

# Managing Our Nation's Fisheries **3** *Advancing Sustainability*

## CONCURRENT SESSIONS: THEME AND FOCUS TOPICS

### Session 2: Advancing Ecosystem-Based Decision Making

1. Assessing Ecosystem Effects and Adapting to Climate Change
2. Forage Fish Management
3. Integrating Habitat Considerations

*Session Chair: John Henderschedt*

*Executive Director, Fisheries Leadership & Sustainability Forum*

Fisheries affect, and are affected by, an ever-changing ocean ecosystem; and decision-makers must consider the relationships between managed species and their environment when setting policy and developing management strategies. Despite general acknowledgment of the concept and relevance of ecosystem-based management, the investment of hundreds of millions of dollars over the past decade, and notable progress in many arenas, agreement over exactly how to implement ecosystem-based management principles remains elusive. However, there is a strong consensus that more active consideration of ecosystem effects will advance the sophistication of fishery management decision-making, and thus the sustainability of fisheries and their attendant benefits to the nation.

Like the ecosystem itself, exploring the totality of ecosystem-based management should begin with an examination of its parts. This session addresses three of many possible topics that might be most effectively woven into the fabric of ecosystem-based fisheries management. The first topic focuses on an emerging adaptive management tool, the Integrated Ecosystem Assessment, which is designed to help fishery managers

recognize, understand, and respond to ocean ecosystem changes. While this tool is presented in the focus topic dealing with climate change adaptation, it applies to all three focus topics. Discussions during the second focus topic dealing with the role of forage fish and their directed fisheries in the ecosystem will coalesce competing perspectives towards possible consensus findings for improved policy and decision-making. The third focus topic will include highlights of how National Oceanic and Atmospheric Administration (NOAA) Habitat Blueprint policy initiative can advance U.S. sustainable fishery management, and include potential findings on refinements or additional improvements in the integration of healthy habitat as an essential component of successful fishery management.

This session is designed to provide an enhanced understanding of the focus topics, examine differences of opinion regarding their significance, and develop findings for application in the decision-making process. Both speakers and conference participants are invited to share their views regarding the interrelationship of these topics in ecosystem-based decision-making, as well as regulatory and legislative opportunities and impediments to implementing ecosystem-based fisheries management.



#### **Advancing Ecosystem-Based Decision Making**

### **Assessing Ecosystem Effects and Integrating Climate Change**

The relationships between marine resources and their habitat, fisheries, other ocean uses, and the ocean environment are characterized by change. In an ever-changing system, fisheries managers must continuously improve their understanding of the marine ecosystem and integrate current information in their decision-making. The deeper our understanding and the more developed our analytical tools, the better we're prepared to recognize ecosystem changes and adapt our management of fisheries resources in response. There is currently a great need to assess ecosystem change if sustainable fishery management is to be advanced to the next level, including the need for management system to be able to adapt to climate-based changes in the ecosystem as they occur.

National Marine Fisheries Service (NMFS) is developing an adaptive analytical tool, known as an [Integrated Ecosystem Assessment \(IEA\)](#), that provides information about ecosystem relationships and interactions for use in fishery management decision-making (Reference 2.1.1). The IEA approach is a decision-support system that uses data and ecosystem models to forecast future conditions; evaluates alternative management scenarios; and assesses economic and ecological tradeoffs to guide decisions, implement, and evaluate management actions relative to objectives. IEAs

hold significant promise. For example, an IEA for the California Current ecosystem could describe the effects of fishing Pacific anchovy on salmon stocks or marine mammal populations, and consequent effects on humans. Notably, the FY2013 President's requested budget proposed a significant investment for additional IEA development (Reference 2.1.2). However, questions remain about how IEAs might be integrated in the regional fishery management council (RFMC) process that establishes fishing seasons.

