



New England Fishery Management Council

50 WATER STREET | NEWBURYPORT, MASSACHUSETTS 01950 | PHONE 978 465 0492 | FAX 978 465 3116

John F. Quinn, J.D., Ph.D., *Chairman* | Thomas A. Nies, *Executive Director*

MEETING SUMMARY

Ecosystem Based Fishery Management (EBFM) Committee

Sheraton Harborside Hotel, 250 Market Street, Portsmouth, NH 03801

January 23, 2017

The EBFM Committee met on January 23, 2017 in Portsmouth, NH to receive and evaluate a report from the Plan Development Team (PDT) on providing ecosystem catch advice and on applying operating models to evaluate management strategies.

n Operational Framework to support development of an example Fishery Ecosystem Plan (eFEP). The committee also discussed how and when the next phase of eFEP would proceed.

MEETING ATTENDANCE: John Pappalardo (Chairman), Dr. Matthew McKenzie (Vice Chair), Mary Beth Tooley, Dr. Michael Sissenwine, Dr. Michael Armstrong (substituting for Dr. David Pierce), Richard Bellavance, and Eric Reid; Andrew Applegate (NEFMC staff, PDT chair) and Tom Nies (NEFMC Executive Director) and Rich Seagraves (MAFMC staff); William Whitmore (NMFS GARFO staff); and Dr. Michael Fogarty (NEFSC). In addition, six members of the public attended, including Megan Herzog, Allison Lorenc, Greg Wells, Emily Tucker, Katie Almeida, and Chris McGuire.

Presentations and background documents are available on the Council's EBFM web page (<http://www.nefmc.org/calendar/jan.-23-2017-ebfm-committee-meeting>).

KEY OUTCOMES:

After hearing reports from Mr. Applegate and Dr. Fogarty on the draft Operational Framework document, the committee discussed the PDT report and reached the following conclusions:

- The Council is pursuing a fundamentally different EBFM approach relative to other Fishery Management Councils and management authorities. Unlike other EBFM approaches, the NEFMC is focused on place-based management and trophic guilds (i.e., energy production units) as management units rather than managing fish stocks using independent harvest control rules. The new approach addresses the implications of both biological interactions (i.e., predator/prey) and fishery interactions (bycatch and mix species fisheries).

- While the scientific underpinning of the Council approach has been advanced over several decades, full management applications are rare and incomplete. Such fundamental management changes will require a long-term commitment to address unresolved scientific, management and legal issues, as well as improving general and public understanding of the approach.
- It is only natural to question if the effort required for such a fundamentally different management approach is worthwhile, or if it will actually be successful. The Committee's response is that real positive change is always challenging and risky, but it will be worth it if it results in:
 - A more scientifically defensible underpinning for fishery management,
 - A framework for managing mixed stock fisheries,
 - A simpler and robust approach with fewer biological reference points that constrain management options but yet provide sufficient conservation and protection for individual stocks, and
 - Management procedures that are potentially based on simpler stock assessment methods that are less susceptible to problems plaguing current stock assessments.
- The Committee continues to believe that a detailed "worked example" of the approach using actual current estimates is a necessary next step to improve general and public understanding, identifying both opportunities, challenges, and issues with a new management approach. This worked example should be more comprehensive (than the 10-species demonstration presented) about how stock complex control rules would be applied and also be clearer about how an ecosystem catch cap is derived from and is based on measures of primary productivity.

Introduction

Mr. Pappalardo opened the meeting at 10:10 am with a brief introduction and summary of the agenda. The focus of the meeting was on a Plan Development Team report describing how catch advice could be integrated into an EBFM framework, based on energetic principles and specifications for stock complexes. The committee also was presented with a demonstration of the potential application of ecosystem operating models (based on a length-based 10-species 'Hydra' simulation model and a surplus production based 'Kraken' model that applied portfolio theory to maximize net returns) to evaluate various management strategies.

The committee discussed the utility of the two approaches presented and provided feedback on the next steps to develop an example fishery ecosystem plan (eFEP) for Georges Bank, which would be used to solicit stakeholder input on operating models, goals, objectives, performance metrics, tradeoffs, and optimal outcomes through a management strategy evaluation (MSE) process.

