MSAB Meeting III – Summary Minutes

May 5-6, 2014. IPHC offices, Seattle WA

Attending: John Woodruff, Scott Meyer, Scott Mazzone, Michelle Culver, Gary Robinson, Jim Lane, Loh-Lee Low, Brad Mireau, Paul Ryall, Ted Assu, Ryan Littleton, Jeff Kauffman, Dan Hull, Bruce Gabrys, Peggy Parker, Tom Marking, Greg Elwood (Day 1), Per Odegaard, Adam Keizer, Robyn Forrest

By Phone: Chris Sporer

IPHC staff: Steve Keith, Bruce Leaman, Steve Martell, Ian Stewart, Jay Walker, Catarina Wor (UBC graduate student)

Absent: Jim Balsiger, Rachel Baker, Rob Kronlund, Shane Halverson

NOTE: The May meeting of the MSAB was webcast and recorded. These summary minutes therefore note highlights and salient points of discussion but do not attribute points to individual speakers. The detailed discussions from the meeting are available in recordings here: https://www.youtube.com/watch?v=dxtK8kkOlkk (Day 1); https://www.youtube.com/watch?v=Iy23JjEtp0I (Day 2); unfortunately, technical issues on Day 2 resulted in only the afternoon session being recorded.

Meeting Objectives (Agenda for the meeting is in Appendix 1)

At its October 2013 meeting the MSAB scheduled its next major meeting for October 20-21, 2014 but also elected to hold a meeting in April/May 2014 to update the Board on progress. Specifically, the May 5-6, 2014 meeting was intended to:

- Receive feedback on objectives based on:
  - Use of the Shiny simulation tool
  - Dialogue with other stakeholders
- Modify candidate procedures based on feedback
- Report on progress in development of coastwide operating model for halibut
- Demonstrate integrated coastwide modelling framework with bycatch and size limit examples, if progress is sufficient; and
- Outline expectations and purpose for October 20-21, 2014 meeting.

Feedback on objectives based on Board members use of tools and dialogue with colleagues

Using the MSE simulation tool

A majority of the Board had spent some time using the simulation tool developed by Dr. Martell. Most found it to be helpful in orienting them to how simulations can be used in the

MSE context. In particular, users appreciated how tradeoffs among objectives were exposed with the tool and how pre-conceived notions on the effects of some procedures or scenarios were overturned. Using the tool highlighted the need for joint consideration of all performance metrics, because procedures did not produce universal or consistent effects on all metrics. However, the exercise left many pining for the next version which would have real halibut data to provide relevance, and to subsequent versions with area-specific features.

Dialogue with other stakeholders

Members reported that their discussions with colleagues elicited a wide range of responses. Some harvesters are taking a 'wait-and-see' attitude to the MSAB process, while others are critically interested in both the objectives and the modelling framework for investigating the scenarios and candidate procedures. The integration of management by the different bodies involved in governing halibut removals (Councils, DFO, IPHC) was a topic of interest to many stakeholders. For harvesters who had not looked in detail at the process, concern was expressed about not 'falling in love with the models' and ensuring that output from the exercises can be validated with real-world observations, to the extent that will be possible. Additionally, some stakeholders want to be reassured that the operating model and scenarios are as realistic as possible and that we don't overestimate our capabilities to understand the true effects of management procedures. Lastly, there is still some confusion by stakeholders about the role of the MSAB and MSE in the decision-making process of the IPHC.

Review and refinement of candidate objectives, procedures, and performance metrics

Members stressed that conservation remains the priority objective of management. There was also a broad commitment to the overarching objectives identified at previous meetings:

- Biological sustainability – identify stock conservation objectives
- Fishery (all directed fisheries) sustainability and stability – identify harvest minimum and acceptable variability
- Assurance of access – minimize probability of fishery closures
- Minimize bycatch mortality
- Serve consumer needs

However, members did spend some time re-visiting the candidate management objectives from previous meetings (Appendix II). It is recognized that the working objectives will evolve as we undertake the process of evaluating them against various scenarios and procedures, and that we are still developing the tools with which to conduct these evaluations. Most felt that it was important to keep all objectives on the table until that process is underway and that we should not be self-censoring objectives or procedures at this stage, although several members noted both the redundancy and conflict included in the draft objectives.