While there is debate about the causes and parameters of climate change, no one claims ecosystems to be absolutely stable. Climate-based ecosystem change has the potential to affect fish stock distribution, population size, productivity, and fishery yield. Informative and predictive indicators of natural variability, combined with an understanding of their effects on fish stocks, could improve fishery management and minimize harvest as a contributor to stock declines. With modern oceanographic observing systems, changes in parameters such as sea temperatures, ocean chemistry, and sea levels can be identified and measured; current data processing technology also allows for enormous amounts of information to be available for analysis. However, it is not clear what information fishery managers need to improve decision-making, or how they can best adapt regulatory approaches when presented with specific information about ecosystem change.

Discussion under this focus topic will allow participants to examine the emerging IEA analytical tool and consider findings about its application in fishery management decision-making. Similarly, this topic will increase awareness about climate-based ecosystem changes, indicate the current status of scientific information available for use, and explore ways to integrate large volumes of scientific data and projections into the management process. Additionally, this session will demonstrate uses of the IEA tool as it might apply to the forage fish and habitat focus topics within this overall session.



**Session 2**  
**Topic 1**  
**Questions**

**Advancing Ecosystem-Based Decision Making**  
**Assessing Ecosystem Effects and Integrating Climate Change**

**Trigger Questions**

1. What are IEAs capable of doing to enhance fishery management decision-making towards improved sustainability?
2. How could IEAs be integrated into the RFMC process?
3. How can fisheries management prepare and adapt to shifts associated with climate change, including distribution shifts of fish stocks across RFMC and international boundaries and changes in fish stock productivity?

4. What are successful examples of the utilization of climate information in decision-making processes, and what is necessary for wider application of these successful approaches?



**Advancing Ecosystem-Based Decision Making  
Assessing Ecosystem Effects and Integrating Climate Change**

**Speakers and General Perspective of Presentations**

- Phil Levin, Ecosystem Science Program Manager, NMFS Northwest Fisheries Science Center. A perspective on the capabilities of IEA use by fishery managers, with examples on climate change, forage fish, and habitat.
- Malin Pinsky, Smith Fellow, Princeton University. A perspective on climate trend information and its integration into active fishery management, including climate velocity and related scientific information.
- Cora Campbell, Commissioner, Alaska Department of Fish and Game. A State government perspective on integrating climate change information into the RFMC process.

Moderator: John Henderschedt, Fisheries Leadership & Sustainability Forum

Rapporteurs: Whitney Tome, Fisheries Leadership & Sustainability Forum  
Kim Gordon, Fisheries Leadership & Sustainability Forum



**Advancing Ecosystem-Based Decision Making  
Assessing Ecosystem Effects and Integrating Climate Change**

**Reference Material**

- 2.1.1. NOAA Technical Memorandum, June 2008. Integrated Ecosystem Assessments. <http://tinyurl.com/a7ctzn8>
- 2.1.2. IEA Report to the Pacific Council, Nov. 2011. Development of an Annual Report on Conditions in the California Current Ecosystem. <http://tinyurl.com/c4cngtx>
- 2.1.3. Fiscal Year 2013 President's Request Budget, NMFS budget presentation and comparison to FY 2012. <http://tinyurl.com/bafmvhy>



## Session 2 Topic 2

- 2.1.4. NOAA Report to Congress. 2009. “The State of Science to Support an Ecosystem Approach to Regional Fishery Management.”  
<http://tinyurl.com/b6pf2d3>
- 2.1.5. 2006 NOAA Administrative Version of Magnuson-Stevens Fishery Conservation and Management Act. <http://tinyurl.com/bbved8j>
- 2.1.6. NOAA’s Integrated Ecosystem Assessment Program.  
<http://www.noaa.gov/iea/>

### Advancing Ecosystem-Based Decision Making

## Forage Fish Management

Forage fish clearly play an important role in marine ecosystems. Scientists generally agree on the basic characteristics that define forage species: they are small in size, comprise a considerable portion of total ecosystem biomass, are found in the diet of other predators throughout their lifespan, mature early and have high inherent productivity potential, exhibit schooling behavior and can show high variation in inter-annual recruitment. Forage fish are an important linkage of energy and biomass between primary production and higher trophic levels. They are also the target of valuable and regionally important directed fisheries. As ecosystem-based management concepts have evolved in recent years, there has been a growing public focus on proper management of forage fish.