AGENDA ITEM 1–PROVIDING CATCH ADVICE FOR A FISHERY ECOSYSTEM PLAN (eFEP)

Presentation

On behalf of the PDT, Mr. Applegate gave a summary presentation of the material in Document 2b (<http://s3.amazonaws.com/nefmc.org/Document-2b.-Providing-catch-advice-for-a-fishery-ecosystem-plan-eFEP.pdf>) and summarized in Document 2a (http://s3.amazonaws.com/nefmc.org/2a.-Overview-memo-from-PDT-chair_1.pdf). He stated that the PDT had completed a considerable amount of work in a very short period to respond to the committee's request and guidance. He said that the PDT had had difficulty understanding what the committee wanted for a 'worked example' and that the committee responses to questions posed in December had helped.

Briefly, Mr. Applegate reviewed the guidance the committee had made at previous meetings and the main components of the "Draft Operational Framework" document (<http://s3.amazonaws.com/nefmc.org/2b.-Draft-Operational-Framework-and-Operational-Models-to-Support-Fishery-Ecosystem-Plan-Development.pdf>) that was presented to the committee and Council in September, including three ecosystem simulation models, an operating model to provide strategic advice and guidance, and an operational framework which described a management strategy evaluation (MSE) process, use of assessments to provide tactical advice, catch limit specifications for the ecosystem based on energetic principles and functional group or stock complex specifications related to maximum sustainable yield (MSY) and allowable biological catches (ABC). Other measures would apply to prevent species from becoming overfished or depleted.

This report and presentation described in more detail how the Council could develop an overall catch cap based on system energetics which are measured and derived from satellite-based measures of primary production. He said that by seasonal chromatic analysis scientists can estimate the amount of new primary production that would become available to higher trophic levels. To get to an ecosystem cap for harvested species, additional allowances would be needed to account for diversions to microbial loop and non-fished species to derive a cap for fished and managed species. Under the presented catch limit framework, stock complex catch limits would be balanced to optimize multiple ecosystem objectives, with minimum biomass thresholds to protect individual species from depletion and overfishing, and would not in total exceed the ecosystem catch cap. Mr. Applegate showed a diagram that described how the various components worked together, developed by Ms. Amanda Hart at UMASS Dartmouth.

Discussion

Many on the committee felt that the summary document 2a was a helpful description of the proposed framework. However, many questions were raised about the catch framework, often focused on the relationship between an energetically-based ecosystem cap and the catch limits for stock complexes.

Mrs. Tooley asked if there were examples of applying an ecosystem cap based on primary production (PP) in other areas and whether the PDT had considered any alternatives that should be considered. Mr. Applegate and Dr. Fogarty answered that although an ecosystem cap had been adopted on the west coast, for in particular the California Current FEP, this would be the first direct application based on system energetics. Dr. Fogarty added that ecosystem caps were also established for the Aleutian Island and Bering Sea FEPs. Mrs. Tooley felt that the committee and Council would need more information on using PP as the basis for setting a catch cap.

Dr. Sissenwine also thought that we are cutting new ground and there are probably not many examples of actual applications of this approach. But he said there is a very broad range of literature of energy flow approaches, based on Ecopath, with estimates of yield to primary production. Actually applying these estimates for management is new ground.

Dr. McKenzie pointed out the ratio between microplankton to total primary production and is independent from catch rates. Mr. Applegate explained that the amount of new productivity as a rate had been applied in the operating models, in lieu of a direct estimate from the PP estimate. Dr. McKenzie also asked for clarification about the terms 'functional group' and 'stock complex'. Mr. Applegate explained that 'functional group' was identified as a set of species that are caught together in a fishery, whereas a 'stock complex' was brought forward as a group of related species with similar trophic and life history characteristics that can be managed together, with a common set of catch specifications, which is a concept that is addressed in the revised National Standard 1 guidelines. He added that biomass floors would be established for individual species to trigger action and ensure that a species does not get into trouble. Those actions could for example be specific catch limits, a type of point system, selective gear, or specific area closures. Dr. Sissenwine added that the relationship between a functional group and stock complex need to be harmonized, be compatible, and make sense in the way that they are used and applied for management.

