NEFMC RISK POLICY WORKSHOP

March 20-21, 2013

WORKSHOP SUMMARY

Hosted by the
New England Fishery Management Council
With support from the
Fisheries Leadership & Sustainability Forum

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Executive Summary

The New England Fishery Management Council (NEFMC), with the support of the Fisheries Leadership & Sustainability Forum (Fisheries Forum), convened a Risk Policy Workshop March 20-21, 2013 in Salem, MA. The goal of the workshop was to provide a structured platform for discussion between NEFMC Council members, Council staff and advisors, Scientific and Statistical Committee (SSC) members, NOAA Fisheries staff, and other management partners to advance the development of a risk policy used to determine acceptable biological catch (ABC) buffers for New England fisheries.

The workshop began with introductory presentations on the concepts of risk and uncertainty and a review of the National Standard 1 (NS1) guidelines as they pertain to accounting for risk and uncertainty when specifying ABCs. Participants reflected on their experience setting ABCs for groundfish and scallops and also learned from other councils' experiences in developing and implementing ABC risk policies and control rules. Drawing on these experiences, the group characterized what a successful risk policy for New England fisheries could look like and what they hope it will achieve. On the second day of the workshop, participants rotated through four working groups where they explored the biological, ecological, social and economic considerations associated with setting catch levels and discussed where in the process those considerations are most appropriately addressed. Building on the presentations and discussions over the course of two days, participants shared their perspectives on the elements of a successful risk policy for New England fisheries, and generated ideas on how to move forward.

The following sections of the executive summary are intended to highlight the key concepts, discussion themes and general outcomes from the Risk Policy Workshop. These ideas outlined are not meant to be comprehensive and do not represent agreement or consensus among the group; rather they capture the salient ideas, observations and recommendations from the group's discussion.

Key Concepts

Risk
The concept of risk is often associated with the probability of an event occurring. However, risk is a function of both the **likelihood** of an event and the severity of associated **consequences** should the event occur. In a fishery management context, managing to the same probability of overfishing for two stocks can result in drastically different consequences and thus pose significantly different levels of risk. Participants noted that perceptions of risk, and therefore risk tolerance, can be subjective. Individuals may perceive risks differently depending on how they view different consequences and the value they place on certain outcomes.

Uncertainty
Uncertainty in a fisheries management context can arise from knowledge uncertainty or natural variability. Knowledge uncertainty can be reduced through additional data and

analysis, while natural variability, the result of inherent variability in natural systems, cannot be controlled or reduced through science or management. Scientific uncertainty, a type of knowledge uncertainty, refers to incomplete or imperfect data, parameters, and scientific modeling that can result in uncertain OFL estimates. The National Standard 1 (NS 1) guidelines instruct SSCs to establish ABCs at a level equal to or below the OFL to account for scientific uncertainty.

ABC Control Rules
ABC control rules are policies established by the council with advice from its SSC, intended to limit the probability of overfishing occurring. The NS1 guidelines specify that control rules should clearly articulate how far below the OFL the ABC will be set based upon the level of scientific uncertainty in the OFL estimate, and should take into account uncertainty in stock assessment results, time lag in assessments, retrospective patterns and projections. Control rules should reflect the council's risk tolerance, but must result in less than a 50% probability of overfishing per the NS 1 guidelines.

ABC Risk Policy
In addition to establishing ABC control rules, councils can also establish complementary risk policies, which articulate the bounds of how risk tolerant or risk averse a council should be given certain criteria. Risk policies inform and work in conjunction with a council's application of a control rule.

Discussion Themes

Accounting for uncertainty
While the NS1 guidelines separate scientific and management uncertainty, participants felt that the distinction between these types of uncertainty is blurred through the science-management feedback loop. Participants discussed the lack of clarity regarding where these sources of uncertainty should be accounted for in the ABC/ACL specification process. The group also highlighted the need to recognize the interplay between scientific and management uncertainty, to avoid "double counting" (accounting for the same source of uncertainty twice) in the specifications process.

Understanding the relationship between stock status and consequences
Working group discussions on biological, ecological, social and economic consequences of catch limit decisions highlighted how adverse consequences are often more severe (or perceived as such) in the case of overfished stocks. For example, the economic consequences of setting a precautionary catch limit are viewed as more significant for overfished stocks with low catch levels than for healthy stocks with higher and/or more stable catch levels. Participants noted that the relationship between stock status and severity of consequences could inform the Council's risk policy and control rules in two ways: first, by acknowledging stock status as a contributor to adverse consequences, and second, by informing the Council's tolerance for the risk of overfishing.

Using clearly defined process
The group emphasized the need to clearly differentiate between ABC control rules, harvest control rules, and risk policy. While these pieces are linked through the stepwise specifications process, it is important for them to remain discrete. Though informed by scientific advice, the Council's risk tolerance is ultimately a policy decision, and should be clearly articulated in a risk policy.

Clarifying roles and responsibilities
Participants felt that the respective roles and responsibilities of the Council and SSC in developing ABC control rules and risk policies for New England fisheries are unclear. In particular, workshop participants questioned how the social scientists on the SSC can contribute to the Council's exploration and evaluation of social and economic risk considerations. The risk policy and ABC control rule development process would benefit from clarifying the roles of each body, and how they are expected to contribute and interact.

Outcomes

Start Simple
Although the working group discussions highlighted the importance of biological, ecological, social and economic considerations in fisheries management, workshop participants generally felt that it may be too challenging to incorporate all of these factors when setting ABCs, and/or that they are more appropriately addressed through other pathways. Ultimately, many participants placed a high value on simplicity and felt that a simple, understandable approach for specifying ABCs is preferable to a comprehensive approach that spans the breadth of risk considerations.

Adapt risk policies and control rules over time
The experiences shared from New England and other council regions demonstrate that risk policies and control rules are not static management measures. They are in fact, evolving processes which can change over time as the Council responds to new information, adapts to changing priorities, and learns from past performance. Workshop participants felt that a simple risk policy, such as that employed by the Mid Atlantic Council, could be a useful starting point for New England. This approach can be improved incrementally over time as additional data and methods allow for broader incorporation of other risk considerations.

Balance consistency and flexibility
Many participants value a consistent, transparent, data-driven approach to guide ABC specification and establish clear expectations among stakeholders of how ABCs will be determined. Others valued the ability of the Council to be flexible in responding to different circumstances and adapting their approach to the different life histories and management realities of New England stocks. There was general momentum among workshop participants to develop an approach that balances the need for consistency

while still allowing the Council flexibility to effectively manage to broad range of stocks under their jurisdiction

Summary Guide

The purpose of the following summary is to capture the themes of workshop discussions, serve as a resource, and support NEFMC's goal of developing an ABC risk policy for New England fisheries. This summary is organized in chronological order and covers the following sections within the agenda:

Part I. Background and Context
Part II. Learning from Experience
Part III. Characterizing a successful risk policy
Part IV. Risk Consideration Working Groups
Part V. Looking Forward

Supporting materials are available through the Council, and the final workshop agenda is included as Appendix 1 to this document.

Workshop Development

The New England Fishery Management Council (NEFMC), with the support of the Fisheries Leadership & Sustainability Forum (Fisheries Forum), convened a Risk Policy Workshop March 20-21, 2013 in Salem, MA. The goal of the workshop was to provide a structured platform for discussion between NEFMC Council members, Council staff and advisors, Scientific and Statistical Committee (SSC) members, NOAA Fisheries staff, and other management partners to advance the development of a risk policy used to determine acceptable biological catch (ABC) buffers for New England fisheries.