The issue of area-specific vs. coastwide objectives garnered much discussion, with members frequently expressing a desire for area-specific objectives over the long term but recognizing that we will start with coastwide objectives, and that area-specific objectives may not be possible without either very precise knowledge of migration probabilities or strong assumptions about them. Members also felt that it was important to understand the tradeoffs between trying to achieve area-specific objectives simultaneously with coastwide objectives. Regarding the

objectives that specify particular results (e.g., spawning stock levels or specific probabilities), it was recognized that the specific values require evaluation and should not be regarded as ultimate targets until such evaluation occurs. The objective of minimizing bycatch continued to attract the majority of attention and comment, with members desiring to understand both area-specific and coastwide impacts of bycatch mortality. From the perspective of procedures to be investigated, exploring the impacts of variable harvest rates among areas and changing the minimum size limit were high on the list of desirables.

Lastly, Dr. Martell reminded the meeting of some broad principles for the investigations: what objectives and results do we want to achieve, how are we measuring that achievement, over what time interval do we wish to achieve the results, and how badly to we want to achieve them? Casting the investigations in this context should help us prioritize the objectives and results. This process was followed in developing the modified objectives presented later in this report.

Progress and details on development of the coastwide operating model

Dr. Martell and Catarina Wor reviewed the progress on development of the coastwide operating model (OM). The presentation of this material is included on the MSAB website here: MSE OM Presentation May 2014.

Much of the presentation and discussion concerned technical aspects of the model construction and how it handles data inputs from various sources. The general features of the OM are:

- Inherits data structures from any estimation model.
- Stock dynamics: explicit rules for sex, area, stock/group, recruitment, advection-migration.
- Fishery dynamics: explicit rules for fleets, areas, selectivity/availability, size-limits.
- Scientific data: sex-specific data on catch, age composition, size composition, weight-at-age sampling.
- Stochastic variability: recruitment deviations, size/age sampling, relative abundance indices, implementation error.

Most of the details of these features are not yet complete and there is much work still to be done on the OM. Each of the features is described in greater detail in the presentation. However, the first feature of the OM is an extremely important development because the OM will not need to be recoded when the assessment model (which produces the original data series to condition the OM) changes. This important feature resulted from extensive web-based collaboration on the model development by a number of experts from around the world.

The OM will be conditioned on output from the two stock assessment model data periods (1888-2013 and 1988-2013), corresponding to the periods of different data availability (e.g., comprehensive fishery-independent surveys). These two conditioning periods will allow the evaluation of the different data streams to decision making. While the model is still in the development stage, the staff plans to have the operational version reviewed by the IPHC's Scientific Review Board.

Dr. Martell then used the current version of the OM to illustrate its usage with a simple example involving two scenarios (random/independent recruitment vs. environmentally-driven recruitment) and several procedures (no size limit, 82 cm size limit, 82-108 cm size limit, and combination of these limits, with either fixed harvest rates or a 30:20 F_{MSY} control rule harvest).

The demonstration showed both predictable and surprising results. Harvesting at a fixed harvest rate (similar to the current harvest rate) resulted in continuous declines in spawning biomass under either scenario; addition of a minimum size limit reduced the magnitude of the decline and resulted in higher spawning biomass and higher catch. However, it requires more fishing effort for the same catch when a size limit is in place, compared with no size limit. In the case of a management procedure with an 82-108 cm slot limit, the results showed a decrease in spawning biomass compared with a fixed 82 cm limit because both large and small fish had to be discarded, with attendant mortality on some discards. Like the fixed 82 cm size limit, more fishing effort is required for the same weight of catch under the slot size limit. A new term, fishing efficiency, was introduced for consideration as a performance metric. Efficiency refers to the ratio of landed weight (or numbers) to the total weight of landed and discarded fish handled during the catching process.