Dr. Sissenwine thought that the example of setting an ecosystem cap with catch limits for aggregated groups of related species made sense, but how they should be aggregated is in the eye of the beholder. An important consideration for management purposes is that a stock complex would need to be harvested together in a fishery.

Mr. Pappalardo agreed that it will be important to establish some agreed on terms and concepts, to provide a frame of reference about what the Council is considering. He felt that this was beginning to gel. He understood that the framework being proposed is using PP or a PP ratio to set an ecosystem catch cap. He thought what the document was saying was that 27-30% of the PP was generated and moved up the food chain to species that we are managing. Mr. Applegate clarified that there was a missing step, that about 2/3rds of PP made it to higher trophic levels, about 18-20%, according to work that has been done. Mr. Pappalardo asked if that level plus another filter could be used to set a catch cap.

Dr. Fogarty said that the catch cap could consider other factors that the Council wanted to be considered. He elaborated that the particular approach that is put forward in the PDT document is a fraction of PP that is renewed every year, representing growth potential at the start of the year. It gives us a rate approach and definition as an avenue to recruitment and ecosystem overfishing, as a rate process. We also need to define overfished or depleted levels. Thus an overfishing level at an ecosystem level and biomass floors at the individual species level. He felt that a 'gut' check is needed to evaluate how it related to what we have been achieving from the ecosystem. We can look at the observed patterns in the fishery and how much has been removed from the ecosystem, including total biomass estimates from the survey, telling us about how the energy has been distributed in the system.

Mr. Nies asked about how the estimated primary production carbon generation would apply to an ecosystem catch cap. Mr. Reid also how a lower level of metric tonnes of catch relates to measures of primary production. He felt that to put this in perspective, the total removals need to be expressed in terms of their total carbon impact. Mr. Reid added that we need to think about the effect and impact of discards, whether or not we allow discarding to continue occurring.

Dr. Fogarty explained that the primary production grams Carbon estimates do not translate directly into catch and that different values are applied in the models. He said that the 3.8 million mt PP estimate is not for the catch cap. He explained that the models apply an exploitation ratio at a level that accounts for the annual renewal of energy in the ecosystem. He added that to reduce variability, a three-year average could be applied to determine the appropriate exploitation rate to use.

Dr. Sissenwine asked how lobsters and scallops would be considered under an ecosystem catch cap, since these species have a different trophic relationship compared to teleost and elasmobranch fish?

Dr. McKenzie asked for more clarification about how ecosystem-based limits would compare to what is being achieved now for Georges Bank stocks, compared to single species MSY and current catch (or fishing mortality). He noted that for most stocks, the actual catches are not at F_{msy} . He was curious how the ecosystem F rate ratios compare to them. Mr. Applegate pointed out that much of the information about current catch levels and MSY is shown in the 'Appendix I' table, presented to the committee and Council in September. He added that the general concept is that single species MSY levels in total are higher than what the ecosystem can produce based on amounts of PP available to the higher trophic levels for harvested fish and shellfish.

Mrs. Tooley thought that the ratios applied in the operating model demonstration were quite a bit lower than the B_{msy} values that have been estimated for many of the managed stocks. She was curious about the minimum biomass thresholds based on a proportion of unfished biomass, how it relates to B_{msy} . She felt that people will struggle with definitions and flipping from a proportion of B_{msy} vs. a proportion of unfished biomass. Mr. Applegate pointed out that the values selected were chosen mainly for demonstration and that many of the current fishing mortality rate estimates are in the neighborhood of 0.1 to 0.3. Mr. Applegate added that the models are designed to help evaluate sustainability, taking into account trophic relationships, but that each species would exhibit differing levels of sensitivity to higher fishing mortality rates.

AGENDA ITEM 2 – EXAMPLE APPLICATION OF OPERATING MODELS FOR GEORGES BANK ECOSYSTEM PRODUCTION UNIT (EPU) STRATEGY EVALUATION

Presentation

On behalf of the PDT, Mr. Applegate summarized the material in Document 3 (<http://s3.amazonaws.com/nefmc.org/Document-3.-Example-application-of-operating-models-for-Georges-Bank-ecosystem.pdf>), which presented a demonstration of how two types of operating models could be used to test and evaluate management strategies and harvest control rules (HCRs).