The development of the workshop agenda was guided by a steering committee comprised of Council, Council staff and SSC members. To foster a discussion around ABC risk policy for this audience of managers and advisors, the steering committee identified the following objectives:

- Strengthen working relationships and communication channels among members of the New England Council community;
- Establish a clear understanding of the concept of risk, the relationship between risk and uncertainty, and a common language with which to frame discussions about risk and risk policy;
- Illustrate the experiences of other regions in developing risk policies and articulating risk tolerances, with a focus on process, outcomes and lessons learned;
- Facilitate a critical examination of the factors that should be incorporated in an ABC risk policy;
- Outline the attributes and components of a successful ABC risk policy for New England fisheries; and
- Generate ideas on how the Council might move forward in developing and adopting a formal ABC risk policy.

The final agenda (Appendix 1) supported these seven objectives through a balance of background information, regional examples, and small and large group discussions.

Part I. Background and Context

Understanding Risk

To provide context for discussions on ABC risk policy, the workshop began with two introductory presentations exploring the concept of risk. Mr. John Henderschedt, Fisheries Forum Executive Director, introduced the concept of risk as defined by the Oxford English Dictionary: "(Exposure to) the possibility of loss, injury or other adverse or unwelcome circumstance; a chance of situation involving such possibility". Simply stated, risk is a function of the **likelihood** of an event occurring, and the severity of the **consequences** associated with that event. Mr. Henderschedt used several examples to demonstrate the differences between likelihood and consequences, and how the two concepts together represent risk.

The interpretation of risk is subjective, and is shaped by an individual's perceptions of what constitutes severe consequences and how they value certain outcomes. For example, many people perceive the risks associated with airplane and automobile transit differently than statistical data would suggest. The likelihood of fatality resulting from an automobile crash is dramatically higher than from an airplane crash. However, the perception that an airplane crash is a more severe consequence may lead to the perception that air travel is "riskier."

Mr. Henderschedt also demonstrated the difference between risk analysis and risk management. **Risk analysis** involves identifying the hazard, event and consequence of an activity, while **risk management** can entail mitigation of the hazard, reducing the likelihood of the event, and limiting the consequences. In closing Mr. Henderschedt reviewed several risk management principles, emphasizing the benefit of managing risk through a structured, transparent approach that incorporates continual evaluation and review of risk management decisions.

Mr. Tom Nies, NEFMC Executive Director, reinforced the concept of risk as the probability of an adverse event and the severity of resulting consequences. Shifting the discussion into a fisheries context, Mr. Nies emphasized that risk is not synonymous with probability. He discussed how managing at the same probability of overfishing for two different stocks could have significantly different consequences, and thus, constitutes different levels of risk. For example, overfishing a long-lived stock that is currently rebuilding could further hinder the stocks productivity while overfishing a short lived, highly fecund stock above its B_{MSY} target would likely have minimal impact on the health of the stock.

Fishery managers primarily manage the risk of overfishing by incorporating buffers to reduce the overfishing limit (OFL) when specifying ABCs. In addition to preventing overfishing, fisheries are managed for a wide range of biological, ecological, social, and economic objectives. Precaution in reducing the potential for overfishing can come at the cost of the social and economic benefits derived from the fishery. While determining an acceptable level of risk is guided by the parameters of the MSA and NS1 guidelines, this is ultimately a policy decision made by the Council. Mr. Nies proposed that by

identifying the biological, ecological, social and economic consequences associated with different probabilities of overfishing, the Council could consider these tradeoffs to determine an appropriate level of risk when specifying ABCs.

Discussion
Discussion following these presentations focused on the challenge of characterizing uncertainty and the respective roles of science and policy in risk analysis and management. Participants recognized that uncertainty around the likelihood and consequences of overfishing makes risk decisions significantly more complicated. Although probabilities of overfishing can be specified for many New England fisheries, there is significant uncertainty associated with the calculation of those probabilities. While scientific and technical advances can help characterize uncertainty and estimate probabilities, science can inform but not answer the policy question of how much risk is acceptable. It was suggested that focusing efforts on identifying and prioritizing consequences could help managers understand the implications and tradeoffs of their risk decisions.

Managing Risk and Uncertainty

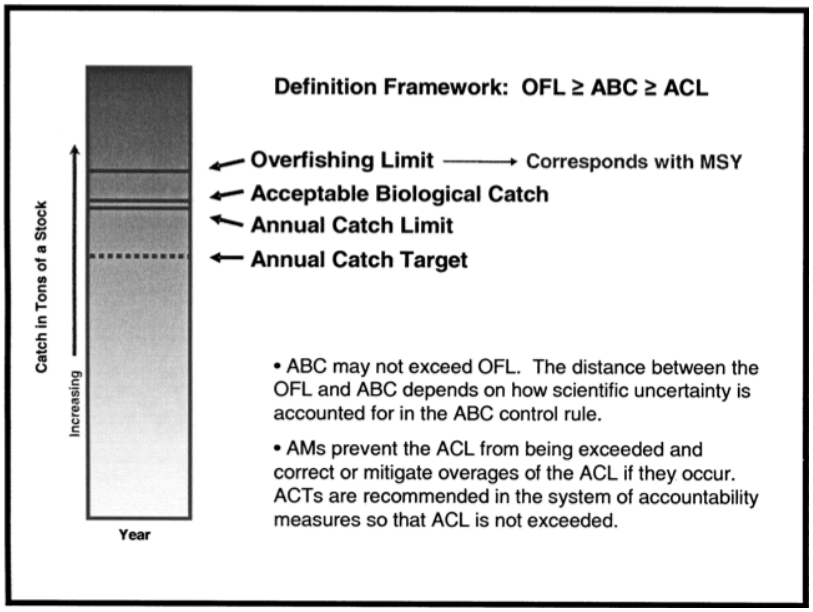
The science-management framework employed in fisheries management involves decisions based upon predicted future states, and thus always involves some level of uncertainty. Dr. Luiz Barbieri provided workshop participants with a primer on uncertainty, and helped participants distinguish between knowledge uncertainty, and uncertainty resulting from natural variability. **Natural variability** refers to inherent variability in stocks or marine systems and cannot be controlled or reduced through science or management. In contrast, **knowledge uncertainty** can be reduced with more data and analysis, though not without cost.

Scientific uncertainty, a type of knowledge uncertainty, refers to incomplete or imperfect data, models and parameter estimation, and results in cumulative error through the process of data collection, data analysis, modeling, and ultimately model projections. These model projections feed into the management process by providing estimates of the OFL. National Standard 1 instructs councils to account for scientific uncertainty in estimating the true OFL. Applying a probabilistic approach to the OFL distribution when specifying ABCs (P*) is one tool mangers have used to buffer for uncertainty when the true value of the OFL is not known. Managers can also respond to uncertainty around the risk of an action by taking a more precautionary approach and attempting to avoid undesired consequences.

Bringing the discussion squarely into a risk policy context, Mr. George Darcy outlined how risk and uncertainty are addressed in the Magnuson Stevens Act (MSA) and the National Standard 1 guidelines. While the MSA does not explicitly address risk and uncertainty, the act instructs managers to prevent overfishing while achieving optimum yield (National Standard 1) and provides a framework for how that should be accomplished. In addition to requiring annual catch limits (ACLs) and accountability measures (AMs) for all managed fisheries, the act instructs scientific and statistical committees (SSCs) to provide scientific advice to Councils, including recommendations

for ABCs which the Council may not exceed. The National Standard 1 (NS1) Guidelines expand on the MSA requirements and provides additional detail on how and where uncertainty should be accounted for (Figure 1).

