

MSAB Meeting V – Summary Minutes

May 27-28, 2015. IPHC offices, Seattle WA

Attending: Bob Alverson, Rachel Baker, Michele Culver, Robyn Forrest, Dan Hull, Jeff Kauffman, Adam Keizer, Jim Lane, Loh-Lee Low, Tom Marking, Scott Mazzone, Scott Meyer, Per Odegaard, Peggy Parker, Paul Ryall, Chris Sporer, John Woodruff

Visiting: Allan Hicks (Northwest Fisheries Science Center), Carey McGilliard (Alaska Fisheries Science Center)

Absent: Greg Elwood, Bruce Gabrys, Shane Halverson, Ryan Littleton, Brad Mireau

IPHC staff: Bruce Leaman, Steve Martell, Ian Stewart, Tom Kong, Steve Keith

Notes

- This meeting of the MSAB was webcast and recorded. These summary minutes therefore note highlights and salient points of discussion and do not attribute points to individual speakers. Elements of the discussion are grouped together for narrative clarity, rather than being presented in strict chronological order.
- The detailed discussions from the meeting are available in recordings posted at the IPHC MSAB meetings webpage (<http://www.iphc.info/Pages/MSAB---Previous-Meetings.aspx>):
 - [Day 1](#)
 - [Day 2](#)
- The agenda and presentations from this meeting are also posted on the IPHC MSAB meetings webpage:
 - [Agenda](#)
 - [MSAB V Key Elements](#)
 - [MSAB V Presentation](#)
- The IPHC MSE Application, which is used to review equilibrium simulation results from the operating model, is found at:
<http://shiny.iphc.int/>
Note that this is a new web address for the tool since the last MSAB meeting.

Meeting Objectives

The objectives for the May 2015 MSAB meeting were:

- Review MSAB governance, deliverables, meeting logistics, and facilitation
- Affirm fishery goals and draft objectives
- Review and evaluate alternative management procedures
- Introduction to spatial equilibrium models

The agenda for the meeting is attached at the end of this summary.

Summary Review from MSAB Meeting IV, October 2014

The meeting opened with a brief overview of the previous meeting, including the five overarching objectives and five management procedures for the fishery, modeling scenarios and variables, and candidate goals and objectives for the MSE process. (The slides for this opening presentation are posted on the IPHC MSAB webpage at <http://www.iphc.info/MSAB%20Documents/Outline%20Key%20Elements%20v2.pdf>, and summary minutes of the October 2014 meeting are posted at http://www.iphc.info/MSAB%20Documents/MSAB_October2014SummaryMinutes_final.pdf.)

Dr. Martell then presented a more detailed review of the previous MSAB meeting, in particular the lessons from Pacific hake MSE example, the development and use of the equilibrium modeling tool, the priorities and objectives the Board established for the IPHC MSE, and the previous discussion about MSAB governance. (The slide presentation for this review and the rest of the meeting is posted at <http://www.iphc.info/MSAB%20Documents/MTG5%20presentation.pdf>.)

Dr. Martell also reported the very positive reception he received when presenting the IPHC MSE process at a recent international conference, noting that the IPHC is at the cutting edge of this work among fisheries management organizations worldwide.

MSAB Governance

The Board took up the issue of MSAB governance as its first order of business. Aiming to build on previous work and strengthen the stakeholder-driven nature of the IPHC MSE, the discussion centered on chairmanship and facilitation for the MSE process, and included the related topics of agenda preparation, outreach, and the role of other user groups in MSE.

Discussion from previous meetings about instituting an MSAB chair or co-chairs was echoed at this meeting, emphasizing the desirability of stakeholder leadership. The chair(s) could report directly to the Commission, and enable more effective IPHC staff participation in the MSE process by reducing the staff's meeting leadership duties. Possibilities discussed at this meeting included having one chair or two co-chairs, as well as having the chair(s) be from outside the Board membership. Dr. Allan Hicks contributed the experience of the Pacific hake (whiting) MSE process in developing its leadership structure.

