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M E M O R A N D U M

DATE: October 4, 2010

TO: Richard B. Robins, Jr., Chairman, Mid-Atlantic Fishery Management Council

FROM: /s/ John Boreman, Ph.D., Chairman, MAFMC Scientific and Statistical Committee

Subject: Report of September 2010 Meeting of the MAFMC Scientific and Statistical Committee

The Scientific and Statistical Committee (SSC) of the Mid-Atlantic Fishery Management Council (MAFMC) met on 21-22 September 2010 to review stock assessment information and develop acceptable biological catch (ABC) recommendations for spiny dogfish. Other business addressed during the meeting included an orientation session for new SSC members, and discussions related to the assessment and management strategy evaluation project being undertaken by the University of Maryland/CBL, advice to the MAFMC on 5-year research recommendations, the charge by the Council to establish an SSC Ecosystems Subcommittee, development of industry advisory panel reports to the SSC, the upcoming SAW/SARC schedule, and the planned joint workshop involving the NEFMC and MAFMC SSCs and the Northeast Fisheries Science Center.

ABC Recommendations for Spiny Dogfish

The development of ABC recommendations for spiny dogfish was undertaken during the afternoon of September 21st. A total of nine of the 16 SSC members were in attendance for this part of the agenda, which represented a quorum as defined by the SSC standard operating procedures. Also in attendance for the ABC discussion were representatives of the MAFMC, MAFMC staff, Northeast Fisheries Science Center (NEFSC) staff, and the public (see the attendance list, Attachment 1).

The MAFMC staff lead for dogfish, Jim Armstrong, described the assessment history, the most recent survey and landings information, and the basis for the most recent quota set by the MAFMC. The species lead for the Northeast Fisheries Science Center, Dr. Paul Rago, then provided additional comment. Finally, the public in attendance was then invited to comment, but only on scientific uncertainty issues for the species. Following this comment period, the SSC discussed selection of an ABC for the 2011 - 2015 fishing years. Once the discussion was completed, the SSC developed a preliminary consensus recommendation in response to each of the terms of reference provided by the MAFMC. The preliminary consensus recommendations were held in abeyance until after the October 1st webinar, which was scheduled in order to receive additional public comments; however, no member

of the public participated in the webinar, so the preliminary consensus recommendation became final.

The following represents the final consensus responses by the SSC to the ABC terms of reference (TORs) provided by the MAFMC (TORs in italics):

Using information provided by August 30, 2010, the SSC will provide a written report that identifies the following for the upcoming fishing year(s):

1) *The materials considered by the SSC in reaching its recommendation;*

MAFMC [Mid-Atlantic Fishery Management Council]. 2010a. Spiny Dogfish ABC, Commercial Quota and Trip Limits for the 2011+ Fishing Years (Staff Memo to SSC, Spiny Dogfish MC). 7p.

MAFMC 2010b. Omnibus Amendment. (Amendment 13 to the Atlantic mackerel, squids, and butterfish fishery management plan; Amendment 3 to the bluefish fishery management plan; Amendment 2 to the spiny dogfish fishery management plan; Amendment 15 to the summer flounder, scup, and black sea bass fishery management plan; Amendment 16 to the surfclam and ocean quahog fishery management plan and Amendment 3 to the tilefish fishery management plan). 274p.

NEFSC [Northeast Fisheries Science Center]. 2006. Report of the 43rd Northeast Regional Stock Assessment Workshop (43rd SAW): 43rd SAW Assessment Report. CRD 06-25. 400p.

Rago, P. J. and K. A. Sosebee. 2010a. Update on the Status of Spiny Dogfish in 2010 and Initial Evaluation of Alternative Harvest Strategies. 35p.

Rago, P. J. and K. A. Sosebee. 2010b. Update on the Status of Spiny Dogfish in 2010 and Initial Evaluation of Alternative Harvest Strategies – Updates: 75% of $F_{threshold}$ Scenario and Probabilities of Exceeding Reference Points for Quotas of 15, 17, 19, and 21 M lb. 4p.

Rago, P. J. and K. A. Sosebee. 2010c. Biological Reference Points for Spiny Dogfish. Northeast Fisheries Science Center Reference Document 10-06. 52p.

2) The level (1-4) that the SSC deems most appropriate for the information content of the most recent stock assessment, based on criteria listed in the most recent version of the proposed omnibus amendment;

The 2010 Omnibus Amendment defines four levels into which assessments may be categorized (see Attachment 2). These levels recognize differences among assessments based on the extent to which the assessment expresses and quantifies the uncertainty in the overfishing limit (OFL) for the stock and the methods used to quantify the uncertainty. In the highest level (Level 1), the assessment fully characterizes uncertainty, and the distribution of OFL is calculated via a purely statistical routine within the assessment. In level 2 assessments, the uncertainty is not fully characterized and the distribution of OFL is estimated by ad hoc methods. Level 3 assessments are those that may provide a point estimate of OFL, but do not provide an estimate of the distribution of OFL and key sources of uncertainty are not adequately captured in the assessment. Finally, level 4 assessments do not provide any information on OFL.