The first demonstration compared two types of HCRs applied to the stock dynamics and trophic interactions between 10 species caught on Georges Bank: winter flounder, yellowtail flounder, spiny dogfish, winter skate, haddock cod, Atlantic mackerel, Atlantic herring, silver hake, and monkfish. These species were chosen because they make up the majority of the commercial catch from Georges Bank and they represent species that have well-estimated trophic interaction parameters. To apply exploitation rates, these 10 species were also grouped by fishery where they are commonly caught together.

One set of HCRs were applied to compare results (i.e. performance metrics) using constant exploitation at three levels: 0.15, 0.20, and 0.30. Another set of HCRs used the same maximum exploitation, but also applied an exploitation ‘ramp’ when stock biomass declined below a threshold, set at 30% of unexploited biomass (i.e. B_0) for elasmobranchs (i.e. spiny dogfish) and 20% of B_0 for all other species. An additional HCR scenario was demonstrated using a ‘ramped’ exploitation approach with a minimum biomass threshold of 50% of B_0 for individual species.

Reported performance metrics included stock complex and species biomasses, catch by species complex (and although not reported, by fishery), and the percent of iterations that stock complex and species biomasses declined below their respective minimum biomass thresholds. Unsurprisingly catch was relatively constant across the range of exploitation rates and biomass declined with increasing exploitation. The planktivores tend to have more variable recruitment and therefore tended to have higher levels of risk (declining below a minimum biomass threshold) than other stock complexes. Although not presented here, net revenue as a performance metric could be applied by estimating fishing costs by fishery as a function of exploitation.

Example results from the portfolio analysis were also shown, comparing an historic scenario to an optimized bounded strategy. Performance metrics shown included catch, revenue, and biomass. For some species, the historic scenario catch was too high while for others too low. The optimized strategy will however depend on the relative importance of various objectives established by fishermen, interested people, and managers.

To give the concepts more realism, Mr. Applegate presented a summary of Georges Bank (statistical area 511,522,525,526,561,562) commercial landings, commercial catch (discards estimated from 1994 to 2016, and catchability-adjusted swept area biomass. Most herring fishery landings and bycatch had not yet been incorporated because these data reside in a different data set that had not yet been analyzed.

Discussion

Committee members had some difficulty understanding the output from the Hydra model examples, which were all scaled to the maximum value of a result for each trophic group. Mr. Applegate walked the committee through some examples, pointing out that at a specific fishing mortality rate, the planktivore group tended to have higher variability in recruitment and therefore biomass, indicating a higher risk of biomass declining below the minimum biomass threshold. He added that one main reason for scaling the results relative to the maximum value for each group is that the values for catch and biomass were usually very different among the trophic groups, with high biomass for planktivores relative to other trophic groups for example.

There were also some questions about the historical reference period used in the portfolio analysis, represented by white bars, and how the results for the 'optimized' strategy were derived from the simulation.

Dr. McKenzie asked if the size of the error bars can be linked to factors of risk. Mr. Applegate replied that the error bars represent variance in catch and biomass, so if stability is a desirable outcome, then the size of the error bars can be related between different types of HCRs.

In response to ER's question, Dr. Fogarty said that spiny dogfish, silver hake, and haddock do have interactions with the herring fishery as bycatch, which has been taken into account by the Hydra model parameterization.

Mrs. Tooley compared biomass across the three runs and thought that it was odd that the planktivores fell below the minimum biomass threshold more often than the other trophic groups. Mr. Applegate said it was related to recruitment variability and the application of constant fishing mortality. He said that this risk is somewhat addressed by HCRs that apply a ramped fishing mortality when biomass is below the minimum biomass threshold. She asked how that was determined, based on the past 25 years or some other value?

