**Pacific Herring Working Group, Meeting #4**

**December 7-9, 2016**

**Seattle, WA**

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| **Working Group Members** |
| Phil Levin (Co-chair), The Nature Conservancy and the University of Washington |
| Tessa Francis (Co-chair), University of Washington Tacoma |
| Derek Armitage, University of Waterloo |
| Jaclyn Cleary, Fisheries and Oceans Canada |
| Sherri Dressel, Alaska Department of Fish and Game (not present) |
| Russ Jones, Haida Oceans Technical Team, Council of the Haida Nation |
| Harvey Kitka, Sitka Tribe of Alaska |
| Lynn Lee, Marine Ecologist, Gwaii Haanas National Park Reserve, National Marine Conservation Area Reserve, and Haida Heritage Site |
| Alec MacCall, Retired |
| Jim McIsaac, TBuck Suzuki Foundation, Gwaii Haanas Advisory Committee |
| Dan Okamoto, Simon Fraser University |
| Melissa Poe, Washington Sea Grant |
| André Punt, University of Washington  |
| Steve Reifenstuhl, Northern Southeast Regional Aquaculture |
| Ole Shelton, National Oceanic and Atmospheric Administration  |
| Jen Silver, University of Guelph |
| Jörn Schmidt, Kiel University (not present) |
| Tom Thornton, Oxford University |
| Rudi Voss, Kiel University (not present) |
| John Woodruff, Icicle Seafoods |

**EXECUTIVE SUMMARY**

The Ocean Modeling Forum (OMF) convened a working group comprised of traditional knowledge holders, social scientists, fisheries scientists, fisheries managers, representatives of the fishing industry, and experts in herring ecology to explore aspects of the Pacific herring social-ecological system and improve advice for managing herring fisheries. The working group brings together multiple models and types of information, including local and traditional knowledge as well as conventional fisheries data, to explore the consequences for fisheries, ecosystems, and people of incorporating spatial complexity in herring population structure into models of the herring social-ecological system. We are exploring these questions in a comparative framework, comparing the social-ecological herring systems in Haida Gwaii, British Columbia and Sitka, Alaska. The group will provide broadly-applicable advice on incorporating multiple forms of knowledge into formal fisheries assessments, and on evaluating fisheries sustainability in terms of ecological, economic, and social outcomes.

The group is using multiple models and forms of analyses to pursue four main research questions:

1. What are the impacts of herring fisheries on ecological, economic, social and cultural benefits of social-ecological systems?
2. How can traditional/local knowledge and spatial considerations be incorporated into conventional herring fisheries assessments?
3. How does spatial structure of the fisheries system impact the distribution of ecological, economic and social benefits in the system?
4. How does governance influence the sustainability of herring social-ecological systems?

The OMF’s Herring Case Study participants met for the fourth time in Seattle, Washington, from December 7-9, 2016. The group was focused on advancing the technical work of modeling the herring social-ecological system, specifying links between biological and assessment models and system benefits, and developing scenarios for exploring with the models. Models are being developed to represent the system being managed (operating models) as well as those used to conduct assessment and provide the scientific basis for decision makings (assessment models). Several of the operating and assessment models are operational and ready for use within the context of the working group’s aims and questions.

Over the course of three days of meetings, the group identified many working group products/papers for completion in 2017, including:

* Using the operating model to evaluate alternative biological and management scenarios, based upon theoretical objectives identified by the working group;
* Evaluating the performance and utility of a spatial assessment model;
* A comparison of the Sitka and Haida Gwaii governance systems;
* An exploration of incorporating governance into management strategy evaluations;
* An evaluation of how models are (and are not) used in fisheries managements, and consequences therein;
* An assessment of the “triple bottom line” – economic, social/cultural, and ecological benefits – associated with herring fisheries;
* An analysis of the informal herring fishery economy; and
* An historical spatial analysis of herring spawn.

An additional product evaluating the concept of optimal yield as currently used in the context of European fisheries and its utility in Pacific herring fisheries is also underway, and will be further developed via additional OMF meetings in smaller groups.

The above projects will continue to be developed over the next 1-5 months or more, and results will be communicated to the herring fishery communities, managers, and stakeholders in Sitka and Haida Gwaii as appropriate, including via a web-based forum to be convened in spring of 2017 by the Ocean Modeling Forum.