In reviewing the material provided to it (#1 above), the SSC determined that the 2010 spiny dogfish assessment (Rago and Sosebee 2010a, 2010b, 2010c) should be considered a Level 3 assessment. The principal reasons for this categorization include the fact that no distribution of OFL was provided and that considerable uncertainties relating to stock size, and the relationship between pup

survival and the sex ratio in the stock and the size distribution of mature female dogfish were not fully incorporated into the OFL estimation.

Based on this categorization, the SSC is required to develop and adjust the OFL distribution to develop an ABC recommendation that to applies to the Council's risk policy. If no objective approach to estimating the distribution of OFL can be determined a default value of the catch at 75% of F_{MSY} should be used as the foundation for OFL.

3) The level of catch (in weight) associated with the overfishing limit (OFL) based on the maximum fishing mortality rate threshold;

Management reference points should be compatible. A stock that is exploited at F_{MSY} should exhibit a biomass, albeit variable, close to B_{MSY}. For spiny dogfish the $F_{threshold} = F_{MSY\ proxy}$ estimate (F = 0.325) given in Rago and Sosebee (2010 a) was predicted to yield a long term, expected spawning stock biomass of 159,288 metric tonnes (mt). However in reviewing the material provided (Rago and Sosebee 2010a; Figure 3), the SSC noted that projections of SSB when fished at $F_{MSY\ proxy}$ forecast a declining pattern of biomass. These projections indicated that SSB would be below the B_{MSY} proxy in five years, and decline thereafter almost reaching the ½ B_{MSY} proxy (the overfished definition) after 20 years. **Based on this projected outcome, the SSC rejected the current $F_{MSY\ proxy}$ estimate** (F = 0.325) **because it was not compatible with B_{MSY} and thus not a suitable foundation for OFL.**

Available projections at a slightly lower F (75% $F_{MSY\ proxy}$ = 0.244) indicated an expected SSB after 20 years that occurred between the proxies for B_{MSY} and ½ B_{MSY} (Rago and Sosebee 2010b; Figure 10). In reviewing other projections provided to it, the SSC noted that projections of SSB for F = 0.207 (the current target F) stabilized close to the proxy for B_{MSY} after 20 years. In discussions with the lead analyst for the Northeast Fisheries Science Center, the SSC determined that F=0.207 continued to achieved B_{MSY} over longer 30-year projections as well. **Accordingly, the SSC determined that F = 0.207 is currently the best-available basis for determining OFL.** From this determination, the OFL for one-, three-, and five-year planning horizons are:

For 2011:	20,267 mt
For 2011 - 2013:	20,267; 20,861; 20,865 mt
For 2011 - 2015:	20,267; 20,861; 20,865; 20,397; 19,701 mt

4) The level of catch (in weight) associated with the acceptable biological catch (ABC) for the stock based on one, three and five year planning horizons. The ABC will be selected based on the overfishing definition contained in the FMP and to reflect the level of scientific uncertainty inherent in the OFL such that the recommended ABC is less than or equal to the OFL and is consistent with the intent of the Act, and the National Standard 1 Guidelines;

The SSC evaluated the sources of uncertainty in the spiny dogfish assessment materials provided (Rago and Sosebee 2010a, 2010b and 2010c). The SSC determined that a natural log-scale standard deviation of 0.5 (approximately 50% coefficient of variation) is appropriate for biomass projections. No estimate of uncertainty was available for fishing rates in the material provided. The SSC determined that a similar level of uncertainty would be the best available estimate for the threshold rate of exploitation ($F_{MSY\ proxy}$). **Assuming that statistical error in estimates of biomass and threshold exploitation rate are independent, and that the overall level of uncertainty is log-normally distributed, the SSC recommends an overall level of uncertainty in OFL of CV = 75%.**

The SSC considered the extent to which the unusual life history of spiny dogfish could potentially increase vulnerability to exploitation had been included in the assessment material. The SSC noted that

the assessment team had gone to considerable efforts to include important sources of uncertainty. However, the SSC also noted that key sources of uncertainty in recruitment related to the variation in pup size due to changes in the sex ratio in the stock and the body size of spawning females had not been included in projections. **Accordingly the SSC defined the stock as having an atypical life history for purposes of determining ABC.**

Based on the Councils' presumptive risk policy (MAFMC 2010b), the SSC determined that an appropriate buffer for scientific uncertainty would be to base ABC on the 35th percentile of a lognormally-distributed OFL with median OFL = 15,200 mt and a CV=75%. Calculations performed by the SSC indicate that this value is equal to 75% of the OFL. Accordingly, the SSC recommends the following ABCs based on one-, three-, and five-year planning horizons.