The competing interests of stakeholders results in widely diverging perspectives among environmental groups, recreational anglers, and those involved in the commercial fishing industry on what proper forage fish management means. Forage fish have traditionally represented an important resource for commercial fisheries, both for direct consumption and for the production of bait, fishmeal, and other valuable products. Many recreational anglers view forage fish as a food source for larger game species, arguing for greater protection of forage species to ensure more large fish to improve the angling experience. Some environmental groups believe that current forage fish fisheries, and the chance that these fisheries could expand, create a high risk of undesirable ecosystem effects.

Forage fishery conflicts have emerged on both coasts. On the east coast, NMFS is considering a petition to list river herring under the Endangered Species Act as environmentalists fear that incidental bycatch is contributing to declining populations. Also on the east coast, anglers and environmental groups argue that localized depletion of menhaden by large factory trawlers limits food available to predatory fish populations such as recreationally important striped bass, sea birds, and marine mammals. Menhaden is the second largest fishery in the United States by volume and its products are used for aquaculture, livestock, and health supplements. Commercial

fishermen argue that the removals are so small compared to the overall population biomass that they cannot cause a significant ecological impact, and note that it is ecologically safer to fish lower on the food chain than for predatory fish at higher trophic levels.

On the Pacific coast, some environmental groups worry that fishing levels for sardines do not adequately account for forage needs within the ecosystem. At the same time, there are those in the fishing industry who feel that ecosystem “set-asides” and low fishing rates represent more than sufficient protection. The many questions posed in various RFMC arenas around these complex considerations illustrate the importance of forage fishery conflicts.

In addition to concerns about existing fisheries, there are concerns about developing new fisheries for forage species. There are fears that the rising demand for aquaculture or terrestrial animal feed, or other markets, may result in initiation of new fisheries for species low on the food chain. There has been some action in this regard, such as the Pacific Council [ban on krill fishing](#) and consideration of additional forage species protections (Reference 2.2.4), and the North Pacific Council’s [Arctic FMP](#) bans harvesting a variety of unfished species in the arctic area. Currently, regulations at 50 CFR § 600.747<sup>4</sup> define a process for RFMCs to consider new fisheries, but these regulations have not been updated for several decades and may not have sufficient flexibility for regionally-specific application.

All of these uses and interests require careful consideration of forage fish management options, as management policies and goals are ultimately a reflection of the values placed on forage fish populations and their predators. During this session, speakers will provide views on a range of uses, values, and trade-offs related to the management and protection of forage fish, towards a group discussion on potential findings to advance sustainability of this important resource.



**Advancing Ecosystem-Based Decision Making  
Forage Fish Management**

**Trigger Questions**

1. Do current characteristics of forage fish warrant a departure from the current management approaches, characterized by some as a traditional single species approach?
2. Where on the trophic scale should we be harvesting and managing species? As societal targets change, is there a need to redefine optimum yield (OY) and what the RFMCs should be managing for?

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<sup>4</sup> These regulations reflect MSA section 305(a); the legislative and regulatory language is collectively shown in Reference 2.2.5.

3. Are current fishing rates for forage fish too high in U.S. fisheries?
4. How should management reconcile ecosystem services valuation and the economic value of forage fisheries? What are some of the tradeoffs?
5. How do inter-jurisdictional, including international situations, factors influence the protection and recovery of forage fish stock?
6. Are legislative changes necessary for RFMCs to best leverage their management objectives in the international processes (e.g. co-managed stocks, incidental catch)?
7. Do RFMCs have the flexibility to address emerging forage issues under the current law and regulations? Are MSA Section 305 and Administrative Rules § 600.747 obsolete?



**Session 2**  
**Topic 2**  
**Speakers**

**Advancing Ecosystem-Based Decision Making**  
**Forage Fish Management**

**Speakers and Perspective of Presentations**

- Peter Baker, Director, Northeast Fisheries Program, Pew Environment Group. An environmental perspective advocating for higher levels of protection of forage fish in U.S. domestic fisheries.
- Ronald Lukens, Senior Fisheries Biologist, Omega Proteins Corporation, Inc. A perspective on safe, sustainable commercial fishing for forage fish in U.S. fisheries.
- Isaac Kaplan, Research Fishery Biologist, NMFS Northwest Fisheries Science Center. A scientific perspective on ecosystem relationships of forage fish.

