# Economics & Human Dimensions Program Review

*National Response FY2017*

## Background

Scientific integrity is a fundamental element of the process by which NOAA delivers the best available science and earns the public's trust in our science and management. To this end, NOAA drafted a policy to uphold scientific integrity principles contained in the President's March 9, 2009, Memorandum and in the December 17, 2010, Memorandum on Scientific Integrity[1] from Dr. John Holdren, Director of the Office of Science and Technology Policy. Peer review is an essential element of this policy and these reviews are an opportunity for scientific exchange, maintaining and improving standards, improving performance, and increasing scientific credibility.

Peer reviews are an important feedback mechanism needed to provide fresh ideas and improve fisheries science programs. The National Marine Fisheries Service (NOAA Fisheries) provides opportunities for peer reviews at multiple levels (http://www.st.nmfs.noaa.gov/science-quality-assurance/index) and uses a suite of processes to ensure the quality of its scientific products including:

- Internal peer review of Fundamental Research Communications (including both internally and externally published scientific manuscripts, abstracts, and other media);
- External review of fishery stock assessments;
- External review of marine mammal stock assessments; and
- External review of Fisheries Science Centers' scientific programs.

Historically, all NOAA Fisheries Science Centers and the Office of Science and Technology (OST) have individually conducted reviews of elements of their science programs on an *ad hoc* basis. NOAA Fisheries added the Science Program Reviews[2] in FY 2013 as the overarching and systematic, national approach to peer review that ensures the NOAA Fisheries science enterprise is being properly conducted. This approach complements NOAA's Science Advisory Board and its Ecosystem Science and Management Working Group, which provide overarching thematic reviews of NOAA science by adding advice directed toward specific topics relevant to the NOAA science portfolio. Through continued use of this agency-wide peer-review process NOAA Fisheries will more effectively maintain a high level of scientific quality, advance its science nationally, and provide guidance for future science investments.

This document serves several purposes:

- Provides an overview of how NOAA Fisheries' Economic & Human Dimensions Program reviews were conducted in FY 2017;
- Summarizes the key issues reviewers identified during the FY 2017 reviews; and
- Presents a national-level response for those issues identified within four or more of the reviews.

[1] http://nrc.noaa.gov/ScientificIntegrityCommons.aspx

[2] http://www.st.nmfs.noaa.gov/science-program-review/

The Science Program Reviews, developed in FY 2011, are an approach to the NOAA Fisheries peer review process and provide the ability to compare science programs across all regions simultaneously. As a part of this process, a national strategic planning effort (as a baseline for the reviews) was conducted in FY 2012 to facilitate the incorporation of results from the program reviews into operations.[3]

During FY 2012, the individual Science Centers and OST developed a five-year schedule for the program reviews:

- FY 2013 - Data used for fishery stock assessments
- FY 2014 - Fishery stock assessment process
- FY 2015 - Protected species data and science
- FY 2016 - Ecosystem-related science including climate and habitat
- FY 2017 - Economics and human dimensions

NMSF Science Leadership (the Chief Science Advisor, Science Center and OST Directors, and the Fisheries STs) worked with staff to develop terms of reference[4] (TORs) for the FY 2013-17 reviews. The focus of the 2017 program reviews was economics and human dimensions science. Each Science Center and OST focused the TORs to address their specific issues and needs.

## FY 2017 Science Program Reviews

The seven reviews for FY 2017 were scheduled between May and September 2017 as follows:

- Northeast Fisheries Science Center. May 1-5, Woods Hole, MA
- Southeast Fisheries Science Center. May 15-19, Miami, FL
- Alaska Fisheries Science Center. July 17-21, Seattle, WA
- Southwest Fisheries Science Center. July 24-28, Santa Cruz, CA
- Pacific Islands Fisheries Science Center. July 31 - August 4, Honolulu, HI
- Northwest Fisheries Science Center. August 7-11, Seattle, WA
- Office of Science and Technology. Sept 26-28, Silver Spring, MD

Review panels were chaired by a non-NOAA Fisheries scientist, and generally included:

- One scientist from NOAA Fisheries (but not from the Science Center conducting the review);
- One scientist from another NOAA line or staff office (optional);
- Three to five (the majority) scientists external to NOAA; and
- One Science Center Director (optional, and not from the Science Center conducting the review).