For 2011:	15,200 mt
For 2011 - 2013:	15,200; 15,646; 15,649 mt
For 2011 - 2015:	15,200; 15,646; 15,649; 15,298; 14,776 mt

The SSC notes that recommendations for 2012 - 2013 may be underestimates. The projection at hand was intended to represent catch over time at F = 0.207. The reduction in catch from OFL to ABC is very closely approximated by a proportional reduction in 2011; however, the realized F under that reduction in 2011 will be less than 0.207. This means that more fish will be present in 2012 (and following years) than indicated in the initial projection, which assumed F = 0.207 in all subsequent years. The SSC recommends that the projection for 2012 - 2015 be updated for next year's specifications.

The SSC notes that no attempt has been made to include management uncertainty in these estimates.

5) If possible, the probability of overfishing associated with catches associated with the OFL and ABC recommendations (if not possible, provide a qualitative evaluation);

The SSC used a probability of overfishing equal to 35%, based on proposed risk policy contained in the Omnibus Amendment and the determination that spiny dogfish had an atypical life history.

6) The most significant sources of scientific uncertainty associated with determination of OFL and ABC;

Sources of uncertainty are explicitly addressed in the assessment model:

- Three-year running average of survey biomass (design-based variance) for males and females;
- Area swept-per-tow in the NEFSC trawl survey;
- Conversion coefficient for Bigelow CPUE to Albatross CPUE;
- Discard level and associated mortality by fishery; and
- Sampling distribution of biomass and fishing mortality based on integration of all input parameters.

Sources of uncertainty NOT addressed in the assessment model:

- Estimate of sex ratios in landings and discards;
- Mortality rates of discarded fish;
- Variance in gear catchability;
- Discards of dogfish in Canadian fisheries;

- Future Canadian landings;
- Changes in selectivity, particularly with more directed fisheries;
- Scaling of survey indices with landings;
- Changes in effort associated with changing regulations, especially for groundfish sectors; and
- The survey catchability coefficient (q-value).

Sources of uncertainty NOT incorporated in the projections characterizing stock status or evaluating harvest strategies:

- Biological reference points;
- 95% parametric confidence interval for 30.3 kg/tow is {10.98, 49.71} (scales to SSB_{max});
- Sex ratios of landings;
- Effects of male dogfish — high biomass, negligible F;
- Gear-specific differences;
- Pup survival; and
- Stock-recruit relationship.

7) A certification that the recommendations provided by the SSC represent the best scientific information available.

To the best of the SSC's knowledge, these recommendations are based on the best available scientific information.

Orientation Session

New members of the SSC participated in an orientation session during the morning of September 21st, where they were introduced to the Council decision-making process, the current status and issues for species managed by the Council, and the SSC's standard operating procedures and protocols.

Assessment and Management Strategy Evaluation Project

Mike Wilberg gave an update on the status of the Management Strategy evaluation Study being conducted by Drs. Wilberg and Miller at the University of Maryland/CBL. In August they hired post-doc John Weideman to work on the project. Drs. Wilberg and Weideman have been in contact with Paul Rago and Mark Terceiro at the NEFSC to coordinate development of the project with NEFSC assessment personnel. The focus of year one will be summer flounder because it is perhaps the most data rich stock in the MAFMC portfolio of managed species. Dr. Wilberg is also planning a meeting of the MSE Steering Committee in late October to discuss project development and execution. The oversight Committee will consist of SSC members, Council members, and staff, as well as NEFSC staff, and should insure that the study yields results applicable to assessment and management needs of the SSC and Council.

Five-year Research Priority Plan

Rich Seagraves gave an overview of the revisions to the current Council research priority plan recommended by Council staff. A specific concern is the inadequate coverage of Mid-Atlantic fisheries in the NMFS at-sea observer program. Poor observer coverage of Mid-Atlantic fisheries leads to high uncertainty about discard estimates which has ramifications for both specification of ABCs as well as determining if ACLs are exceeded in given year or specified time period. The SSC agreed that this should be highlighted, as well as the need for research to determine the mortality of discards by gear type. Bonnie McCay recommended that language be added to the general research need category

identifying the current inadequacy of social and economic data (a bullet was added). Tom Miller recommended adding a bullet describing the need for the estimation of uncertainty about OFL estimates. All staff and SSC recommendations are incorporated in Attachment 3. The changes recommended to the current five-year research plan reflect progress made for some species as identified in recent assessments, as well as new research needs identified by the SSC. Species-specific changes were as follows:

- Summer flounder – add, "Evaluate current summer flounder management measures, especially in the recreational fishery as they relate to sex specific mortality."
- Black sea bass – add, "Conduct stock identification research to identify population subgroups and the extent of mixing."
- Scup, *Loligo*, Illex, Atlantic mackerel, and butterfish – add, "Explore the utility of incorporating ecological relationships, predation, and oceanic events that influence scup population size on the continental shelf and its availability to the resource survey into the assessment model."
- Spiny dogfish – add, "Need to revise the assessment model to investigate the effects of stock abundance, sex ratio and size of pups on birth rate and first year survival of pups."