The concept of using outside facilitation for MSAB meetings was also discussed at length, noting the possibilities for facilitation to help move meetings along and enable the Board to be more productive. Facilitation could free up staff time and help elicit input and responses

from Board members. The facilitator would not necessarily need to be a subject matter expert, especially if used in combination with a knowledgeable chair or co-chairs. The facilitator could also help improve the Board's outreach efforts.

It was noted that there would need to be a proper balance of roles between facilitator and chair(s) in driving the Board's efforts, as well as a proper overlap with Board members and lead analyst Dr. Martell. The facilitator would need assistance in setting the agenda for meetings, and an agenda committee was suggested as a mechanism to provide Board input and direction.

Members reported varied experiences with facilitation, ranging from poor to excellent. Various possible combinations of chair and facilitation, or one or the other, were discussed, noting that the IPHC is an MSE pioneer in the world of fisheries management and there is no standard organizational path to follow. In the end, the members coalesced around adding both co-chairs and facilitation to the IPHC MSE process, and agreed to implement them on a trial basis for the next MSAB meeting. Dr. Leaman reported that the staff has begun looking at a number of firms that provide facilitation services.

In concert with the deliberations on internal MSAB leadership issues, the Board engaged in a wide-ranging discussion of governance topics related to incorporating other voices and views on halibut management besides those of the directed fishery. Noting that not all users of halibut are included in the current MSE process, how should external user groups or entities be represented? Should they be consulted or participate directly, or would it be better to engage them in other ways, such as through workshops or other joint collaborations? Should engagement be episodic, or continue on a regular, long-term basis? Examples from different regions and fisheries of both integration and lack of integration of divergent interest groups were noted, as well as initiatives either desired or currently under way with other halibut-related entities. While acknowledging that the MSAB could make recommendations to the Commission regarding changes to its membership and processes, the discussion gravitated toward outreach as the likely best path for engagement, particularly once the MSE process has begun to produce concrete modeling products. It was noted that facilitators could help with outreach, and the Board agreed to pursue outreach as the primary avenue for understanding and engaging other groups.

Wrapping up the governance topic later on the first day of the meeting, the Board made the following decisions and requests:

- Agreed on Adam Keizer and Michele Culver as its first co-chairs, beginning with the next MSAB meeting.
- Appointed an agenda committee consisting of Chris Sporer, Peggy Parker, and Rachel Baker, also to begin operation with the next meeting.
- Agreed to pursue outside facilitation of its meetings and outreach, with the goal of having facilitation services in place for the next MSAB meeting. Dr. Leaman will arrange facilitation services on behalf of the Board.
- Asked for pre-meeting training for members, possibly including homework, to better prepare them for the meeting and reduce time spent during the meeting refreshing old information.
- Asked for more detailed pre-meeting information to be sent out with the agenda to explain previous progress and outline what is planned for accomplishment, including a timeline for the process beyond the next meeting. The co-chairs, agenda committee, and facilitator are expected to contribute to this as part of their preparation for the meeting.

Fishery Objectives

As the Board began its review of the overarching objectives and management procedures for the fishery, Dr. Martell reminded the members of the essentials of the MSE process described in “Management Strategy Evaluation – The Light on the Hill” by A.D.M. Smith (posted at <http://www.iphc.int/documents/MSAB/201306/Lightonthehill.pdf>), which include these four items:

- A clearly defined set of management objectives
- A set of performance criteria related to the objectives
- A set of management strategies to consider; and
- A means of calculating the performance criteria for each strategy

The Board reviewed the **five overarching objectives** for the halibut fishery developed in previous meetings:

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

In discussing how to think about and use the objectives, Dr. Martell emphasized the importance of treating them as a hierarchy and using their rank order to avoid the “combinatorics” problem – the unmanageable multiplication of possibilities that results if there is no priority among them. Ranking simplifies the process for both stakeholders and analysts.

