Ecosystem-Based Fishery Management: A Pragmatic Approach

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Introduction

In the U.S. there is growing national momentum to adopt an ecosystem-based approach to fishery management

• The National Research Council Ecosystem Panel 1999
• NMFS Ecosystem Principles Advisory Panel 1999
• Pew Oceans Commission 2003
• Marine Fisheries Advisory Committee’s (MAFAC) Ecosystem Approach Task Force 2003
• U.S. Commission on Ocean Policy 2004
• Managing our Nation’s Fisheries II conference 2005
• Scientific Consensus Statement on Marine Ecosystem-based Management 2005
• Reauthorization of MS-FCMA will likely contain EBFM provisions

Emergence of ecosystem-based fishery management—change in focus from populations to communities and ecosystems
How to Implement Ecosystem-Based Fishery Management

Ecosystem Approach To Fishery Management
Definition: Ecosystem-Based Fisheries Management

Ecosystem-based fishery management recognizes the physical, biological, economic and social interactions among the affected components of the ecosystem and attempts to manage fisheries to achieve a stipulated spectrum of societal goals, some of which may be in competition.

NMFS rosethorn rockfish
Research and Data Collection for Ecosystem-Based Fishery Management

• We will need all of the elements of conventional (single species) fishery management:
  - Fishery dependent sampling
  - Resource surveys
  - Stock structure
  - Life history/demographics
  - Habitat research
  - Modeling and assessment
  and more.

• The transition to EBFM will be evolutionary not revolutionary, i.e., we should incrementally add more EBFM-relevant science to the knowledge base as we transition to EBFM.
Incorporate a Broader Array of Societal Goals and Uses for Ecosystem Products and Services

- Biodiversity/ecosystem resilience
- Ecotourism
- Existence values
- Commercial harvest
- Sport fishing
- Coastal tourism
Recognize the Significance of Ocean-Climate Conditions

Rockfish recruitment success is related to the environment.
Emphasize Food-Web Interactions

- Recognize that harvest of target species has profound impacts on ecosystem structure and function through trophic interactions
- Expand the predator-prey interaction focus beyond target species to include wider array of species in the ecosystem

- Resource surveys (NOAA/NMFS/NEFC and AKFSC) and dockside sampling can provide biological samples needed to develop a comprehensive predator-prey database
Employ Spatial Representation

• Conventional management focuses on temporal and age-structured considerations and population homogeneity

• Explicitly accounting for space is a practical way to move toward EBFM

• Central to understanding and predicting spatially explicit population dynamics and stock structure

• Allow more effective spatial management e.g., MPAs and distributing harvest consistent with spatial/habitat variation in productivity and to protect life-history characteristics and biodiversity
Increase and Expand Focus on Habitat

- Essential for employing spatial representation and management
- Knowledge of the identity and description of essential habitat for target species is limited
- Knowledge of the association of demographic rates of target species with habitats is virtually non-existent
- Habitat information for non-target species is also needed and is even more limited
Expanded Scope of Research and Monitoring

- Will be qualitatively different than present work, including new subject matter
- Will probably not replace current efforts
- Should focus on understanding biological interactions/processes, and measuring total fishery removals of target and non-target species
- Essential for understanding effects of habitat alteration and ocean climate change on target and non-target species
Acknowledge and Respond to Higher Levels of Uncertainty

• Current understanding of ecosystem processes in highly uncertain
• Existing marine ecosystem models are rudimentary, but useful to shift focus from species and populations to communities and ecosystems
• Focus on what information can be collected to most improve estimates of the level of uncertainty
• Realistically incorporate uncertainty in management policy
Review and Improve Ecosystem Modeling/Research

- Conduct modeling/research to quantify uncertainty and to identify critical data needs to reduce uncertainty
- Conduct modeling/research to understand critical mechanisms and interactions, and to identify most explanatory and cost effective variables to measure
- Include modeling that will quantify trade-offs among management objectives (MSE)
- Include research on how ocean climate impacts target and non-target species

ECOSIM trophic feedback model of the Alaskan Gyre (Aydin unpub)
In Summary: An Ecosystem-Based Approach to Fishery Management Should

• Incorporate a broader array of societal goals and uses for ecosystem products and services
• Recognize the significance of ocean-climate conditions
• Emphasize food-web interactions
• Employ spatial representation
• Increase and expand focus on habitat
• Expanded scope of research and monitoring
• Acknowledge and respond to higher levels of uncertainty
• Review and improve ecosystem modeling/research