All Science Centers provided their panelists with briefing materials and background documents approximately two weeks prior to the start of the review (documents are available on the regional websites[5]).

Reviews typically began with at least a half-day of background presentations on the roles and responsibilities of the individual Science Center. The next two to three days were devoted to presentations by the Science Centers' staff on the various Economics and Human Dimension Programs and assessment methods used by the Science Centers (e.g., surveys, modeling approaches and peer review processes). Presentations typically ended by early afternoon to allow the panel time for discussion. Public comment was solicited daily at the end of presentations. After the public component of the reviews concluded, at least one day was set aside for panel follow-up discussions and report writing, and a debriefing by the panel for the Science Centers' Directors, Leadership, and Headquarters representatives.

Following the review, the Panel Chair prepared a summary report of the meeting and submitted it, with the individual panelists' reports, to the Science Center Director. The Director forwarded these reports to the NOAA Fisheries Chief

[3] http://www.st.nmfs.noaa.gov/strategic-plan/index
[4] http://www.st.nmfs.noaa.gov/science-program-review/program-review-reports/index
[5] https://www.fisheries.noaa.gov/national/about-us/noaa-fisheries-science-program-review

Science Advisor, along with a brief response to the Chair's summary report, usually within ten weeks of receiving the report package. Each Science Center's and the OST Director's responses included action items, timelines and clarifying information, and sometimes responded to specific points within individual reports.

Generally, within three months of the close of the review, all documents (Chair's summary report, Director's response, and individual reviewers' reports) were posted on the Science Center and OST program review websites (http://www.st.nmfs.noaa.gov/science-program-review/program-review-reports/index).

## Context: Five Years of Reviews (FY 2013-2017)

Having conducted reviews[6] for five major program areas (data collection, stock assessment, protected species, ecosystem-related, and economics and human dimensions science), it is increasingly clear that there are interconnections between these focus areas. This limits the ability to fully present the interconnections between our fishery stock assessment, protected species assessment, ecosystem, climate, habitat, economics and human dimensions programs in a single review. As we conclude five years of program reviews, there are themes that are not only recurrent among Science Centers, but also recurrent between years and unlikely to change in the near future. The following themes were frequently noted during the FY2017 program reviews, and also relate to recommendations that have been made in past reviews. However, it bears reiterating that it is clear that holistic approaches to these issues are needed.

## Findings from FY2017 Economics and Human Dimensions Program Reviews

The reviewer reports praised NOAA Fisheries Science Centers and OST staff for conducting a broad range of use-inspired research. Often noted was the high level of productivity for relatively small programs, with limited staff but tightknit and well-functioning teams. Staff exhibited a high level of technical expertise and professionalism, receiving positive comments on data collection efforts, providing economics and human dimensions inputs to the management process, and conducting innovative research, all with an entrepreneurial spirit. Many NOAA Fisheries economists and social scientists are leaders in their fields and contribute to the advancement of the state of the science of economics and human dimensions. Reviewers also noted the staff time and effort put into producing high quality presentations of their work and responding to requests for clarifying information.


While most of the reviewer comments were specific to individual Science Centers or OST and are covered in the individual review reports and responses, those recommendations that span multiple Science Centers are considered as national themes, and therefore, require additional consideration. Recommendations made at four or more of the reviews that are appropriate to address at a national level are listed below, together with national-level responses.