The Board provided feedback to Dr. Martell on elaboration of performance metrics to be considered for the fishery, including average size of fish in the catch, discard ratio by area, effect of PSC limits on the directed fishery, etc. Dr. Stewart outlined the framework of total mortality accounting that will be presented to the Commission for its consideration at a September work meeting. In this approach, all mortality is presented as part of the yield tables. In comparison, the accounting for U26 mortality is currently embedded within the target harvest rate and not directly visible in the yield tables. This framework will be reviewed by the Commission and the SRB. The eventual product of these reviews will then be brought forward for broader discussion, likely to occur first at the Commission's Interim Meeting in December, 2014.

There is much work on the OM still to be done. The key elements are to implement the model with Pacific halibut data and parameters, determine an appropriate method for seeding recruitment into the population, modify MSY-based reference points to account for size limits and bycatch limits, evaluate current management procedures vs. perfect information, explore alternative harvest control rules and management procedures, develop data structures for spatially resolved modelling, develop frameworks for migration by size, age, and sex, and develop and relate performance measures to stated objectives. The Board expressed a concern that the project remain focused on some achievable goals for 2014 and not get buried in trying to do everything at once. Dr. Martell concurred and explained that an evaluation structure needs to be adequate for eliminating unusable management procedures at an early stage. Not all procedures need to be investigated individually if general patterns are included. A major concern is the non-stationarity of the resource (not all regulatory areas have the same exploitation history or local characteristics). While this cannot be controlled, the OM needs to accommodate it.

The second day of the meeting was largely occupied with further discussions on the performance metrics to be considered and refinement of the candidate objectives. The Board discussed economic performance of the fishery at length, but most felt it was beyond the current scope of the project and that the performance metrics of catch rate, total catch, and biological characteristics of the catch could function as economic proxies for the current investigations. Dr. Leaman reviewed the expectations for the MSE process in 2014, noting that no spatially explicit results are expected, but the goal is to have a fully-functioning coastwide halibut OM for the fall MSAB meeting. He also noted that some of the questions the Board wished to investigate would be addressed only partially in the coastwide model, while others would await the development of a spatially explicit OM. The latter is not anticipated until sometime in 2015.

The Board held a broader discussion on the performance metrics as they pertain to the decision table used at the annual meeting to determine catch limits. There was a diversity of opinions on the utility of the decision table with most believing that the explicit treatment of risk was valuable for decision-making as well as accountability. However, others regretted the loss of direct staff recommendations on a specific catch limit. Staff explained that the entire table represented staff recommendations and that the Blue Line was the anchor point to previous/existing harvest policies, although it did not represent a uniquely acceptable option. Staff also noted that the existing harvest policy needs to be updated – a part of which involves the MSE process. Board members noted that fishing mortality had been reduced over the past several years and was moving in an appropriate direction. It is necessary to do a thorough evaluation of any new harvest policy before replacing the current policy. The Board suggested receiving input on the development of the management procedure process in the Pacific hake and herring fisheries.

The Board spent considerable time refining the candidate objectives and a small working group produced a new table of candidate goals and objectives, with accompanying performance metrics, probabilities, and suggested time frames (Table 1). This table is an attempt to bring some operational clarity and specificity to the five overarching goals identified in previous meetings. The Board's discussion concerned the management procedures to be investigated, as well as the performance metrics. The management procedures included:

- Total mortality: Direct accounting by area for all sources of mortality in that area, including sublegals.
- Size limits: No size limit, current minimum size limit, 26 inches instead of 32, slot limits.
- Harvest strategies: 30:20 control rule, reference removal rate 21.5%/16.125%, coastwide and by area.
- National shares: catch limits by areas would be allocated rather than based on apportionment.
- Bycatch mitigation: Compensation among areas for bycatch in a particular area.

Dr. Martell commented that while the procedures were somewhat general, there were many nuances to them and we need to be careful about the combinatorics that arise from these nuances. It will not be possible to address all of these combinatorics. Dr. Stewart also pointed out that the current apportionment process applies to the O26 biomass and there is no current analogue for allocating U26 biomass.