In further discussion, the Board considered whether some of the objectives were redundant, but decided that all were necessary for the present and made no changes. Members noted that the objectives might be revised in the future, and that subordinate objectives might be developed as a result of the iterative process of MSE. It was pointed out that although some management procedures supporting these objectives are outside of IPHC control, their effects should nevertheless be analyzed under different scenarios within the MSE. It was also noted that gaps in knowledge which become evident or are highlighted in the MSE process, such as the movement of juvenile halibut, will influence research priorities.

With the overarching fishery objectives in hand, the Board turned to the on-line modeling tool and an update on the operating model before examining specific management procedures.

The Equilibrium Modeling Tool

MSAB members noted that the on-line equilibrium modeling tool (called “Shiny” in previous meetings) was impressive, but they found using it and interpreting the results to be challenging. A number reported that they had not spent much time with the tool, and highlighted the need for more assistance to make the most use of it, including dedicated training before meetings.

Several members reported difficulty accessing the tool via the web. Dr. Martell noted that there is currently limited access to the posted version of the tool due to the nature of the account being used to host it, but that the staff is working on improving access. The tool, now called the **IPHC MSE Tool**, can be found at:

<http://shiny.iphc.int/>

Note that this is a new web address for the tool since the last MSAB meeting.

The IPHC MSE Tool uses a simple age-, sex-, and size-structured equilibrium model to explore the long-term, equilibrium conditions for a given harvest policy. The objective of the equilibrium model interface is to better understand the relationship and tradeoffs between policy variables (such as fishing mortality, size limits, and discard mortality rates) and response variables (such as yield, discards, and wastage in the directed fishery). Equilibrium models are widely used in setting harvest policies, but we recognize that policy alternatives will need to eventually be examined within a dynamic modeling environment.

The interface allows the user to compare two alternative procedures and examine equilibrium values of many different variables over a range of fishing mortality rates in the directed fishery. Model parameters which can be varied for analysis include both *scenarios*, the natural elements that humans cannot change, and *procedures*, the management elements that humans can change. The model output consists of graphical displays and tabular data that summarize the biological sustainability objectives, fisheries sustainability objectives, and economic metrics.

Dr. Martell demonstrated the tool by navigating through several examples to see the operation and results of the Operating Model. Throughout the rest of the meeting, Dr. Martell used the tool to illustrate the discussion and to solicit ideas for improving both the MSE Tool itself and the underlying Operating Model.

An MSE Dashboard is in development alongside the equilibrium modeling tool at the same website. The dashboard will allow the user to compare various combinations of scenarios and procedures. It is expected to be operational by the time of the next MSAB meeting.

