MASSACHUSETTS MARINE FISHERIES INSTITUTE

END-TO-END REVIEW OF NEW ENGLAND GROUNDFISH STOCK ASSESSMENTS: Scoping Meeting Report

January 22, 2012 DRAFT

Summary

Experts from regional fisheries organizations were invited to help plan an integrated series of technical workshops intended to recommend improvements to groundfish science for supporting fisheries management. The workshops are intended to form an end-to-end review of the stock assessment system. The end-to-end review is designed to be more comprehensive than routine stock assessment reviews, with greater consideration of how data collection programs support stock assessment on the 'front end' and how stock assessments support the needs of fishery management on the 'back end.' Current challenges to implementing a more effective science and management system were identified and topics were prioritized based on importance and feasibility of progress in a workshop format. Three workshop topics were agreed upon: 1) Incorporating Environmental Change in Assessments and Management; 2) Fishery Monitoring and Survey Selectivity; and 3) Overfishing Reference Points and Uncertainty Buffers. The three workshops will be coordinated so that they form an integrated review. The expected outcome is a series of recommendations to improve the scientific basis of management for groundfish fisheries.

Contents

1. Introduction

A scoping meeting for an end-to-end review of the New England groundfish stock assessment system was held on January 2 2013, at the University of Massachusetts School for Marine Science and Technology (SMAST) in New Bedford, Massachusetts. The meeting was hosted by the Massachusetts Marine Fisheries Institute (MFI). The MFI is a partnership between the University of Massachusetts and the Massachusetts Division of Marine Fisheries (MADMF). The mission of the MFI is to provide timely information and guidance to protect, conserve, and manage Massachusetts marine and coastal resources. The purpose of the scoping meeting was to plan a series of topical workshops to review the New England groundfish science and fishery management system and to provide recommendations to address current scientific problems.

Requests for a systematic review in New England were prompted by rapid changes in our perception of stock size, retrospective patterns that are difficult to understand, updated assessments that were not consistent with previous stock projections, and the perception that assessment results do not, in many cases, match industry observations. Systematic problems were most recently demonstrated by the SAW53 Gulf of Maine cod assessment, the 2012 groundfish assessment updates, and the 2012 TRAC assessment of Georges Bank yellowtail flounder. The 2011 Gulf of Maine cod assessment indicated that the 2008 assessment significantly overestimated stock size. Resulting catches produced overfishing despite being within catch limits and making rebuilding by the mandated deadline impossible. The 2012 groundfish assessment updates concluded that most projections based on 2008 groundfish assessments were overly optimistic. Finally, the 2012 assessment of Georges Bank yellowtail flounder showed the re-emergence and intensification of a retrospective pattern, despite the earlier application of 'fixes'. All of these assessment problems created management crises in which severe fishery restrictions are needed to end overfishing and rebuild stocks. In the context of the declared economic crisis, a systematic review of the groundfish stock assessment process is warranted.

A recent statement from the Northeast Seafood Coalition helped to frame the problem and emphasizes concerns from the fishing industry: "*At some point everyone in the groundfish community – the scientists, managers and policy-makers need to accept the reality that the current process is just not working. We need to step back out of the weeds and look at the bigger picture. There are critical elements of the science, management and law that all need to be fixed. We cannot remain in the same box, performing the same rituals and expect a different result.*" In recognition of these problems, the need for an end-to–end review of groundfish stock assessments was identified by Senator Kerry and Congressman Keating.

The MFI is hosting a series of collaborative workshops to develop a better understanding of the challenges faced in the current system, and collaborate with other experts in fisheries science and management to develop guidance for improving system performance. A goal of the workshops is to provide practical short-term recommendations. Major questions that each workshop will address are; (1) what has changed in the fisheries science and management system and ecosystem that might explain the poor performance of stock assessments?; (2)

what can be improved?; and (3) what alternative methodologies and technologies are available that might help?

The scoping meeting for the End-to-End Stock Assessment Review was held on January 2, 2013, at SMAST in New Bedford Massachusetts. The meeting ran from 10:00 am to 5:00 pm. Steve Cadrin moderated the meeting and asked participants to be respectful, objective and candid. Emily Keiley served as the meetings rapporteur. A small group of participants were invited from a various states and organizations within New England. The meeting was attended by seventeen individuals who represented various organizations including regional academic institutions (SMAST, URI and UNH), the Northeast Fisheries Science Center (NEFSC), the Northeast Regional Office (NERO), the New England Fishery Management Council (NEFMC), the Groundfish Advisory Panel, New England's Science and Statistical Committee, MADMF, the Northeast Seafood Coalition (NESC), and Saving Seafood. A complete list of meeting attendees and their affiliations can be found at the end of this report.

