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## The IPHC mortality projection tool for 2023 mortality limits

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### PURPOSE

This document provides a description of the IPHC's web-based mortality projection tool (<https://www.iphc.int/data/projection-tool>) for setting mortality limits in 2023.

### BACKGROUND

Since 2019, IPHC Secretariat has provided an interactive tool in support of the IPHC's process for setting Pacific halibut mortality limits based on the coastwide TCEY and the distribution of that mortality among IPHC Regulatory Areas. The tool has been updated each year to reflect the IPHC's interim management procedure and all associated modifications and agreements in place each year.

### THE MORTALITY PROJECTION TOOL

The tool relies on previously calculated stock assessment outputs representing a broad range of total mortality. These include projections of spawning stock size and fishing intensity, such that alternative harvest levels can be evaluated in the context of the harvest decision table as well as relative trends. The tool is divided into five components:

- 1) Inputs
- 2) Summary results
- 3) Biological distribution
- 4) Detailed sector mortality information
- 5) Graphics

A brief description of each of these is provided below.

#### *Inputs*

The first section of the tool provides the user with two primary inputs:

- 1) The total distributed mortality limit (TCEY) in millions of net<sup>1</sup> pounds.
- 2) The percent of the distributed mortality limit (TCEY) assigned to each IPHC Regulatory Area.

Previous versions of this tool have provided default values that reflected the IPHC's interim management procedure, as it was specified at the time. The previous interim agreement was specified to apply for the period from 2019-2022 (AM095; [para. 69](#)). As there is no interim agreement currently in place for 2023, there are no default values in the current version of the tool and the user must input both the total coastwide TCEY and the percentage distributed to each IPHC Regulatory Area.

The distribution percentages for each IPHC Regulatory Area are input manually, and are intended to sum to 100%, if they do not, the total will be highlighted in red, and the inputs will be

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<sup>1</sup> Net pounds refer to the weight with the head and entrails removed; this is approximately 75% of the round (wet) weight.

automatically rescaled so that the sum of the distributed mortality limits across all IPHC Regulatory Area will exactly match the coastwide total input.

There are two optional inputs, with drop-down menus, specifying:

- 1) The basis for projecting non-directed discard mortality. The default projection, consistent with the IPHC's recent Interim Management Procedure (specified during AM096 [para. 97](#)), is to use the three-year average non-directed discard mortality from the most recent year. Alternatives include the previous year's estimates and the values consistent with full regulatory attainment of domestic non-directed discard mortality limits.
- 2) The units of mortality measurement. This can either be millions of net pounds (default) or net metric pounds.

### ***Summary results***

The second section of the tool provides the projected coastwide SPR for comparison with the harvest decision table. In addition, this section reports the distributed mortality limit (TCEY) for each IPHC Regulatory Area; the total can be compared to the total input above to verify that the calculations are working properly. The total mortality limit (all sizes and sources of mortality, including U26 non-directed discard mortality of Pacific halibut) is also summarized by IPHC Regulatory Area.

### ***Biological and fishery distribution***

The third section of the mortality projection tool provides the most current modelled estimates of stock distribution by Biological Region, compared to the distributed mortality limits (TCEY). These two values are then used to project a harvest rate by Biological Region, standardized such that Region 3 (IPHC Regulatory Areas 3A and 3B) is always equal to a value of 1.0 and the other Regions (2, 4 and 4B) are relative to that value.

### ***Detailed sector mortality information***

This section provides a full distribution of mortality among IPHC Regulatory Areas and fishery sectors. Calculations are based on catch sharing agreements used by the domestic agencies for IPHC Regulatory Areas 2A, 2B, 2C, 3A, and 4CDE (4CDE allocating among sub-Areas). Static projections are used for non-directed discard mortality (see above), and subsistence mortality (based on the most recent estimates available). Discard mortality in directed fisheries scales with the landings based on the most recently observed rates for each fishery. The total of this section (matching the total in the summary results) provides the best projection of all sizes and sources of Pacific halibut mortality based on the specified mortality limits.

### ***Graphics***

The last section of the projection tool provides a series of five graphical results updated to reflect the inputs made by the user. These graphics are similar to those provided in the annual stock assessment and/or presentation material.

The first figure uses previously calculated three-year projections for a range of coastwide TCEY (and corresponding SPR) values to illustrate the coastwide spawning biomass trend associated

with the specified inputs to the tool. Uncertainty is shown as a shaded region, with the projected period highlighted by the brighter color relative to the darker estimated time-series. Importantly, not all possible SPR values are available, so the closest value available is reported. The projected SPR is reported above the figure, and a warning will be returned if the user has specified a coastwide TCEY outside of the range of values available, or if the value lies between the pre-calculated grid.

The second figure provides a bar chart of the time-series of estimated relative fishing intensity with 95% confidence intervals. The inputs to the projection tool provide the basis for the projected fishing intensity, shown as the hatched bar at the end of the series. Values are relative to the IPHC's Interim Management procedure, currently based on an SPR of 43% (see description above), such that values above the target represent higher fishing intensity.

The third figure provides a graphical display of the relative harvest rates by Biological Region as reported in the ***Biological and fishery distribution*** section.

The fourth and fifth figures provided the detailed sector mortality information (allocations) in both absolute values (millions of net pounds) and relative values (percent of the projected mortality) by IPHC Regulatory Area.

## **DISCUSSION**

There may be some alternatives may require additional analyses beyond those available in this tool. Such alternatives will continue to be produced by the Secretariat staff as needed to support all meetings and decision-making.

## **UPDATE SCHEDULE**

The mortality projection tool was updated in early January 2023 for use during the 2023 Annual Meeting (AM099). The update included final end-of-year 2022 mortality estimates from various fisheries, including non-directed discard mortality estimates that affect projections for 2023.

## **REFERENCES**

IPHC. 2020. Report of the 96th Session of the IPHC Annual Meeting (AM096).