NOAA FISHERIES

Northwest Fisheries Science Center

NWFSC's Review of Ecosystem Science

Response to Panelists' Comments and Suggestions

Background

NOAA Fisheries conducts annual peer review of its science on a six-year cycle for each of its six Science Centers and headquarters' Office of Science and Technology. Each year a specific theme is emphasized. The 2016 NOAA Fisheries Science Program Reviews evaluated ecosystem science programs that inform the management, protection, and restoration of resilient and productive ecosystems. Ecosystem-related science programs are defined in the Ecosystem Science Program Review Terms of Reference as "those elucidating ecological, oceanographic, climate, and habitat-related processes as they are linked to living marine resource (LMR) species." In particular, this year's review assessed whether the Centers' science programs are adequately focused on priority ecosystem science information required to complete the National Marine Fisheries Service's mission.

On July 12 - 14, 2016, the Northwest Fisheries Science Center (Center) hosted a panel of experts at the Center's Montlake Laboratory in Seattle, WA, to conduct a programmatic review of the quality, relevance, and performance of the ecosystem science they conduct. We presented the ecosystem perspective of our science programs for the California Current Large Marine Ecosystem, including Puget Sound. The NWFSC has a large research program for Pacific salmon. The ecosystem science components for Pacific salmon were primarily addressed in the previous year's Protected Species program review. This current review was also intended to aid NMFS in positioning the Center to be a national leader in ecosystem science. Additional details regarding the review, including the full review Terms of Reference, presentations, and supporting materials can be found at: https://www.nwfsc.noaa.gov/news/events/program_reviews/2016/index.cfm.

Acknowledgments

We thank the review panelists who devoted a significant amount of time to prepare for, and participate, in this review. Their observations and recommendations provide valuable feedback on a very complicated and diverse science program. The panelists for this review were:

- Marc Mangel, University of California, Santa Cruz, CA (Chair)
- Doug Demaster, Alaska Fisheries Science Center (Reviewer)

- David Fluharty, University of Washington (Reviewer)
- Beth Fulton, CSIRO, Hobart, Tasmania, Australia (Reviewer)
- Sarah Gaichas, Northeast Fisheries Science Center (Reviewer)
- Ian Perry, Pacific Biological Station, Nanaimo, BC, Canada (Reviewer)
- Ellen Pikitch, Stonybrook University, Stonybrook, NY (Reviewer)

Finally, we would like to express our appreciation to the Center staff for their contributions, insights, and candor during this three-day review. Preparing for such a review is a tremendous amount of work, particularly when coordinated across all divisions within the Center, and our staff did an outstanding job.

Charge and Review Structure

The Panelists were asked to address eight overarching questions:

1. Does the Center have clear goals and objectives for ecosystem science? Is ecosystem science integrated with the other science activities across Divisions within the Center? Are the ecosystem science activities appropriately prioritized and evaluated as part of an overall strategic plan?
2. Does ecosystem science at the Center focus on information to address the priority needs of the Regional Offices, other NOAA managers, Fishery Management Councils and Commissions, and other partners that require ecosystem-related information to achieve their mission?
3. Has the Center appropriately established a Regional Action Plan to identify the major climate threats to the ecosystem, identify major vulnerabilities of living marine resources with respect to climate, address the core science needs to address impacts from a changing climate, and integrate this information into management advice, congruent with the NOAA Fisheries Climate Science Strategy?
4. What is the status of oceanographic, habitat, climate and ecological data required to fulfill needs of ecosystem science? Has the Center developed strategies to obtain and manage such data?
5. Is the Center appropriately analyzing and modeling ecosystem-level processes? Are cumulative and integrative ecosystem-level analyses being conducted? If not, is there a plan in place to initiate or contribute to the science needed to address cumulative impacts?
6. Is the Center oceanographic, habitat, climate and ecological advice sufficiently included into living marine resource management advice? Are there suitable mechanisms to determine when such inclusion is warranted?
7. Is ecosystem science at the Center adequately peer-reviewed relative to their purpose and use? If not, has the Center developed a strategy for peer-review?
8. Does the Center appropriately communicate research results and resource needs to conduct ecosystem-related science to various managers, partners, stakeholders and the public?