NOAA Fisheries is also planning systematic review of science programs on national and regional levels. In January 2013, NOAA Fisheries will begin a nationwide peer review process of the regional science center and headquarters Office of Science and Technology's programs that inform fisheries management. Independent scientists from inside and outside NOAA will examine NOAA's science programs on a 5-year review cycle. The purpose of the review is "to improve integration, identify best practices, and share successes and challenges". Each year one of several key elements within the system will undergo a review (e.g., data collection/quality, stock assessment methods, protected resources, ecosystems, habitat, climate impacts and adaptation, and socioeconomics). The reviews will begin by looking at data collection during 2013 and the stock assessment modeling process during 2014. The reviews will generally be open to the public and stakeholders are encouraged to participate. The science review process will be part of a broader dialog with Fishery Management Councils, fishing industry, nongovernmental organizations, and other stakeholders.

An explicit goal of the MFI workshops is to provide a complementary source of feedback, information, and recommendations to decision makers in the process. To the extent practicable, the MFI workshops will be coordinated with the regional and national reviews to confront unique and corresponding issues. The MFI workshops may also provide a forum to engage additional fishery stakeholders. The MFI workshops will likely have more flexibility to deal with issues of interest that may fall outside the scope of the national or regional reviews NOAA is conducting. In order to ensure that the MFI review is complementary to the NOAA reviews, personnel from NOAA will continue to be engaged and invited in the process. In addition once NOAA's plans are available revisions may be made to the MFI work plan in an effort to reduce redundancy.

2. Identification of Regional Issues and Needs

2.1 Data Collection and Transmission

The introduction of Annual Catch Limits (ACLs) and sector management in the groundfish fishery introduced a suite of new challenges and opportunities. Management now requires real-time estimates of vessel catch (landings and discards) to enable fishermen and sectors to develop business strategies and prevent exceeding their quotas. Participants cited the significant effort made by sector managers to ensure the effective and efficient transfer of data from vessels to the Regional office. Despite significant improvements many participants cited the need for a more streamlined system. Meeting participants also expressed interest in pursuing opportunities afforded by sectors to collect more detailed data that may be incorporated into stock assessments.

The current data collection system was designed for a groundfish fishery that operated under the days-at-sea (DAS) management strategy. Many participants cited the need to review the needs of the new management system and design new collection protocols that reflect these needs. One of the challenges identified with the collection of catch data is that paper VTR (Vessel Trip Report; i.e., logbooks) are still being used. Electronic vessel trip reporting (E-VTR) is a relatively new technology that is available for application to monitoring the groundfish fleet, but few vessels are taking advantage of it, and the infrastructure for implementation by the entire fleet is still under development. A more efficient electronic system that minimizes data entry needs, improves efficiency of data transition, and promotes data quality and assurance would be a preferred alternative.

A concern expressed by some meeting participants was the accuracy of catch data, particularly discarded catch and misreporting of fishing location. Questions about the potential existence of a so-called “observer effect” also arose in the discussion of data quality control and assurance. Also in this theme were questions about the current methods to allocate catch to specific statistical areas and stocks and misreporting of catch by area (e.g., Gulf of Maine cod reported as Georges Bank cod).

Some meeting participants felt that the current allocation of observer coverage warrants review. It was suggested that some vessels, that land a small percentage of the overall catch, are frequently observed, while larger vessels or those with greater catch allocations have a disproportionately lower number of observed trips. Specifically it was stated that “many vessels are repeatedly sampled including those not responsible for much catch”. Several alternative sampling designs for at-sea monitoring were recently developed by a Council-appointed team including a proposal for proportional sampling, in which observed trips are allocated in proportion to allocated catch.

Given the significant questions regarding how the current data collection system works and potential areas of improvement, fishery monitoring was selected as a workshop topic – additional information is presented in Section 3.

Several aspects of the trawl surveys were discussed. The fishing industry has little faith that survey trends represent stock trends. Some participants were concerned that the survey gear may be inefficient for some species (e.g., flatfish), and the seasonal design may be inappropriate for others (e.g., cod spawning stocks). The size-selectivity of survey and commercial fishing gear and the relative efficiency of the Albatross and Bigelow surveys have important implications for stock assessment, but are not well known. Shifting distributions of fish stocks in response to climate change was identified as another potential problem for surveying groundfish stocks. Collaborative research in the form of industry-based surveys, application of alternative survey designs and technologies and selectivity studies were discussed as potential solutions.

2.2 Stock Assessment Process

The management system requires stock assessments that have predictability, efficiency and timeliness. Many meeting participants felt that it was not the science itself but the application of science within a narrowly defined process that produces administrative crises.