## Strategic Planning to Increase Capacity

### Reviewer Observations & Recommendations:

There was the recognition that increased capacity will be needed to meet current and future economics and human dimensions research needs. However, the comments addressed not only numbers of staff but careful consideration of which capabilities are important to increase or consider decreasing. Reviewers most frequently noted that economists outnumbered other disciplines and highlighted a lack of human dimensions staff. Reviews also noted that much of the work being done by the programs lacks long-term, stable funding. Panelists recommended that the Science Centers and NOAA Fisheries seek to increase the resources and staff necessary for maintaining and expanding current programs, some of which are currently limited to one Science Center, across multiple Council regions.

[6] https://www.st.nmfs.noaa.gov/science-program-review/index

Review panelists also recommended that to better address this capacity issue, NOAA Fisheries undertake some level of strategic planning for the Economics and Human Dimensions Program. Depending on the Science Center, this ranged from development of an externally facilitated planning process to a formal 5-year data collection and research plan to less formal plans to catalogue current projects, prioritize research, prioritize backfill of open positions and integrate disciplines.

### Response:

In the current budgetary situation, NOAA Fisheries' ability to create new positions will be limited, and given the demands in other areas, to even maintain the current level in Economics and Human Dimensions Programs. Science Centers and OST will identify major gaps and their highest priorities for hiring across all disciplines and programs. Based on past reviews, NOAA Fisheries has implemented some actions to increase scientific capacity; for example, NOAA Fisheries has supported hiring one new management strategy evaluation (MSE) scientist at each Center, and we are working to ensure that economic and human dimensions are being incorporated into the work they are helping to lead. Unfortunately, since that action, the ability to support increased positions has declined. In order to maintain or increase capacity in economics and human dimensions science, the Science Centers and OST will need to continue to leverage and increase partnerships with other agencies, Line Offices, and academia to develop the economic, bioeconomic models, human dimension studies and information products that can be utilized to support management decisions. NOAA Fisheries agrees with the recommendation to review staffing plans with a long-term view toward setting an optimal balance between related disciplines (e.g., economists and other social science disciplines).

That said, NOAA Fisheries agrees that national strategic planning in coordination with Science Center specific actions is needed and will be completed within a year of the publication of this response. Science Center and OST strategic planning will address areas such as funding allocation (i.e., commercial, recreational, ecosystems, protected resources), process efficiencies, and capacity building with respect to numbers of staff, balance of workload between innovative research and immediate application needs, and balance between disciplines required to meet current and future challenges. Additionally, the plans will consider ways to advance the integration of economics and human dimensions into emerging management need areas including ecosystem based fishery management (EBFM), ecosystem valuation, MSEs, Integrated Ecosystem Assessments (IEAs), and climate and social vulnerability assessments. Social science will be key to including traditional, local and indigenous ecological knowledge into these focus areas.

### Action items:

- NOAA Fisheries will ensure the Science Centers and OST conduct formal strategic planning processes for their respective economic and human dimensions programs.
- OST will lead a national effort, working with regional program staff, to draft a strategic plan for the Economics and Human Dimensions Program as a whole and that provides a framework to incorporate the strategic planning efforts undertaken at the regional level.

## Data Collection and Management

### Reviewer Observations & Recommendations:

Reviewers noted that in some cases the Science Centers or OST have valuable long-term data sets that do not exist elsewhere. Yet, there is a need to improve data management and access in order to bring effective data use to fruition. Data management should improve data quality control and archiving, and increase data access and sharing, both within and outside of the agency. There remain barriers (some historical, some technical) to data sharing across Science Centers, laboratories, or even across divisions. Additionally, in the 2017 reviews it was noted that there are needs to enhance primary data collection (e.g., systematic collection of cost data, crew and processor information, recreational, and social data), centralize data storage and improve or formalize data access protocols. Finally, reviewers felt that efforts to advance automation in data collection, and transfer data consolidation tools to data managers, would make staff time available for basic economic and human dimensions research.

### Response:

As with all NOAA Fisheries science endeavors, the Science Centers and OST continue to address these issues as part of implementing the Public Access to Research Results Plan (PARR[7]), which has led to improvements in data archiving and access across NOAA Fisheries. Economic and Human Dimension data are included in PARR implementation. Science Centers and OST use InPort, NOAA Fisheries' metadata catalog, as a central repository for data documentation and information about access and use. While the system does not store or serve data, it increases partners' and the public's awareness of existing datasets.