Pres Pate gave an overview of the Council's RSA (Research Set-Aside) program. The Council is currently in the process of re-evaluating the efficacy of this program. The first step was to develop a Mission Statement to more clearly define the goals of the RSA program. The next step is to do a project-by-project evaluation of research projects previously funded under this program to determine which projects yielded results that could be incorporated into the Council's management programs. An area of concern already identified by the Council is the need more for rigorous scientific peer review of research proposals both before funding and after projection completion to insure that the information derived meets the requirements of National Standard 2. The SSC generally agreed to become more involved in the peer review of projects proposed and/or funded under the RSA program. It was also noted that many of the problems experienced in the RSA program result from the fact that it is administered as a grants program. Mike Wilberg noted that the Great Lakes Fisheries Commission Cooperative Research is a very successful model that should be examined.

ACL/AM Workshop Summary

John Boreman gave an overview of the recent ACL/AM workshop held in Woods Hole on August 12-13, 2010. The goal of the workshop was to develop a new operational approach to develop ABCs and ACLs given the increase in demand for scientific advice as a result of the 2006 reauthorization of the Magnuson-Stevens Act and fixed and/or limited resources. The results of the workshop will be forwarded to the NRCC at its next meeting in late October.

The next step is to hold a joint meeting of the MAFMC and NEFMC SSCs in conjunction with NEFSC scientists, probably in December or January. The purpose that meeting is to discuss responsibilities and capabilities of the various entities involved in the assessment and ABC specification process, as well as to develop a clear understanding of the information required by the SSC to make ABC determinations, especially with regard to quantification of uncertainty of biological reference points and relevant population dynamic metrics.

SAW/SARC Schedule

Rich Seagraves discussed the current SAW/SARC schedule. Previous discussions of the SSC identified the need to update the scup stock assessment due to the high uncertainty about current stock size estimates. The SSC concluded that the schedule should remain as currently proposed, but add scup to the agenda as soon as possible. The SSC also noted that there is a scheduled survey vessel change for the clam survey next year. That survey, which is conducted every three years, will transition from the

Delaware II to an industry-based research platform. If possible, ocean quahog should be added to the SAW/SARC schedule in 2012, or a special peer review panel should be convened, to evaluate conversion to the industry vessel-based survey results, including an evaluation of the vessel calibration experiments to be conducted between the NOAA and industry vessels.

Industry Advisors Performance Report

Rich Seagraves gave an overview of the Council proposal to develop an Industry Advisory Report to inform the SSC about non-biological factors that can affect catch and landings of a particular species (see staff white paper, Attachment 4). This information should be particularly useful in data poor situations where the only information available is catch data. John Boreman noted that he saw this as an opportunity to energize the social science members of the SSC and will send out a communication to those members to solicit their participation, as a subcommittee of the SSC, in the development of the protocols and TORs for the AP Advisory Report. Bonnie McCay was appointed interim leader of the SSC subcommittee.

Ecosystems Terms of Reference

The Council has requested that the SSC form a Subcommittee to provide scientific advice to the Council on ecosystem structure and function to inform them relative to the development of ecosystem-based management policy. John Boreman appointed Jason Link to Chair this subcommittee, and will poll the SSC to determine who would like to serve on it. The SSC discussed the draft TORs for the subcommittee and were in general agreement with them (Attachment 5). Dr. Link proposed, and the SSC agreed, to recommend adding the following TOR: *Work with the Council (especially the Council's Ecosystems and Ocean Planning Committee) to help identify and establish the Council's ecosystem level goals, objectives, and policies.*

Attachments

cc:
Members, MAFMC SSC, R. Seagraves, J. Armstrong, Lee Anderson

SSC Attendance
September 21, 2010

Name	Affiliation
SSC Members	
John Boreman, Chair	North Carolina State University
Tom Miller, Vice-Chair	University of Maryland/CBL
Dave Secor	University of Maryland/CBL
Wendy Gabriel	NMFS NEFSC
Jason Link	NMFS NEFSC
Mike Wilberg	University of Maryland/CBL
Mike Frisk	SOMAS
Doug Lipton	UMCP
David Tomberlin	NOAA
Other	
Rich Seagraves	MAFMC Staff
Jim Armstrong	MAFMC Staff
Rick Robins	Chair, MAFMC
Paul Rago	NMFS NEFSC
Greg DiDomenico	GSSA

September 22, 2010

Name	Affiliation
SSC Members	
John Boreman, Chair	North Carolina State University
Tom Miller, Vice-Chair	University of Maryland/CBL
Bonnier McCay	Rutgers University
Wendy Gabriel	NMFS NEFSC
Jason Link	NMFS NEFSC
Mike Wilberg	University of Maryland/CBL
Other	
Rich Seagraves	MAFMC Staff
Tom Hoff	MAFMC Staff
Rick Robins	Chair, MAFMC
Pres Pate	MAFMC
Greg DiDomenico	GSSA
Ellen Bohaneck	NFI

