

2019-2021 CYER ISBM Impacts on Canadian stocks

The Chinook Technical Committee produces Mortality Distribution Tables (MDT) annually in order to monitor the distribution of mortality for Chinook indicator stocks in AABM and ISBM fisheries. These estimates are where the Calendar Year Exploitation Rate (CYER) metric is derived from in order to evaluate ISBM fishery performance. Actions are triggered in the 2019 Pacific Salmon Treaty (PST) when a stock exceeds its CYER limit, which is based on a running three year average from years that meet the inclusion criteria specified in Paragraph 7(c) (Figure 1).

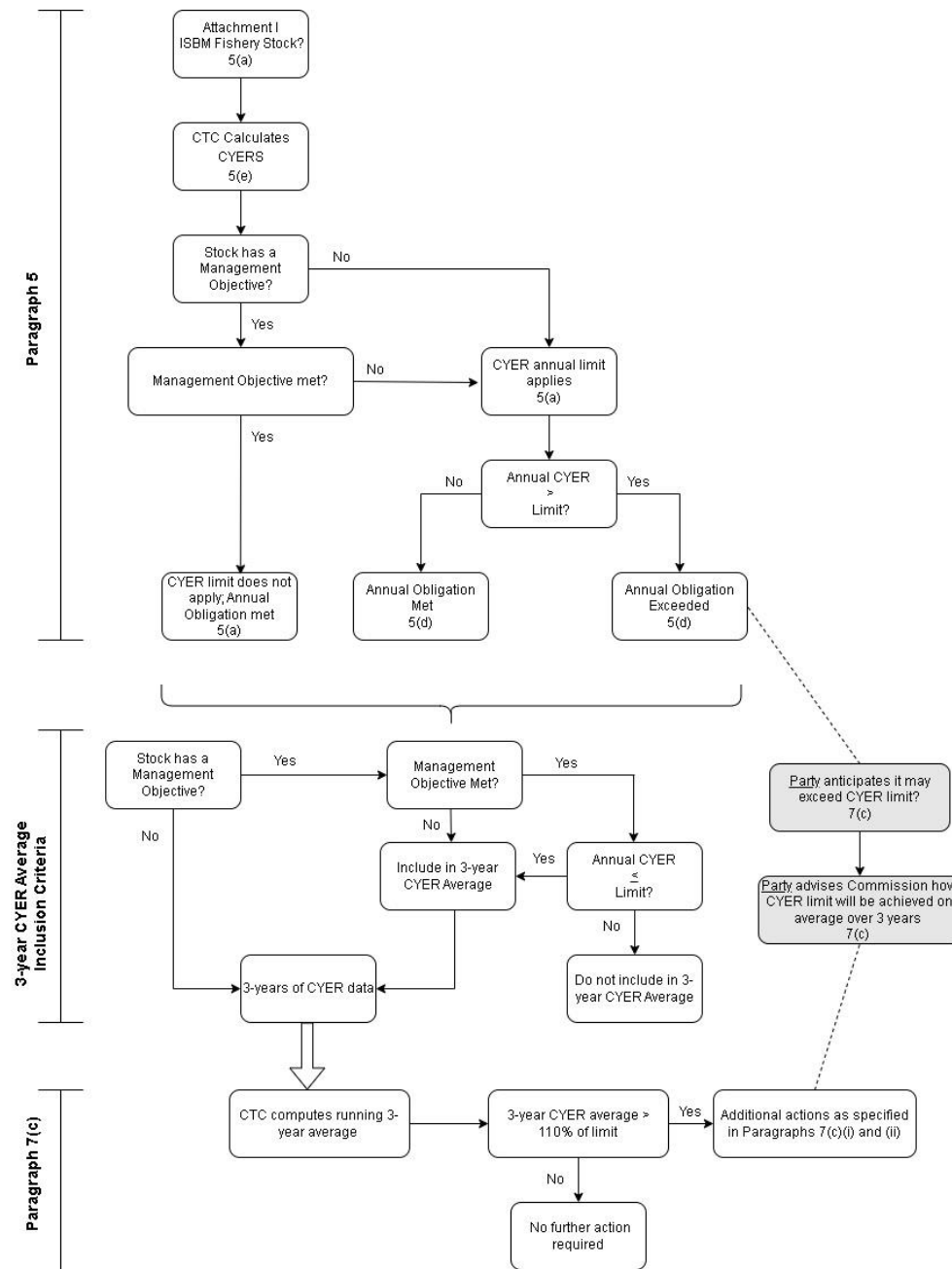


Figure 1: Inclusion criteria for the running CYER three year average.

In 2022, both HAR and QUI exceeded their ISBM CYER limits with a 10% buffer (Table 1 and 2), although actions are pending Commission decision due to Footnote 17 of the PST, which states that reporting of the running three year CYER average shall begin when data is available from both parties (Canada and the United States). Currently, there is a two year lag in CWT (coded-wire tag) data in some US stocks, meaning that the running three year average cannot be calculated for those stocks.

