Report of the 9th Session of the IPHC Scientific Review Board (SRB09)

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IPHC Scientific Review Board Meeting

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Overview

We met on 27-29 September 2016 for 1 full day and two half days. IPHC staff requested that we prepare a brief commentary to the Commission summarizing our discussions, conclusions, and comments on research priorities for early 2017.

We begin, as in June, by noting that in the last 2.5 years, IPHC scientists and the SRB have developed a successful pattern in which the June meeting is the major one for input from the SRB, giving IPHC scientists the time between June and the end of September to develop and investigate the ideas we discuss. The September in-person meeting and the December teleconference are then effectively used to fine-tune the developments before the Annual meeting. We recommend that this pattern of non-confrontational, but critical, advice become the norm for SRB interactions with IPHC scientists.

Geostatistical approach to survey indices

Dr. Webster presented a refinement of the new geostatistical approach (GeoStat) to computing biomass indices from the IPHC survey data that he introduced to us in June. To minimize confusion with past methods, we propose a standard naming convention for the new "Geostat Approach" and the previous "Empirical Approach."

The GeoStat approach exploits the well-known spatial and temporal coherence of halibut abundance. It is a uniform treatment of the survey data informed by knowledge of halibut biology.

We continue to support the GeoStat approach because it takes into account the space and time components of fish distribution that fishermen and the public can understand and relate to – that is, where spatial patches of biomass hotspots persist over time. By accounting for these patterns, the GeoStat approach can be used to fill-in survey gaps without resorting to ad-hoc expansion and correction factors as has been done in the past. Ultimately, the GeoStat approach provides more realistic and reliable estimates of uncertainty in biomass indices derived from the coastwide survey.

Recommendations for the GeoStat approach:

1. NOAA's Auke Bay Lab (ABL) longline survey data should continue to be applied to help with edge effects for deeper depth areas;
2. The Commission should put a high priority on staff publishing the GeoStat approach in a peer-reviewed journal because it will be an important contribution to both the statistical and the fisheries literature.

Survey timing adjustment

The current approach to adjusting survey biomass indices is circular via dependence on the outdated notion of coastwide exploitable biomass (i.e., EBio). The survey timing adjustment is meant to account for the local harvest rate within a regulatory area; however, there is no simple way to estimate that harvest rate. Noting that harvest rates have generally declined in all regulatory areas toward area-specific targets, **we recommend simplifying the timing adjustment by using the area-specific harvest rates in the computation rather than the estimated**

area-specific harvest rates. This alternative will provide a more transparent (i.e., non-circular) and stable survey timing adjustment.

We also request that, in the future IPHC provide detailed mathematical specifications for models and analyses that we are expected to comment on.

Hook competition adjustment

IPHC analysts moved the hook competition adjustment to the surveys at the station level, which is preferred over the previous method that applied the adjustment region-wide. We consider this to be a further refinement and improvement in the analysis.

Other matters: survey expansion

Cook Inlet bathymetry and tidal effects raised some concerns about expansion to areas that are questionable Pacific halibut habitat. We encourage staff scientists to continue to think about novel ways of handling this issue.

Extending results among other areas using meta-analysis may provide a way to illicit prior distributions on some coefficients used in the GeoStat approach. For example, the relationship of halibut density and depth seems to be similar in most areas and less well defined in others. Using such results from other areas as priors may help and this is something that might be evaluated in the future (short of doing a coast-wide simultaneous estimation).

Stock assessment overview

Dr. Stewart began the presentation with an overview of bycatch, wastage, and other sources of Pacific halibut mortality. He developed a new system for presenting the information needed to help determine what data will most improve estimates of fish handled, discarded, and killed. The current version captures the ideas well and is ready to go public provided that the presentation carefully builds in a sequence such as; e.g.,

1. Mean Total not retained
2. Range of total not retained
3. Mean DMR
4. Range of DMR
5. Range of dead fish

We also recommend clarifying the assumptions about observer coverage by gear type, in particular for the GOA trawl and longline gears.

Spatially explicit stock assessment model

The spatially explicit model is meant as a strategic tool for testing alternative harvest strategies. We don't foresee this as a tactical model for near term use in developing harvest recommendations. If it were a tactical model, then it would need to sufficiently explain most, but not all, of the observed data. As a strategic tool, the spatially explicit model should be able to explain certain parts of the data depending on the hypotheses being represented.

We suggest reducing the emphasis on accurately predicting how particular strong year-classes propagate (apparently) from the Bering Sea shelf region and instead, determine what types of observations would need to be explained for the model to be considered plausible enough for harvest strategy evaluation. For instance, there may be metrics that could be predicted well by the spatial model (e.g., average delays between recruitment and survey cpue in distant areas).

