NOAA FISHERIES

National Response to the FY 2013 Reviews of NOAA Fisheries' Stock Assessment Data Collection and Management Programs

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 has drafted a policy to uphold the principles of scientific integrity contained in the President's March 9, 2009, Memorandum and in the December 17, 2010, Memorandum on Scientific Integrity[1] from John Holdren, Office of Science and Technology Policy Director. NOAA considers peer review an essential element of this policy and considers these reviews to be an opportunity for scientific exchange, while maintaining and improving standards, improving performance, and increasing scientific credibility.

Peer reviews are an important feedback mechanism needed to provide fresh ideas and contributions toward constantly improving fisheries science programs. NOAA Fisheries provides opportunities for peer reviews at multiple levels (http://www.st.nmfs.noaa.gov/science-quality-assurance/index). At the base of the pyramid of reviews is the NOAA Fishery Science Centers' policy to conduct internal peer review of Fundamental Research Communications (FRC). This policy requires all such communications (including both internal and external scientific manuscripts, abstracts, and other media) to undergo rigorous internal technical review before release and use by managers. Such a policy meets the requirements of both the Information Quality Act and, where appropriate, the Office of Management and Budget's Peer Review Guidelines. Manuscripts submitted for external publication then undergo review prior to a decision on acceptance in that publication.

Other more specialized scientific products (such as stock assessments) undergo their own unique review processes. Fishery stock assessments are reviewed according to the National Standard 2 Guidelines of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), which are designed to ensure that fishery management is based upon the best scientific information available. These guidelines contain protocols for a Science Center and Regional Fishery Management Council sanctioned peer-review process that involves both external reviewers, principally from the Center for Independent Experts (CIE; http://www.ciereviews.org/), and regionally knowledgeable reviewers. Assessments employing significantly new methods or of greater complexity or controversy are reviewed with greater reliance on external reviewers. Reviewed assessments are passed to the Regional Fishery Management Council's Scientific and Statistical Committee for their use in making recommendations regarding fishing levels—principally the Acceptable Biological Catch level. Because the assessment review process is rapid and open, Science Centers will often rely upon previously reviewed data streams and assessment methods, rather than conducting additional internal review of assessments prior to the MSA review process.

Marine mammal stock assessments undergo a somewhat different peer-review process. This process begins with a Science Center review of the assessment followed by review by one of the three Scientific Review Groups mandated by the Marine Mammal Protection Act. The assessments are then provided for public comment and response prior to the publication of annual marine mammal stock assessment reports. Other scientific products, such as Endangered Species Act (ESA) species status reviews and certain complex Biological Opinions, also involve external peer review (often involving the CIE), depending on the nature of the product.

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

This approach to peer reviews ensures that all research communications are properly vetted. These reviews do not, however, provide the overarching peer review necessary to ensure that the NOAA Fisheries science enterprise is being properly conducted. Program-specific reviews have historically been conducted at all of the Science Centers for a variety of reasons. However, to date there has not been a systematic, national approach to these reviews. Such an approach was called for in the 2010 review of NOAA Fisheries' scientific enterprise conducted by Sissenwine and Rothschild.[2] While NOAA's Science Advisory Board and its Ecosystem Science and Management Working Group provide overarching thematic reviews of NOAA science, they do not provide advice specifically geared toward individual Science Centers. To meet this need, NOAA has established an agency-wide peer-review process[3] that will help NOAA Fisheries more effectively standardize and advance science nationally throughout all our Science Centers and our Office of Science and Technology (OST). Review results will also provide guidance for future science investments both regionally and nationally.

This document serves several purposes:

- Provides an overview of how NOAA Fisheries' Science Program reviews were conducted in FY 2013.
- Summarizes the key issues reviewers identified during the FY 2013 reviews.
- Presents a national-level response for those issues identified during three or more of the reviews. Our response, like the responses provided by the individual Science Centers or Office Directors, will be provided on an annual basis, once all reviews are completed.