Table 1: Performance of Attachment I ISBM fisheries relative to the three-year average CYERs for stocks without a management objective.

Attachment I Stocks	ISBM CYER 2019-2021 Average	ISBM CYER Limit	ISBM CYER Limit with 10% buffer	7(c) triggered?
Skeena (KLM)	10.33	14.64	16.10	No
Northwest Vancouver Island (RBT adj)	8.03	8.55	9.41	No
Southwest Vancouver Island (RBT adj)	8.03	8.55	9.41	No
East Vancouver Island North (QUI adj)	19.28	14.98	16.48	Yes
Phillips (PHI)	9.00	10.1	11.11	No
Nicola (NIC)	11.59	16.43	18.07	No
Nooksack Spring (NSF) *	13.74	13.00	14.30	No *
Stillaguamish (STL) *	10.18	10.76	11.84	No *
Snohomish (SKY) *	9.08	7.73	8.50	No *

* Provisional - Based on two years of data (2019-2020)

Table 2: Table 1: Performance of Attachment I ISBM fisheries relative to the three-year average CYERs for stocks with a management objective.

Attachment I Stocks	Escapement Goal Met?			ISBM CYER ≤ Limit?			Number of years meeting inclusion criteria	7(c) triggered?
	2019	2020	2021	2019	2020	2021		
Atnarko (ATN)	No	Yes	No	No	No	Yes	2	No
Cowichan (COW)	Yes	Yes	Yes	No	Yes	Yes	2	No
Lower Shuswap (SHU)	Yes	Yes	Yes	Yes	Yes	Yes	3	No
Harrison (HAR)	No	No	No	No	No	No	3	Yes
Skagit Spring (SKF) *	Yes	Yes	Yes	Yes	No	NA	1	No *
Skagit Summer/Fall (SSF) *	Yes	Yes	No	Yes	No	NA	1	No *

* ISBM CYER data only available for two years (2019-2020)

The regional/temporal distribution of estimated Adult-Equivalent-Adjusted Total Mortality for Harrison, Nicola, and Quinsam Chinook stocks in Canadian sport and combined net and troll fisheries

The following figures were generated to give a basic estimation of where the highest impacts to ISBM fisheries are occurring for stocks that have, or are at risk of, exceeding their ISBM CYER limit. Estimates of the Adult-Equivalent Adjusted Total Mortality (AEQ TM) of Chinook from HAR, NIC and QUI within Canadian Sport, Net, and Troll Fisheries were derived using a combination of output from the CTC 2022 Exploitation Rate Analysis (ERA; as described in [TCCHINOOK-23-01](#)) and unadjusted estimates of CWT recoveries exported from the DFO mark-recovery program (MRP).

The ERA produces annual estimates of AEQ TM within ERA fine-scale fisheries each of which are composed of a number of CWT regions. It is therefore not possible to derive estimates at a finer scale than CWT region due to the availability of data from the ERA and MRP, however, the following methodology was utilized in order to determine the general region and month that these stocks experienced the greatest impacts.

CWT recovery data was estimated from MRP by date and CWT region under the assumption that the monthly and regional distribution of AEQ TM within a fishery was proportional to those of estimated CWT recoveries. AEQ TM within a region in a given month was then estimated by multiplying the annual AEQ TM by the ratio of the monthly-regional CWT estimate over of the total annual CWT recoveries in that fishery:

$$TM_m^r = \left(\frac{CWT_m^r}{CWT^f} \right) * TM^f$$

Where,

TM = estimate of AEQ total mortality,

CWT = estimate of CWT recoveries,

r = region,

m = month, and

f = fishery

This method relies on raw CWT estimates from MRP, but these results have not been formally validated by the CTC and do not directly reflect the data that go into (or come out of) the ERA, or that are reported by the CTC. There are several assumptions made in this data such as that the spatiotemporal distribution of AEQ adjusted total mortality is the same as that of the estimated CWT recoveries, and the validity of this may vary by region/fishery.

Additionally, exploitation rates later in the year may be underestimated (biased low), because the population is decreasing throughout the year, and the proportion allocation method does not account for incidental mortality, so fisheries with lots of releases will have their CYER underestimated and fisheries with lots of retention will have and overestimated CYER. This is particularly relevant for non-retention fisheries.

