



# ADAPTING FISHERIES MANAGEMENT TO A CHANGING ECOSYSTEM

The North Pacific Fishery Management Council hosted the 7th national meeting of the Scientific Coordination Subcommittee (SCS7) in Sitka, Alaska August 15-17th. The meeting addressed challenging and timely fishery management issues and was well attended by SSC delegates and staff from all eight Regional Fishery Management Council SSCs, as well as NMFS Headquarters.

Dr. Anne Hollowed (retired Alaska Fisheries Science Center Senior Scientist and long-time SSC Chair for NPFMC) chaired the meeting. Bill Tweit, the Vice Chair of the NPFMC, provided opening and closing remarks that identified critical Council management needs to focus the scientific dialogue and advice.

The agenda for the meeting, all presentations, and recordings from the workshop are available [online](#). The proceedings from SCS7 will be available in the Spring of 2023 and presented at the May CCC meeting.

## KEY FINDINGS

### 1 Councils need to start preparing now for increasingly complex management decisions due to climate change

The effects of climate change on US Fisheries are being observed now with more profound implications expected in the next 20 years in several regions. Regional Fishery Management Councils (FMCs) need to consider adaptation options to sustain fisheries in a changing environment. Adaptation tools need to be tailored to regional differences in how climate change is affecting marine ecosystems. Several FMCs have started considering models that include ecosystem linkages and/or have adopted climate-informed risk assessments. Additional studies of the performance of current and alternative management strategies are needed to identify pathways to sustain fisheries in a future non-stationary marine environment. FMCs may encounter new issues due to competing use of marine systems, abrupt shifts in distribution or abundance, and changes in ecosystem structure and function with impacts on sectors and communities and data collection methodologies. Finding equitable management adaptation pathways will be challenging.

### 2 Investment is needed in the development of new data collection and analysis tools that are responsive to changing conditions

Maintaining suites of models of different levels of complexity will be needed to inform management of marine resources undergoing complex responses to non-stationary environment conditions. This suite could include Models of Intermediate Complexity for Ecosystems (MICE) including ecosystem linked single or multispecies assessment models; foodweb models, and full end-to-end models. Collaborations amongst regions would be strengthened by streamlining data management and allowing for more 'open source' type data flows and interoperability. Interdisciplinary research teams will be needed to ensure future success and training students in this field will be critical.

### 3 SSCs and Councils need to be prepared to transition toward a more sophisticated toolbox

SSCs need to prepare for transition from reliance on indicators derived from observations, to informed dynamic simulations of marine ecosystem change, tuned (or skill tested) to observations (Climate Ecosystem and Fisheries Initiative, CEFI). Scenario planning should begin now to better prepare for avoiding reactive responses. Additional flexibility should be considered in the management process as well as the creation of more opportunities for strategic and creative thinking at the regional and national levels.

### 4 Stakeholder engagement will be critical for adaptive management to be successful

Adaptive fisheries management will require engagement from all stakeholders and new understanding of increasingly complex models and uncertainty due to environmental variability. Science-based recommendations and management risks need to be clearly presented to build stakeholder confidence in new models or tools that provide tradeoffs given increased uncertainty. An inclusive process will benefit stakeholder education as well as inform ecosystem-based management approaches.

## Recommendations for future SCS workshops

SSC delegates acknowledged the value of active participation by a Council member at the workshop and encourages increased Council member participation in scientific dialogues at future SCS meetings. The group noted that the two-year delay to meet in-person, rather than substituting a virtual meeting, was worth the tradeoff, noting the benefits for enhanced communication and collaboration among regions. Delegates noted that the meeting format, with breakout sessions (including rotating regional participation by session) and case studies, facilitated discussion and sharing of experiences across regions. SCS7 participants recommend that the workshops continue on a biennial basis, but that additional communication amongst regions occurs in the off-year. Ideas for this could include an informal workgroup of SSC leadership, participants, NMFS Headquarters staff, or a virtual workshop.

## THEME TOPICS

### 1 How to incorporate ecosystem indicators into the stock assessment process?

Much work has been done in developing ecosystem indicators to assess environmental changes as they relate to federally managed species. Stock assessments are beginning to incorporate these indicators in a variety of ways to serve multiple management purposes. This session focused on understanding ecosystem dynamics and how insights from modeling can best inform stock assessments and resulting management decisions. For example, changing environmental conditions may affect vital population parameters (recruitment, mortality, growth) and the availability of fished species to survey or commercial fishing gear (catchability). Changes in these parameters can greatly affect the assessment of stock status and biological reference points. This session focused on approaches to incorporate ecosystem indicators into the stock assessment process. Among other approaches, this theme session also explored the current and future utility of ensemble or multi-models in the assessment and management process.

### 2 Developing information to support management of interacting species in consideration of ecosystem-based fishery management (EBFM).

Stock assessment considerations under evolving ecosystem-based fishery management (EBFM) principles must address, among many things, the interaction of multiple species including predator-prey relationships. Various avenues have been explored, including assessment and management of fish assemblages and the use of multispecies predator-prey models to evaluate harvest options for both predator and prey. This session focused on how best to address these considerations on a regional and national level, as well as the development of elements and considerations that should be considered for inclusion in the development of national guidelines.

### 3 How to assess and develop fishing level recommendations for species exhibiting distributional changes?

The Magnuson Act requires that stocks are managed throughout their distributional range. However, this mandate is challenging for species exhibiting shifts in their distribution, often under changing climate conditions. Fish movement away from traditional fishing grounds and survey areas creates difficult challenges for stock assessment. The primary focus of this session was to address how stock assessment and fishing level recommendations should best accommodate stocks whose geographic distributions are modified by climate variability and climate change.



SCS7 Delegates in front of Crescent Harbor, Sitka, Alaska

SCS7, August 15-17th, Sitka, Alaska