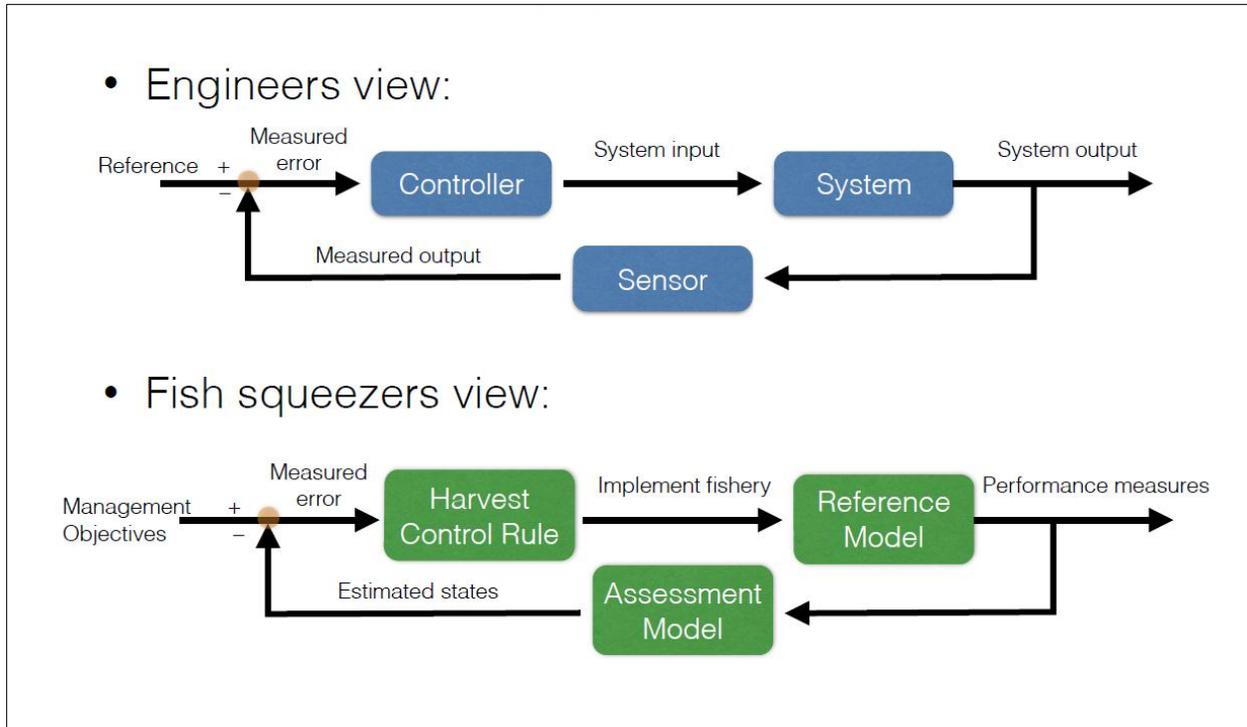
Operating Model Update

The Board discussed the Operating Model at length, focusing on the nature and utility of closed-loop modeling, differences between modeling for MSE and for stock assessment, the current state of the Operating Model, development of a spatial model, and the tractability of management questions using existing and future analysis models.

Open-Loop and Closed-Loop Modeling

Dr. Martell used the example of an automotive cruise control system to illustrate how closed-loop modeling works. The key is incorporating feedback from the process output as an input into the control system to regulate the process going forward, closing the loop. When the automobile is using cruise control, feedback from the speed sensing mechanism is fed back to the cruise control system as an input to regulate the fuel supply in order to achieve the desired speed. In contrast, the process or mechanism in an open-loop system does not modify its operation in response to the result it produces.

The Operating Model is a closed-loop system; the results of a procedure (such as a harvest control rule) factor into the operation of that procedure going forward. As the scenario runs into the future, the stock status at the end of each iteration becomes the starting point for the next iteration. This concept is illustrated in the following diagram:



Modeling for MSE and for Stock Assessment

Dr. Martell and Dr. Stewart discussed the differences between equilibrium and dynamic models and how they are used for MSE and stock assessment.

As noted earlier, an equilibrium model calculates the long-term average outcome based on biological and management inputs. These calculations are extremely efficient and helpful for rapid comparison of alternative scenarios and procedures. In a dynamic model, each outcome is a unique solution derived from the common initial starting conditions, and the range of outcomes describes the estimated probabilities of future results from the given input conditions. Scenarios and procedures can then be varied to examine and compare their effects on variability over the long term.