Mrs. Tooley asked about lobsters and scallops, which were not included in the demonstration model results because they have little trophic interaction with the 10 species, but she pointed out that they consume a lot of the energy from PP that becomes available and asked how these species would be taken into account, under the ecosystem catch cap. Dr. Fogarty said that this

was an important issue, but this is one reason why a ratio is applied as an exploitation fraction, because it is scalable to the species included in the operating models. Mrs. Tooley thought that the models need to account for the energy consumed by species that are not included in the models or in the stock complex MSY estimates. She thought that the appropriate exploitation rate would vary with time, depending on the relative biomasses of trophically related species. Dr. Fogarty agreed that the rate could vary over time but would be related to the fraction of annual PP that is being renewed and available to higher trophic levels, which could be affected by climate change and forcing. He added that for these operating model demonstrations, there was a set three-year window when fishing mortality was held constant, but that that window could be changed by managers to be more stable or more responsive to short-term changes in the system. He said that this demonstration focused on the framework, whether it would work to set exploitation rates for the stock complexes and biomass limits for individual species. Other factors, such as climate change effects can be evaluated in these models.

Dr. Armstrong asked how the operating models were initiated and Dr. Fogarty replied that the 10-species model were run in simulation mode with zero exploitation to initiate the starting point in an unexploited state. Dr. Fogarty replied that this simulation, the 10 species have a size structured population model in the unexploited state as a starting point. All the energetic considerations are therefore implicit in the model, rather than being explicitly set outside of the model. The focus is on the fraction of PP that is renewable.

Mr. Applegate suggested using a different perspective, from an historic point of view. We know that the ecosystem relationships have been out of balance, but in terms of an ecosystem cap we can examine estimated total removals by the fishery for Georges Bank over a long period, going back at least to 1994 for catch, and put that into perspective in light of measured trends in biomass of fish and shellfish. He showed the committee some preliminary landings and catch estimates for Georges Bank. Mrs. Tooley asked that the committee be provided a list of what species belong to the stock complexes represented on the graphs.

AGENDA ITEM 3 – EFEP DEVELOPMENT PROCESS

Presentation

Mr. Applegate reviewed the approach to FEP development that the Council selected in 2015, to develop a realistic example or prototype FEP. The work so far has centered on Georges Bank because this is where most of the trophic dynamic ecosystem models have been applied. The intent of this eFEP is to describe how the system could operate and focus debate when soliciting further public input.

Mr. Applegate described the work that the PDT has done toward this end. Although the concepts and components were coming together, there remained work to be done on describing the important issues and elements of each component, including goals and objectives, ecological overfishing thresholds, species depletion/ecosystem risk, forage fish management, bycatch, ecological habitat consideration and spatial management, access to fisheries, and coordination by management bodies. He indicated that when this Phase II work was completed, the Council would be well-positioned to solicit input through a planned management strategy evaluation in Phase III.

Mr. Applegate asked the committee on feedback and guidance as to how close we are to starting Phase III and begin planning a management strategy evaluation (MSE) process. He also asked the committee what additional details about an eFEP that the committee wanted to see next.

Discussion

Mrs. Tooley asked what type of product that we should take out to the public, how complete the eFEP should be. She thought we need to make some decisions up front, or is the Council going to go through a deliberative process before we go out to the population. She thought that discussion about an advisory panel and how to get educated on the topic was warranted.

Dr. McKenzie agreed that early buy-in will help the process along and suggested that this might be the point to open the dialogue with the legal types to identify where the potential problems lie. He thought that we should lay the groundwork for an MSE, but should not begin it too soon before some questions are answered.

Drew Minkiewicz doesn't feel he understands many of the concepts, and they weren't yet in a digestible form. He thought a lot more needs to be done to engage the public, so there is understanding about what is trying to be achieved. Dr. Sissenwine agreed that it will require a considerable amount of explanation focused on a tangible example. He said that it will take a multi-year commitment to develop a stand alone FEP, based on a tangible worked example. Once that decision is made, then it would be the right time to engage the public and begin scoping. He thought a systematic response to a series of questions would be useful in this regard. He felt that estimates of ecosystem MSY and criteria for defining overfishing and overfished will be needed. We need to provide an example that if we had an FEP, this is what management of Georges Bank is like, compared to what it is like now. He felt that we need to specify the details and take whatever time is needed to do that, using a tangible worked example recognizing it as a snapshot that will vary over time.

