



Ocean Modeling Forum Holds Final Meeting of Pacific Sardine Working Group

The Ocean Modeling Forum (OMF) has convened a working group to improve the use and usefulness of models in informing the management of Pacific sardines on the west coast of North America. The aims of the OMF Sardine Case Study are to use multiple models to **examine the impact of the existing harvest control rule for Pacific sardine** off the west coast of North America (U.S., Mexico, and Canada) **on the target stock, the fisheries that depend on this resource, and the dynamics of the west coast ecosystem.** As a pilot study for the OMF, this effort will involve a series of workshops to identify how multiple models can be integrated to inform ecosystem approaches to the management of Pacific sardine, and is in part a response to a review of ecosystem models by the Pacific Fishery Management Council.

The OMF's Sardine Case Study participants met for the fourth (and final) time June 29-30, 2015 in Seattle, Washington.

Working Group Members

André Punt (Co-Chair), University of Washington
Phil Levin (Co-Chair), NOAA NWFSC
Alec MacCall
Bill Sydeman, Farallon Institute
Enrique Curchitser, Rutgers University (*not present*)
Francisco Chavez, MBARI
Kirstin Holsman, NOAA AFSC
Felipe Hurtado-Ferro, University of Washington
Isaac Kaplan, NOAA NWFSC
Kelli Johnson, University of Washington
Kerry Griffin, Pacific Fishery Management Council (*not present*)
Laura Koehn, University of Washington
Nathan Taylor, Fisheries and Oceans Canada (*not present*)
Richard Parrish
Salvador Lluch Cota, CIBNOR
Tessa Francis, University of Washington Tacoma
Tim Essington, University of Washington

Meeting Observers

Mike Okoniewski, Pacific Seafood
Steve Marx, Pew Charitable Trust

Sardine Model Review

Case Study participants first reviewed progress on the relevant sardine models given the aims of the working group, following their review by the PFMC in 2013, the workplan from the 3rd sardine workshop in February 2015, and to support the goals for the sardine case study outlined in November 2014. The group reviewed preliminary results from the initial set of common model runs identified in February. Progress and outstanding issues related to the following models were presented at the June 2015 meeting:

- MICE (model of intermediate complexity). *Modelers: André Punt and Kelli Johnson, University of Washington.*
- “EcoPath”. *Modelers: Laura Koehn and Tim Essington, University of Washington.*
- Atlantis. *Modeler: Isaac Kaplan, NOAA.*

A fourth model being used was not reviewed, as no major updates had occurred between February-June: Single species/sardine model, *Modeler: Felipe Hurtado-Ferro, University of Washington*

Case Study Questions/Activities

The Sardine Case Study is investigating how ecosystem models can be used to evaluate aspects of the agreed Sardine Harvest Control Rule, through model runs that explore key environmental and food web consequences of sardine harvest. The **primary research question** being pursued by the case study members is:

- What are the consequences of the existing sardine Harvest Control Rule for:
- a. the sardine stock, yield, revenue (and their spatial distribution);
 - b. sardine predators (fished and unfished) and prey; and
 - c. ecosystem metrics, such as the balance between benthic and pelagic energy pathways, or the distribution of biomass among different trophic guilds.

Other Meeting Outcomes

- The group identified outstanding model issues to be addressed before final model runs and comparisons could be conducted.
- The group created a model comparison tool for communication of results, and outlined several possible manuscripts.
- There were discussions about possible near-term management relevance of the case study outcomes, in light of the sardine fishery closure in spring 2015.

Next Steps

- Modelers will work in smaller groups on isolated issues of model tuning and alignment over the next 1-2 months.
- A set of final model runs of the Atlantis and MICE model will form the basis for a model comparison exercise focused on the case study research questions.
- Results, including descriptions of individual model structure and parameterization, across-model overlap, alignment and divergence, and model predictions related to the research questions will be communicated via peer-reviewed publications, and in

reports and presentations geared towards the management stakeholders and other identified audiences.

Previous Meetings

- May, 2014 (Seattle, WA)
- November, 2014 (Seattle, WA)
- February, 2015 (Seattle, WA)

The Ocean Modeling Forum

Researchers have expansive knowledge and tools that can be used for Ecosystem Approaches to Management. Yet even with many tools and techniques at their disposal, information available is often specific to one location and not integrated with other types of data, making decisions about how to manage marine resources more challenging. To tackle this challenge, André Punt from the University of Washington's School of Aquatic and Fishery Sciences and Phil Levin from NOAA Northwest Fisheries Science Center, with support from the Packard Foundation, developed The Ocean Modeling Forum (OMF). OMF brings together modeling experts, scientists, ocean managers and policy makers to work through case studies and determine how to use existing models and analytical techniques holistically. Their goal is to determine what is the most usable and useful information for ocean managers and policy makers in making informed decisions that will yield positive outcomes for our oceans.

OMF will coordinate a set of ad hoc working groups to address ocean-management topics of high importance using modeling methods. It will advance the implementation of the Ecosystem Approach to Management, which has been widely accepted by scientists, managers and policy makers. OMF will involve scholars from a range of scientific disciplines to address topics in an integrated and collaborative manner. Participants in specific projects will be identified by the leadership group and will involve key scientists, stakeholders and managers. The first case study by OMF will model the impact of alternative harvest control rules for the Pacific sardine off the west coast of North America (U.S., Mexico, and Canada) on the target stock, the fisheries which depend on this resource, and on the dynamics of the west coast ecosystem. This effort will initially involve conducting a series of workshops to identify how existing modeling frameworks can be modified to evaluate potential harvest control rules in terms of their ability to satisfy fishery and ecosystem goals.

The Sardine Case Study was launched in spring of 2014, and convened its first official meeting in November 2014, in Seattle, Washington. An additional meeting took place in February 2015 and the fourth and final meeting occurred in June of 2015.

The Ocean Modeling Forum Sardine Case Study is funded by a generous grant from the David and Lucile Packard Foundation.