Twice per year the Northeast Regional Coordinating Committee (NRCC) meets to review upcoming management actions and to determine the region's scientific needs. From these meetings a stock assessment schedule is set for all 50 northeast stocks under management of the New England and Mid-Atlantic Fishery Management Councils and the Atlantic States Marine Fisheries Commission. Determination of the schedule is based on management requirements and the scientific needs (i.e. the age of an assessment, retrospective patterns). The NRCC is limited by the region's current capacity to conduct assessments. Approximately five assessments can be produced per year. The need for stock assessments far exceeds the current capacity.

The insufficient capacity for producing peer reviewed stock assessments is further exacerbated when stock assessments are inconsistent and 'crisis management' demands resources that could be devoted to the stock assessment system. For example, recent groundfish assessments indicated that previous assessments and catch limits were overly optimistic, and severe reductions in catch are needed to end overfishing or meet rebuilding plans. The magnitude of catch reductions resulted in an economic disaster. In the context of assessment inconsistencies and the economic crisis, stock assessments are scrutinized. In response to concerns about the quality of stock assessments, resources are devoted to addressing potential scientific problems, and the reallocation of these scientific resources sets back other priorities. Therefore, a comprehensive review of the stock assessment system is needed to help resolve assessment inconsistencies and poor performance of catch projections.

There is a need for increased capacity for stock assessments. A meeting participant stated, "we would like to have robust assessments, provided in timely manner that meet management needs and are broadly accepted." In order to increase production of stock assessments several

recommendations were made (1) exploring assessment methods that are not as complex and require fewer resources, (2) outsourcing assessments to regional partners such as regional universities, (3) the 'ICES model' in which a large through-put of annual update assessment apply accepted methods that are developed by occasional benchmark workshops, and (4) streamlining the data collection and processing to make data accessible in a timely manner.

Several participants from the management perspective felt that they would benefit from the presentation of a range of model choices. Current practice is for a single model to be selected within the assessment process. The results of the model are then reviewed by independent experts and finally given to the SSC to be translated into management advice. The SSC and Council are not presented with any alternative assessments. In scenarios where assessments are highly uncertain and difficult decisions need to be made, some attendees expressed the desire to have a range of options to choose from. Presentation of alternative reference points and models were suggested as one way in which the SSC and Council could make better decisions with respect the catch limits.

Some meeting participants felt that external reviewers within the stock assessment process were not familiar with management requirements from the Act and guidelines. Reviewers often recommend precautionary targets as proxies for the overfishing limit without knowing how the limits are used to form catch limits. When precautionary buffers are applied to precautionary proxies, the resulting catch limit may be more precautionary than intended.

Groundfish stock assessment are currently using $F_{40\%}$ as a proxy for F_{MSY}. It was noted by several academic participants that FMSY may be estimable now that a significant time series of data is available. Consideration of direct estimates of F_{MSY} was suggested. The selection of 40% was also discussed, it was suggested that 40% was a subjective decision, and noted that other regions utilize $F_{35\%}$. It was suggested that the selection of x in $F_{x\%}$ is a risk policy choice and should be presented to the Council as such. The discussion about reference point and model choice led to a proposal to improve communication on these choices from scientists to managers. There was discussion about revisiting definitions utilized in science and management such as overfishing, bycatch, sustainability, reference points. Reference point selection was chosen as a workshop topic (see Section 3).

Within the current system it is difficult for the SSC to reject an assessment. Recently the SSC was asked to provide advice on setting the ABC and OFL for the Georges Bank yellowtail flounder stock. The SSC was unable to come to a conclusion, about an appropriate OFL, due to the significant degree of uncertainty in the assessment (retrospective pattern). However, the assessment had already been accepted so is considered "the best available science". The development of specific performance metrics for assessments may aid in the selection of improved models. In the scenario that a model does not meet the performance standards it was suggested that a preselected fall-back plan be implemented in the interim. Additional information on the suggested plan is detailed in Section 2.3.

Many sources of information suggest that the ecosystem is changing. However, expected environmental changes, the impact on fish stocks, and how to adapt the science and management system to such changes are not well understood. Ecological shifts and their influence on stock assessments and the effectiveness of management measures need to be considered. Several important questions were asked during the meeting; (1) to what extent is climate change or the environment affecting stock abundance; (2) what do we really know; and (3) what can we expect to understand?