The FY 2013 Science Program Reviews

Though the concept of national reviews for the NOAA Fisheries scientific enterprise was mutually agreed upon with NOAA leadership, formal planning for the reviews did not begin until September 2011. At that time, the NOAA Fisheries Science Board decided to use FY 2012 as a time to begin a national strategic planning effort (as a baseline for the reviews) and to use FY 2012 as a planning year for the reviews. Adopting a strategic planning process at each of the Science Centers was crucial to facilitate the incorporation of results from the program reviews into Science Center operations.[4]

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

- FY 2013 - Review of data used for fishery stock assessments
- FY 2014 - Fishery stock assessment process
- FY 2015 - Protected species science
- FY 2016 - Ecosystem approaches to management, climate, and habitat
- FY 2017 - Economics and social sciences

Fishery stock assessment reviews were split into two years (one for data and one for the assessment process) to ensure each receives a substantive review.

The Science Centers and Office Directors worked with OST staff to develop a general review process and terms of reference for the FY 2013 reviews, which were then tailored by the individual Science Centers to meet their specific needs (www.st.nmfs.noaa.gov/science-program-review/).

The seven reviews for FY 2013 were scheduled between June and September 2013 as follows:

- Southeast Fisheries Science Center – June 3–5, Miami, FL
- Pacific Islands Fisheries Science Center – June 25–27, Honolulu, HI
- Southwest Fisheries Science Center – July 29–August 1, La Jolla, CA
- Northeast Fisheries Science Center – August 5–9, Woods Hole, MA

[2] Sissenwine, M. and B. Rothschild. 2011. Building capacity of the NMFS Science Enterprise. 28 pp. Avail. at http://www.st.nmfs.noaa.gov/Assets/science_program/07_sciencerept.pdf

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

[4] http://www.st.nmfs.noaa.gov/strategic-plan/index

- Alaska Fisheries Science Center – August 26–30, Seattle, WA
- Office of Science and Technology – September 9–12, Portland, OR
- Northwest Fisheries Science Center – September 17–20, Seattle, WA

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

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

All Science Centers and OST 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 and OST websites).

Reviews typically began with at least a half-day of background presentations on the roles and responsibilities of OST or the individual Science Center. The next two to three days were devoted to presentations by Science Center staff on the various data streams collected and maintained by the Science Center or OST (e.g., fishery-dependent versus fishery-independent data). Presentations typically ended by early afternoon to allow the panel time to discuss what they had learned. Public comment was solicited daily at the end of presentations. The review concluded with one to two days devoted to the panel for follow-up discussions and report writing (most of the panels were charged with submitting their individual reports by the end of the review). The review concluded with a debriefing of the panel by the Science Center Director or OST Director.

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 or OST Director. The Director then immediately sent these reports to the NOAA Fisheries Chief Science Advisor. The Science Center Director also prepared a brief response to the Chair's summary report and sent it to the NOAA Fisheries Chief Science Advisor within six weeks of receiving the report package. The Science Center Director's response included action items and clarifying information, and responded to controversial points within individual reports even if they were not mentioned in the summary.

Generally, within sixty days 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/).

Summary of Findings from the FY 2013 Reviews

Each of the seven program reviews produced a series of recommendations and Science Center responses, which are posted on the Science Center and OST program review websites. Most of the recommendations focused on the enterprise of individual Science Centers, but there were also a number of crosscutting national themes that we respond to here. Recommendations made during at least half of the reviews are listed below, together with national-level responses. A spreadsheet detailing the panelists' recommendations is included on the NOAA Fisheries science program review website.

Comprehensive data management and informatics systems

Reviewers noted that data management is a central NOAA Fisheries function and a product having enduring scientific and practical value. Data managed by the Science Centers and OST are archived in several different ways using a wide variety of software solutions (e.g., Excel, Access, Oracle, SQL server, etc.). In some cases, individual principal investigators (PIs) house research data on their desktop computers with little or no documentation. Inconsistent formats and insufficient technical knowledge limit the ability of PIs to meet data requests, and data cannot always be served easily to end users, including the public. Data collections are major scientific assets for the nation and they need to be safeguarded. Moreover, scientists and the public should have user-friendly access to the data.