Including the NMFS trawl survey data in the spatial model may show the relative paucity of juveniles and pre-recruits in the region and may help with some alternative hypotheses on movement dynamics.

Management strategy work

Abundance Based Management

Dr. Hicks presented recent activities related to North Pacific Fishery Management Council's action on developing an abundance-based Pacific halibut bycatch limit (known as "Prohibited Species Catch" or PSC limit).

The main issue for this activity involves evaluating tradeoffs between constraints to the non-Pacific halibut groundfish fishery and the economic impacts of bycatch allocation to directed Pacific halibut fishing communities in area 4CDE.

We note that time-varying PSCs could affect the 2nd line of the decision table used to inform annual harvest decisions. We suggest **examining the SPR rates due to bycatch in a sensitivity context; e.g., what would a blue-line SPR be under zero by-catch, current level, and double the anticipated by-catch.** This may show the impact on the remaining directed fishery allowances and also show the relative consequence/footprint on coast-wide SPR rate estimates.

Current and planned harvest policy developments

The second part of the presentation included an examination of the current harvest policy by the IPHC. This included an overview of the different metrics and decision tables used and how the Commission has recommended catch scenarios compared to a reference level (the blue line). We suggest evaluating near-term harvest relative to the actual average harvest rates rather than blue-line values.

Together with staff scientists, we discussed the issues and problems related to the EBIO calculation; it became clear that there is an inconsistency between this value and the recent assessments. In particular, the EBIO calculation is based on assumptions of selectivity by area that are unlikely to represent current selectivity patterns. **We recommend that the EBIO calculation be phased out as it was made clear that the estimates may be misleading and alternatives can be developed (e.g., the implied SPR rate from recent years).** We also agree with the staff that SPR estimates provide a more consistent way to evaluate catch specifications relative to impacts on spawning biomass.

We also recommend that other measures of fishing intensity be explored. One example includes the spawning-exploitation harvest rate, which is simply the 1-(B/A) where "B" is the actual estimated spawning biomass estimate at the end of the year and "A" is the spawning biomass estimated *in the absence of fishing*. While this measure tends to exclude harvests of immature Pacific halibut, it does provide an alternative simple approach that should be comparable from year to year. If a target rate is developed, then consideration of catches of immature Pacific halibut would be explicitly included (i.e., given a selection pattern overall for different ages).

We also discussed the current area-specific harvest rates and noted that the history of the 16% and 20% rates were originally based on having a lower rate in areas that were perceived to have greater uncertainty. Also there were apparent differences in yield per recruit between regions. Without the EBIO calculation, the proposal involves embedding these rates (which were revised to 16.125% and 21.5%) in the apportionment procedure where area-specific rate would be combined with relative biomass. For background on SRB discussions about apportionment, please refer to the first SRB report.

Biological Research

Dr. Planas presented all the different types of research activities underway and planned at the IPHC. This included reproductive studies and sex-determination evaluations including genetic sex markers (SNP assays).

Growth studies proposed on Pacific halibut include using fish in captivity to evaluate molecular growth measures. This includes evaluating alternative feeding and temperature settings in the lab. Deliverables include identification of growth markers from field studies (fast vs slow growers). We asked about size-at-age and how traditional methods (e.g., observed differences in size at age from direct measure) compare.

Dr. Planas presented a variety of activities related to estimating discard mortality rates.

We note that, for trawl bycatch DMRs, it will be important to cover a broad range of the types of vessels (weighted perhaps by fisheries where most of the bycatch occurs) and also coordinate with the NOAA observer program is used in grading halibut condition.

We recommend that staff consider simulation studies to evaluate the effectiveness of different types of tagging programs and data requirements needed to address mortality estimates.

Migration patterns via genetics, elemental, and isotopic information of adults was discussed. It was raised whether some of the isolation by distance studies can be used to evaluate how areas might be connected and if the current movement estimates are consistent with these.

We are delighted to see the Commission scientists working in collaboration with other agencies and universities. This research is more academic than much of that done at the Commission, but has the potential for great synergies with the Commission's applied work. When done properly, it will sit squarely in Pasteur's Quadrant (Stokes 1997) in which an important applied problem motivates a search for basic understanding.

Other business

Jim Ianelli will attend the Interim Meeting in Seattle.

Reference

Stokes, D. 1997. *Pasteur's Quadrant.* Brookings Institution Press, Washington, DC