**User guide – Columbia River coho harvest accounting tool**

Developed by Tim Sippel - WDFW

**Introduction**

This is a user guide for a Columbia River coho harvest accounting tool. It is broken into 3 sections; 1) Data Input, 2) Data processing and calculations, 3) Output

1. **Data Input**.

Columbia River input: An MS-Excel file is used as a template for data input. There are four types of tabs on the template file with the following 3 prefixes, Input\_; LUT\_; Sandbox\_, plus the “MetaInformation” tab. The “TemplateInfo” tab contains information about required and optional information in the template tabs and headers.

* + MetaInformation: Information about the Columbia River harvest and escapement information, including a unique run number and comments about the run.
  + Input: Templates for sport and commercial fishery handle, LCN abundance. Handle and timing curves can be entered daily, if available. If data are available as stat week summaries only (ie. LCR), then pick a day of the stat week (ie. Aug 15) that will correspond to the same date by area on the timing curves tab.
  + Lookup Tables (LUT): fishing gear types, fishery areas, and ***timing curves (read additional information below)***.
  + Sandbox: Tabs for playing with data calculations for sport and commercial fishery handle, and any other “Sandbox” tabs that might be developed. These tabs are intended to be independent from the “Input” tabs, and should not be linked to the required tabs.
  + Timing curves: The tab “LUT\_Timing\_curves” is set up to allow proportions of early/late stocks to be estimated on a regular basis (daily) by fishery areas. The table is set up for proportions of **early** stocks to input by area (**late is estimated by the tool as 1-early**). The idea is to use CWT data as inputs in smoothing functions such as cubic splines or loess to estimate the curves. The will allow stock composition to be more accurately accounted for (including for OPI tables), and thus harvest rates and exploitation rates to be more accurately estimated. The previous harvest account spreadsheet and OPI tables assume early/late stock composition is fixed at the same proportions every year. Rebuilding the OPI table harvest data sets with updated CWT stock composition estimates should produce more accurate OPI run reconstructions, and provide better data for forecasting.

FRAM input: MS-Excel files from FRAM with ~40 different tabs. No user input or data manipulation is required with these files. The function read\_FRAM\_data.R reads all of the data, does formatting, etc.

1. **Data processing**. These are the R scripts that read data from the input template, link input and LUT fields together, and do Harvest Rate (HR) and Exploitation Rate (ER) calculations. Data processing scripts are found in the R project “Functions” folder
   * read\_inriver\_data.R – Reads in the inriver harvest template, and joins together the Input (sport and commercial handle) and LUT (timing curves, gear types, fishery areas) tabs. After joining things together, it calculates fishery handle (Kept, Released, Release Mortality by early/late stock type). The result is a new data.frame list containing all of the calculated fishery handle, and LUT it used. The resulting data.frame is used within the “Calc\_ER\_HR.R” function.
   * generate\_fishery\_calendars.R - This function is a utility used internally within the read\_inriver\_data.R function for generating fishery calendars by statistical weeks. It simplifies setting up stat week calendars, including the different days of the week used for sport vs commercial fisheries.
   * read\_FRAM\_data.R - This function reads in coho FRAM output. It reads from the following FRAM output tabs.
     + *FishSumAllPRN*: FRAM Run name is read from here
     + *ColRHarvestInput*: Reads the data in Table 1, including Ocean Abundance, Ocean Harvest, In-river run size, Buoy 10 harvest of hatchery (upper table panel) and wild (lower table panel) coho.
     + *AttachC*: Reads the Upriver unmarked escapement used in calculating ER for fisheries above the Lewis River.
   * Calc\_ER\_HR.R – Does the calculations of HR and ER, by fishery and produces a new data.frame.
2. **Output**. Using the new data.frame generated from the Calc\_ER\_HR.R function, summary outputs are created, including
   * An .Rmd summary page of HR and ER by fishery, data tables, plots, model run information, etc.
   * A master data table of all fishery inputs, look up tables, and HR/ER calculations.

**Calculations of harvest rates (HR) and exploitation rates (ER)**

Harvest rates. Calculated the same for all fisheries and areas for each line of fishery handle data (ie. by date).

* HR\_marked\_early = Kept\_clipped\_adults\_early / FRAM: Inriver abundance of early marked fish
* HR\_marked\_late = Kept\_clipped\_adults\_late / FRAM: Inriver abundance of late marked fish
* HR\_unmarked\_early = Kept\_unclipped\_adults\_early / FRAM: Inriver abundance of early unmarked fish
* HR\_unmarked\_late = Kept\_unclipped\_adults\_late / FRAM: Inriver abundance of late unmarked fish

Exploitation rates.