**Pacific Herring Working Group, Meeting #3**

**August 23-25, 2016**

**Sitka, Alaska**

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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 (not present) |
| Jaclyn Cleary, Fisheries and Oceans Canada |
| Sherri Dressel, Alaska Department of Fish and Game |
| 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 (not present) |
| Steve Reifenstuhl, Northern Southeast Regional Aquaculture |
| Ole Shelton, National Oceanic and Atmospheric Administration |
| Jen Silver, University of Guelph |
| Jörn Schmidt, Kiel University |
| Tom Thornton, Oxford University |
| Rudi Voss, Kiel University |
| John Woodruff, Icicle Seafoods |
| **Local Participants** |
| Victoria (Tory) O’Connell, Sitka Sound Science Center |
| Sarah Busch, Sitka Sound Science Center |
| Lauren Sill, Alaska Department of Fish and Game |
| Jeff Feldpausch, Sitka Tribe of Alaska |
| Mike Miller, Sitka Tribe of Alaska |
| John Duncan |
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| **Observers** |
| Steve Marx, Pew Charitable Trusts |
| Eric Coonradt, Alaska Department of Fish and Game |
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**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 third time in Sitka, Alaska, from August 23-25, 2016. Input and perspectives were invited from the local Sitka community, including representatives and elders of the Sitka Tribe of Alaska, the local fishing community, and Alaska Department of Fish and Game.

The group made major progress on the primary research questions, including:

* The working group decided on a set of **simulation** **scenarios to explore with the herring operating and assessment models**, including varying herring harvest rates, herring migration/diffusion rates among stocklets, ocean productivity, predator-driven mortality rates, and spatial allocation of catch.
* The group identified **social benefits connected to herring fisheries** to evaluate in connection with the model simulations, including: cultural continuity, food practices, and wellbeing.
* Efforts to evaluate economic benefits associated with management scenarios include a draft map of herring-related economic benefits in Haida Gwaii, BC. Next steps include an impact analysis of different management scenarios on the herring fleet, and mapping the economic groups and flows for Sitka.
* Potential **attributes to use in linking governance systems to probability of conflict** in fisheries were identified, including legitimacy, accountability, access, trust, participation in decision making, and knowledge transfer.

In addition, the group identified many **opportunities to incorporate traditional and local knowledge into the modeling and analyses**, including: in hypotheses about herring stock structure and behavior; to develop management simulation scenarios about where and when to fish; to develop ecological model scenarios, and; to inform spatial distribution of spawning and stocks.

Key goals before the next group meeting to be held December 7-9, 2016, in Seattle, Washington, include:

* Finalize the approach for linking governance characteristics to sustainability of fisheries social-ecological systems;
* Continue to develop a paper comparing governance in Haida Gwaii and Sitka;
* Run simulations evaluating multiple management scenarios for distribution and abundance of herring;
* Map herring fishing operations and economic benefit flows in Sitka;
* Model spawn occurrence for Haida Gwaii; and
* Further develop a new spatially-explicit herring stock assessment model that is fitted to data from BC and AK.