Figure 1. Relationship of OFL >/= ABC >/= ACL >/= ACT.



Source: Federal Register. "Magnuson-Stevens Act Provisions; Annual Catch Limits; National Standard Guidelines." 16 January 2009. pg. 3180. "Relationship between OFL, ABC, ACL, and ACT."

The OFL is derived from applying the maximum fishing mortality rate to the stock's abundance, and represents the long-term average of fish that can be caught in a year without resulting in overfishing. The SSC is responsible for establishing the ABC at a level equal to or below the OFL to account scientific uncertainty, and should be specified on the basis of the council's ABC control rule. **ABC control rules** are policies established by the council with advice from its SSC, intended to manage the probability of overfishing occurring. The NS1 guidelines specify that these control rules clearly articulate how far below the OFL the ABC will be set based upon the level of scientific uncertainty in the OFL estimate, and should take into account uncertainty in stock assessment results, time lag in assessments, retrospective patters and projections. Control rules should reflect the council's risk tolerance, but must result in less than a 50 % probability of overfishing per the NS1 guidelines. Councils have flexibility in how they address risk and uncertainty but should consider the implications of setting ABCs too high which could result in overfishing, slow rebuilding and trigger AMs, or setting ABCs too low which could prevent overfishing but result in forgone yields and los of economic benefits.

Discussion

Much of the discussion during this session focused on the distinction between scientific and management uncertainty, as well as the relationship between risk policies, control rules and reference points. Participants discussed the potential benefit of separating out

natural variability, but recognize the difficulty in being able to accurately differentiate natural variability from other sources of uncertainty. Similarly, identifying appropriate models, incorporating multiple runs and combining results of different models would help quantify scientific uncertainty, though this poses significant challenges in practice. With limited resources and a large number of managed stocks, prioritizing resources to address the most critical uncertainties is likely the best path forward. Recognizing the interplay and overlap between scientific and management uncertainty, participants discussed the need to address which uncertainties are accounted for at what point in the OFL-ABC-ACL-ACT process on a case by case basis. Participants also discussed relationship and integration between control rules and risk policies and the respective roles that the Council and SSC should play in the development of those policies.

Part II. Learning from Experience

Lessons Learned from New England's Experience

Mr. Tom Nies and Dr. Jake Kritzer reviewed the ABC specification approaches employed for groundfish and scallops and reflected on lessons learned from those experiences.

Groundfish

When developing an approach for specifying groundfish ABCs the Council considered a more comprehensive approach to risk but ultimately decided on a simpler process. Neither approach incorporated the Councils risk tolerance nor did either successfully end overfishing. In 2009, the Groundfish Plan Development Team (PDT) and SSC considered a three step approach to evaluate productivity and assessment uncertainty for each stock to inform the catch value that would be selected from the stock projection. While this time intensive approach fell short of explicitly incorporating adverse effects and consequences, the testing of this process also revealed that it would not have been effective in ending overfishing. In the absence of better information, the SSC and Council adopted a relatively simple ABC control, basing ABC specifications on the catch associated with 75% FMSY. The control rule also incorporates modifications to this default approach for rebuilding stocks. Similar to the approach initially explored in 2009, the current ABC control rule employed does not incorporate the Council's explicit risk tolerance or an evaluation of tradeoffs, and ultimately was not successful in ending overfishing.

The Council's experience with groundfish highlights how an approach for specifying ABCs would benefit from:

- Capturing the true extent of uncertainty;
- Explicitly evaluating consequences, adverse effects and tradeoffs;
- Incorporating policy guidance from the Council, specifically its acceptable level of risk;
- Scaling the time and analysis required to the available scientific resources and management realities;
- Responding to the different risks and tradeoffs specific to individual stocks; and
- Ensuring that ABCs prevent overfishing and promote rebuilding.

Scallops

The ABC control rule employed in the scallop fishery represents a more comprehensive evaluation of risk than is utilized for groundfish. High biomass and significantly more scientific information allowed for evaluation of the relationship between probabilities of overfishing (P*) and yield, economic benefits derived from the fishery and other ecosystem management goals. The analysis considered the different short term and long term economic benefits derived from different levels of fishing mortality, and the different values and priorities stakeholders place on these benefits over time. To balance these priorities the SSC identified a control rule that specifies ABC as the lower value of either the harvest rate associated with a maximum P* of 0.25 or up to a 1% loss of yield.

During this process, the effect of ABC specification on other management goals such as habitat impacts and bycatch interactions was also discussed, raising the question of whether ABC specification is the most appropriate place for incorporating these goals.

The scallop ABC control rule approaches risk in a more comprehensive manner through:

- Factoring uncertainty and variability into simulations:
- Evaluating economic impacts and competing economic priorities: and
- Balancing the prevention of overfishing and optimization of yield relative to the stock's status.

The Council's experience establishing ABCs for scallops highlights the following questions that are useful to consider when developing a risk policy:

- What is appropriate balance between policy and technical guidance when developing control rules? What are the appropriate roles for the Council and its technical staff?
- Is the ABC specification process the appropriate place for consideration of bycatch, habitat and other outcomes? Are other policy instruments more appropriate to address these?
- Should additional objectives be considered when setting ABCs to more explicitly justify buffer selections?

Experiences from other council regions

As NEFMC and their management partners explore options for developing a risk policy and revising their ABC control rules, valuable insight can be gleaned from the approaches employed by other council regions. Speakers from three different council regions reflected on their experience developing risk policies, highlighted the lessons they learned through the first few years of implementation, and shared some of the current thinking and recent developments in ABC risk policy underway in their respective regions.

Mid-Atlantic Fishery Management Council
Dr. Chris Moore, Mid-Atlantic Fishery Management Council

The Mid Atlantic Fishery Management Council's (MAFMC's) risk policy and control rules are complementary and together guide the specification of ABCs for Mid-Atlantic stocks. In developing this approach, the SSC formed a scientific uncertainty subcommittee to provide advice to the Council in developing their risk policy and to develop ABC control rules that utilize that policy. The Council and subcommittee considered if and how probability of overfishing, stock status, assessment level, stock history and life history should be incorporated in the Council's approach. The Council ultimately adopted a simple approach linked to biomass and life history, which is applied across all managed resources.

The Council's control rule utilizes a four-level approach based upon the quality of the stock assessment available. The top three levels utilize a combination of overfishing limit

distribution and probability of overfishing (P*) while data poor stocks in level 4 rely on an ad hoc approach. The Council's risk policy complements their control rule through informing the probabilistic approach utilized in levels 1-3. The acceptable P* is prescribed relative to the stock's B/B_{MSY} ratio and categorization of either typical or atypical; atypical stocks employ a more precautionary P*. Despite the fact that all MAFMC-managed stocks fall into levels 3 and 4 under their control rule, the delineation of four assessment levels provides an incentive to attain stronger assessments and a mechanism to incorporate these higher-level assessments.. The Council's ABC specification process works well for data moderate stocks, but determining the appropriate ad hoc approach for data poor stocks is an ongoing challenge.