Each Science Center proposed actions related to data management and collections to address specific recommendations made by review panels in the response to each individual program review. These range from efforts to work with partners to prioritize existing and new data collections to developing web-based tools to serve data and data products. All these efforts will respect the legal bounds of data confidentiality, and will need to balance industries' willingness to share accurate data.

Data collection and management will be a major topic of the strategic planning process. In particular, planning will look for efficiencies in the data collection process (e.g., Amazon Mechanical Turk, electronic data collection, automated error checking and data validation), and examine the different roles that individual staff positions may play in data collection, management and analysis.

### Action items:

- OST and the Science Centers will work to ensure data collection and management is addressed in all strategic planning efforts
- OST and the Science Centers, in collaboration with appropriate Council and Regional Office staff, will identify best practices in collecting survey data and the use of that data in analytical tools to support management.

## Tools to Meet Management Needs

### Reviewer Observations & Recommendations:

Looking across the Economics and Human Dimensions Program as a whole, reviewers saw a well-balanced mix of quantitative and qualitative data, models, methods, and research tools that are appropriate to address identified research questions. Furthermore, the information produced is often useful in the management context, in addition to contributing to scholarship in economic and social science fields. For example, bioeconomic multispecies modeling at the Alaska Science Center tied to regional economic models and the collaborative MSE project at the Northwest Fisheries Science Center linking the Atlantis ecosystem model and the Input-Output Model for Pacific Coast Fisheries (IO-PAC) model were noted as progress towards the type of bioeconomic modeling efforts needed to address management needs. Another notable decision support tool was the FISHeries Economics Explorer (FISHEyE) developed at the Northwest Fisheries Science Center. Two efforts recognized for national expansion and adoption were the Spatial Economics Toolbox for Fisheries (FishSET), developed at the Alaska Fisheries Science Center, and the Bioeconomic Length-Structured Angler Simulation. Tool (BLAST), developed at OST and the Northeast Fisheries Science Center and being implemented on the West Coast and in the Gulf of Mexico. The development of social indicators for coastal communities, initiated in the Northeast and Southeast and then implemented nationally was highlighted as an example of human dimension research supporting fisheries management needs. The reviewers also noted some areas of tension including the need to better integrate with other ecosystem based management efforts, the balance between development and on-going model maintenance, and the balance between meeting management needs and producing novel methods research and contributing to peer reviewed publications. In some cases, the output from these tools require translation to make them accessible and useable by management as discussed later on in the communication section.

In several cases, reviewers suggested efforts to make clear connections with emerging socioeconomic components in ecosystems to move toward the fully integrated ecosystem based research agenda. Reviewers also urged the programs to provide clear end goals for model development along with a plan for resources needed for model utilization in

[7] https://repository.library.noaa.gov/view/noaa/10169

management and maintenance. These recommendations included fairly specific comments to prioritize model development, consider expertise and resources needed to develop, maintain and update models and tools, support expansion of tools developed in multiple regions, invest in bioeconomic models, explore high performance computing, and move FishSET into the R statistical package (https://www.r-project.org/). Other recommendations championed the extension of automated Stock Assessment and Fishery Evaluation reports and decision support tools to more regions, and an increase of ecosystem service valuation methods and their application to management.

### Response:

NOAA Fisheries recognizes there is variation in the degree to which decision support tools are implemented in each region. This stems in part from individual regional needs but also from the historical and limited size of the overall Economics and Human Dimensions Program. NOAA Fisheries agrees that expanding existing tools to more regions is a worthy goal and some cases this is already happening.

