

Putting Ocean Tipping Points Science into Practice in Your Ecosystem: A Workshop for Scientists and Natural Resource Managers

The Ocean Tipping Points Project, an interdisciplinary research collaboration among academic, non-governmental and governmental partners supported by the National Center for Ecological Analysis and Synthesis, held a three-day workshop for scientists and practitioners of marine ecosystem management in Santa Barbara, California, November 1-3, 2017. The training focused on cutting-edge scientific and management strategies to better understand and cope with the potential for dramatic change in the ocean or coastal ecosystem. The workshop, which was the culmination of the multi-year project, focused on helping resource managers understand and apply a suite of scientific tools and methods to support effective management decisions related to ecological regime shifts, fisheries collapse and other types of dramatic ecological change in the ocean.

Although not representing the Pacific Fishery Management Council (Pacific Council) in an official capacity, the following team, including Council staff and members of the Ecosystem Workgroup, participated in this workshop with a focus on the Council's scoping of the new climate change related ecosystem initiative. The following team name and statement of interest are adapted from the materials we submitted for the workshop.

Team Name: Fisheries, Fishing Communities, and the California Current Ecosystem

Our team is seeking a better understanding of the best available forecasts for fishery changes over the near- and long- term. Additionally, we hoped to identify potential strategies for improving the flexibility and responsiveness of our management actions and building resilience and adaptability into strategies for achieving social, economic, and ecological goals. While fisheries are our main focus, we also set out to learn how tipping point science could aid spatial management on the U.S. West Coast, including in marine spatial planning and ecosystem-based and partnership driven marine protected area management.

Team Members (alphabetical order)

Mike Burner, *Deputy Director*, Pacific Fishery Management Council. Primary expertise: federal fisheries management, staffed the Council's Ecosystem Plan Development Team and Ecosystem Workgroup.

Corey Niles, *Coastal Marine Policy Lead*, Washington Department of Fish and Wildlife. Primary expertise: fisheries management, member of the Pacific Fishery Management Council's Ecosystem Workgroup and of Washington's interagency coastal marine spatial planning team.

Amanda Van Diggelen, *Environmental Scientist*, California Department of Fish and Wildlife. Primary expertise: Marine Protected Areas (MPA) monitoring, policy, and research through California's MPA Management Program to facilitate adaptive management of California's MPA network

Deborah Wilson-Vandenberg, *Senior Environmental Scientist Supervisor*, California Department of Fish and Wildlife. Primary expertise: state and federal fisheries management, member of the Pacific Fishery Management Council's Ecosystem Workgroup.

Statement of Interest

The Pacific Council is interested in building a better understanding of the best available forecasts for change in the California Current Ecosystem over the near and long term and to consider strategies for improving the flexibility and responsiveness of our management actions and building resilience and adaptability into strategies for achieving social, economic, and ecological goals. Fisheries in federal waters of the California Current are managed through the Pacific Council and management

is guided by four fishery management plans (FMP) as well as a Fishery Ecosystem Plan (FEP) for advancing the use of ecosystem concepts in its conservation and management recommendations. At its September 2017 meeting, the Pacific Council chose to pursue a new FEP initiative, called the Climate and Communities Initiative, to address this issue. The Pacific Council has also expressed special interest in drawing connections between understandings of Climate Change vulnerability and fishing communities. The realities of climate shift and variability mean that management actions need to be able to recognize key inflection points and be able to build in additional adaptive capacity. The focus of this workshop and work of the Ocean Tipping Points project are directly relevant to these goals.

Workshop Summary

The workshop's format included plenary sessions for presentations and team reporting as well as numerous breakout sessions. There were teams from a broad range of interests and regions, including British Columbia and the Philippines. The breakout sessions offered a mix of topic-focused discussions, associated with understanding and communicating tipping points for more informed fishery decision-making, and hands-on sessions where participants were trained on analytical tools designed to detect tipping points in datasets provided by team members. Our team tended to focus more on policy and management issues associated with ecosystem changes and responses to potential tipping points. Other teams were more concentrated on particular fisheries and ocean policy challenges and able to begin applying the tools for mapping trends and detecting system tipping points to their systems. The workshop proved to be a valuable way to learn about the state of ocean tipping point analysis and to network with ocean scientists that are asking many of the same questions. Our team identified the following questions and next steps.

Key questions, goals, objectives:

- How do we decipher our broad range of indicators from the Annual California Current Ecosystem (CCE) Report into management responses?
- How do we apply what we learned here to our Fishery Ecosystem Plan initiative on the effects of climate shift and potential impacts to fishing communities?
- Where can tipping point and tradeoff analyses best be used as potential tools for tying ecosystem science to management?

Next steps:

- Consider tipping point and tradeoff science throughout the course of a webinar series over the winter as we better refine the next ecosystem initiative. Perhaps a focus on social or community tipping points as community vulnerability to management actions is a focus of the climate initiative.
- Work with the Ecosystem Workgroup and Integrated Ecosystem Assessment Team on further exploration of tipping point science. Consider developing a case study.
- Lesson learned: Keep the dialogue going between scientists, policy makers, stakeholders. This workshop was a great opportunity for this by allowing time to step back and share ideas and concepts. The project experts also encouraged participants to keep the learning going and offered to serve as resources for applying concepts and tools to the management challenges we face.

Visit the [Ocean Tipping Points website](http://oceantippingpoints.org/) (<http://oceantippingpoints.org/>) for project overviews and tipping point resources for managers. The project experts are also encouraging a community of practice around tipping point science. Toward this goal, they have started a portal through Open Channels where experts and managers can connect and share resources (<https://otp.openchannels.org/>).