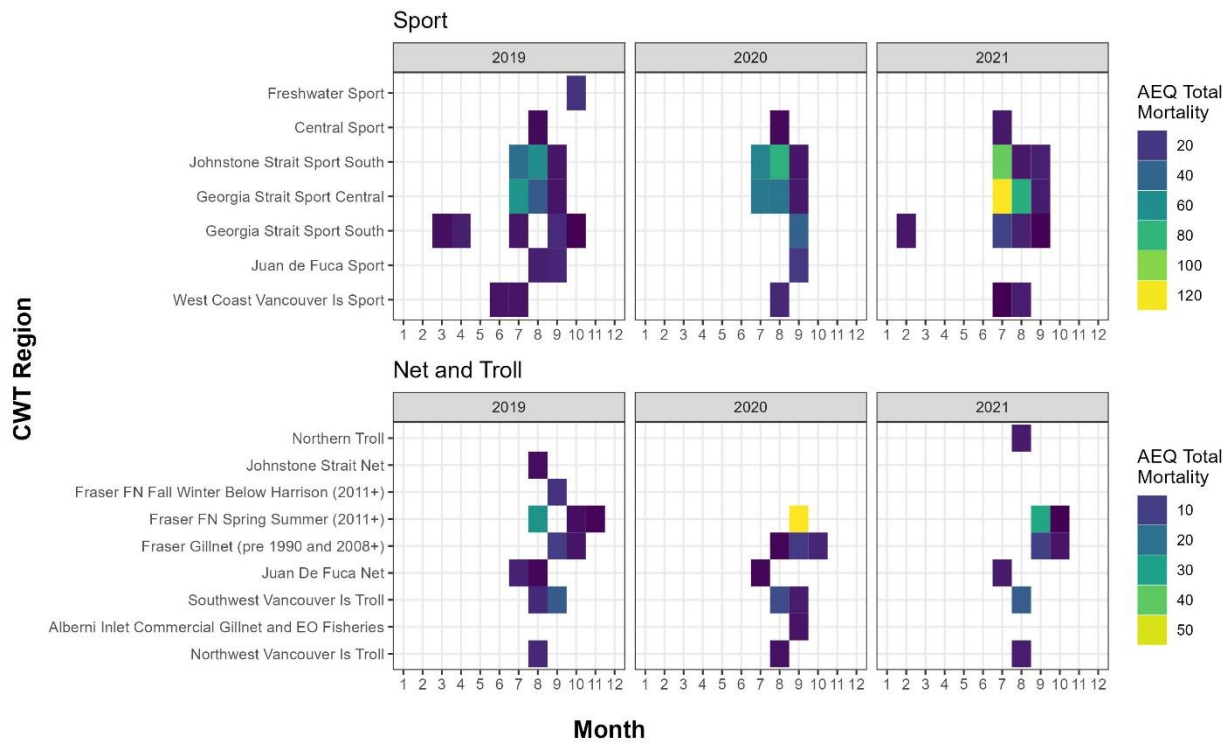


Figure 2. Distribution of estimated AEQ Total Mortality of Harrison Chinook from sport (top) and Net and Troll (bottom) fisheries across CWT regions by month for the in 2019 – 2021 where colour denotes the estimated number of fish mortalities attributed to the fishery.