October 7, 2010 (Webinar)

SSC Members

John Boreman, Chair	North Carolina State University
Tom Miller, Vice-Chair	University of Maryland/CBL
Mike Wilberg	University of Maryland/CBL
Wendy Gabriel	NMFS NEFSC
Mark Holliday	NMFS HQ
Yan Jiao	Virginia Tech University
Jason Link	NMFS NEFSC
Dave Secor	University of Maryland/CBL

Other

Rich Seagraves	MAFMC Staff
Rick Robins	MAFMC Chair
Lee Anderson	MAFMC Vice-Chair
Lindsey Feldman	NMFS NERO

Assessment Level Specification Criteria

The levels of stock assessments, their characteristics, and procedures for determining ABCs are defined as follows:

Level 1: Level 1 represents the highest level to which an assessment can be assigned. Assignment of a stock to this level implies that all important sources of uncertainty are fully and formally captured in the stock assessment model and the probability distribution of the OFL calculated within the assessment provides an adequate description of uncertainty of OFL. Accordingly, the OFL distribution will be estimated directly from the stock assessment. In addition, for a stock assessment to be assigned to Level 1, the SSC must determine that the OFL probability distribution represents best available science. Examples of attributes of the stock assessment that would lead to inclusion in Level 1 are:

- Assessment model structure and any treatment of the data prior to inclusion in the model includes appropriate and necessary details of the biology of the stock, the fisheries that exploit the stock, and the data collection methods;
- Estimation of stock status and reference points integrated in the same framework such that the OFL calculations promulgate all uncertainties (stock status and reference points) throughout estimation and forecasting;
- Assessment estimates relevant quantities including F_{MSY}[1], OFL, biomass reference points, stock status, and their respective uncertainties; and
- No substantial retrospective patterns in the estimates of fishing mortality (F), biomass (B), and recruitment (R) are present in the stock assessment estimates.

The important part of Level 1 is that the precision estimated using a purely statistical routine will define the OFL probability distribution. Thus, all of the important sources of uncertainty are formally captured in the stock assessment model. When a Level 1 assessment is achieved, the assessment results are likely unbiased and fully consider uncertainty in the precision of estimates. Under Level 1, the ABC will be determined solely on the basis of an acceptable probability of overfishing (P*), determined by the Council's risk policy (see alternatives in section 5.2.2), and the probability distribution of the OFL.

Level 2: Level 2 indicates that an assessment has greater uncertainty than Level 1. Specifically, the estimation of the probability distribution of the OFL directly from the stock assessment model fails to include some important sources of uncertainty, necessitating expert judgment during the preparation of the stock assessment, and the OFL probability distribution is deemed best available science by the SSC. Examples of attributes of the stock assessment that would lead to inclusion in Level 2 are:

- Key features of the biology of the stock, the fisheries that exploit it, or the data collection methods are missing from the stock assessment;
- Assessment estimates relevant quantities, including reference points (which may be proxies) and stock status, together with their respective uncertainties, but the uncertainty is not fully promulgated through the model or some important sources may be lacking;
- Estimates of the precision of biomass, fishing mortality rates, and their respective reference points are provided in the stock assessment; and
- Accuracy of the MFMT and future biomass is estimated in the stock assessment by using *ad hoc* methods.

[1] With justification, F_{MSY} may be replaced with an alternative maximum fishing mortality threshold to define the OFL.

In this level, ABC will be determined by using the Council's risk policy (see alternatives in section 5.2.2), as with a Level 1 assessment, but with the OFL probability distribution based on the specified distribution in the stock assessment.

Level 3: Attributes of a stock assessment that would lead to inclusion in Level 3 are the same as Level 2, except that

- The assessment does not contain estimates of the probability distribution of the OFL or the probability distribution provided is not considered best available science by the SSC.

Assessments in this level are judged to over- or underestimate the accuracy of the OFL. The SSC will adjust the distribution of the OFL and develop an ABC recommendation by applying the Council's risk policy (see alternatives in section 5.2.2) to the modified OFL probability distribution. The SSC will develop a set of default levels of uncertainty in the OFL probability distribution for this level based on literature review and a planned evaluation of ABC control rules. A control rule of 75% of F_{MSY} may be applied as a default if an OFL distribution cannot be developed.

Level 4: Stock assessments in Level 4 are deemed to have reliable estimates of trends in abundance and catch, but absolute abundance, fishing mortality rates, and reference points are suspect or absent. Additionally, there are limited circumstances that may not fit the standard approaches to specification of reference points and management measures set forth in these guidelines (i.e., ABC determination). In these circumstances, the SSC may propose alternative approaches for satisfying the NS1 requirements of the Magnuson-Stevens Act than those set forth in the NS1 guidelines. In particular, stocks in this level do not have point estimates of the OFL or probability distributions of the OFL that are considered best available science. In most cases, stock assessments that fail peer review or are deemed highly uncertain by the SSC will be assigned to this level. Examples of potential attributes for inclusion in this category are:

- Assessment approach is missing essential features of the biology of the stock, characteristics of data collection, and the fisheries that exploit it;
- Stock status and reference points are estimated, but are not considered reliable;
- Assessment may estimate some relevant quantities including biomass, fishing mortality or relative abundance, but only trends are deemed reliable;
- Large retrospective patterns usually present; and
- Uncertainty may or may not be considered, but estimates of uncertainty are probably substantially underestimated.