An extensive discussion on bycatch impacts identified the issue that two separate agencies (IPHC, NPFMC/PFMC) are attempting to control the mortality of halibut. The separate jurisdictions and authorities of the two agencies indicate a need for coordinated management of the entire mortality spectrum, and the Board suggested that something like a joint protocol committee between the agencies would be basic to such coordinated management.

The Board invited staff comments on the table elements and these are included in the table. It was noted that several elements are missing from the table, including procedures involving management of bycatch mortality in non-directed fisheries. Board members noted the need to be aware of unstated objectives which may be embedded within broader objectives. For example, while recreational and commercial fisheries may share broadly similar yield objectives, recreational fisheries may desire larger average size of fish than may be acceptable within a commercial fishery. In addition, the table generally specifies objectives but not the management procedures intended to achieve the objectives.

Future Steps

The Board requested that the staff supply a ranking of objectives, scenarios, and procedures to be evaluated, based on the Board's discussions [see below]. Dr. Martell will make his presentation on the OM available on the MSAB website and inform the Board of availability of simulation tools as they become available. The next meeting of the Board is scheduled for October 20-21, 2014 in Seattle.

Lastly, Dr. Leaman presented a request to have the Board select a Chair or Co-Chairs at its October meeting and to have these individuals report on the MSAB process to the Commission at its Interim Meeting in December. The Board agreed to this process.

Staff ranking of objectives, scenarios, and procedures

The staff's ranking of Objectives for evaluation is the same as that the Board developed in Table 1. That is, conservation being the paramount objective followed by fishery performance issues, and assessing the impacts of other sources of mortality.

In terms of Scenarios, the staff believes that maintaining the two alternative scenarios of environmentally-driven recruitment and variable stationary production is an important and realistic framework for investigation. In addition, the scenarios of variable vs. constant mortality with size/age are a second-tier for examination. The former can incorporate elements of bycatch mortality.

Lastly, the staff believes that, for the coastwide evaluation, target harvest rates, harvest control rules, and minimum size limits are the priority Procedures for investigation. The more involved investigation of migration impacts will require spatially explicit operating and assessment models, which are still some time in the future.

Table 1. Candidate goals and objectives for MSE process – May 2014

Goal	Objective	Performance Metric	Probability	Time frame	IPHC Staff Comments
Biological sustainability	Limit - the level of biomass below which no fishing can occur	1) Maintain a minimum of number of mature female halibut coast-wide (e.g., one million)	0.99	Each year	Number of females and spawning biomass can be equivalent, however this objective could also be evaluated with respect to average female size
		2) Maintain a minimum spawning stock biomass of 20% of the unfished biomass	0.95	Each year	Part of current harvest policy. The probability should be evaluated relative to recruitment variability and yield
Biological sustainability	Threshold - the level of biomass below which the harvest rate should decline	3) Maintain a minimum spawning stock biomass of 30% of the unfished biomass	0.75	Each year	See above.
Fishery sustainability and stability Assurance of access Serve consumer needs	Target Harvest Rate - harvest rate applied when biomass is above threshold level - Maintain median catch within ±10% of 1993-2012 average - Maintain average catch at >70% of	4) Maintain directed fishing opportunity	0.95	Each year	Evaluate probability relative to recruitment variability and minimum annual variation in catch desired by industry. This needs a quantifiable unit in order to calculate a probability, e.g., maintain directed fishing opportunity of xx million pounds each year.

Goal	Objective	Performance Metric	Probability	Time frame	IPHC Staff Comments
	historical 1993-2012 average	5) Maximize yield in each regulatory area	0.5	Each year	* See above. This performance metric is actually an objective and requires a specific value for calculating a probability.
			?	Within 5 years of implementation	* See above.
			0.9	Each year	* The absolute quantities for catch will be difficult to achieve. For example you may never be able to achieve 70% of the average catch in 90 out of 100 cases. In terms of assurance of access in 90 out of 100 cases, adjusting the % of the average catch may be necessary.
Fishery sustainability and stability	Harvest efficiency	Wastage in the longline fishery <10% of annual catch limit	0.75	Over a 5 year period	* The performance metric might be best expressed as the ratio of discards to retained, or sublegal:legal. Wastage is difficult to quantify due to assumptions about discard mortality rate and biases in the observer programs with partial coverage.
Fishery sustainability and	Limit catch variability	6) Limit annual changes in TAC,	1	Each year	* This might be better described as a harvest control

