where the proportion of LM encounters is low, an over reliance on angler interview dockside proportions will occur, as the total sample size of TF or VTRs needed to reduce the CV to the 20% threshold will be at levels hard to achieve throughout the season. In this scenario, the angler interview dockside proportions will also take priority over TF, whereas TF has long been established as the highest quality data for encounters (WDFW and NWIFC 2013).

Another situation is where the 20% CV threshold is reached late in the fishing season, after a large amount of landed catch has been accumulated. The switch from the angler interview dockside proportions to TF or VTR proportions has the potential to create large and immediate shifts in estimates of encounters if the angler interview dockside proportions differ from the TF or VTR proportions. With many fisheries having total encounters or a derivative of total encounters as a control, in-season management can be extremely difficult and prone to overages.

To prioritize and ensure that TF or VTR encounter data are always used when possible, dockside encounter data should only be used in-season when there is a total absence of legal-size and marked encounters in TF or VTR encounter data, avoiding a division by zero error while estimating total encounters. This takes advantage of the relatively large sample sizes provided by dockside encounter data at the start of the season for an estimate of encounters, when TF or VTR cannot be used, while also taking advantage of the accuracy of TF or VTR whenever possible.

Bias corrected M2 method for estimating total encounters. Where  $kLM$  is equal to estimated total legal marked chinook retained in the fishery,  $LM$  is equal to the proportion of legal marked chinook in the test fishery, VTRs, or dockside encounters.

$$Total\ Encounters = kLM \times \frac{1}{LM} \times \frac{1}{.87}$$

Equation for coefficient of variation of a proportion. Where  $p$  is equal to the proportion coefficient of variation is being measured, and  $n$  is equal to total sample size.

$$CV\% = \frac{\sqrt{\frac{(1-p)(p)}{(n-1)}}}{p}$$

Equation presented in Figure 1. Where  $LM$  is the proportion of legal marked chinook encounters in the test fishery and  $n$  is sample size needed to achieve a coefficient of variation of 20%.

$$.2 = \frac{\sqrt{\frac{(1-LM)(LM)}{(n-1)}}}{LM}$$

Solving for  $n$ ,

$$n = \frac{25(1-LM)}{LM} + 1$$