IPHC Scientific Review Board Meeting

June 2014

Dr Sean P. Cox, Associate Professor, School of Resource and Environmental Management, Simon Fraser University, 8888 University Dr., Burnaby, B.C., Canada V5A 1S6

Dr James Ianelli, Research Scientist, National Marine Fisheries Service-NOAA, 7600 Sand Pt Way NE, Seattle, WA, USA 98115

Dr Marc Mangel, Distinguished Research Professor and Director, Center for Stock Assessment Research, University of California, Santa Cruz, CA 95064

Overview

We met for a whole day on June 23, 2014. IPHC staff reviewed their current research on Halibut stock assessment, management strategy evaluation, long-term research plans. This brief report is meant to provide a summary of the status and progress on key IPHC research topics.

5-year Research Plan

The long-term research plan is guided by Article III of the Halibut Convention which states:

> *"The Commission shall make such investigations as are necessary into the life history of the Halibut and may conduct or authorize fishing operations to carry out such investigations...for the purpose of developing the stocks of Halibut of the North Pacific Ocean and Bering Sea to levels which will permit the optimum yield from that fishery, and of maintaining the stocks at those levels..."*

While we understand the need for broad policy statements like this to provide general guidance on research, the mandate seems too broad to be useful in guiding a 5-year research plan aimed at improving Halibut fishery management.

Applied fisheries research needs to have a clearer and more concrete mandate that is achievable within the 5-year timeframe. One way to improve the clarity and focus of the plan is to substitute unfocussed statements such as: ""it is important that this [stock] structure be correctly understood..." with more achievable goals like: "identify and assign relative plausibility to least two alternative hypotheses for stock structure and mixing to be used in operating model scenarios." The latter form is consistent with the Management Strategy Evaluation (MSE) approach that IPHC is actively pursuing and will naturally lead to some very specific research challenges and objectives that could be accomplished within 5 years.

A 5-year research plan is very similar to large academic grant writing, so we encourage IPHC staff to consult that literature for specific strategies that would work best in this context.

Bycatch management

Research on the downstream biological effects of Halibut bycatch is an ongoing scientific challenge mainly because of uncertain processes determining movement of juvenile fish. However, even if the biological details were known well enough to warrant management action, institutional barriers currently limit IPHC ability to impose new regulations.

We suggest adding a policy research component to the Research Plan.

Stock Assessment

IPHC staff presented research progress and ideas on three general topic areas – Data Processing, Stock Assessment, and the Harvest Policy.

The main research progress in stock assessment was investigating the so-called "fleets-as-areas" (FAS) approach that we recommended after the October 2013 SRB meeting. The FAS approach could potentially improve the assessment model quality, as well as general utility by representing some of the spatial aspects of the Halibut fishery within the coastwide stock assessment model. Separating the IPHC survey data into spatial areas is relatively straightforward and, at our meeting, IPHC staff presented some preliminary results examining area-specific trends within the CPUE and age-composition data. The most notable Data Processing challenge at the moment is determining area-specific U26 Halibut weight-at-age

The spatial approximation provided by the FAS approach could help in preliminary evaluations of the downstream effects of bycatch. However, IPHC staff noted challenges posed by gaps in understanding Halibut pre-recruit biomass trends, spatial distribution, and movement. Although this is clearly an interesting question that could be relevant to the overall IPHC mandate, it is likely a type of question that is more appropriately addressed within the MSE research because it integrates over multiple spatial processes in the Halibut population and fisheries. Furthermore, it is not clear how information about sub-legal Halibut abundance or trends would be used within the current decision-making framework. Regardless of the context within which sub-legal Halibut bycatch is examined, there will be serious data challenges because of limited size frequency coverage in observer samples and unknown sampling rates mainly in the GOA.

IPHC staff are investigating more effective ways of communicating with decision-makers. One approach is to incorporate U26 mortality into the harvest policy information to make it clearer how O26 catch limits affect mortality over all sub-sets of the stock.

We note that decision-makers operating in different institutional contexts (e.g. NPFMC vs IPHC vs DFO) may respond better to familiar information. For instance, adopting an approach based on Spawning Potential Ratio (SPR)[1] would be more consistent with information provided to NPFMC. Although we encourage research into more effective communications, the SPR approach presented at our meeting generated some confusion and probably warrants further investigation and review before it is formally used in decision-making context.

In 2013, IPHC used an ensemble modeling approach in which multiple stock assessment models were fitted to data and then combined to generate harvest advice and decision tables. Models are being investigated for inclusion in this year's ensemble. Notable options include (i) a virtual population analysis, which is an age-structured approach that doesn't require assumptions about fishery selectivity (note, however, that VPA and a statistical catch-age approach will give nearly identical solutions if selectivity is allowed to vary over time in the latter) and (ii) using iSCAM (see MSE comments) to establish a connection with the assessment approach used in the MSE simulations.

---

[1] SPR is the ratio of Spawning Biomass Per Recruit of a fished population to that of the unfished population. When not otherwise annotated, SPR is calculated at the rate of fishing mortality that gives Maximum Sustainable Yield. A brief review of SPR can be found in Mangel et. al. 2013. A perspective on steepness, reference points, and stock assessment. Canadian Journal of Fisheries and Aquatic Sciences 70:930-940

We encourage further analysis of BSAI and GOA length frequencies in an attempt to estimate the apparent mortality rate of fish in those areas because apparent mortality could be an indication of movement/emigration.

Management Strategy Evaluation

IPHC staff noted that stakeholder uptake of MSE has been slow and that the process continues to require a large education component. Slow uptake of MSE is not uncommon where it has been attempted and it is also not surprising given the biological and political complexity of Halibut fishery management.

IPHC staff is making good progress in developing state-of-the-art stock assessment modeling and simulation tools needed to support the MSE process.

Similar to the 5-year research plan (described above), the Halibut MSE process faces challenges in establishing a clear and concise set of goals and objectives.

Some possible questions and issues that could be investigated:

- What differences do stakeholders see between MSE and the annual stock assessment? There are some instances where MSE-type questions are raised in stock assessment research (e.g., downstream effects of bycatch) and this may create the perception that MSE is redundant to stock assessment. Similarly, the stock assessment seems to investigate harvest policy issues independent of MSE context.
-
- What are the key challenges facing each fishery that the annual stock assessment does not address? Which of these are controllable and which are uncontrollable? This exercise could help stakeholders understand how MSE can help improve outcomes in the presence of the uncontrollable factors.
-

Finally, we are concerned that the names and visual images of the models (iSCAM, a cow, and a chocolate bar) may tend to cause some stakeholders to dismiss the work. We suggest considering Halibut or fishery related names for the assessment and operating models, to add gravitas, and increase the likelihood of buy-in by stakeholders.