### Action items:

- OST will support extension of models and decision support tools to additional regions (e.g., FishSET and BLAST). "Lifecycle plans" will be developed for these tools to determine and plan for development, application and maintenance roles.
- Science Centers and OST strategic planning efforts will outline goals for building upon and expanding the current efforts to integrate economic and human dimension data, research and decision support tools into climate, EBFM and IEAs. These goals will be developed with close consultation with appropriate Fishery Management Councils and the Regional Office to ensure the tools most effectively meet management needs.

## Integration and Engagement

### Reviewer Observations & Recommendations:

Throughout the reviewer comments, there is implicit and explicit recognition that increased integration of the Economics and Human Dimension Program at varying scales is required to meet the needs of the NOAA Fisheries mission. Some reviewers encouraged seemingly independent economics and human dimensions programs to better integrate with each other, combining both economics and human dimensions to answer research questions, while others encourage the programs to integrate with other science programs both at the regional and national level. Further, there was encouragement to increase coordination of the Science Center programs with Regional Offices to address priorities. There was also strong encouragement for the Science Centers and OST to work with outside organizations including academia and international entities. Some reviewers specifically suggested economics and human dimensions science staff integrate with the agency's ecosystem working group.

Reviewers further identified that integration at multiple scales would be helpful for research on multi-species, incidental catch, ecosystem modeling, IEAs, EBFM, and MSEs. Reviewers called for improved integration across disciplines at the regional and national level for both the Science Centers and OST, and this would also include unified Science Center and OST strategic planning for identifying gaps in knowledge and expertise. The Human Dimensions Working Group of the IEA program has membership that spans the scientific disciplines of the IEA program and has been very successful in ensuring integration of human dimensions in the regional projects, as well as developing concepts such as social indicators that can be applied across regions.

Finally, reviewers suggested that the Science Centers and OST explore incentives to increase integration, including dedicated funding to such efforts and requiring both biophysical and socioeconomic elements be present in research proposals. They also suggested hosting in-person workshops to foster engagement within and outside of the Science Centers and OST.

### Response:

NOAA Fisheries agrees with the reviewers' recommendations, and values improved integration and engagement at all levels. Integrative collaborations lead to problem-based research questions and management-relevant answers,

and that they can allow for increases in efficiencies and leveraging of limited resources. These efforts should be encouraged, developing them where they do not exist and strengthening them where they do.

Each Science Center and OST proposed actions in response to specific recommendations made by review panels. NOAA Fisheries agrees that the Economics and Human Dimensions Program should pursue actions to improve integration within the program. NOAA Fisheries proposes that each Science Center encourage integration at regular staff meetings; host interdisciplinary brown bag series; include "interdisciplinary research" as a criterion for project evaluation and prioritization; and include economists or human dimensions scientists on members of center-wide teams, where appropriate. Similarly, NOAA Fisheries supports formal participation in external groups and co-hosting workshops as some of the actions needed to improve integration outside of NOAA Fisheries Economics and Human Dimensions Program.

### Action Items:

- NOAA Fisheries will encourage all Science Centers and OST to incentivize the development and maintenance of integrative research efforts through project prioritization, travel support, and formal participation in working groups and research teams.
- OST, to the extent practicable, will continue to support ongoing efforts that facilitate the integration of economics and human dimensions in major program activities including EBFM, Climate and IEAs.
- OST will support and seek opportunities for integration activities across Science Centers and with external organizations.

## Communication

### Reviewer Observations & Recommendations:

Reviewer comments concerning communication were varied, with some indicating that the Science Centers and OST are doing a good job communicating to their primary stakeholders and management partners. Publishing in the peer reviewed literature was considered evidence for good scientific communication. What was not as clear was the broader efforts to disseminate research results to the public and raise the profile of the economic and human dimensions work being done. This in part stems from the need to better explain, in simpler terms, complex concepts, model uncertainty, and statistical significance. Further, some reviewers felt it was important to provide managers and end users information about how to appropriately and most effectively use and apply models and information tools. In instances where the approach to communication seemed ad hoc to the reviewers, it was suggested it may be good to develop a communications strategy especially given that not all programs have dedicated communications staff. Part of this strategy might include balancing the need to publish in the peer-reviewed literature with the need to develop a broader range of communication products. Additionally, some Science Centers were encouraged to embrace social media as a means to communicate to a wider audience.