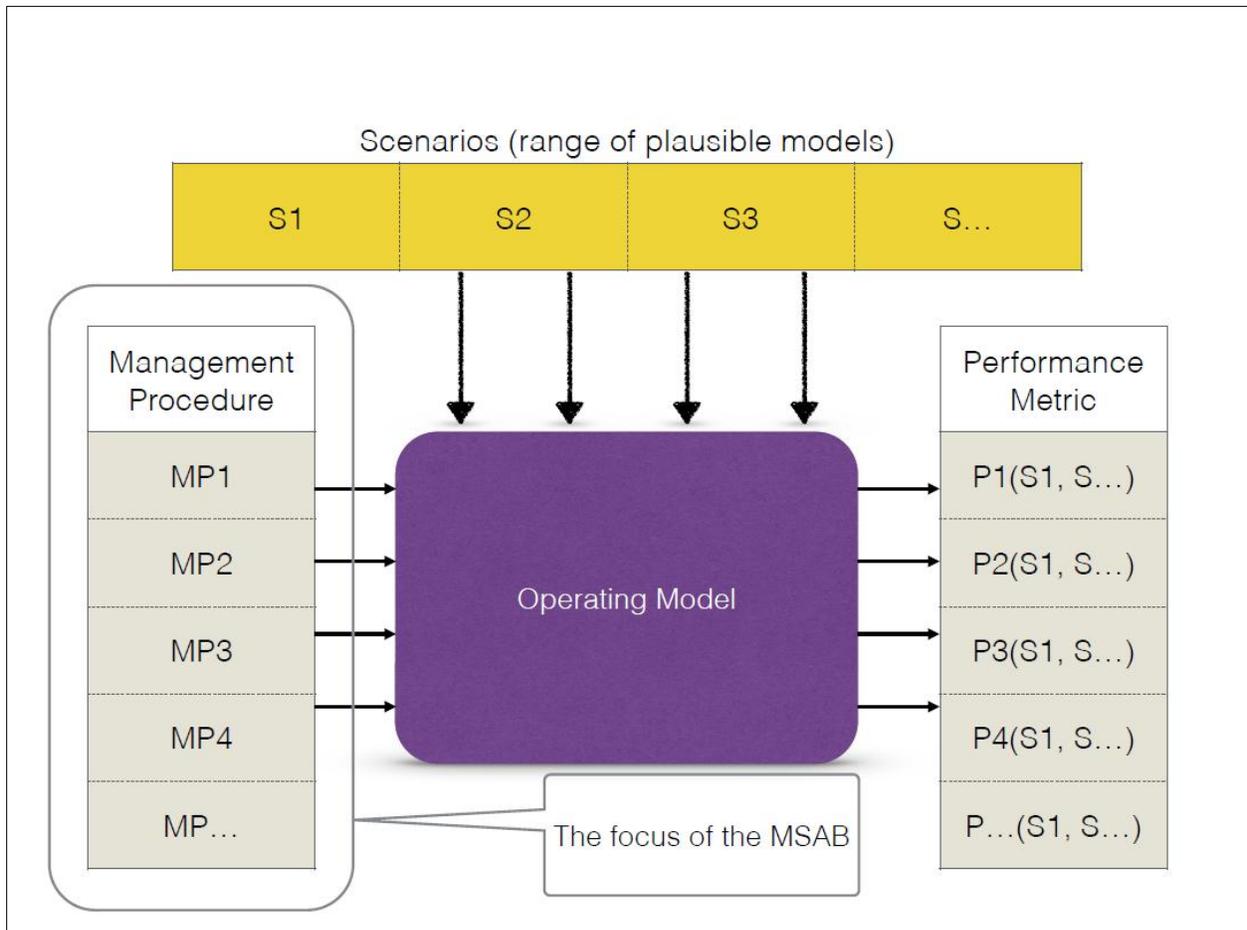
The Shiny tool is an equilibrium model, and the MSE Operating Model is dynamic; both are conditioned with actual halibut data so that the starting point describes the current state and mechanics of the stock. By predicting the probability of various future outcomes under different conditions, the Operating Model can be used to test the ability of candidate fishery management procedures to achieve objectives against various scenarios and their robustness to changing conditions.

In contrast, modeling for the stock assessment is focused on the present state of the stock as a dynamic product of current and past measured conditions. Although they share many of the same analysis methods and data, the dynamic stock assessment model is used to understand how

the stock arrived at the present and how it might change over short-term projections, while the equilibrium MSE Operating Model is used to understand how the stock and management system respond to long-term changes.