The review presented science categorized into five themes:

Theme 1 – Management Context and Strategic Planning

Theme 2 – Ecosystem Data

Theme 3 – Ecosystem Modeling and Analysis

Theme 4 – Incorporation into Management

Theme 5 – Communication and Peer Review

Response

Overall, the panel was clearly impressed with the ecosystem science conducted at the Center, and noted that our staff are talented and motivated, conducting cutting edge science with clear benefits to management. The panel provided a substantive report with insightful findings, comments and suggestions. While we will bear in mind all of the comments as we go about our strategic planning and program management activities, we will undertake a series of actions in direct response to the panel's suggestions, outlined below.

Here, we provide our response to the major points identified in the summary report. We focus on points where the panel noted opportunities for improvement or where information was lacking, trusting that the many positive comments in the panel's report will speak for themselves.

Theme 1 – Management Context and Strategic Planning

There was widespread agreement among panelists that the ecosystem science conducted at the Center is world-class. At the same time, they emphasized that there is a need for a strategic plan for ecosystem science at the Center. Ecosystem scientists and Center leadership will work together to integrate ecosystem science efforts seamlessly into the Center strategic plan, but also develop a stand-alone ecosystem science guidance document. In addition, following recommendations from the Panel, the Center will:

- Develop a transition plan for the new NWFSC Director
- Increase budget transparency
- Facilitate an environment of collaboration and engagement across divisions and disciplines
- Support and enhance human dimensions work and staffing, as with the Washington Sea Grant – NWFSC liaison agreement
- Strengthen ties between NWFSC and AFSC, including modeling methods and toolbox of approaches
- Explore options to provide training in grant writing
- As part of the ecosystem science strategic plan, detail a broad view of NWFSC

constituency/clients and increase communication efforts to reach stakeholders
- Explore opportunities to increase the number of postdocs doing ecosystem science research at the Center
- Continue to recognize the value of the IEA, and work with HQ to increase the number of FTEs with dedicated IEA funding
- Continue the internal grant program and pursue alternative income streams for supporting young scientists and new ecosystem science research directions
- Continue to use Puget Sound as a test bed for ecosystem science research and source of collaborative partnerships, and facilitate and encourage Center involvement in ecosystem science research in Puget Sound
- Raise the profile of marine spatial planning and benthic invertebrates in ecosystem science research

Theme 2 – Ecosystem Data

The panelists were impressed by the depth and breadth of data collection efforts at the Center, though they expressed concerns about uncertainty surrounding consistent funding and rigorous evaluations of the utility of the many time series and spatial data sets in the Center arsenal. In response to recommendations along these lines and several others, the Center will:

- Develop a plan for obtaining data critical for hypothesis-driven, ecosystem-level analysis and assessment
- Investigate feasibility of increased diet collections and promote efforts to do so
- Clarify role and source of physical oceanography data for NWFSC ecosystem science
- Incorporate "peripheral" data collection programs more fully into assessment and ESA programs
- Harmonize ongoing groundfish, salmon, small pelagic, and HAB monitoring surveys to increase the breadth of full ecosystem research
- Identify opportunities to collect additional ecosystem data, such as that related to marine benthic invertebrates
- Work with DOC and NOAA IT to address and mitigate IT constraints on ecosystem data collection, archiving, and sharing

Theme 3 – Ecosystem Modeling and Analysis

The scientific expertise and influence of Center staff in the area of ecosystem modeling and analysis was widely noted. Panelists noted opportunities to conduct a gap analysis for ecosystem modeling approaches not currently in the scope of Center work and to facilitate more direct collaborations between data gatherers and data users. Accordingly, the Center will:

- Conduct a formal analysis of the set of available models at the Center, including a gap

analysis focused on prioritizing those approaches most necessary for EBM and EBFM
- Assess the weight and importance of time series for different studies, and for different types of ecosystem models (e.g., MICE models, Atlantis, etc.)
- Strengthen ties between NWFSC and AFSC, including modeling methods and toolbox of approaches
- Continue to enhance linkages to HAB forecasting and fish forecasting based on ocean indicators such as PDO, etc.
- Work with DOC and NOAA IT to address and mitigate IT constraints on ecosystem modeling

Theme 4 – Incorporation into Management

The Panel felt that stakeholder needs for ecosystem advice were well met by the Center. The reviewers highlighted the California Current Integrated Ecosystem Assessment team's work with the Pacific Fisheries Management Council (PFMC) in particular, as well as participation by Center scientists in Puget Sound Partnership (PSP) activities, as vehicles that have ensured, and should continue to ensure, that local managers will benefit from the most current scientific advice. In addition, following recommendations from the Panel, the Center will:

- Work with PSP, the PFMC, and other regional management entities to identify objectives for ecosystem-based management, prioritize monitoring and modeling efforts, etc.
- Provide support to facilitate both scientific surveys and management-relevant monitoring
- Encourage analysis of the major HAB event to provide a formal lessons learned analysis
- Facilitate the IEA team's participation in writing ecosystem considerations sections of stock assessments
- Work with NMFS leadership to identify new funding for hiring additional staff to work on ecosystem-level management strategy evaluation (e.g., protected resources, habitat), as well as stock assessments, in mind
- Continue to take advantage of strong, unusual ecosystem conditions and events, to engage management entities on the influence of ecosystem dynamics on decision-making (e.g. via presentations to the Pacific Fisheries Management Councils, Puget Sound Partnership, etc. along with participation in associated working groups)
- Continue to work on marine ecosystem tipping points, with communication to PFMC and stakeholders

Theme 5 – Communication and Peer Review

The Panel felt that the Center is communicating effectively about ecosystem science to the PFMC, PSP, and other clients and stakeholders. They highlighted the Center's stellar ecosystem science publication record. Following recommendations by the Panelists Center leadership will:

- Ensure engagement with public and Council has rewards comparable to publishing peer-reviewed articles
- Provide formal training in communication (focus on translating science to society)
- Detail a broad view of NWFSC constituency/clients and increase communication efforts to reach stakeholders
- Facilitate continued and expanded collaborations with social scientists and further develop stakeholder processes that ensure two-way communication

Major Action Items

The following major action items reflect those actions that are central to meeting the full suite of recommendations discussed above. The Center will address all of the recommendations, but will focus on the following as they are seen as core to responding to the review panel's comments.

Theme	Recommendation	Recommended by	Action, Schedule
1	1. Develop an ecosystem science strategy, linked to the Center's and the Agency's strategic plans.	All	Strategy will be articulated in the 2018 Annual Guidance Memoranda, Sept 2017
1	2. Support and enhance human dimensions work and staffing.	Chair's summary Reviewers 2, 3, 5, 7	Ongoing, as with the Washington Sea Grant – NWFSC liaison agreement. The Center will develop full response in tandem with that for the Human Dimensions Program review, Fall 2017
2	3. Develop plan for obtaining data critical for hypothesis-driven, ecosystem-level analysis and assessment, including diet collections if necessary.	All	Will emerge from articulation of an ecosystem science strategy, Sept 2017.

3	4. Coordinate the ecosystem science modeling work being done across the Center and beyond, while identifying and filling gaps as necessary and as possible, with an eye toward the EBFM road map, the National Climate Strategy and Regional Action Plan, etc.	Chairs summary Reviewer 3	Ecosystem modelers at the Center will form a working group to assess strengths and gaps in ecosystem modeling, with a report due by September 30, 2017
4	5. More fully integrate ecosystem and ecosystem management considerations into stock assessments.	Chair's summary Reviewers 3, 4, 5	IEA team will work with the FRAM Division and PFMC to determine the best way to begin this without upsetting the basic process of STAR panels, Council review, etc. Focus likely on sablefish and possibly rockfish. Work with PFMC and SWFSC for similar efforts on CPS. Plan in place by June 2017.
1, 4, 5	6. Continue to develop connections with key stakeholders, such as PFMC, PSP, etc., and identify joint objectives for EBM	Chair's summary Reviewers 2, 5	Ongoing, with work between IEA and PFMC and advisory bodies; Center science representation to PSP; and, this recommendation will be included in the ecosystem science strategic plan.
2, 3, 5	7. Work with DOC and NOAA IT to address and mitigate IT constraints on science and communication	Chair's summary Reviewers 2, 3, 4, 7	Ongoing. Center staff will continue to document productivity costs associated with IT security restrictions and Center leadership

			will ensure these costs are communicated to NOAA leadership.
All	8. Continue to use Puget Sound as a test bed for ecosystem science research and source of collaborative partnerships	Chair's summary Reviewers 1, 3, 4, 6, 7	The Center will continue to engage in Puget Sound science, as evidenced by formal participation with the Puget Sound Partnership and continued study of trust resources.