Proposed FEW Short-Term EBFM Activities for 2011-2012

The EBFM Fisheries Ecosystem Workgroup is considering undertaking short to mid-term activities to enhance current single and multispecies management plans in Chesapeake Bay in addition to their goal of long-term strategic EBFM planning. The FEW met in February and discussed potential activities to incrementally move to EBFM. The following collated list of issue statements represents the seven short to mid-term activities that the FEW will focus on over the next 6-12 months. The FEW would like to request feedback from the GIT Executive Committee as to which activities are of greatest interest and relevance to current fishery management needs.

(1) Menhaden EBFM Reference Points (HOUDE, Secor, Fegley)

Atlantic menhaden is a key forage fish and filter feeder, and the target of the Chesapeake's largest fishery. An EBFM Plan for Chesapeake Bay requires precautionary management that conserves the ecosystem services of menhaden. Two major issues are at hand: 1) "localized depletion" of age-1+ menhaden by fishing and 2) low recruitments of YOY menhaden in the Bay for the past 20 years. No abundance estimates are available for YOY or age-1+ menhaden in the Bay. Indicators and reference points that consider the state of the menhaden stock from perspectives broader than optimizing fishery yield are needed to develop and implement ecosystem-based fishery management in the Bay.

(2) TMDL/Production Relationships (PAOLISSO, Lipton, Tuckey)

Implementation of total maximum daily loads (TMDLs) in Chesapeake Bay is underway with the intent of decreasing nutrient and sediment transport into Bay waters. Target TMDLs were established to protect designated uses for Chesapeake Bay, including fish and shellfish production, by improving Bay water quality and habitat availability. It is important to understand linkages between TMDLs, fisheries production, and socioeconomic impacts. A conceptual framework that connects TMDLs, sociocultural and economic factors and fisheries production in an ecosystem-based context will be developed for use in evaluating the effectiveness of TMDL targets in Chesapeake Bay. The framework should explore how moving towards or achieving TMDL targets will impact Chesapeake Bay fisheries.

(3) Demographics relative to Sediments and Water Flow (PAOLISSO, Lipcius,Townsend)

Increased population, changes in land use and settlement patterns, and development of infrastructure are key sociocultural and economic factors that affect the flow of sediment and water in the Chesapeake Bay watershed. In turn, these human and ecological dimensions have implications for fisheries and their management. A conceptual framework for integrating key demographic factors, including linkages to land use and infrastructure, will be developed for use in evaluating how to improve efforts to reduce sediment loading and sustain water flow. The resulting ecosystem-based framework will require conceptual and methodological input from both social and natural sciences.

(4) FMPs and Indicators - matrix of risk (CAMPFIELD, Houde)

A valuable step forward in ecosystem-based fisheries management is to add ecosystem considerations to the current content of single-species Fishery Management Plans. Several biotic and abiotic variables have already been rigorously evaluated in an EBFM context by the Fisheries Ecosystem Workgroup. A next step is to consider which of those variable(s), or others that may be of more direct importance to individual species (blue crab, oyster, alosines, menhaden, and striped bass), to integrate within FMPs. The FEW/researchers/managers (?) will make final selections of Indicator variables that are most influential in determining the health of each species in Chesapeake Bay, then review content of existing FMPs and identify next steps toward adding Indicators to FMPs. A Matrix of Risk will also be constructed to compare Indicators among species and evaluate susceptibility of species to anthropogenic activities (land use, pollution, fishing).

(5) MSY and EwE Analysis for 19 managed species (TOWNSEND, Miller)

Maximum Sustainable Yield (MSY) is the theoretical largest catch level that can be taken sustainably from a fish stock over an indefinite period. To data MSY has been used a management reference point in single species management. Often, the reference point is expressed with respect to the biomass or abundance that supports MSY- termed B_{MSY}. Depending on species life history and age-specific selectivity of fishing methods, B_{MSY} has been found to occur from 10-60% of the unfished biomass (Rothschild and Yao 2009 However, in the context of ecosystem-based management, Walters et al (2005) show that "widespread application of single-species MSY policies would in general cause severe deterioration in ecosystem structure, in particular the loss of top predator species."

Here we propose to explore the application of ecosystem-based B_{MSY} value for the Chesapeake Bay. We propose to use the Chesapeake Bay Fisheries Ecosystem Model (developed using the Ecopath with Ecosim, EwE, software) to determine the effects and feasibility of fishing all managed species in the Chesapeake at MSY (or other related threshold reference point) and using the analysis results as ecosystem-based strategic advice for managing bay fisheries. We will also explore a range of potential system MSY levels on the sustainability and resilience of individual species in the Chesapeake ecosystem.

References

Rothschild, B.J. and Y. Jiao, 2009. The structure of complex biological reference points and the theory of replacement. *Trans. Am. Fish. Soc. 138*, 949-965. doi: 10.1577/T08-191.1.

Walters, C.J., V. Christensen, S. J. Martell, and J. F. Kitchell. 2005. Possible ecosystem impacts of applying MSY policies from single-species assessment. International Council for the Exploration of the Seas Journal of Marine Science 62: 558-568

(6) Pros and Cons of Single Species Management vs. EBFM (O'REILLY, Johnson)

Most managers of Chesapeake Bay natural resources have participated or assisted in the development of fishery ecosystem plans, yet most management relies on a single species approach, from assessment to rule making. It does not seem these managers are resistant to ecosystem-based fisheries management, rather single-species management offers a familiar, pragmatic course of action, and there have been successes in improving the biological status of various stocks. In recent years; however, there have been new complexities associated with single species management. One is the recent change in natural mortality rates, from either increased predation or disease intensity and prevalence, among the five key species chosen for ecosystem based fisheries management for Chesapeake Bay. This additional complexity, alone, can undermine the successes of single species management.