Moderator: John Henderschedt, Fisheries Leadership & Sustainability Forum

Rapporteurs: Amy Kenney, Fisheries Leadership & Sustainability Forum  
Abigail Furnish, Fisheries Leadership & Sustainability Forum



**Session 2**  
**Topic 1**  
**References**

**Advancing Ecosystem-Based Decision Making**  
**Forage Fish Management**

**Reference Material**

- 2.2.1. Lenfest Ocean Program's Forage Fish Task Force Report: "Little Fish, Big Impact: Managing a Crucial Link in Ocean Food Webs." 2012. <http://tinyurl.com/6thkwtl>
- 2.2.2. Smith, A.D.M et al. (2011). Impacts of Fishing Low-Trophic Level Species on Marine Ecosystems. Science, 333, 1147-1150. <http://tinyurl.com/b629vwg>

- 2.2.3. NOAA Alaska Fisheries Science Center Forage Fish documents. <http://tinyurl.com/ajk5ajo>
- 2.2.4. Pacific Council: Draft Fisheries Ecosystem Plan (Nov 2011). <http://tinyurl.com/bp8wlyu>; potential species and developing markets and deliberations on mechanisms to protecting unfished species from future directed fisheries. <http://tinyurl.com/axmqt5f>
- 2.2.5. MSA Section 305(a), (<http://tinyurl.com/abb96sx>), 50 CFR Section 600.747 (<http://tinyurl.com/b3cdlfw>) for list of current allowable fisheries and gear see 50 CFR Section 600.725 (<http://tinyurl.com/bdsztb>).



### Advancing Ecosystem-Based Decision Making

## **Integrating Habitat Considerations: Opportunities and Impediments**

In 1996 when the Fishery Conservation and Management Act of 1976 was amended as the Sustainable Fisheries Act (also known as the MSA<sup>5</sup>), the requirements for habitat conservation as a component of managing ocean fisheries were widely considered as one of the major accomplishments of the new legislation. In 2006, the MSA was reauthorized and further amended to include deep sea coral protection and research provisions in recognition of the special contribution deep corals play in ocean ecosystems. RFMCs and NMFS have made great strides to conserve important habitats since 1996. RFMCs have designated “essential fish habitat” for more than 1,000 managed species and have designated over 100 Habitat Areas of Particular Concern; review and update of these essential fish habitat designations occurs on a routine, periodic basis. Since 2004, NMFS and the RFMCs have protected over 700 million acres of ocean habitat essential to marine fisheries from damaging fishing practices, and NMFS conducts thousands of consultations with other Federal agencies on non-fishing impacts to habitat.

Despite the volume of important habitat conservation activity over the past two decades, there is a general consensus that additional habitat protection is necessary. Some fish stocks continue to show signs of distress even after substantial reductions in fishing intensity; and for some of these stocks, this distress may be due to a shortage of healthy habitat. As fishing is only one impact on habitats, RFMCs need to collaborate with non-fishing ocean users

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<sup>5</sup> The primary law governing marine fishery management in the United States, the *Magnuson-Stevens Fisheries Conservation and Management Reauthorization Act of 2006* (referred to here as the Magnuson-Stevens Act), was originally enacted as the *Fishery Conservation and Management Act of 1976* (also referred to as the *Magnuson Fishery Conservation and Management Act* and the *Magnuson Act*) and reauthorized in 1996 as the *Sustainable Fisheries Act* (also referred to as *Magnuson-Stevens Fishery Conservation and Management Act*).

to protect and conserve important fish habitat. One impediment is a lack of shared understanding about how best and where to focus conservation efforts for the benefit of fisheries and ecosystems; and without this focus, it can be very difficult for NMFS and the RFMCs to convince other ocean users to reduce their impacts on habitats. Without a stated habitat conservation objective, it also becomes challenging for the RFMCs to frame the value of their own habitat conservation efforts to minimize fishing impacts on the ecosystem. Some of these impediments are exacerbated by a shortage of habitat science and information. One might also question whether all of the necessary habitat policy and management pieces are in place within the MSA mandates and guidance.