Current State of the Operating Model

Dr. Martell described the current state of the Operating Model, demonstrating its use with the IPHC MSE Tool. Model parameters which can be varied for analysis include both *scenarios*, natural elements that cannot be changed, and *procedures*, management elements that can be changed. The use of the Operating Model is illustrated in the following diagram:



Current Operating Model scenario elements include:

- Recruitment (positive or negative)
- Growth (increasing and decreasing trends in size at age, density dependence); and
- Natural mortality (size-dependent, time-varying).

In discussing how to choose among scenarios in order to manage the number of options for assessment, Dr. Martell noted that the issue is coming up with a plausible set of scenarios to test the robustness of management procedures against a range of conditions.

Current procedural elements available in the Operating Model include:

- Harvest control rules (empirical or model-based reference points, catch floors, size limits, apportionment or shares, regulatory discards, and bycatch limits); and
- Stock assessment (the “sensor” in the closed loop) choices regarding input data and models.

Dr. Martell worked through a series of examples to illustrate how these elements can be used, including changes in other removals (such as recreational catch), minimum size limits and slot limits, and maternal effects, noting the resulting changes in yield, Spawning Potential Ratio (SPR), and Fishing Mortality Rate (F). Several of these examples underscored the important harvest policy implications of hypotheses regarding biology.

Dr. Martell also noted that the dashboard being developed in the IPHC MSE Tool will make it easier to test various options using the Operating Model by tuning procedures or objectives.

Development of a Spatial Operating Model

The current Operating Model is a coastwide model, as is the current stock assessment model. Dr. Martell and his graduate assistant Catarina Wor have constructed equations for a spatial MSE model and have started the preliminary coding for it. During the coming months they will incorporate Dr. Stewart’s work on spatial data sets, which will be required for conditioning the model, and start to program the spatial model itself.

The team is aiming at the end of the summer to produce a working model. Dr. Martell noted the importance of the model’s assumptions regarding migration, because it will not be possible to confirm migration scenarios with the limited existing data. However, the Commission’s Scientific Review Board has expressed the view that the MSAB should continue to invest in the examination of a coastwide model because of its links to current management and its value in evaluating some procedures that would be coastwide in their application, as noted below.

Tractable Questions using Coastwide and Spatial Operating Models

To illustrate the utility of a spatial model, Dr. Martell displayed a set of questions that have been referred to MSE, noting which of them can be answered using the coastwide model and which will require a spatial model to analyze (pages 21-23 of <http://www.iphc.info/MSAB%20Documents/MTG5%20presentation.pdf>).

The coastwide model can be used for exploring changes in harvest control rules and exploitation rates on a coastwide basis, but it cannot address area-specific questions of interest. Analysis of the current harvest policy with the coastwide model is likewise problematic, since the harvest policy itself was developed using a series of area models. Although it can implicitly represent some spatial inputs (such as by changing bycatch selectivity), the coastwide model cannot see apportionment or other area-specific inputs. A spatial model would be able to look explicitly at bycatch and fishery interactions specific to each regulatory area.

This does not diminish what is available through the coastwide model, however, as no questions can be addressed without any model. Although it has limitations, when the Board considered whether development of the coastwide model should continue, the consensus was that it should.

From this discussion of the Operating Model, the Board engaged in a wide-ranging conversation about questions to be examined and how these questions should be tied together. These included, among others:

- Discard mortality rates (DMRs)
- Slot limits
- Maternal effects of big old fat fecund females (“BOFFFs”)
- Implications of moving to a different SPR target
- Impacts of turning over lots of small fish in particular regulatory areas
- How much change in the O26/U26 ratio would be required to appreciably change the harvest policy
- How to tie various components together into a full MP for evaluation
- Which scenarios have the greatest impact, and how to consider scenarios versus procedures

Given the many combinations of analysis variables available in the MSE Tool, the staff offered to produce a reference matrix describing the results of changing various parameters in the tool, as well as the existing constraints in the Operating Model. Members will be able to compare their own results to the matrix summaries and explore specific topics in more detail. However, noting the MSAB’s need to coalesce around a set of questions, the Board discussed whether it might be more effective to have the co-chairs assemble questions for its consideration. It was agreed that the co-chairs could structure the questions in a logical framework for examination, and that the questions should be related to the overarching fishery objectives, which are well understood. Any policy question related to removals would be fair game, and performance metrics should link back to the objectives. The five current MPs, which are less well understood, could be refined to produce clear alternatives for testing. The Board agreed that this was a more productive approach.