Climate change will likely have an effect on the distribution of fish stocks. It was suggested that acoustic arrays be set up to document the potential movement of species such as cod. Shifting stock distributions will have a variety of consequences for scientists and managers. Current survey designs may no longer be valid with respect to the new footprint of a species' habitat. Expectations of a stocks ability to rebuild may need to be adjusted. Life history parameters such as natural mortality may change. Stock boundaries may need to be redefined. Stock assessment models and management measures may need to adjust to all of these factors. Coping with environmental change was prioritized as a workshop topic (see section 3).

2.3 Management Process

Updated stock assessments for several of New England's groundfish stocks have resulted in significant changes in the perceptions of the stock, most often down-grading our perception of stock status. Unpredictable changes in stock status precipitate management requirements to end overfishing. Crisis management has become the norm in New England, which has a negative impact on the fishing industry as well as the scientific and management process. Resources are reallocated to address the crisis and are in turn diverted from other priorities.

Managers, scientists and fishermen agreed that more stability is needed in the management process. Several industry representatives suggested the development of a "fall-back" plan which could be implemented when stock assessments are rejected as a basis for fishery management. The fall-back plan could involve a catch limit that has, historically, resulted in an increase in stock size.

Many of the current fisehries crises (e.g., Gulf of Maine cod, Georges Bank yellowtail, etc.) have been caused by uncertainty in assessment results – when updated assessments did not corroborate the previous results and projections. Overly optimistic projections resulted in catch limits that were set too high, and in retrospect it was determined that, despite the fishery staying within the set catch limits, overfishing occurred.

Due to the complexity of fishery systems and natural ecosystems, a significant degree of uncertainty can be expected in stock assessments. Scientists aim to reduce this uncertainty by improving model choices and input data however this is often a long-term process. The present management system has the difficult task of accounting for scientific uncertainty in their decisions.

New requirements implemented in 2010 for fisheries subject to overfishing, and 2011 for all other fisheries, require that Councils establish a mechanism for determining Annual Catch Limits (ACLs) and Accountability Measures (AMs). In the absence of better information on what an appropriate buffer should be between the Overfishing Limit (OFL) and the Acceptable Biological Catch (ABC), a relatively simple ABC was applied to all groundfish stocks. Retrospective inconsistencies in most groundfish assessments precluded a probabilistic approach to ABCs. Given the guidance for specifying ABC as the lesser of 75%Fmsy or Frebuild, and the definition of optimum yield in the current Multispecies Fishery Management Plan as that associated with 75%Fmsy, the SSC recommended that the Council consider this ABC specification be applied to all groundfish stocks.

The simple ABC control rule developed by the SSC was intended to be an interim measure – although at this point it appears to have become the standard practice. Many meeting participants felt that a careful analysis of the costs and benefits of uncertainty buffers is warranted. Several important questions were asked; (1) what are alternative control rules?; (2) what are the probabilistic or statistical issues?; (3) what are the costs of buffers?; (4) why do we "pay the highest cost" for the most abundant species in forgone ABC?; and (5) can we incorporate risk into control rule decisions? The group felt that determining uncertainty buffers, particularly for groundfish, was an important regional issue that may warrant a workshop. Buffers were selected as a workshop topic, see Section 3, Workshop 3, for more information.

3. Proposed Workshops

There was general agreement that the workshops should be used, in part, as a vehicle to improve communication and foster trust. Problems with communication are apparent in all segments of the system. Participants called for better communication of management needs to scientists, improvement communication between industry and government and clear presentation of technical material. The New England fisheries management system has long has an adversarial culture, government and industry, and even between different segments of the fleet. The workshops will be developed with the general goal of fostering a constructive and positive attitude.

Specific comments from meeting participants include:

- Not all options are understood by external reviewers or effectively communicated to the SSC or the Council.
- Communication and education may help to resolve some problems.
- Clear presentation of technical information needed.
- Scientific alternatives should be considered.

Workshop #1 – Incorporating Environmental Change in Assessments and Management

Workshop 1 will address the incorporation of environmental change in assessments and management. The ecosystem is changing, but we are unsure of the impacts on fish stocks or how to account for such changes in the scientific methods or management approaches. Climate change is a monumental topic thus the workshop scope and terms of reference must be carefully crafted. It was suggested that the incorporation of environmental factors in the most recent herring assessment may be a good starting point. The general approach proposed was to consider case studies in which the incorporation of environmental variable has improved stock assessment and fishery management (e.g., New England herring, California sardine).

Workshop 1 – Draft Terms of Reference

1. Document changes, in the ocean environment, that have occurred in the New England region. Consider the potential for future changes. Identify effects on fish stocks.
2. Identify methods to account for these effects in science and management, particularly to incorporate environmental variables into stock assessments (i.e. herring assessment).
3. Identify data collection needs to monitor environmental change and the effect on fish populations.
4. Provide recommendations that are relevant to the general topic.