Dr. Moore highlighted several lessons learned from the Council's experience developing and implementing their risk policy and control rule. With the new layers of complexity added by the 2006 MSRA, it is important to keep the approach simple and easy to communicate. Dr. Moore also shared that it is helpful to be as clear and prescriptive as possible in how ABC will be determined, but also to build in flexibility so the Council and SSC can respond to unanticipated circumstances. The formalization of a process for specifying ABCs created clarity in the respective roles of the Council and SSC, and also manages expectations across management partners and stakeholders through the consistent application of their control rule and risk policy.

Gulf of Mexico Fishery Management Council
Bob Gill, Gulf of Mexico Fishery Management Council (2006-2012)

The Gulf of Mexico Fishery Management Council (GMFMC) employs a multi-tiered, conditional ABC control rule that integrates the Council's risk policy through bookending the selection of appropriate probability of overfishing (P*) values with minimum and maximum values. Reflecting on the outcomes from the first years of implementation, Mr. Gill suggests that the Council's ABC control rule has performed fairly well, while the risk policy has been less successful in conveying the Council's risk tolerance and adequately parsing out risk and uncertainty. The Council is currently working on making improvements to their ABC approach. These next steps include improving cohesion between the Council's risk policy and control rules, and improving the utility and function of the different tiers in their approach.

To facilitate the development of its risk policy and control rule, the Council formed an ABC Control Rule Working Group comprised of SSC, Council, Council staff, and NOAA Fisheries staff. This working group was an effective mechanism for leading the development Council's GMFMC's process and continues to spearhead efforts to improve and revise the control rule and risk policy. Drawing on his experience through the Gulf Council's risk policy process, Mr. Gill shared several lessons learned for NEFMC to consider at they move forward. Employing a working group dedicated to the process was instrumental in developing GMFMC's approach. The development of GMFMC's risk policy and control rules would have been improved by enhanced leadership by the Council and by clearly delineating roles and responsibilities between the Council and SSC. Mr. Gill also emphasized that risk policies and control rules are iterative and can be

incrementally improved over time as councils learn from their experience, develop new approaches, and acquire new information. Despite the complexities of managing risk and uncertainty across managed species, Mr. Gill emphasized the benefits of keeping the council's approach as simple and straightforward as possible.

North Pacific Fishery Management Council
Dr. Jim Ianelli, NOAA Fisheries/Alaska Fisheries Science Center

The North Pacific Fishery Management Council (NPFMC) employs a six-tiered ABC control rule for groundfish that assigns stocks to tiers based upon data availability and informs ABC specification for stocks within each respective tier. The ABC specification for groundfish is not based on risk analysis but does incorporate a sloping control rule that increases the buffer between OFL and ABC as biomass declines. To inform the tiered ABC specification approach for North Pacific crab stocks, an analysis was performed to evaluate the tradeoffs in yield and revenue between applying a constant percentage buffer to the OFL or applying a constant probability of overfishing (P*). The study found that the benefits of managing for long term stability are not fully offset by the short-term costs of any forgone yield.

Using an approach similar to the tradeoff analysis performed for crab, groundfish plan teams in the North Pacific employ 3 categories of decision tables to help address uncertainty and inform evaluation of tradeoffs. The decision tables can provide insight on how an ABC will perform, and allow the Council and SSC to make informed tradeoff decisions. For example, the decision tables can assess how a range of ABCs will perform against NS1 criteria (probability of exceeding F_{MSY}, or falling below B_{MSY}), how different ABCs will influence future fishing (probability that this years catch level will result in future reductions in catch), and how higher or lower ABCs might impact the stock biologically (probability of changes in age diversity and/or distribution).

Another innovative approach employed in the North Pacific is the use of annual Ecosystem Considerations Reports, intended to provide advice and support a more holistic approach to considering reductions in ABCs or total allowable catch (TAC) limits below the maximum permissible level. The reports contain report cards for the Eastern Bering Sea, Aleutian Islands, and Gulf of Alaska ecosystems, as well as ecosystem assessments for these areas and the Arctic. A range of ecosystem and management indicators are explored to identify the larger ecosystem effects of single-species ABCs; however, specific formulas are lacking to synthesize these indicators and considerations in a way that directs manager toward the "right" decision. In closing, Dr. Ianaelli reflected on this question of knowing what the " right answers" are and suggest that clear representation of uncertainties, unpacking issues and assumptions, and clearly expression priorities and objectives for management are all steps toward finding those answers.

Part III. Outlining a Successful Risk Policy

Attributes of a successful ABC risk policy

Reflecting on the lessons learned in New England and the insights shared from other council regions, workshop participants identified a set of attributes that characterize a successful ABC risk policy for New England fisheries. The attributes identified are arranged by theme below and have been synthesized to succinctly represent the groups' discussion. In addition to these specific attributes, many participants expressed the benefit of keeping the Council's approach as simple as possible, and balancing the need for structure and consistency with the flexibility necessary for the Council to respond and adapt.

Reflective of New England's unique management context

- Addresses current challenges and future goals
- Balances sustainability with achieving optimum yield
- Works within current data and resource constraints
- Conforms to NS1 guidelines
- Incorporates rebuilding and a tempered response to high or low recruitment events
- Complements and is supported by broader management controls

Considers short term/long term tradeoffs

- Balances short term and long term goals and tradeoffs
- Defines the time horizon that characterizes short term and long term tradeoffs

Iterative and performance based

- Incorporates review of past performance (social, economic, biological, ecological)
- Responds to lessons learned and corrects course over time

Comprehensive and holistic

- Evaluates indirect effects of ABCs (impacts to other species and broader ecosystem impacts)
- Considers multi-dimensional consequences – biological, social, economic, ecological
- Incorporates multiple perspectives of risk and what's at risk (across managers, scientists, stakeholders, etc.)
- Takes an ecosystem view (i.e. predator/prey relationships)
- Accommodates variability across fisheries

Provides direction for improvement

- Works on improving assessments, and incorporating scientific input
- Increases incentives to minimize and mitigate risk
- Promotes economic stability (promotes investment, reduces risk to businesses) conducive to industry
- Reduces probability of undesirable outcomes

Responsive to availability of information

- Responds to different levels of scientific information and uncertainty
- Anticipates, adapts and responds to new information within specifications process
- Considers time lags in evaluating management effectiveness, and the Council's ability to correct course (reaction time) when evaluating risk
- Coordinates assessment and management processes

Resilient in the face of change (including environmental)

- Considers ecosystem changes, including the variable magnitude and speed of change
- Responds to changing risks
- Adapts to changing needs

Transparent and objective with clear roles and responsibilities

- Articulates a clear decision process and delineates responsibilities
- Identifies what we are trying to achieve (objectives) and avoid (consequences)
- Unbiased process to incorporate "good" and "bad" news
- Transparent
- Easy to explain and interpret
- Supported by both the SSC and Council

Balances structure and flexibility

- Utilizes Council's judgment
- Employs objective method to evaluate consequences
- Is informed rather than driven by data
- Maintains flexibility for the council to react and respond to past performance and new information
- Balances ad hoc and probabilistic approaches

Defining Risk

The workshop steering committee developed the following draft definition of risk to define this concept in a fisheries management context, and prompt discussion among workshop participants:

> *Risk is the likelihood and the severity of adverse consequences of an action.*
> *Risk assessment entails:*
> *a) the possible results from the action;*
> *b) the probability that each result will occur: and*
> *c) the set of possible consequences from each result and their probabilities*.

