Mid-Atlantic Fishery Management Council
Ecosystem Approach to Fishery Management Guidance Document
Draft Outline (revised 5/30/14)

1. Introduction

The Mid-Atlantic Fishery Management Council (Council) has been considering mechanisms to introduce ecosystem considerations into the fishery management process since the late-1990s. In the fall of 2011, the Council hosted the fourth National Scientific and Statistical Committee Workshop which was convened to provide an opportunity for the eight Council SSCs to discuss incorporation of ecosystem considerations in federal fisheries management (Seagraves and Collins 2012). After a review of the various approaches to incorporating ecosystem considerations into fishery management around the US, the MAFMC adopted the approach being taken by the Pacific Fishery Management Council's (PFMC). The PFMC Fishery Ecosystem Plan is intended to act as an "umbrella" plan to introduce ecosystem considerations in PFMC management actions in a step-wise, evolutionary fashion. While the Council has adopted the general PFMC approach, various aspects of ecosystem approaches to fishery management being taken by the other six fishery management Councils are being considered here as well.

This approach addresses several key elements necessary for the successful implementation of an ecosystem approach to fisheries management. The first is the need to carefully develop a transition strategy to move from the current single-species focused management approach to a multi-species/ecosystem one. This transitional approach will allow the Council to meet its current MSA requirements with respect to the prevention of overfishing and attainment of OY while moving towards a definition of OY which truly takes into account impacts on multiple dimensions of the environment/ecosystem, of which humans are inextricably a major component.

The second desirable aspect of this strategy is that it allows for the growth and development of EAFM policy at a rate commensurate with existing science. It is important that EAFM policy be developed in a step-wise fashion such that management policy does not exceed current or reasonably expected advances in the science necessary to support it. Another desirable attribute of the approach is the recognition that stakeholder involvement is imperative to success. It is also recognized that EAFM will likely require engagement of a much broader range of stakeholder interests compared to traditional fisheries management.

This EAFM Guidance Document is intended to provide overall guidance to the Council with respect to the incorporation of ecosystem considerations into its current management programs. Based on this guidance, initial implementation of Council management actions with respect to ecosystem considerations will occur in a consistent, coordinated fashion, but within the existing FMP structure. This guidance document was developed to allow the Council to transition to an EAFM, but it could ultimately be converted into a regulatory document in the future (i.e., a stand-alone Fishery Ecosystem Plan or FEP).

2. Purpose and Need

Specific national guidance on how to implement ecosystem considerations into the federal fishery management process is currently lacking. This EAFM Guidance document is intended to

enhance the Council's species-specific management programs with more ecosystem science, broader ecosystem considerations and management policies that coordinate Council management across its Fishery Management Plans (FMPs) and the relevant ecosystems. The document provides a framework in the form of guidelines for considering policy choices and trade-offs as they affect FMP species and the broader ecosystems. Most importantly, the intent of the Council is to develop a practical "how-to" guide for the implementation of EAFM that will allow the Council to transition to an ecosystem approach to management following the guidelines established herein.

The needs for an ecosystem-based fishery guidance document within the Council process are:

1. Improve management decisions and the administrative process associated with providing biophysical and socio-economic information on ecosystem climate conditions, climate change, habitat conditions and ecosystem interactions.

2. Provide adequate buffers against the uncertainties of environmental and human-induced impacts to the marine environment by developing safeguards in fisheries management measures.

3. Develop new and inform existing fishery management measures that take into account the ecosystem effects of those measures on ecosystem species, habitat, and fishing communities.

4. Coordinate information across FMPs for decision-making within the Council process and for consultations with other regional, national, or international entities on actions affecting ecosystems or FMP species.

5. Identify and prioritize research needs and provide recommendations to address gaps in ecosystem knowledge, particularly with respect to the cumulative effects of fisheries management on marine ecosystems and fishing communities.

Perhaps the most important aspect of EAFM is that will allow the Council to make specific management decisions based on a policy that considers the impacts of incremental management measures on the ecosystem. Conversely, it will also allow the Council to evaluate

3. EAFM Definition

> *An ecosystem approach to fishery management recognizes the biological, economic, social, and physical interactions among the components of ecosystems and attempts to manage fisheries to achieve optimum yield taking those interactions into account*

4. EAFM Goal

To manage for ecologically sustainable utilization of living marine resources while maintaining ecosystem productivity, structure, and function.

5. Ecosystem Considerations of Highest Priority for Development of EAFM Guidelines

Based on Council and SSC discussions and stakeholder input from the Councils Visioning project, the Council concluded in October 2012 that the EAFM document should focus initially on the following major issues:

1. Forage/low trophic level species considerations
2. Species interactions (predation, competition) and their effects on sustainable harvest policy
3. Incorporation of social and economic considerations in OY
4. Effects of systematic changes in oceanographic conditions on abundance and distribution of fish stocks and ramifications for existing management approaches/programs
5. Incorporation of habitat conservation and management objectives in the current management process.