Recommendations: Reviewers singled out a variety of specific recommendations under three primary themes:

- Processing, quality assurance/quality control (QA/QC), metadata, change documentation, and management
- Improving access to survey, commercial, recreational, observer, and biological data
- Establishing a consistent fishing trip identifier code to improve integration of the several fishery-dependent data sources, including those maintained by the states and fishery information networks (FINs)

Response: The President's Open Data Initiative challenges federal agencies with "accelerating and expanding efforts to make government information resources more publicly accessible in 'computer-readable' form and spurring the use of those data by entrepreneurs as fuel for the creation of new products, services, and jobs." Specifically, President Obama has called for "increasing access to the results of federally funded scientific research"[5] leading the Office of Science and Technology Policy (OSTP) to direct each federal agency having over $100 million in annual expenditures for research and development to develop a plan to support increased public access to the results of federally funded research. To this end, NOAA has developed an implementation plan that is presently under review at OSTP.

Action items:

- Schedule plan implementation within NOAA Fisheries - upon approval by OSTP of the NOAA Implementation Plan, NOAA Fisheries will establish a working group including representatives from OST and the six Science Centers to develop a schedule executing the Implementation Plan's recommendations.
- Fund the implementation - subject to budget constraints, NOAA Fisheries will provide short-term funding to support execution of the Implementation Plan within one to two fiscal years.
- In FY 2014, a national Working Group will be established under the Fisheries Information System's Program Management Team to report on various approaches to implementing a consistent fishing trip identifier.

Statistical survey and sampling design

Reviewers recognized fishery-independent surveys as critical components of our assessment data collection efforts, and there were a wide array of recommendations covering a range of needed short- and long-term improvements to surveys.

Recommendation: Reviewers highlighted areas that are or should be addressed at a national level, and the relevant national recommendations were:

- Statistical analyses to determine impacts on stock assessments of survey sampling gear, density, and frequency
- Sensitivity analyses to determine which surveys contribute most to precision of assessments
- Statistical analyses to determine appropriate biological sample sizes (e.g., otoliths, reproductive tracts, stomachs) and criteria to prioritize requests and allocate resources

Response: We agree with panelists' recommendations concerning the need for rigorous review of the utility of individual surveys on fishery stock assessments. With respect to the third item above, the effort currently used to achieve a given sample size may constitute over- or under-sampling. Management Strategy Evaluations or Quantitative Observing System Assessments will be needed to better align survey and data collection efforts with assessment needs. We have established a Working Group to develop a framework for these analyses, but will wait until the FY 2014 review of stock assessments is concluded to address the concerns raised in the first two items above.

Action Items:

- Rationalizing data analysis workloads and schedules - working through the Science Board and OST, NOAA Fisheries will host a national workshop in FY 2014 with senior staff from age and growth, reproduction, and food habits laboratories. The workshop will focus in part on the development of national

[5] www.whitehouse.gov/sites/default/files/microsites/ostp/ostp_public_access_memo_2013.pdf

protocols to determine the number of samples that need to be processed in order to complete mandated stock assessments.

Strategic planning

An ideal program that satisfies data collection requirements for all information needs will quickly outstrip available staff time and program funding. Therefore, strategic guidance would be beneficial in prioritizing goals and objectives for data collection and management programs in both the short and long term.

Recommendation: Examine whether the frequency of assessments is optimal and develop an adaptive plan for providing the data to conduct the proper suite of assessments on an appropriate schedule. Panelists specifically singled out the need to:

- Balance new directions while retaining core function
- Maintain a long-term vision while engaging in tactical planning
- Evaluate the cost versus benefit of decisions

Response: We agree that the need for strategic planning is crucial to providing a balanced, long-term scientific enterprise within NOAA Fisheries, particularly during a period of declining resources. Largely because of this, each of the Science Centers and OST have embarked upon a regular strategic planning process coupled with annual tactical implementation of both their Strategic Plans and the annual NOAA Fisheries priorities document through their Annual Guidance Memoranda (http://www.st.nmfs.noaa.gov/strategic-plan/index).