In this level, a simple control rule will be used based on biomass and catch history and the Council's risk policy.

Mid-Atlantic Fishery Management Council
Five-Year (2009-2013) Research Plan
Revised September 22, 2010

The Magnuson Stevens Reauthorization Act of 2006 requires that each Council, with the assistance of its Scientific and Statistical Committee (SSC), develop a five-year research priority plan. To facilitate this process, the Mid-Atlantic Fishery Management Council (MAFMC) examined the research needs that have been identified in numerous stock assessments, Council FMP/Amendment documents and through the Council's Research Set Aside Program. In addition, the NE portion of the NMFS Strategic Plan for Fisheries Research and the research needs list which formed the basis for proposed changes to marine recreational fisheries statistics in the US as part of the Marine Recreational Information Program were evaluated. The Council, in consultation with its SSC, identified the top research needs for each of its managed species based on documented research needs contained in the sources described above. In addition, the Council and SSC identified research needs common to all species that are of high priority to address future assessment and fishery management needs.

General Research and Information Needs

- Collect accurate size and age composition of commercial and recreational catch (especially the discarded component of the catch) to develop catch at age matrices for all managed stocks; estimate mortality of discards by gear type
- Implement novel supplemental surveys to derive fishery independent indices of abundance (where appropriate; see species specific needs below)
- Develop assessment models to support fishery management control rules for data poor stocks (i.e., use fishery dependent data)
- Build the regional capacity within governmental agencies and academia to undertake management strategy evaluations of MAFMC managed stocks to evaluate management performance
- Develop bio-economic models to support fishery management
- Establish a framework for risk analysis of alternative harvest policies
- Incorporate ecosystem level data (predator/prey interactions, trophic dynamics, etc.) into single and multi-species assessment and management models
- Investigate effects of climate change on ecosystems and fisheries they support
- Review and improve capacity for social and economic impact analyses, including updated data on fisheries organization and structure, participation, community linkages; for regular FMP work and at scales appropriate for ecosystem-based management
- Quantify uncertainty in biological reference points

Species Specific Research Needs

Bluefish: 1) increase sampling of size and age composition by gear type and statistical area and target landings for biological data collection and increase intensity of sampling for biological data, 2) investigate alternative survey methods that target bluefish across all age classes to create a more representative fishery-independent index of abundance, and 3) initiate sampling of offshore populations in winter months.

Tilefish: 1) conduct hook selectivity study and collect data on spatial distribution and population size structure and, 2) explore the influence of water temperature and other environmental factors on the trend in the commercial fishery CPUE index of stock abundance.

Surfclams: 1) develop a forward-projecting, age-structured stock assessment model based estimate of abundance, 2) consider using year-, region- or episodic natural mortality rates, 3) consider the potential impacts of climate change on the natural mortality of the surfclam resource given recent trends, 4) determine factors that control recruitment success in surf clams (i.e., predation or environmental factors), and 5) determine how much of Georges Bank is suitable habitat for surfclams, and if depletion and selectivity experiments done in the mid-Atlantic are applicable to the Georges Bank region.

Ocean Quahog: 1) Carry out simulations to determine optimum proxies for Fmsy and Bmsy in ocean quahogs, given their unusual biological characteristics, 2) improve estimates of biological parameters for age, growth (particularly of small individuals), and maturity for ocean quahogs in both the EEZ and in Maine waters, 3) investigate model formulations that accommodate spatial heterogeneity and 4) Additional age and growth studies are required to determine if extreme longevity (e.g., 400 years) is typical or unusual and to refine estimates of natural mortality. Similarly, additional age and growth studies over proper geographic scales could be used to investigate temporal and spatial recruitment patterns.

Summer flounder: 1) expand the collection of otoliths on an ongoing basis to include all components of the catch-at-age matrix, particularly for fish larger than 60 cm (~7 years; could provide a better indicator of stock productivity), 2) conduct inter-lab aging calibration studies between NEFSC and state agencies, 3) develop a reference collection of summer flounder scales and otoliths to facilitate future quality control of summer flounder production aging, 4) collect information on overall fecundity for the stock (egg condition and production) to serve as an indicator of stock productivity, 5) investigate trends in sex ratios and mean lengths and weights of summer flounder in state agency surveys catches, 6) evaluate selectivity patterns in trawl gear as a function of mesh size, and 7) evaluate current summer flounder management measures, especially in the recreational fishery as they relate to sex specific mortality.