These challenges and impediments are reflected in the recently-announced NOAA Habitat Blueprint (Reference 2.3.1), a strategy to better align NOAA's habitat-related programs, use habitat as a fisheries tool more prominently within NOAA, and demonstrate the impact and value of these programs. The National Ocean Policy also highlights, among other things, the opportunities and challenges that fisheries managers face in protecting fish habitat from non-fishing ocean uses (Reference 2.3.2). Additionally, there is debate about whether artificial habitat structures, such as off-shore gas and oil platforms, represent an opportunity or an impediment to habitat protection for sustainable fishery management.

This session will explore regulatory and legislative measures to improve integration of habitat considerations into fishery management, through examining real-world examples. The discussion will include how RFMCs might better engage and consult on the permitting of non-fishing ocean uses that impact fisheries habitat. Potential findings will enable better policy development to advance fishery sustainability through more effective habitat protection.



**Advancing Ecosystem-Based Decision Making  
Integrating Habitat Considerations**

**Trigger Questions**

1. How effective are current consultations regarding non-fishing habitat impacts, and how can they be improved?
2. How can regulatory and legislative provisions support RFMC engagement in non-fishing ocean uses and minimize impacts on fisheries and habitat?
3. Is there a need for national standards on habitat quality, productivity, or allowable degradation? Should a maximum sustainable yield-equivalent standard be established for habitat "removal"?

4. What is the proper role of non-natural habitat structures, such as off-shore petroleum platforms and artificial reefs, in optimizing habitat for sustainable fisheries?
5. Should habitat protection and improvements have a designated role in fish rebuilding programs? If so, what are meaningful alternatives?



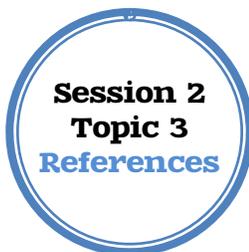
**Advancing Ecosystem-Based Decision Making  
Integrating Habitat Considerations**

**Speakers and General Perspective of Presentations**

- Frederick “Buck” Sutter, Director of the Office of Habitat Conservation, NMFS . NMFS policy perspective on opportunities and impediments to achieve on-the-ground conservation, including setting new objectives.
- Rip Cunningham, Chairman, New England Fishery Management Council. A perspective on challenges and opportunities with designation, protection and management of habitat within the RFMC process.
- John Boreman, Adjunct Professor, North Carolina State University. A perspective on establishing a National Standard on habitat, including implications for both scientific information and management decision-making.

Moderator: John Henderschedt, Fisheries Leadership & Sustainability Forum

Rapporteurs: Katie Latanich, Fisheries Leadership & Sustainability Forum  
Whitney Tome, Fisheries Leadership & Sustainability Forum



**Advancing Ecosystem-Based Decision Making  
Integrating Habitat Considerations**

**Reference Material**

- 2.3.1. NOAA Habitat Blueprint Documents. <http://tinyurl.com/aaqlfo3>
- 2.3.2. National Ocean Council: National Ocean Policy. <http://tinyurl.com/3lpp9xr>
- 2.3.3. American Fisheries Society 2012 Annual Meeting: The NOAA Habitat Blueprint: Improving Fisheries, Marine Life, and Coastal Communities through Habitat Conservation, Symposium summary. <http://tinyurl.com/ao7p9kc>

- 2.3.4. Fisheries Forum. 2011. Excerpts on essential fish habitat from “The Role of the Regional Fishery Management Councils in Multi-Sector Spatial Planning: Exploring Existing Tools and Future Opportunities” (pg. 16-17). <http://tinyurl.com/ahdmkz7>
- 2.3.5. NOAA. 2012. Deep Sea Coral Research and Technology Program Report to Congress. <http://tinyurl.com/ay2ltxc>