

INTERNATIONAL PACIFIC



HALIBUT COMMISSION

Implications of a reduced FISS in 2021

IPHC-2020-SS09-04



Introduction

- We consider the implications of omitting IPHC Regulatory Areas 2A, 4A, 4B and 4CDE from the FISS in 2021, areas also unsampled in the 2020 FISS:
 - Increased uncertainty in estimates from unsurveyed IPHC Regulatory Areas;
 - Potential for bias in estimates of overall stock trends;
 - Effects on stock distribution, harvest rates and stock assessment model;
 - Impact on future FISS planning.



Implications for uncertainty

- IPHC Regulatory Areas 2A, 4A, 4B and 4CDE were not surveyed by the FISS in 2020
- As a result, CVs for WPUE in 2020 were outside of the target range of $\leq 15\%$ for three of these areas:
 - 22% for Regulatory Area 2A
 - 25% for Regulatory Area 4A
 - 25% for Regulatory Area 4B
- The CV for Regulatory Area 4CDE increased from 10% to 12% in 2020

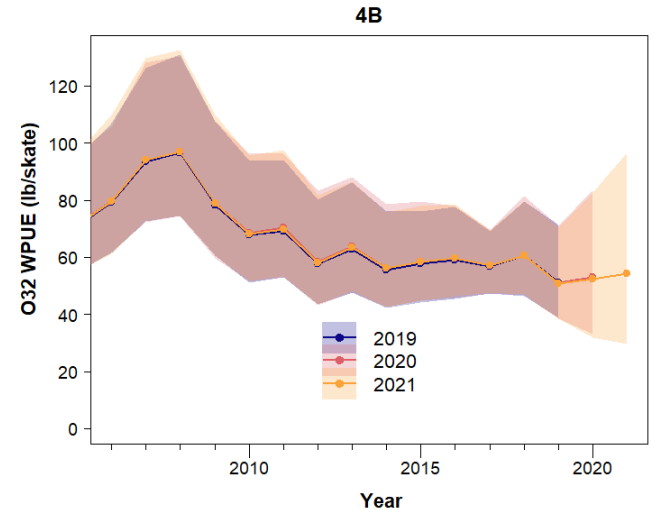
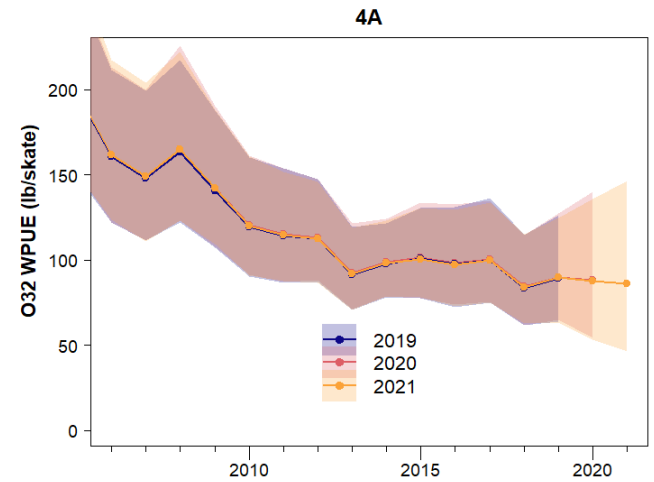
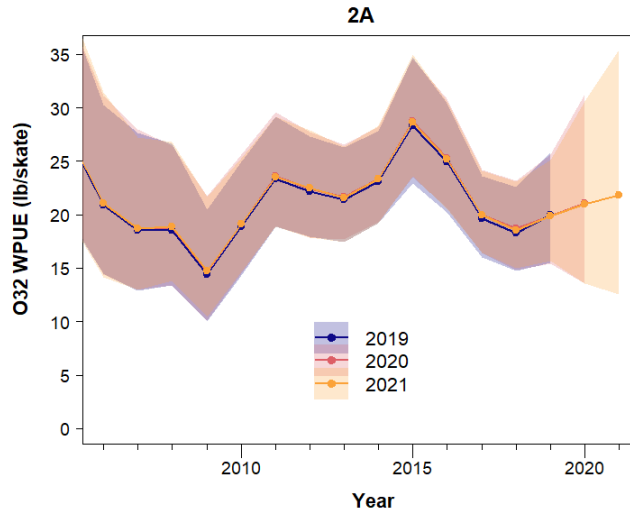


Implications for uncertainty

- If the proposed FISS 2021-23 designs are implemented, we expect CVs for all four areas to return to within the target range
- However, under a reduced FISS in 2021, with these areas unsurveyed for the second consecutive year, uncertainty will increase further, leading to the following CVs for 2021:
 - 26% for Regulatory Area 2A (greatest since 2006)
 - 30% for Regulatory Area 4A (greatest in 1993-2021 time series)
 - 31% for Regulatory Area 4B (greatest since 1994)
- We can also expect the CV for Biological Region 4 to increase further outside the target range



Increases in uncertainty since 2019 if no FISS at ends of stock in 2020-21



Potential for bias

- Lack of FISS at ends of stock in 2021 increases the potential for bias:
 - No information on stock trends in Regulatory Areas 2A, 4A and 4B since 2019
 - Limited information on stock trends in Regulatory 4CDE (some information expected from NMFS trawl survey in shallower waters)
- Increases or decreases in Pacific halibut density and abundance over that period in unsurveyed habitat will be unobserved and our estimates of WPUE and NPUE indices may be biased