Black sea bass: 1) evaluate alternative indices of stock abundance, 2) initiate routine aging of black sea bass in survey collections to investigate the magnitude of year effects, 3) tagging studies should be initiated to obtain return rates over longer periods, 4) at –sea samples need to be obtained to improve understanding of the timing of sex change over years in order to study the potential influence of population size on sex switching (may have implications for overfishing BRPs) and 5) evaluate management approaches appropriate for species with protogynous life histories, and 6) conduct stock identification research to identify population subgroups and the extent of mixing.

Scup: 1) evaluate indices of stock abundance, 2) expand age sampling of scup from commercial and recreational catches, with special emphasis on the acquisition of large specimens, 3) conduct biological studies to investigate factors affecting annual availability of scup to research surveys and maturity schedules, 4) improve estimates of discards and discard mortality for commercial and recreational fisheries and, 5) explore the utility of incorporating ecological relationships, predation, and oceanic events that influence scup population size on the continental shelf and its availability to the resource survey into the assessment model.

Atlantic mackerel: 1) explore the efficacy of acoustic surveys and other indices of abundance for monitoring total stock abundance, 2) initiate broad scale international egg surveys within potential spawning habitat, including the shelf break (potentially in cooperation with the commercial fishing industry, 3) obtain accurate estimate of discards, especially during years when large year classes are entering the fishery, 4) examine stock structure and degree of mixing between northern and southern 'contingents' and, 5) explore the utility of incorporating ecological relationships, predation, and oceanic events that influence mackerel population size on the continental shelf and its availability to the resource survey into the assessment model.

Butterfish: 1) explore the utility of incorporating ecological relationships, predation, and oceanic events that influence butterfish population size on the continental shelf and its availability to the resource survey into the assessment model, 2) explore the use of an age-based model for future assessments, and 3) a study of growth, morphometrics, distribution and other biological attributes of inshore and offshore components of the butterfish population should be conducted.

Illex: 1) Collect maturity and age data throughout the fishing season to evaluate the effects of differential growth and maturity within seasons and between years, 2) re-estimate biological reference points for each seasonal cohort by incorporating seasonal information regarding growth, selectivity, and natural mortality, 3) design and assess the benefits of an annual, pre-fishery stratified random survey to estimate initial stock size and, 4) explore the utility of incorporating ecological relationships, predation, and oceanic events that influence *Illex* population size on the continental shelf and its availability to the resource survey into the assessment model and 5) investigate the distribution of *Illex* beyond the depth range of current NEFSC trawl surveys, possibly using experimental research or supplemental surveys

Loligo: 1) Develop biomass based reference points for *L. pealeii*, 2) expand age and growth studies to better estimate average growth patterns and to discern seasonal patterns, 3) improve the spatial resolution, coverage and accuracy of commercial catch data and 4) explore the utility of incorporating ecological relationships, predation, and oceanic events that influence *Loligo* population size on the continental shelf and its availability to the resource survey into the assessment model.

Spiny Dogfish: 1) need to revise the assessment model to investigate the effects of stock abundance, sex ratio and size of pups on birth rate and first year survival of pups, 2) initiate a large scale [international] tagging program consisting of conventional external tags, data storage tags, and satellite pop-up tags to help clarify movement patterns and migration rates, 3) investigate the distribution of spiny dogfish beyond the depth range of current NEFSC trawl surveys, possibly using experimental research or supplemental surveys, 4) initiate aging studies for spiny dogfish age structures (e.g., fin spines) obtained from all sampling programs (include additional age validation and age structure exchanges) and conduct an aging workshop for spiny dogfish, encouraging participation by NEFSC, NCDMF, Canada DFO, other interested state agencies, academia, and other international investigators with an interest in dogfish aging (US and Canada Pacific Coast, ICES), and 5) investigate population genetic structure with emphasis on identifying discreet breeding populations and the extent of mixing.

Draft Framework for Advisory Panel (AP) Fishery Performance Report

"Why"

A. Having a formal AP Fishery Performance Report for characterizing and describing fishery performance on an annual basis from the AP's on-the-water perspective would provide additional information that can assist the SSC in interpreting catch information, especially in data-poor situations.

B. Assessments often integrate input from industry regarding the catch history. Having a systematic record of narratives for each year's catch might be more useful than ad hoc recollections by SAW/SARC attendees about what might have happened in a given year.

C. An AP Fishery Performance Report could generally be a better way to incorporate AP expertise, and to provide the AP with a structured role and opportunity for input in the specification-setting cycle.

"Who"

A. Who develops questionnaire/questions? SSC subset + staff subset + AP subset?
B. Who is asked? Are current APs sufficiently representative to characterize the performance of a fishery throughout its range and across fishing modes?
C. Who collects responses?
D. Who creates summaries?
E. Also need to ensure some AP representation on pre-decisional call and/or ABC meeting in case questions come up on narrative(s)?