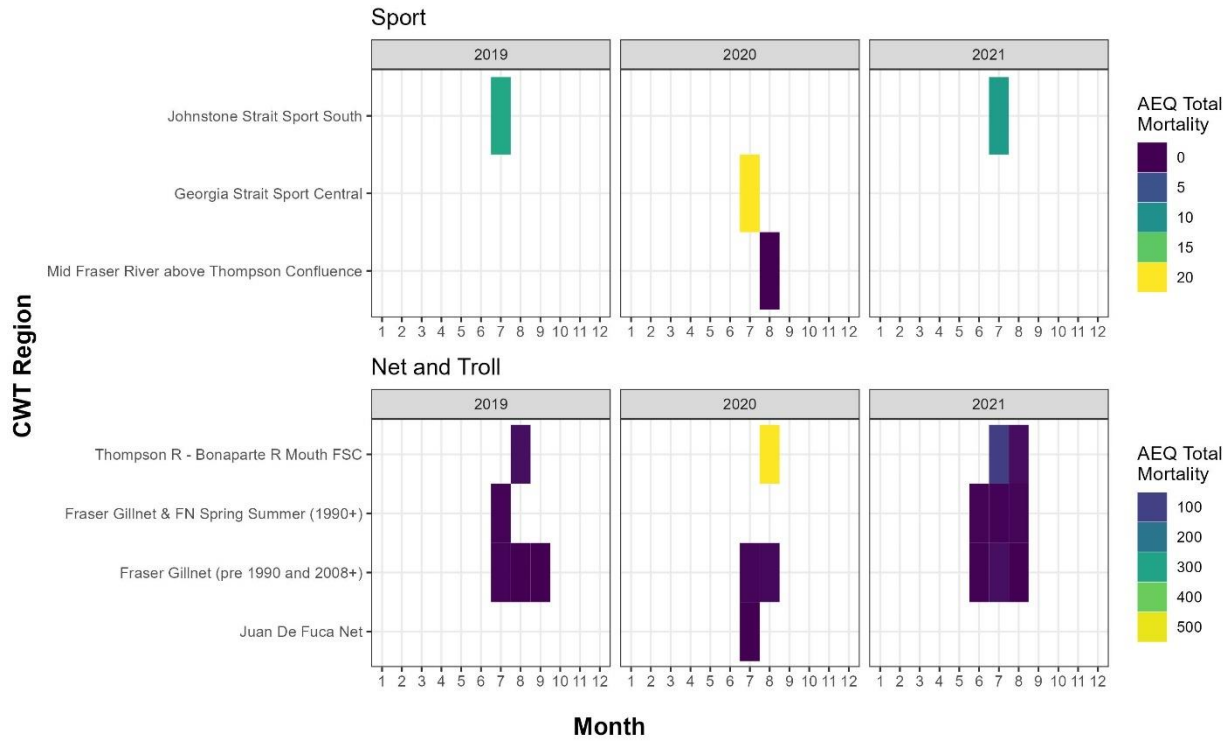


Figure 3. Distribution of estimated AEQ Total Mortality of Nicola Chinook from sport (top) and Net and Troll (bottom) fisheries across CWT regions by month for the in 2019 – 2021 where colour denotes the estimated number of fish mortalities attributed to the fishery.

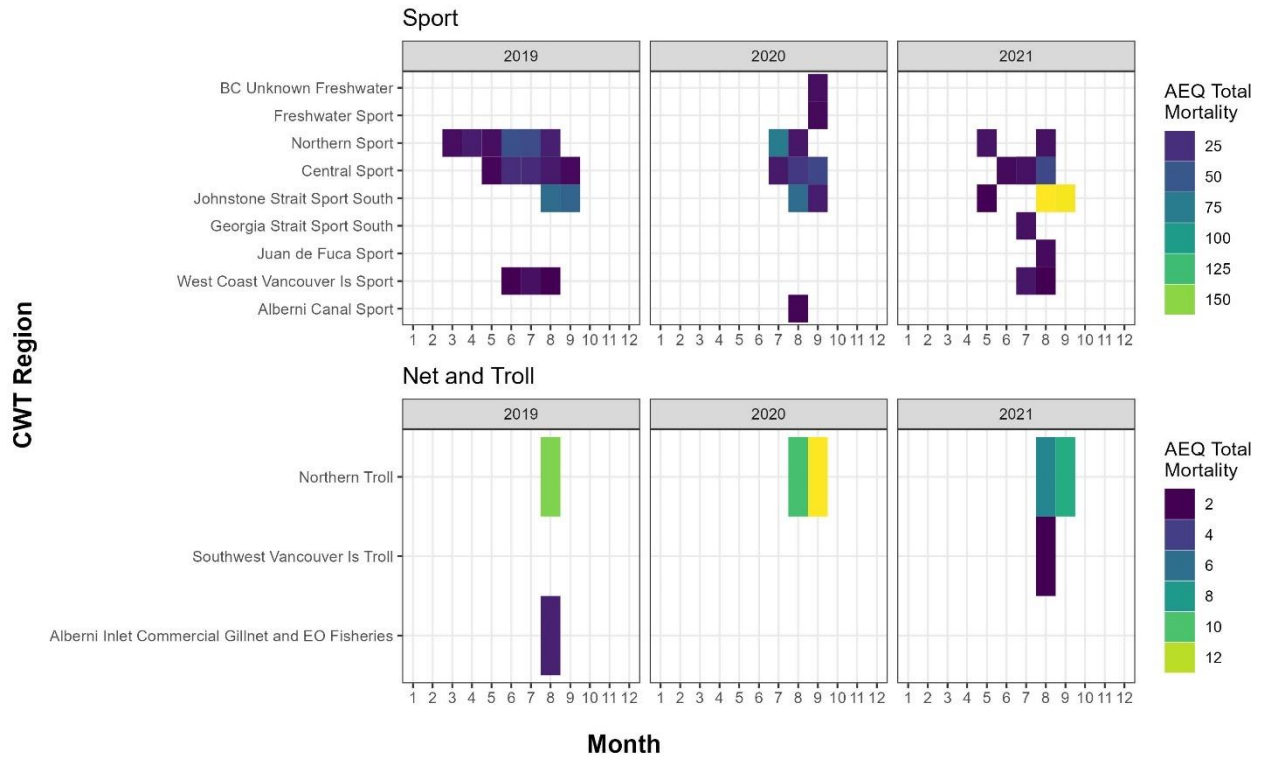


Figure 4. Distribution of estimated AEQ Total Mortality of Quinsam Chinook from sport (top) and Net and Troll (bottom) fisheries across CWT regions by month for the in 2019 – 2021 where colour denotes the estimated number of fish mortalities attributed to the fishery.