6. EAFM Principles (under construction)

7. Description of the Ecosystems (under construction)
    - Delineating the ecosystem(s); geographical scale and extent
    - Biological Components and relationships
        - Description of trophic structure/food webs
        - Key predator-prey relationships
        - Forage species warranting special management consideration
    - Oceanographic features (physical, chemical)
        - Climate and Physical interactions
    - Habitat(s) (including human effects)
        - Ecosystem based EFH definitions

8. Description of Managed Fisheries (under construction)
    - Social and Economic
        - Harvest and processing sector
        - Fishery Dependent Communities
        - Fleet dynamics
        - Valuation methods

9. Description of Existing FMPs and Management Structure (under construction)
    - Description of current FMPs and management process (including inter-jurisdictional issues)
    - Cross FMP evaluation of goals and objectives
    - Identification of potential conflicts and solutions

10. Operational Handbook - Transitional Strategy to EAFM (under construction)
    - Incorporation of EAFM into existing FMPs
        - Policy guidelines addressing tradeoffs between yield and ecosystem effects
            - ABC and OY Control rules
                - Forage species considerations
                - Incorporation of climate effects
                - Incorporation of social/economic considerations
                - Species interactions and addressing competing objectives and ecosystem effects via management strategy evaluation
            - Prohibition of new fisheries for forage species
            - Habitat Considerations
                - Ecosystem based EFH and HAPC designations
                - Water quality issues
            - Consideration of system level OY caps
        - Addressing elements of Council's visioning/strategic plan
            - Integrate Ecosystem research needs in Council research plan
        - Governance Framework to address dynamic processes affecting the ecosystem(s)
            - Ecosystem regime shifts
            - Climate change (develop predictive climate velocity models)
    - EAFM in context of Marine Spatial Planning
        - Development of time variant geospatial models
            - Distribution of species and fisheries in time and space

Development Key:
Seagraves
Hare
Gaichas
Depiper
Lederhouse/Abrams

Summary of Ecosystem Considerations for inclusion in EAFM Document

Forage Species Issues

1. Finalize forage definition
2. Fully develop list of forage species in MA – describe past and present abundance
3. Assess current forage base in MAB; define/describe functional groups (in assessing forage base adequacy); develop policy analysis in support of potential prohibition on new forage/LTL fisheries
4. Develop options for ABC control rule protocol and risk policy modifications incorporating M2 (predation mortality)

Ecosystem Impacts Due to Climate Change

Understanding climate change and the associated impacts on the ocean environment has emerged as one of the major challenges facing fishery science and management. The purpose of this portion of the EAFM guidance document purpose is to 1) inform the Mid-Atlantic Council about the state of climate science relative to prediction of climate change and 2) to describe the ecosystem impacts/changes which have already occurred and are likely to persist or intensify over the next two decades. The intent is to provide the Council with the current state of knowledge relative to climate change and the expected range of impacts on living marine resources under Council jurisdiction and to aid the Council in the development of an adaptive fishery management framework that can respond effectively to ecosystem responses related to climate change.

<u>Key elements</u>

Description of physical oceanography of the system (Hare)
- key features/drivers (atmospheric/oceanographic forcing)
- recent and future climate change
- improve link between climate and physical predictions

Climate vulnerability and risk assessment (Hare/Seagraves)
Which species/fisheries are at greatest risk?

<u>Key areas of interest/concern</u>

Science (biological issues)

1. Predict/monitor changes in distribution (climate change predictions/climate velocity models)
   -stock id, stock unit
2. Predict/monitor changes in productivity
   -monitor changes in growth, maturity, survival and recruitment (stock assessments);
   -include environmental covariates in current assessment models (stock assessment TOR)
   -monitor /update biological reference points (Council/SSC)
   -explore multi-species models, functional groups, more complex whole ecosystem models (Gaichas)

3. Ecosystem state changes and impacts on fishery prosecution and production (Hare/Gaichas)

Based on integration and evaluation of 1 and 2 above, can we identify future ecosystem states which might significantly alter the fundamental structure and productivity of the ecosystem as a whole? How will these changes impact fishery resources and their management?

4. Description of Fleet Dynamics (Depiper)

-describe information needed to inform description/evaluation of fleet behavior and dynamics in response to change in species distributions and productivity

-What analytical models/analyses are available and/or need to be developed to describe the expected fleet behavior in response to changing oceanographic conditions and shifting species distributions and interactions

Management (Policy issues)

1. Develop guidelines to revise current management structure and operations to accommodate shifting species distributions

-develop operational climate velocity models to predict future stock distributions under various climate change scenarios (Hare/Seagraves/[Pinsky?])