Potential for bias

- This has both local implications, and implications for our understanding of coastwide stock trends and distribution
- Historically, it is not unusual for mean WPUE for a Regulatory Area to change by over 20% in a single year
- If such changes have occurred in unsurveyed areas at the ends of the stock since 2019, our estimates of overall stock trends will be biased

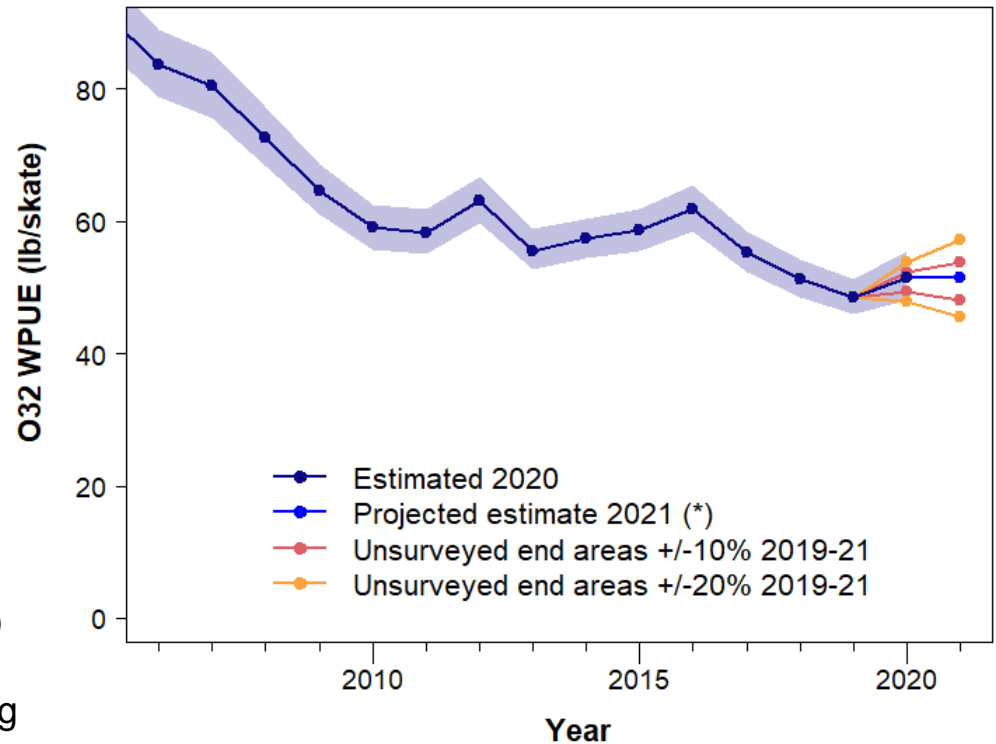


Illustration of potential for bias in coastwide trend

Under scenarios of +/- 10 or +/-20% per year in the end areas only, the “true” coastwide trend would follow the red and orange lines, and our estimate in blue would be biased.

*The 2021 projected coastwide estimate assumes no change in mean WPUE in the core IPHC Regulatory Areas (2B, 2C, 3A, 3B) and no observed change in other areas due to no sampling occurring in those areas in 2020-21.

Coastwide trend: FISS in core areas only in 2020-21



Effects on stock distribution, harvest rates and stock assessment model

- The four end areas currently contain almost 30% of the Pacific halibut stock
- The stock and fishery are currently in transition between a strong 2005 year-class and more recent 2011 and 2012 year-classes
- A two-year sampling gap in these areas (particularly 4A-4CDE) increases the likelihood that stock distribution and therefore realized harvest rates may differ appreciably from those intended by the IPHC's interim management procedure.



Effects on stock distribution, harvest rates and stock assessment model

- With reduced precision, the ability of the stock assessment model to update currently predicted trends based on new information is much more limited:
 - Model relies heavily on the trend information provided by the annual FISS
 - Actual increases or decreases in overall stock trend may not be tracked by the assessment model



Impact on future FISS planning

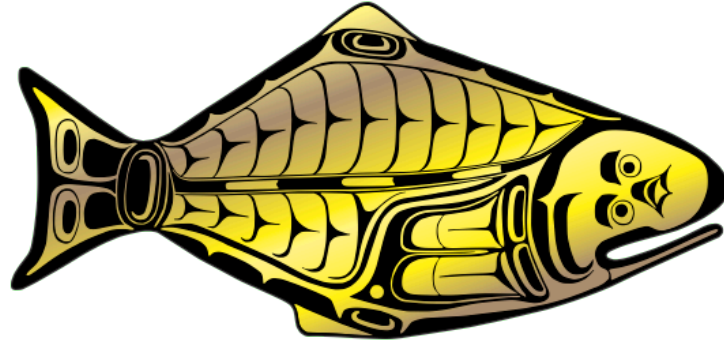
- A second consecutive reduced FISS in 2021 will have implications for the 2022-24 FISS designs
- An increased level of sampling in 2022 would be required to “catch up” from the greater uncertainty due to reduced sampling in 2020-21
 - This would include sampling the regions omitted in 2021 as well as at least some of those planned for 2022
- The longer large gaps in sampling coverage persist, the more difficult it is for estimation quality to recover
 - The result could be a period in the time series with permanently higher uncertainty around stock trends and distribution



Thus, we do not recommend reducing the FISS footprint from the '*minimum 2021 FISS design*' proposed by the IPhC Secretariat and endorsed by the Scientific Review Board.



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