Workshop #2 – Fishery Monitoring and Survey Selectivity

Workshop 2 will address fishery monitoring and survey selectivity. The workshop will first examine the sampling theoretic related to fishery-independent survey design and the collection of catch data (fishery-dependent). Experts on sampling theoretic and topical practitioners will be invited. Given the wide scope of these topics, the workshop is expected to provide an overview and broad recommendations for a longer-term approach to improving fishery monitoring and surveys.

Workshop 2 – Draft Terms of Reference

1. Document current protocols and sampling designs for the fishery monitoring programs and resource surveys.
2. Document the current data needs of management and science, including any changes anticipated to these needs. Determine if these needs are being met by current sampling programs.
3. Recommend revisions to the current data collection system to improve the ability to meet the scientific and management needs.
4. Provide recommendations for an optimal sampling system to meet scientific and management needs.
5. Provide recommendations that are relevant to the general topic.

Workshop #3 – Reference Points and Uncertainty Buffers

Workshop 3 will address the reference points and uncertainty buffers. An appropriate starting point for the workshop terms of reference (TORs) are the recommendations made by the SSC in their report on MFI's analysis "A Report on Economic and Scientific Conditions in the Massachusetts Multispecies Groundfishery". In order to address the SSC's recommendations, the workshop should provide a catalog of reference points and document the effect of their utilization on the probability of overfishing and catch limits. Best practices should be developed utilizing different scenarios of data availability, and model choice. The workshop should also address the risk implications of these decisions. The workshop should document current practices relative to setting OFL-ABC buffers and address the potential costs and benefits of these buffers. The workshop should analyze alternative methods to setting buffers and should recommend best practices.

Workshop 3 – Draft Terms of Reference

1. Evaluate the biological, social and economic risk implications of commonly used F_{MSY} and B_{MSY} proxies.
2. Provide guidance on the magnitude of the buffer between OFL and ABC, which is intended to take account of scientific uncertainty.
3. Provide recommendations that are relevant to the general topic.

Appendix A. Meeting Participants

Attendee	Affiliation
Steve Cadrin	UMass Dartmouth, SMAST / NE SSC
Richie Canastra	Whaling City Auction, Groundfish AP
Jeremy Collie	University of Rhode Island
Wendy Gabriel	NEFSC
Dan Georgianna	UMass Dartmouth, SMAST / NE SSC
Vito Giacalone	NESC Policy Director
Mark Gibson	RIDFW & Council
Chris Glass	University of New Hampshire / Northeast
David Goethel	NEFMC
June Jiao	UMass Dartmouth, SMAST
Emily Keiley	UMass Dartmouth, SMAST
Steven Lohrenz	UMass Dartmouth, SMAST
Dan Morris	NERO
David Pierce	MADMF / NEFMC / Adjunct Faculty at SMAST
Brian Rothschild	UMass Dartmouth, SMAST
Kevin Stokesbury	UMass Dartmouth, SMAST
Bob Vanasse	Saving Seafood

Appendix B. Agenda

End-to-End Review of New England Groundfish Stock Assessments
Scoping Meeting

January 2, 2013, 10:00 a.m. – 5:00 p.m.
SMAST (706 Rodney French Blvd, New Bedford) Conference Room (108)

10:00 a.m. – 12:00 p.m. – Introductions and Individual Perspectives

1) Welcome to SMAST – *Steve Lohrenz*
2) Introductions – *Steve Cadrin*
3) Review Agenda – *Steve Cadrin*
4) Introduction of MFI and the End-to-End Review – *Brian Rothschild*
5) Identification of the challenges with New England groundfish science and management (**please prepare ~5min statement of your perspectives for items b-f**)
    a) NEFSC plans for national review - *Wendy Gabriel*
    b) NERO perspective - *Dan Morris*
    c) Council perspectives - *Mark Gibson, David Goethel, David Pierce*
    d) SSC perspectives – *Steve Cadrin, Dan Georgianna*
    e) Academic perspective- *Jeremy Collie, Chris Glass, Kevin Stokesbury*
    f) Fishing Industry perspective - *Vito Giacalone, Richie Canastra*

12:00 – 1:00 p.m. Working Lunch

1:00 – 5:00 p.m. Scoping Discussion *(moderated by Steve Cadrin)*

6) Discussion of priority issues that can be addressed by regional workshops
7) Identification of priority issues to be addressed by regional workshops
8) Expected product for each workshop

3:00 – 3:30 p.m. Break

9) Scheduling of workshops
10) Critical invitees for each workshop
11) Next Steps

Adjourn 5:00 p.m.