Goal	Objective	Performance Metric	Probability	Time frame	IPHC Staff Comments
stability Assurance of access Serve consumer needs		coastwide and/or by Regulatory Area, to less than 15%			rule or procedure (akin to slow up fast down). The performance metric would be the average annual variability in catch. In this case the AAV <= 0.15 with a probability of 1 each year.
Biological sustainability	Risk tolerance and assessment uncertainty	When Limit < estimated biomass < Threshold, limit the probability of declines	0.05 – 0.5, depending on estimated stock status	10 years	* The performance metric here might better be expressed as the frequency that Blimit < estimated biomass <= threshold, and the desired probability of being in this window is on the order of 0.05-0.5 over a 10 year window.

* Many of the performance metrics are likely to interact with both conservation targets and harvest rate objectives, and their probabilities will be dependent on recruitment variation and desirable/acceptable economic standards of participants. Finding the balance of these competing objectives is the primary purpose of the MSE process.

Appendix I – Agenda

Monday May 5, 2014

12:30 PM:	Welcome, introductions and format for meeting
12:45 PM:	Meeting objectives and questions
1:00 PM:	Review and refinement of candidate fishery objectives and performance metrics for investigation, based on feedback since last meeting
2:00 PM:	Experience of the MSAB with existing simulation tool
2:30 PM:	Break
2:50 PM	Introduction of coastwide operating model and features
3:30 PM:	Demonstration of application of coastwide model with bycatch scenario
4:30 PM:	Discussion of alterative procedures to investigate, e.g., size limit changes
5:00 PM:	Adjourn

Tuesday May 6, 2014

8:00 AM:	Coffee and pastries
8:30 AM:	Recap of first day
9:00 AM	Refinement of evaluation framework for management procedures and further investigation of candidates
10:00 AM:	Break
10:30 AM:	Implications of 2013 stock assessment results to MSE outline
12:00 PM:	Lunch
1:00 PM:	Tasks for staff and MSAB for the next meeting (October 20-21, 2014)
2:30 PM:	Discussion, feedback, & closing remarks
3:15 PM:	Adjourn

Appendix II – Working objectives and performance metrics

The working fishery objectives from the previous MSAB meetings:

1. Maintain a minimum of number of mature female halibut coast-wide (e.g., one million) in each year with a probability of 0.99.
2. Maintain a minimum spawning stock biomass of 20% of the unfished biomass in each year with a probability of 0.95 (spawning biomass limit).
3. Maintain the spawning stock biomass above 30% of the unfished biomass in each year with a probability of 0.75 (spawning biomass threshold).
4. Maintain directed fishing opportunity each year, conditional on satisfying objectives 1 and 2, with a probability of 0.95 (i.e., cannot afford to close the directed fishery for a single year).
5. Maximize yield in each regulatory area each year without exceeding the target harvest rate in a given area 50% of the time.
6. Limit annual changes in TAC, coastwide and/or by Regulatory Area, to less than 15% per year, conditional on satisfying objectives 1 and 2.
7. Maintain median catch within ±10% of 1993-2012 average within five years of implementing the procedure.
8. Maintain average catch at >70% of historical 1993-2012 average, 90% of the time.
9. Reduce bycatch mortality to within 5% of total catch limits/minimize bycatch to the extent practicable.

The working performance metrics from the previous MSAB meetings:

1. Absolute number of sexually mature female halibut (re: objective 1).
2. Ratio of current SSB relative to unfished SSB_0 (where SSB_0 is based on current size-at-age (re: objectives 1 & 2).
3. Total catch and directed catch from each regulatory area (re: objectives 4, 5, 6, 7, & 8).
4. Legal biomass in each regulatory area in each year (re: objective 5).
5. Bycatch from each regulatory area in each year (re: objective 9).