Mr. Pappalardo agreed that it will be difficult to get buy-in for the next step without a more tangible, understandable example. Mr. Applegate expressed concern that some of the PDT members are more comfortable bringing forth a general conceptual framework, but they were not comfortable being more specific with catch and reference point estimates. He said that these values need to be estimated but are related to how the Council specifies the goals and objectives. As an example, he pointed out that the MSY specification would be very different if the fisheries focus on lower trophic level species than if more of the catch comes from higher trophic level species. Dr. Sissenwine suggested defining MSY as being conditional on various aspects, including climate effects, trophic structure, and fishery selectivity. He recommended comparing them to the existing set of single species reference points and catch levels for species that are caught on Georges Bank. It is important that people understand how a new management regime would be different from what they know. Mr. Applegate asked if we needed to be so specific or be place more emphasis of developing a conceptual framework, with a discussion of the issues associated with the elements of an FEP.

Dr. Armstrong felt a worked example with numbers, even if theoretical, would help explain to people how the concept would be applied. Just the concept of basing catch limits on levels of productivity will be shocking to people, he said, because it is so different from the way that we currently manage.

Dr. McKenzie was concerned about a reaction to hypothetical numbers. The foundation of the proposal has to be well explained. Mrs. Tooley recognizes the worry of taking out a theoretical example that might not be clear. She wondered how the jurisdictional issues would be handled in a realistic example. She thought it will be important for people to understand how their business would be affected by the proposed ecosystem approach. As a means of communication, Mr. Pappalardo wondered if we could explain how to arrive at our current performance if we had been operating under an eFEP¹.

Mr. Reid thought it will be important to translate estimates of primary productivity and compare that with 50 years or so of protein, fishery production. It would be helpful to explain how much of the primary production becomes available at each trophic level. He saw that path as one that we would have a product that the average person could understand. Mr. LaPointe commented that it would be helpful to understand the steps and process for setting an overall catch limit based on primary productivity, specifying the steps taken to get from grams of carbon production to pounds of fish.

Dr. Sissenwine added his thoughts that it is appropriate to go forward to see where the appropriate science leads us, then have the discussion of what can be done within legal bounds, or if policies need to be altered. We need to demonstrate what is the right thing to do, with solid scientific grounds. Regarding the need to develop a more specific worked example, it would be reasonable to expect numerical results, even if it is a hypothetical example using realistic management rules. He thought that the PDT needs to make this worked example as specific as they can, involving more than 10 species as a demonstration. It is useful to develop it as a realistic example for Georges Bank and compare it to how we currently manage, to help the Council and the public to understand what is being proposed. Mr. Minkiewicz emphasized the need to develop an FEP that is compliant within the current legal framework with numbers that people can understand how it would be different from what they are doing today, with catch recommendations. He thought that what has been presented is much too theoretical for people to understand.

Addressing the concerns that had been raised, Dr. Fogarty agreed that we need to come to a place where there are a specified set of numbers for Georges Bank, even if it is in a virtual world. He reminded the committee that there has been a request for a CIE review, because we need to assure that the appropriate review processes had been followed. It is an important issue. He said that it is important that the EBFM concept makes us face up to the tradeoffs, many of which are implicit in current management process, but not recognized. He recommended that we lay out basic principles and concepts, including the concept of an ecosystem catch cap, a comparable overfishing level for stock complexes, and minimum biomass thresholds for individual stocks, explicitly taking into account the fishery and biological interactions.

¹ To a large extent this is what was presented in the portfolio analysis approach, comparing current performance by stock with an optimal economic strategy.

Mr. Nies thought that the recommended approach to design a system then tell people what the outcome and catch limits would be would be a lot like the process followed for (Multispecies sic) Amendment 16, which established catch shares and the allocations came later. People were surprised that the allocations were not what they had signed into. He did not think Dr. Fogarty's recommended approach was the way to go and the Committee should think carefully about what you want to get (out of the PDT sic). He is also concerned about how the cross jurisdictional issues will be handled, with squid, Jonah crab and lobsters, and Canadian groundfish as example issues. He thought that we would need some specificity and numbers before we start talking with other management authorities about allocations and management issues. He said that details would need to be fleshed out in order to address these questions. Mr. Whitmore added that it is unclear how the Council will shift from a hypothetical example to a real plan that can be implemented.