One of the common themes from this discussion was the question of whether risk should include outcomes that are not 'adverse'. Some participants suggested that discussions around risk should be inclusive of risk–reward and cost–benefit relationships, while others expressed the perspective that the benefits are implied through our engagement in

fishing, and that risk discussions should be squarely focused on undesirable outcomes. The group also identified several challenges, including the difficulty of assessing risk in dynamic and changing ecosystems. In particular, participants questioned the accuracy with which probabilities and consequences can be determined in a changing system, and how to respond to the uncertainty surrounding those predictions. Recognizing the value of defining risk in the risk policy development process, several participants noted that the definition presented is a good starting point and will benefit from future refinement and dialogue.

Part IV. Risk Consideration Working Groups

Workshop participants rotated through four working groups, where they explored the biological, ecological, social and economic considerations associated with the Council's selection of ABCs. The following working group summaries highlight the considerations identified, observations and questions regarding those considerations, and ideas for how the Council might move forward with their incorporation.

Biological Considerations

Subject Matter Guides:
Dr. Jim Ianelli, NOAA Fisheries/Alaska Fisheries Science Center
Dr. Paul Rago, NOAA Fisheries/Northeast Fisheries Science Center

During this working group, workshop participants were asked to reflect on biological implications to the targeted stock resulting from the level of fishing allowed by established ABCs. Through this discussion, the group also shared their perspectives on how these biological risk factors could best be incorporated into the Council's process for specifying ABC levels.

Participants in the biological considerations working groups underscored the importance of biological sustainability as the central objective when specifying ABCs. The group identified a number of individual and cumulative factors that could inform the appropriate level of precaution employed during ABC specification. In addition to these factors, participants also discussed the role of timely assessments and high quality data in the Council and SSC's ability to adequately address biological risk. While the discussion was focused on ABC specification, the group noted the larger management context within which these decision occur, and the relationship between catch limits and other management strategies in achieving biological sustainability.

Participants identified the following factors that may warrant consideration during the Council's specifications process:

- Stock status and sustainability (biomass relative to biological reference points);
- Risk of overfishing or becoming overfished (short and long-term);
- Resilience; ability of the stock to rebuild in response to an overfishing event;
- Vulnerability and susceptibility to growth, recruitment, and ecosystem overfishing, as well as disease or other non-fishing stressors;
- Basic life history characteristics (growth rate, age/size at maturity, fecundity, maximum age, etc.);
- Unique life history characteristics that warrant special consideration (spawning behavior, hermaphroditic transitions, density-dependent reproductive success);
- Stock characteristics (productivity/recruitment success, age structure, spatial stock structure, spatial distribution, ecosystem niche);
- Multispecies and ecosystem interactions (predator-prey and competitive relationships);

- Distribution of fishing mortality across the population (size, age and spawning potential removals, spatial distribution of catch), and ratio of fishing mortality to natural mortality;
- The extent to which complementary management measures (closed ares, gear restrictions, etc.) provide protection for the stock;
- Impacts from climate and ecosystem change (habitat suitability, spatial distribution, interannual variability, changes in productivity and natural mortality rates, trends in size at age over time) and increased vulnerability resulting from these changes; and
- Accuracy of catch data and discard estimates.

Relative to the above factors, participants offered the following observations:

- The variation among different stocks with regard to biological risk factors will necessitate different levels of precaution.
- Understanding the consequences of overfishing relative to these considerations will inform their appropriate contribution to the Councils' risk decisions.
- It is important to distinguish which of these factors are incorporated during assessments and which need to be addressed during ABC specification.
- Many of these factors can only be evaluated using 'soft data' which is accompanied by additional uncertainty.
- Investigating the historical context of these considerations may help inform ABC decisions.

Participants highlighted the following questions, concerns and insights relating to the incorporation of biological risk factors in ABC determination:

- It is important to address risk holistically over the entire process to avoid duplicative levels of precaution.
- Would managing the spatial distribution of groundfish ACLs erode the flexibility afforded to sector management?
- It is important to distinguish what can be accomplished through ABC specification and what needs to be addressed through other management measures. For example, spatial, life history and stock structure concerns will require management mechanisms in addition to ABCs and ACLs.
- The productivity and performance of fish stocks are dynamic and changing, which makes it challenging to understand retrospective patterns, produce accurate projections, and manage to a fixed biomass target.
- Distinguishing between the consequences of overfishing for a single year and the consequences of consistent overfishing is important to guide the Councils risk tolerance.
- The effectiveness of risk policies in maintaining sustainable fish populations may be limited when the driver of decline is ecological change rather than fishing pressure.

Participants provide the following ideas and suggestions to improve the specifications process and risk outcomes:

- Temper the specification of ABCs in response to new information to minimize risk (i.e. slow up – fast down, or phasing in of increases or reductions);
- Distribute fishing effort through setting catch limits on smaller spatial scales while planning and/or mitigating for potential implications of resulting spatial effort shifts;
- Incorporate a matrix of ABC options to facilitate the evaluation of biological risk factors;
- Improve frequency and accuracy of stock assessments;
- Perform retrospective analysis to see how risk policies have performed to date;
- Operationalize risk thresholds such as depletion thresholds above MSST to indicate when fishing effort should be reduced; and
- Clearly differentiate between the elements and consideration of risk assessment vs. risk policy.

Ecological Considerations

Subject Matter Guides:
Dr. Mike Fogarty, NOAA Fisheries, Northeast Fisheries Science Center
Dr. Jamie Cournane, University of New Hampshire

During this working group, workshop participants were asked to reflect on the ecological implications of targeted removals associated with ABCs and consider if and how these ecological considerations should be incorporated during the process of specifying ABCs.

Participants in the ecological considerations working group emphasized the importance of ecological interactions and ecosystem function in supporting sustainable fisheries. The group identified a set of factors that may warrant consideration; however, the group was unclear as to where in the process these considerations should be addressed. Participants had different perspectives on whether ecological risk should be incorporated in the Council's risk policy and/or control rule. Many of the ideas shared centered on the complexities of ecosystem interactions and the inherent and climate driven uncertainties around those interactions. Recognizing the challenge of taking an ecosystem based management approach through single species management, the group identified a number of ideas on how to better incorporate ecological considerations into management.

Participants identified the following factors that may warrant consideration during the Council's specifications process:

- Food web interactions (predator, prey and forage base considerations);
- Interactions across ecosystem components, functional groups and between species (including humans);
- Species and ecosystem linkages, and the provision of ecosystem services;
- Interactions between stocks in multispecies fisheries, and the individual and cumulative impacts of the fishery;

- Ecosystem role of targeted species (prey, predator, competitor, symbiotic, keystone, engineer, vector) and importance of that role in ecosystem stability and function;
- Variability of ecological interactions and ecosystem productivity;
- Climate change impacts on the ecosystem, including changes in reference points (such as MSY), and spatial distribution;
- Uncertainty in how fishing removals impact ecosystem stability and function;
- Vulnerability and susceptibility of the stock to disease or other non-fishing stressor;
- Shifts and flips in the equilibrium state of the ecosystem and food web (as a result of fishing pressure and/or climate change);
- Ecosystem and species level resilience and ability to recover from perturbations including fishing pressure;
- Ecosystem and multispecies MSY (as less than the sum of individual MSY);
- Bycatch of protected and non-target species; and
- Cumulative effect of fishing removals in addition to other drivers.