- evaluate need for more flexible, malleable management units/boundaries by species/fishery; consider alternative multi-species management clusters

- explore how allocations are expected to be impacted by shifting distributions both among established management areas and fishery sectors (Seagraves/Hare)

-identify other significant management/policy issues likely to emerge as a consequence of climate change (changing discard patterns ?) [EAFM WG]

2. Evaluate Council Risk Policy relative to climate change

-explore changes to Council risk policy (ABC specification) for climate sensitive species - i.e., be more precautionary for species which are sensitive and vulnerable but for which climate effects have not adequately incorporated in stock assessments (Counci/SSC)

3. Re-evaluate goals and objectives across FMPs (Seagraves)

-conduct cross-FMP evaluations of goals and objectives to incorporate ecosystem considerations, in particular in light of climate changes issues

Habitat Considerations

1. Demonstrate and communicate the value of habitat to managed fisheries and transition to landscape/ecosystem level habitat descriptions and conservation.

-strengthen EFH designations and consider "essential" from an ecosystem perspective emphasizing connectivity between species, life history stages, etc.

-quantitatively link habitat science and conservation to fishery outcomes (focus on ecosystem resilience and productivity)

2. Determine if existing habitat authorities are being fully utilized and provide guidance to improve efficacy of implementation

3. Identify research needs and actions to support Council habitat mandates and decision-making needs

-establish goals and metrics

4. Incorporate water quality into EFH considerations

Species and Fisheries Interactions (Gaichas/Seagraves)

1. Develop food web for MAB and analytical framework to assess food web dynamics in the MAB, NE Shelf Ecosystems; assess current forage base in MAB and explore definition/description of functional groups for use in maintenance of adequate forage base within the ecosystem(s)
2. Develop multi-species models which take species interactions into account; develop transition strategy to couple multi-species models with ecosystem level models
3. Assess how climate forcing will affect NE Shelf ecosystems from multi-species perspective (i.e., competition, predation, etc.)
4. Describe any ecosystem regime shifts which have already occurred and/or are likely to occur over next 5-20 years
5. Describe recent and future technological interactions among fisheries

Social and Economic Considerations (Depiper/Seagraves)

1. Description of fleet dynamics in Mid-Atlantic (past, present, future)
2. Develop protocol for integration of social and economic analyses into OY considerations, especially from ecosystem level perspective (i.e., integrate social/economic analyses into other ecosystem focus areas – forage management, multi-species OY, habitat, climate change)
3. Describe technological interactions among fisheries

Black Sea Bass Research Track Assessment

Draft Work Plan (5/28/14)

April 2014	Formally Establish Research Assessment Working Group at Spring NRCC Meeting
	Membership: NEFSC, ASMFC and MAFMC Staff, MAFMC SSC, ASMFC Technical Committee, Other
	Tasks: Initiate BSB Research Track Assessment TOR Development
[Summer 2014	ASMFC TC work on age compositions and indices and review Commission aging workshop results]
June 2014	Initiate Peer Review of RSA BSB Trap Survey (MAFMC/ASMFC)
July 2014	Meeting 1 – via conf call BSB RAWG (Develop TORs, NEFSC present recent simulation modeling work - Shepherd/Blaylock/Feaver)
August 2014	Peer Review of BSB Trap Survey
August/Sept 2014	BSB RAWG Progress Report to SSC/Council/ASMFC-approve TOR, BSB RAWG update, and Review BSB Survey Peer Review
	Meeting 2 – BSB RAWG joint with full TC (Data Meeting, Preliminary Model Discussion) -review BSB survey Peer review -TC report on Age compositions, indices
January 2015	BSB RAWG Meeting 3 (Model development)
May/June 2015	BSB RAWG Meeting 4 (Modeling)
May 2015	BSB RAWG Progress Report to SSC/Council/ASMFC
September 2015	BSB RAWG Meeting 5 (any additional work, draft assessment report)
Dec 2015/Jan 2016	BSB RAWG Meeting 6 with full TC to finalize Assessment Report
Spring 2016	Independent Peer Review of BSB Research Track Assessment Report
July/August 2016	Incorporate BSB Research Track Results in 2017 BSB Specifications

Black Sea Bass Research Track Assessment
Terms of Reference
May 29 2014 Draft

1. Explore cohort tracking to verify utility of fishery independent surveys in tracking abundance and/or year class strength.
2. Examine the spatial timing and coherence of fishery-independent surveys relative to black sea bass distribution and migration.
3. Explore options for developing new age-length keys.
4. Develop new assessment model(s) that address:
    a. ageing uncertainty
    b. the spatial structure and migratory behavior of black sea bass
    c. the unique life history features of black sea bass (e.g., protogynous life history, sex-specificity, etc.)
    d. the incorporation of all available length and age data
    e. the incorporation of time-varying catchability to account for possible density dependent catchability in fishery independent surveys.
5. Develop new biological reference points that take into account the complexities of black sea bass life history.
6. Examine impact of systematic oceanographic changes on abundance and distribution