Mr. Applegate replied that many of the latter issues raised have been drafted in decision documents that have not yet been fully reviewed and revised by the PDT, because of the latter focus on the reference point and catch limit framework. He felt that in the September and January documents, the PDT has demonstrated how the operating models could be applied to evaluate different types of harvest control rules. He felt that focusing on the broad procedural context was more important at this stage rather than honing down on specific numbers. He felt that the habitat amendment process is more analogous to what we are trying to do with this FEP than other types of Council actions. In the habitat analysis, a conceptual model of gear impacts and bottom sensitivity was developed, much like the operating models, and then different strategies were evaluated relative to our model estimates. He suggested identifying the framework for making decisions to bring out the important issues, which by engaging the public would develop as a plan or a policy in existing plans to use going forward. He understood the utility of demonstration with practical numbers, but he felt we are a ways away from that and we should frame the issues and components of an FEP to begin the public dialogue. Committee guidance in how to proceed is needed, he said, perhaps identifying which components and issues should be brought forth next.

Mrs. Tooley thought that the key was developing an common understanding of the science and the ways it would be used in an FEP. She recommended focusing on the catch advice for a period of time so that the conceptual framework for setting catch advice is clearer. She favored a comparison to the existing management system as a means of effective communication. She asked for a simple outline of what species we would be managing in a Georges Bank FEP and asked for easier access to documents on the NEFMC web page. She wondered whether the FEP would be applicable to only the 10 species in the operating model and how were the 10 species chosen. She felt that the starting point should be the underlying science and getting everyone on the same page.

Mr. Pappalardo asked the committee to provide some guidance for the PDT, the next steps to bring forward. Although today's discussion has been helpful, he thought that most would need time to digest the reports provided by the PDT. Mr. Applegate said that based on this meeting, he could work with the PDT to identify how the ecosystem catch cap would be derived from measures of primary productivity, that this could be explained better. He suggested instead of

developing a fully fleshed out worked example with numbers, that the PDT focuses on the elements of an FEP, many are not scientific but the issues are more a matter of policy, either vetted through the PDT or brought directly to the committee. He is looking for more guidance in the short term what would be most helpful in moving forward.

Mrs. Tooley felt that focusing on the policy issues like permits and jurisdiction would sidetrack people from what the core issues area, particularly when there is science that we need to be educated on, identifying what the benefit would be with this alternative management approach. More details on what has been provided is needed, e.g. what would be managed beyond the 10 species. Need to understand how we are doing it now, compared to this approach, explicitly how a new system would work. Mr. Pappalardo asked how we would go from the ecosystem productivity to how we would assign a catch value to each one of the boxes in the diagram, how do we make those decisions. At what frequency, would we evaluate our management plan and how would trawl survey and fishery dependent information would be used. The committee agreed that that next focus should be on how we would get from measurements of primary productivity to catch caps for functional groups of species.

The committee briefly discussed when it would be appropriate to formulate an advisory panel. Mr. Pappalardo thought that we would decide in April or June whether to engage an advisory panel (AP). Mr. Applegate thought that the Council needs to be deliberate in that action, knowing what we are going to use the AP to do. Otherwise it would be just another meeting to administer and facilitate without much benefit. Mrs. Tooley thought that an AP would be helpful in finding out how people interpret and react to the scientific concepts. Dr. McKenzie thought that there was a lot more to be done before it would be useful to engage an AP in the process, being very clear about its relationship to the development process.

Mr. Pappalardo asked about the issues to be addressed by a CIE review of the operating models. Dr. Fogarty said that it would be helpful for the Council to help identify the terms of reference for the review. Mr. Applegate said that one of the questions at the recent SSC meeting was how much are the outcomes preordained or baked into the model by the assumptions and parameter choices. He recommended that it would be helpful to evaluate this with a series of sensitivity analyses for the CIE review. Dr. Fogarty was not sure of the timing of a CIE review or when input on draft terms of reference would be needed. Mr. Nies said that he was not aware that this review was on the assessment schedule.

The EBFM Committee meeting began at 10:10 am adjourned at approximately 4:15 p.m.