Relative to the above factors, participants offered the following observations:

- Ecosystems as a whole are more stable than their individual parts.
- The inability to calculate ecosystem impacts does not mean the impacts are negligible.
- Achieving MSY for all species simultaneously is not realistic.
- Identifying specific stocks that represent the greatest ecological concern is important to help the Council prioritize management responses.
- Species at the edge of their range have a higher likelihood of climate impacts and may warrant additional precaution.

Participants highlighted the following questions, concerns and insights relating to the incorporation of ecological risk factors in ABC determination:

- The MSA is not clear on how ecological elements should be considered. Questions remain as to the appropriate step in the process (stock assessments, optimum yield), and the appropriate scale (stock, stock complex, functional group, fishery) to consider ecological considerations.
- The mandate for stock level catch limits and status determination criteria (overfished/overfishing) presents a challenge in managing at an ecosystem or multispecies level.
- It is important to balance a precautionary ecosystem approach with potential tradeoffs in social and economic benefits resulting from reduced stock specific ACLs.
- Is an ecosystem approach to management all or nothing? Are there incremental improvements that can be made while longer-term approaches are developed? Can ecosystem management be done in combination with single species management?
- How should managers address the situation where the abundance of one species is impeding the recovery of another species?

- It is important to continue exploring perspectives on the appropriate science-policy handoff and whether ecological considerations should be incorporated through science (such as ecosystem-oriented assessments), or addressed through policy (such as explicit risk policies), or a combination of both.

Participants provided the following ideas and suggestions to improve ecological outcomes from the ABC specification process:

- Develop council level ecological objectives;
- Tackle big picture ecosystem decisions holistically;
- Work towards a long-term transition to ecosystem based management, while utilizing ecosystem models to help validate, understand and improve single species models in the short-term;
- Consider taking an ecosystem or aggregate approach for specifying TACs. Incorporating new tools such a multispecies modeling, integrated ecosystem assessments and management strategy evaluations can help support a broader ecosystem approach;,
- Maintain flexibility and adaptability to respond to changing ecological factors, and differences in risk tolerance across spatial and temporal bounds;
- Consider setting ecosystem or multispecies level TACs and managing portfolios of species with considerations for individual species;
- Establish or increase buffers for ecological and ecosystem uncertainty;
- Establish terms of reference for incorporating ecosystem issues into stock assessments;
- Specify risk aversion for various ecosystem components of functional categories;
- Incorporate habitat protection to increase/protect resilience and productivity;
- Develop multispecies, functional group or stock complex level reference points;
- Rebalance harvest rates across species to better distribute fishing pressure; and
- Develop ecosystem models to inform how managers can increase or maintain ecological resilience and elevate single species management through informing how single species decisions affect the ecological system.

Social Considerations

Subject Matter Guides:
Dr. Matt McPherson, NOAA Fisheries/Northeast Fisheries Science Center
Dr. Patricia Pinto da Silva, NOAA Fisheries/Northeast Fisheries Science Center

During this working group, workshop participants were asked to reflect on the social implications (to individuals, communities, fisheries, etc.) of the level of fishing allowed by established ABCs, and share their thoughts on if and how these social considerations should be incorporated during the ABC specifications process.

Central to the group's discussion were the social values derived from New England's fisheries, namely the value of stability to individual, family, and community wellbeing. Participants also noted the difference between short-term and long-term objectives, and how risk considerations are different across the two time horizons. There was no

consensus among the group as to whether social considerations were appropriate to consider during the ABC specification process, and what the respective roles of the Council and SSC should be for incorporating social elements into management. Participants noted that social consequences of ABC specification are most dramatic when stocks are overfished and when there is significant uncertainty; social risk is inherently reduced in healthy fisheries.

The social considerations working group incorporated an additional component into their discussion to help provide context for the risk factors they identified. In contrast to the more objective nature of biological and ecological consideration, social considerations are directly linked to the social values derived from a fishery. Through discussing social benefits and risks, participants identified a number of values that contribute to their vision of healthy fisheries and communicates in New England:

- Stability in catch limits over time to allow fishermen to make business decisions, adapt, and maintain economic viability;
- Fishery contributions to communities (economic, employment, cultural);
- Deriving long term social value from fisheries;
- Thriving fishing communities and fishing families;
- Access to the resource;
- Regulatory stability and individual security derived from consistent management;
- Equitable distribution of social benefits;
- Confidence and trust in the science and management; and
- Public engagement in the fishery management process.

Participants identified the following factors that may warrant consideration during the Council's specifications process:

- Dependence of communities on fishing employment and the contribution of fishing to community wellbeing and cultural identity;
- Cumulative impacts and limits to individual, fleet and community resilience;
- Land use impacts and changes to working waterfronts (i.e. gentrification);
- Impacts on industry composition (loss of small boats, consolidation, etc.);
- Career and geographic displacement of fishermen, fleets, and industry;
- Ability of individuals, fleets and industry to respond when stocks are rebuild (maintaining capacity);
- Impacts on markets and loss of infrastructure and support businesses;
- Individual, household and family hardships; and
- Indirect effects and interactions with other fisheries.

Relative to the above factors, participants offered the following observations:

- Social impacts are most notable when rebuilding overfished stocks; there is typically less conflict between socioeconomic and biological goals when stocks are healthy.
- Reducing uncertainty through improving the quality of science and accuracy of projections will help in resolving social impacts.

- The vulnerability and resilience of individuals and communities is linked to their dependence on an individual stock or fishery and their ability to adapt.
- Higher yield does not necessarily equate to more income or more social benefit.
- Social values and perception of social impact are different across fisheries and communities, and individuals.
- The fishing industry is adaptable, innovative and creative in their ability to respond to challenges.

Participants highlighted the following questions, concerns and insights relating to the incorporation of social risk factors in ABC determination:

- Do the Council and SSC have the discretion to incorporate social considerations during ABC specification?
- Is it more appropriate to consider social impacts through ACL specification and allocation decisions?
- How should social and economic considerations be distinguished?
- What is the appropriate scale to manage for social benefits?
- How should minimizing risk to the fish be balanced with minimizing risk to fishery participants?
- There are tradeoffs between managing for short term or long term benefits; social objectives and acceptable social risk differ based upon this perspective.
- It is important to balance managing for social outcomes and allowing individuals and markets to shape the industry.

Participants provided the following ideas and suggestions to improve social outcomes from the ABC specification process:

- Consider non ABC/ACL approaches to address social impacts and goals;
- Adopt a constant harvest strategy (i.e. specifying ACLs for 3 years);
- Limit drastic changes in allowable harvest through buffering (i.e. limit increases and decreases to a certain percentage each specifications cycle);
- Review past performance to inform how much risk is acceptable with respect to social consequences;
- Instruct APs to develop social performance reports; and
- Develop terms of reference to guide social and economic input from the SSC.

Economic Considerations

Subject Matter Guides:
Merrick Burden, Marine Conservation Alliance
Dr. David Tomberlin, NOAA Fisheries/Office of Science and Technology

During this working group, workshop participants were asked to reflect on the economic implications (to individuals, businesses, communities, etc.) of the level of fishing allowed by established ABCs, and share their perspectives on if and how these economic considerations should be accounted for during the specification of ABCs.

Participants in the economic considerations working groups acknowledged the connection between economic outcomes and the level at which ABCs are specified. Some suggested that the Council and SSC should consider economic consequences more explicitly during ABC specifications while other felt that ABCs should be established solely to prevent overfishing and that economic considerations are more appropriately incorporated at a different stage in the process. Throughout the group's discussion, participants noted the importance in distinguishing between short-term and long-term economic implications and the challenge of incorporating long-term economic objectives when the management framework focuses on short-term specifications.