"What"

I. Format

A. Preliminary Format: Staff/SSC/AP sub-group could work together to determine what information would be most useful in the report to inform the SSC. The desired content would then be formatted in a report template acceptable to the SSC that becomes the framework for the annual report. Each AP could have a species-lead, similar to the SSC practice, who would be responsible for compiling the content of the report. The content could be solicited from the AP by the AP species-lead, and incorporated into the document. If a fishery is split between commercial and recreational sectors, it may be necessary to have sector-specific species-leads for an AP, with each lead contributing to the report. The AP could then review and submit the document as a consensus report to the SSC. The process would require TORs and SOPPs to be developed as the process is defined. Staff and/or SSC support likely necessary for the AP leads to develop the report.

Alternative Formats:

B. Gather responses to TOR trigger questions from AP and provide all responses to SSC.
- Information overload?
- QAQC?

- The AP may have a stronger sense of ownership and participation if they produce an AP report, rather than completing an annual survey that is fed into the process through the staff or through the SSC. Alternatively, forwarding all responses (perhaps in the form of a poll) makes sure all voices are heard.

C. Have interested SSC members create summary from responses?
- Are SSC members able to devote time to this task?
- AP/Industry buy-in if SSC creates report?

D. Have staff create summary from responses?
- Workload issues
- AP/Industry buy-in if SSC creates report?

E. Mix and match (A-D) depending on AP's/SSC's preferences for a given fishery?

**Given differences between regions and gears, agreement by AP on one or two final reports could be quite challenging and require substantial annual time investment by whoever (for example AP leads, staff, SSC) leads development of the final product.

II. Content - What to ask? Perhaps get one AP member from each AP to work with SSC and staff on a first cut and then get comments from all AP members? Tight TORs will facilitate creation of a useful product.

A. Preliminary list of factors affecting annual catch and effort
- Consumer Preferences, Price
- Market Opportunities (within fishery and other fisheries)
- Availability and timing (weather, length of season, ocean climate, SST, currents, spatial availability, description of abundance spatially and temporally throughout the fishery and across fishing modes)
- Management induced effort shifts
- Changes in fishing practices (areas fished, methods, gear changes, technologies, sizes targeted, species mix targeted)
- Changes in the economics of production (fuel, LPUE, etc.)
- Regulatory factors which impacted magnitude of landings/catch
- Other externalities, which may have affected effort/catch (i.e., bycatch of other species prohibited effective fishing or capped effort and landings, etc.)
- How yield (e.g. meat yields in scallops or clams) or size selectivity influenced fishing patterns.
- Review of potential new factors not considered in previous years.

B. Establish a historical baseline in the first report that summarizes the history of the fishery, in terms of its development as a fishery and significant factors throughout its transition into its current state.

"When"

I. Initial

Could start with just most recent year or go back 3-5. If one just goes back one year then it will take a while to get a time series. If one goes back 3-5 get same problem as have now - have to rely on recollections. In order for the information to have immediate utility, it would appear that the first report would have to go back 3-5 years or more. The resolution of information may not be as great, but it is likely important to describe the fishery's operating history. Most dealers and fishermen keep detailed records, and the AP could likely characterize performance for the past 3-5 years in the first report. The report could then be updated annually, so that the SSC has an archived description of the performance of the fishery that it can reference in the future.

II. Future iterations

A. Questionnaires could be sent Jan 1, 2011 for 2010 season for all species. 2010 would be relatively fresh in everyone's minds and this process would be separated in time a bit from quota setting. While we would not have final catch data, this could actually be an advantage. Instead of explaining what the catches were on paper, we would get more of an independent description of the conditions that people felt should have influenced catch. Having the catch data could change how people recall the season.

B. Annual, biannual, triennial? More frequent equals more workload… Less frequent equals more distant recollections. An annual cycle should result in the most detailed and accurate information regarding the performance of the fishery and would keep the AP integrated into the Council process.

III. Include final product in SSC mail-out.

Mid-Atlantic Fishery Management Council (Council)
Ecosystems Subcommittee of the Scientific and Statistical Committee (SSC)
Draft Terms of Reference

Organization

The Ecosystems Subcommittee of the SSC will be appointed by the Chairman of the SSC.

Function

The Subcommittee will advise the Council on ecosystems management and ecological issues related to the Council's Fishery Management Plans (FMPs) and management programs.

Objectives

1. Work with the Council (especially the Council's Ecosystems and Ocean Planning Committee) to help identify and establish the Council's ecosystem level goals, objectives and policies.
2. Identify and describe scientific advice that the Council could use to address and incorporate ecosystem structure and function in its fishery management plans (FMPs) and quota specification process to ensure that the Council's management practices effectively account for ecological sustainability.
3. Describe scientific information that the Council could consider to anticipate or respond to shifts in ecological conditions (e.g. climate change and other externalities) or processes in its management programs.
4. Summarize what other countries and regions are doing to incorporate ecosystem-based fishery management principles in their management plans and programs.
5. Describe how ecosystems principles could be used by the Council in the long term to evolve its single-species and multi-species FMPs into a regional ecosystem-based fishery management plan.