Evaluation of Management Procedures

The Board then discussed each of the **five management procedures** currently under consideration:

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

The intent of this discussion was a common understanding of the five current MPs – also referred to as “Tools” – and what they mean, focusing on these primary questions:

- Which ones can be explored with the coastwide model? [indicated by * in the table below]

- For those, what is needed to develop a recommendation?
- Ensure a common understanding of each MP and its linkage to the objective(s).
- Are there additional MPs (alternatives) for each tool?

During this discussion the Board developed the table below as a means of capturing ideas for the initial alternatives to explore. Each of the five current MPs appears as one line in the table. Salient questions and points from the discussion are listed following the table.

Management Procedures – Current Harvest Policy and Alternatives for Exploration

MP (Tools)	Harvest Policy: Current	Harvest Policy: Alternative 1	Harvest Policy: Alternative 2	Harvest Policy: Alternative 3
Total Mortality *	O26 by area and U26 static	O26 by area and U26 coastwide
Size Limit *	32 inch	No limit	Slot limit	Something else?
Harvest Control Rule*	30:20 + 21.5%/16% coastwide	Area-based	Something else?	...
Area Allocation	Apportionment	National Shares	AK/Canada/West Coast? [Alternative based on relative change in survey]	(Canada)/(US/US Tribal*)
Reduction in Bycatch and Bycatch Impacts*	Canada DFO and US through RFMCs. IPHC reactive to those actions [reduce directed catch]	[Discuss with other user groups to come up with possible actions to reduce bycatch and DMR: options for improving incentives]

* Noting that domestic allocation responsibilities are outside the mandate of the Convention

Total Mortality

- Total mortality can be thought of as total impact on the stock. Total mortality accounting enables shifting from E_{bio} to SPR as the measure of the stock status. This could be done using the SPR analogous to the current Blue Line, and would provide a step toward potential Management Procedures from the MSE that are based on SPR.
- The comparison between the two alternatives in the table is between managing only O26 (essentially what is done now) and managing all removals.
- SPR is a coastwide measure. Total mortality can be analyzed initially in the coastwide model, and then in more detail in the spatial model.

- The assessment and the harvest policy can differ significantly in relative sensitivity to changes or uncertainty in bycatch, unreported catch, DMRs, the proportion of O26 to U26, and sex ratio of the catch. The impact or value of increased precision (less uncertainty) in measurement of these variables is directly related to these sensitivities. Testing can show the robustness of different MPs to assumptions about these elements.

Size Limits

- Size limits are about selectivity. The policy implications of different size limits need to be related to objectives for the fishery.
- A range of size limits should be identified for analysis, from no limit to various incremental limits and slot limits.
- If there were a change in the current size limit, the current 21.5/16.125% target harvest rates would need to be re-evaluated or replaced with an SPR-based target.
- Analysis of size limits should also consider the market implications in addition to the management or biological considerations.
- Operationally, other management measures would likely need to be adopted in conjunction with changing the size limit, such as changes to IFQ accounting and to monitoring requirements. Gear regulation could be considered as well, although a minimum hook size is considered unenforceable.
- The MSL example from previous meetings underscored the monitoring necessary to evaluate the effects of changing the size limit. If the effects are not measured, it cannot be known whether the fishery objectives are being met any better or worse than before.

Harvest Strategies

- The current harvest control rule reference points (30:20) were reviewed in previous meetings. They are aimed at producing a yield that is less than MSY, but with greater stability. At MSY-level harvests, there would likely be more variability year to year with 30:20 than with a 40:10 rule.
- The harvest control rules should be tuned to achieve objectives, such as “to achieve no more than __% change from year to year...”
- It may be possible to construct empirical rules based on current data (e.g., survey trends). It may also be possible to develop harvest control rules without limits, but in other fisheries performance is often noted to be worse for more complicated rules.
- The MSE model will be able to vary both limits and rates for analysis. The spatial model will be required to analyze changes to the current area-specific target harvest rates.