Participants identified the following factors that may warrant consideration during the Council's specifications process:

- Impacts of economic drivers on biological objectives (effort shifts);
- Loss of economic value resulting from overfishing;
- Level of employment supported by the fishery and the economic benefits of that employment on communities;
- Stability of catch streams and benefits of consistent catch limits on business planning and viability for individuals, fisheries, communities and support infrastructure;
- Relative market prices in response to allowable catch levels;
- Different scales of economic impact (individual, vessel, fleet, fishery, port, community, region);
- Ability of the industry to absorb risk and resilience to short-term and long-term economic losses;
- Tradeoffs in yield with different overfishing probabilities (different levels of precaution); and
- Risk tolerance of the industry, and the value they place on avoiding certain economic consequences.

Relative to the above factors, participants offered the following observations:

- Control rules could help improve industry's ability to plan into the future.
- Economic impacts should be considered at the appropriate level. For example, managing for economic impact at the level of an individual's cost/benefit decision of whether to fish is not the appropriate resolution.
- It is important to distinguish between economic consequences that result from ABC specification versus allocation decisions.
- Economic objectives and the severity of economic consequences are more significant when stocks are in an overfished condition.
- Fisheries are dynamic systems – markets, behaviors and incentives are all shifting and can have risk implications.
- Depending on the life history characteristics of a stock, overfishing can have significantly different economic implications.
- Fishers who have a diverse portfolio of target stocks and flexibility in how they prosecute those stocks are less susceptible to economic risks than those who are dependent on a single stock or fishery.

Participants highlighted the following questions, concerns and insights relating to the incorporation of economic risk factors in ABC determination:

- Where in the process is it appropriate to consider economic objectives and economic risk (ABC or ACL/ACT)? Is considering economic considerations at the ABC level incorporating too many factors at once?
- How should social and economic considerations be parsed out?
- Are tools available to help quantify and predict economic impacts?
- At what scale should economics be considered (individual, fleet, region, ecosystem), recognizing that the economic objectives are different for each scale?
- Are economic considerations best addressed when considering management uncertainty?
- Does the sector management system in place for groundfish already incorporate an economic risk management strategy at the industry level?
- Do existing policies (i.e. ABC = 75% OFL) already incorporate economic considerations implicitly?
- Is it unrealistic to attempt to manage for economic outcomes when we don't have a good handle on uncertainty?
- Should the Council consider long-term economic considerations beyond the timeframe of the current specifications cycle?

Participants provided the following ideas and suggestions to improve economic outcomes from the ABC specification process:

- Guide the SSC in considering economic consequences through a risk policy, terms of reference and/or criteria to apply when specifying ABCs;
- Clarify the role of economists on the SSC; guidance from the Council on the role of social science in the SSC and how to better utilize their expertise would be beneficial;
- Determine who the appropriate body is to determine and consider economic consequences (Council, SSC, AP);
- Consider establishing a new social science SSC;
- Engage stakeholders in the process of determining how the Council approaches managing economic risk; and
- Consider instructing the SSC could provide the Council with a range of ABCs that all achieve the biological objectives, and the Council could consider economic outcomes in its selection among the ABC alternatives.

Part V. Looking Forward

Sketching out a risk policy approach

Reflecting on the working group rotations and the concepts and examples presented on the first day of the workshop, participants shared their thoughts on how the Council might best move forward.

Incorporating risk considerations
Some participants felt that biological, ecological, social and economic risk considerations are important factors to incorporate during the ABC specifications process. Others felt that the ABC should be specified solely on scientific uncertainty and biological considerations and that it is more appropriate for the Council to address social and economic after ABCs are set. Many noted the importance of simplicity in ABC risk policy and control rules, and that a simple, straightforward approach would be more valuable than a complex, comprehensive approach.

Balancing structure and flexibility
Several participants noted that they liked the tiered approaches employed by MAFMC, GMFMC and NPFMC. Categorizing stocks based upon data considerations incentivizes data and stock assessment improvements to move stocks into higher tiers, and also provides structure and consistency through using objective criteria to categorize stocks and inform ABC specification. Participants noted the need to avoid being overly prescriptive through balancing structure and flexibility, highlighting GMFMC's approach of providing P* ranges as a way of responding to different stocks over a range of circumstances. The group also discussed the idea of the SSC providing a range of ABCs and their respective uncertainty buffers to the Council, noting that while this provides flexibility, the option of consistently selecting the highest ABC can be problematic.

Borrowing approaches and incremental progress
There was momentum among the group to develop an approach similar to that employed by MAFMC. Participants noted the benefits of MAFMC's control rule and risk policy in responding consistently to risk and adjusting allowable harvest rates in response to biomass trends. While some supported a more nuanced approach to incorporate additional risk considerations, such as mechanisms to adjust P* in response to socioeconomic or ecological factors, there was general agreement that starting with MAFMC's risk policy and control rules would be a step in the right direction. The control rule and risk policy can then be improved incrementally over time reflect the characteristics of New England Fisheries, respond to new needs, and make adjustments based on performance.

Recommendations and next steps

To advance the Council's development of a risk policy for New England fisheries, the group put forth a number of ideas for consideration. To inform the process for moving forward, the Council could review the control rules already in place and decide whether control rules and risk polies should be plan-specific or represent a larger, overarching

approach. Participants also suggested reflecting on the discussions from this workshop to prioritize which risk considerations identified during the working groups are most important and if they warrant consideration during ABC specification.

To further build on the experiences of other council regions, the Council should explore a couple of the approaches used by other councils in more detail. The most promising approaches could then be tested on past assessments to see how they would have preformed. Participants noted that this simulation testing prior to adopting a formal policy is an important step to ensure successful outcomes.

Participants recommended the formation of a committee or group to move the risk policy development forward. This group should be comprised of both Council and SSC members and work closely with staff to identify the information needed, coordinate effort and draft straw man policies for consideration.

Appendix 1: Workshop Agenda

NEFMC Risk Policy Workshop Agenda
March 20-21, 2013

Hawthorne Hotel Ballroom
18 Washington Square W.
Salem, MA 01970

Workshop Goals

The goal of this workshop is to provide a structured platform for discussion between the New England Fishery Management Council (NEFMC), Council staff, Scientific and Statistical Committee (SSC), Advisory Panels, Northeast Regional Office (NERO), Northeast Fisheries Science Center (NEFSC), and other management partners to advance the development and articulation of a comprehensive risk policy used to determine Acceptable Biological Catch (ABC) buffers for New England fisheries.

Specifically, the workshop agenda supports the following objectives:

- Strengthen working relationships and communication channels among members of the New England Council community;
- Establish a clear understanding of the concept of risk, the relationship between risk and uncertainty, and a common language with which to frame discussions about risk and risk policy;
- Illustrate the experiences of other regions in developing risk policies and articulating risk tolerances, with a focus on process, outcomes and lessons learned;
- Facilitate a critical examination of the factors that should be incorporated in an ABC risk policy;
- Outline the attributes and components of a successful ABC risk policy for New England fisheries; and
- Generate ideas on how the Council might move forward in developing and adopting a formal ABC risk policy.