### Response:

NOAA Fisheries recognizes that improved communication with management, stakeholder and the broader public would broaden the benefits of the Economics and Human Dimensions Program. In some cases, this is already addressed at the Science Center level through the presence of communications staff that focus on economics and human dimensions; however, this is not possible in all cases. Science Centers economic and human dimensions staff will work to better integrate with existing center-level communications staff to develop outreach products that explain important data collections, models and science products produced by the program. Economics and human dimensions staff, either directly through the Science Centers or in coordination with OST, will flag relevant communications products for the NOAA Fisheries Communications Office so they may be considered in what gets communicated through the national level communications process.

### Action items:

- As part of the strategic planning process, OST will lead development of a communications strategy for the Economics and Human Dimensions Program.
- The Science Centers and OST will continue to utilize Science Center Communication Offices and the NOAA Fisheries Communication Office to engage the public regarding the importance of economics and human dimensions research and its application to management and other decision-making.

- The Science Centers and OST will continue to develop NOAA Fisheries communications capacity, especially related to the importance of fully integrating economics and human dimensions into other related efforts (e.g., IEAs, Climate Regional Action Plans, Climate Vulnerability Analyses, EBFM implementation plans), and in ensuring that research products are communicated to managers in an effective manner.

**Table 1. Summary of national action items arising from the NOAA Fisheries program reviews**

| Action Item | Timeline |
|---|---|
| 1. NOAA Fisheries will ensure the Science Centers and OST conduct formal strategic planning processes for their respective economic and human dimensions programs. | 2019 |
| 2. OST will lead a national effort, working with Science Center program staff, to draft a strategic plan for the Economics and Human Dimensions Program as a whole and that provides a framework to incorporate the strategic planning efforts undertaken at the regional level. | 2019 |
| 3. OST and the Science Centers will work to ensure data collection and management is addressed in all strategic planning efforts. | 2019 |
| 4. OST and the Science Centers, in collaboration with appropriate Council and Regional Office staff, will identify best practices in collecting survey data and the use of that data in analytical tools to support management. | 2018 and ongoing |
| 5. OST will support extension of models and decision support tools to additional regions (e.g., FishSET and BLAST). "Lifecycle plans" will be developed for these tools to determine and plan for development, application and maintenance roles. | 2018 and ongoing |
| 6. Science Centers and OST strategic planning efforts will outline goals for building upon and expanding the current efforts to integrate economic and human dimension data, research and decision support tools into climate, EBFM and IEAs. These goals will be developed with close consultation with appropriate Fishery Management Councils and the Regional Office to ensure the tools most effectively meet management needs. | 2019 |
| 7. NOAA Fisheries will encourage all Science Centers and OST to incentivize the development and maintenance of integrative research efforts through project prioritization, travel support, and formal participation in working groups and research teams. | 2018 and ongoing |
| 8. OST, to the extent practicable, will continue to support ongoing efforts that facilitate the integration of economics and human dimensions in major program activities including EBFM, Climate and IEAs. | 2018 and ongoing |
| 9. OST will support opportunities for integration activities across Science Centers and with external organizations. | 2018 and ongoing |
| 10. As part of the strategic planning process, OST will lead development of a communications strategy for the Economics and Human Dimensions Program. | 2019 |
| 11. The Science Centers and OST will continue to utilize Science Center Communication Offices and the NOAA Fisheries Communication Office to engage the public regarding the importance of economics and human dimensions research and its application to management and other decision-making. | Ongoing |
| 12. The Science Centers and OST will continue to develop NOAA Fisheries communications capacity, especially related to the importance of fully integrating economics and social science into other related efforts (e.g., IEAs, Climate Regional Action Plans, Climate Vulnerability Analyses, EBFM implementation plans), and in ensuring that research products are communicated to mangers in an effective manner. | Ongoing |