National Shares

- Besides two national shares (the first alternative), there might be other procedures to assign catch to areas (the second alternative).
- Other elements to consider could include the biological benefits of varying the timing of the fishing season in different areas to account for seasonal migrations.

Bycatch Mitigation, or Bycatch Impacts and Reduction

- “Mitigation” is related to stock impact, including the ability to change harvest rates to accommodate bycatch. “Compensation” is about effect on other areas. The Board framed its discussion to focus on bycatch impacts and reduction.

- Institutionally, bycatch management is largely beyond the ability of IPHC to control directly.
- The bycatch analysis should also consider wastage in the halibut fleet. Other elements of this discussion include DMRs, access priority, and economic incentives.
- Integrated fisheries programs and catch floors are potential management tools to deal with bycatch.

In discussing the five identified management procedures, the Board considered additional performance metrics that could be incorporated into the analysis, such as the effect on other fisheries. In this context, it was noted that the Alaska Fisheries Science Center (AFSC) has ongoing research on the effects of one fishery on others. The Board requested more information on this research as well as other AFSC halibut research for its next meeting.

Action Items and Milestones

As detailed above, the Board took these governance-related actions:

- Agreed on co-chairs.
- Appointed an agenda committee.
- Agreed to pursue outside facilitation of its meetings and outreach.
- Asked for pre-meeting training for members.
- Asked for more detailed pre-meeting information to be sent out with the agenda.

The Board made the following assignments and requests for the next meeting:

- Dr. Leaman will arrange facilitation services on behalf of the Board.
- The staff will produce a reference matrix describing the results of changing various parameters in the IPHC MSE Tool, as well as the existing constraints in the Operating Model.
- The co-chairs will assemble questions in a logical framework for the MSAB's consideration. The matrix developed during this meeting can be used as a starting point, and members and sections are also invited to contribute questions.
- AFSC will be invited to provide information on relevant research projects.

Looking ahead, the Board identified this milestone to focus its activities:

- Does the current harvest policy satisfy the five overarching objectives? And if not, how should it be modified to achieve them?

Agenda preparation for the next meeting will involve the new governance structure and a facilitator.

Next Meeting

The Board tentatively scheduled its next meeting for 1-2 October 2015 at the IPHC offices in Seattle.

Agenda for MSAB Meeting #5

Wednesday May 27, 2015

- 12:30 PM: Welcome, introductions, meeting objectives and questions.
Summary review from MSAB Meeting 4 (October 20-21, 2014).
- 1:00 PM: MSAB governance
Briefly recap MSAB interests and purpose, discuss
MSAB governance – Chairs, deliverables, deadlines, meeting format
- 2:15 PM: Fishery goals and objectives
Affirm goals and draft, ranked fishery objectives
- 3:15 PM: Operating model updates
Coastwide operating model updates.
Tractable questions for coast wide model vs. spatial operating model
- 4:15 PM: Management procedures
Review management procedure from meeting 4, discuss alternatives
Develop a scorecard for comparing and tuning management procedures
Review research priorities and relationship to policy variables

Thursday May 28, 2015

- 8:30 AM: Recap from previous day, questions & discussion.
- 9:00 AM: Management procedures
Preliminary evaluation of management procedures
Evaluating current harvest policy (Clarke and Hare, 2006)
Exploration of discard mortality rates
Using the MSE web-based interface to explore alternative procedures
- 1:00 PM: Operating model scenarios
Review proposed scenarios – natural mortality, stock-recruitment, growth,
average recruitment, etc.
- 2:00 PM: MSAB outreach
Suggestions for sharing results, engaging with constituents, forums for providing
feedback