Agenda begins on next page

DAY 1 | WEDNESDAY, MARCH 20, 2013

7:30 – 8:30 am **Continental breakfast**
Location: Ballroom, main level

8:30 – 9:00 am **Workshop introduction and opening remarks**

Welcome and opening remarks
- *Rip Cunningham, NEFMC Council Chair*
- *Dr. Jake Kritzer, NEFMC SSC Chair*

Agenda overview, goals and objectives for the workshop
- *John Henderschedt and Kim Gordon, Fisheries Leadership & Sustainability Forum*

9:00 – 10:00 am **Understanding risk**
Objective: Introduce the concept of risk as function of both probability and severity of consequences, and establish a frame of reference for workshop discussions.

Introduction to risk
- *John Henderschedt, Executive Director, Fisheries Leadership & Sustainability Forum*

Introduction to risk in ABC specification
- *Tom Nies, NEFMC Executive Director*

Q&A/Discussion

10:00 – 10:15 am **BREAK**

10:15 – 11:45 am **Managing risk and uncertainty**
Objective: Provide a basic understanding of scientific uncertainty, management uncertainty and the link between uncertainty and risk; review guidance provided in the National Standard 1 Guidelines regarding addressing risk and uncertainty.

Primer on scientific and management uncertainty
- *Dr. Luiz Barbieri, Marine Fisheries Research Section Leader, Florida Fish and Wildlife Research Institute; South Atlantic Fishery Management Council SSC, Gulf of Mexico Fishery Management Council SSC*

Risk and uncertainty in the National Standard 1 Guidelines
- *George Darcy, Assistant Regional Administrator, NOAA Fisheries/Northeast Regional Office*

Q&A/Discussion

11:45 – 1:00 pm **LUNCH** (provided)
Location: The library, lower level

1:00 – 1:45 pm **Lessons learned from New England's experience**
Objective: Identify the challenges presented by the current approach for managing risk and uncertainty, and the lessons learned from establishing ABCs for New England fisheries.

- *Tom Nies, NEFMC Executive Director*
- *Dr. Jake Kritzer, NEFMC SSC Chair*

Q&A/Discussion

1:45 – 3:15 pm **Experiences from other council regions**
Objective: Examine the process, lessons learned, and recent developments in ABC risk policy approaches of other regional councils.

Mid-Atlantic Fishery Management Council

- *Dr. Chris Moore, Executive Director, Mid-Atlantic Fishery Management Council*

Gulf of Mexico Fishery Management Council

- *Bob Gill, former Gulf of Mexico Fishery Management Council member (2006-2012)*

North Pacific Fishery Management Council

- *Dr. Jim Ianelli, Stock Assessment Scientist, NOAA Fisheries/Alaska Fisheries Science Center*

Q&A/Discussion

3:15 – 3:30 pm **BREAK**

3:30 – 4:30 pm **Attributes of a successful ABC risk policy**
Objective: Identify the attributes of a successful ABC risk policy for New England fisheries, and highlight the gap between the existing ABC risk policy and the policy the region would like to apply in the future.
Fisheries Forum facilitators

Discussion questions:

- What should an ABC risk policy accomplish?
- What are the characteristics of an ABC risk policy that supports these accomplishments?
- How does this characterization differ from the current ABC risk policy?

4:30 – 5:00 pm **Defining risk**
Objective: Propose a working definition of risk to guide the Council's development of an ABC risk policy.
Fisheries Forum facilitators

DAY 2 | THURSDAY, MARCH 21, 2013

7:30 – 8:30 am **Continental Breakfast**
Location: The library, lower level

8:30 – 8:45 am **Recap of day 1/Intro to day 2**
Fisheries Forum facilitators

8:45 – 9:00 am **Working groups: Risk considerations**
Objective: Examine the biological, ecological, social and economic considerations associated with the Council's selection of ABCs, and discuss how these considerations should be reflected into the Council's ABC risk policy.
Fisheries Forum facilitators

*See final page of the agenda for working group descriptions

9:00 – 10:00 am **Working group rotation 1***

10:00 – 10:15 am **BREAK**

10:15 – 11:15 am **Working group rotation 2***

11:15 – 11:20 am ***Transition to next working group***

11:20 – 12:20 pm **Working group rotation 3***

12:20 – 1:15 pm **LUNCH** (provided)
Location: The library, lower level

1:15 – 2:15 pm **Working group rotation 4 ***

2:15 – 3:00 pm **Working group recap**
Objective: Highlight the themes of discussion across all four working group rotations.
Fisheries Forum facilitators

Informal presentations: Report-back from each breakout group
Working group facilitators

Discussion questions:

- How did these discussions inform your perspective on what should be incorporated into an ABC risk policy?
- What common themes emerged across the different breakout groups?

3:00– 3:15 pm **BREAK**

3:15 – 4:30 pm **Sketching out a risk policy approach**

Objective: Discuss how the risk policy attributes and considerations identified during the workshop can be translated into a risk policy for establishing ABCs for New England fisheries.
Fisheries Forum facilitators

Discussion questions:

- What are the desired outcomes/outputs from the Council's ABC risk policy (e.g. control rule for each managed stock, maximum and minimum buffer thresholds, etc.)?
- How might a risk policy be structured (e.g. tiered approach, scoring matrix, decision table, etc.)?
- How could the risk policy incorporate probabilities, consequences and uncertainty when determining ABC buffers?

4:30 – 5:00 pm **Group discussion: Recommendations and next steps**

Objective: Share perspectives on how the Council can move forward in developing an ABC risk policy. Identify questions and information needs that should be explored or discussed further.
Fisheries Forum facilitators

Discussion questions:

- Do you have any suggestions on how the Council can move forward in developing an ABC risk policy for New England fisheries?
- What insights or recommendations can you share based upon your role in the management process?

5:00 – 5:15 pm **Workshop Wrap up and Closing remarks**

***Working group rotations:**
Participants will rotate through four working groups, focusing on one category of potential considerations in each rotation. Subject matter guides will be present in each working group to answer questions, share their experience and help guide the group's discussion.

Biological Considerations
What are the biological implications to the targeted stock resulting from the level at which ABCs are set?

- *Dr. Jim Ianelli, Stock Assessment Scientist, NOAA Fisheries/Alaska Fisheries Science Center*
- *Dr. Paul Rago, Chief, Population Dynamics Branch, NOAA Fisheries/Northeast Fisheries Science Center*

Ecological Considerations
What are the implications to the ecosystem that result from targeted removals associated with ABCs?

- *Dr. Mike Fogarty, Chief, Ecosystem Assessment Program, NOAA Fisheries, Northeast Fisheries Science Center; NEFMC SSC*
- *Dr. Jamie Cournane, Research Scientist, Institute for the Study of Earth, Oceans and Space, University of New Hampshire*

Social Considerations
What are the social implications (to individuals, communities, fisheries, etc.) of the level of fishing allowed by established ABCs?

- *Dr. Matt McPherson, Chief, Social Sciences Branch, NOAA Fisheries/Northeast Fisheries Science Center*
- *Dr. Patricia Pinto da Silva, Social Scientist, NOAA Fisheries/Northeast Fisheries Science Center; NEFMC SSC*

Economic Considerations
What are the economic implications (to individuals, businesses, communities, etc.) of the level of fishing allowed by established ABCs?

- *Merrick Burden, Executive Director, Marine Conservation Alliance*
- *Dr. David Tomberlin, Economist, NOAA Fisheries/Office of Science and Technology; MAFMC SSC*