Data collection and management staff are overwhelmed with requests from Science Center assessment staff, as well as NOAA Fisheries Regional Offices, Regional Fishery Management Councils, and Interstate Marine Fisheries Commissions. However, a recently developed draft protocol for scheduling assessments may provide some relief here. We also see a need to better estimate the optimal number of biological samples for stock age structure and stomach samples for food habits processed by the Science Centers' age and growth laboratories and food habits laboratories. In addition, there appears to be a need to better understand the data needs of both the Regional Offices and the Regional Fishery Management Councils.

Action items:

- Continue to develop the Science Centers and OST strategic planning effort – a key element of the national strategic planning effort is the development of consistent protocols for prioritization of research. This is particularly relevant to the balancing of core functions (such as fishery stock assessments) with new initiatives (such as ecosystem approaches to management). The Science Board is presently engaged with the development of consistent prioritization protocols for 1) each Science Center's research portfolio, 2) distribution of vessel resources, and 3) stock assessment scheduling. Draft protocols for prioritization will be available during FY 2014.
- Planning bodies – during FY 2014–2015, standing regional planning bodies will be implemented—including members from Fisheries Science Centers and Regional Offices, Fishery Management Councils, and Commissions—to support the scheduling of stock assessments and the work priorities and staffing needs for the coming year.

Staffing shortfalls

Virtually all the Science Centers have significant vacancies in their data collection (e.g., surveys), processing (e.g., age and growth units), and management divisions that have not been backfilled. There is increasing reliance upon contract staff, with a loss of investment in long-term staff development. Thus, there is generally little opportunity for succession planning as senior staff retire. As a result, assessment scientists have significant data management–related challenges, resulting in failure to modernize many existing databases. There are universal needs to extract, error check, and prepare data for statutory reporting requirements and for use by assessment scientists. Moreover, as data are made more available to the public, the interest in data products will increase.

Recommendation: NOAA Fisheries' Science Centers and OST will establish a priority for hiring staff specifically in data collection, QA/QC, database design, data extraction, and statistics. This will include the provision of sufficient lead time for backfill hires.

Response: This issue was identified at all Science Centers. We agree with the panelists' recommendations and propose several steps to alleviate this problem.

Action items:

- Develop staffing plan – by the end of FY 2014, OST and each Science Center will have developed a staffing plan at the direction of the NOAA Fisheries Office of Management and Budget (MB). We will pay special attention to data-associated staffing needs, particularly in light of the workload priorities. This will provide a road map to the number of data-associated staff required.
- Fast-track crucial hires – once Science Centers have determined their staffing needs and the requirement for new hires, NOAA Fisheries leadership will work with NOAA Workforce Management to fast-track these hires. The most efficient approach to filling these vacancies may be a national blanket announcement for new hires (effectively establishing a hiring register).
- Develop national procedures for building capacity and succession planning – MB staff are working with the Deputy Science Center Directors and Deputy Regional Administrators to develop national policies to facilitate succession planning. Implementing the NOAA Science Career Track Policy—the NOAA policy for non-competitive research and development science promotions—provides another mechanism for building capacity and succession planning. This policy will allow scientists to be hired at lower levels and then be non-competitively promoted as their knowledge, skills, and abilities improve. The policy will be implemented during FY 2014. However, concerns regarding the inability to fully manage labor costs at a Science Center under such a policy need further examination.

Planning for the FY 2014 Reviews

Work has now begun on the second year of MSA stock assessment reviews, which will focus specifically on the fishery stock assessment process. Much was learned by Science Center and OST staff in the first year, with comments from the panelists providing important advice on how the reviews can be improved. By and large, the first year of reviews went remarkably well. Changes for the FY 2014 reviews will fine-tune the process (e.g., the requirement that the Chair be a non-NOAA federal employee has been relaxed to allow academics to serve as Chair).

Overarching Terms of Reference for the FY 2014 reviews are posted at:

- http://www.st.nmfs.noaa.gov/science-program-review/index

As in FY 2013, schedules and results of the seven reviews will be posted on this site as they become available.