REPORT TO CONGRESS

Section 201 of the Modernizing Recreational Fisheries Management Act of 2018

Developed pursuant to 2018 PUBLIC LAW No: 115-405

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2018 PUBLIC LAW No: 115-405 INCLUDED THE FOLLOWING LANGUAGE

SEC. 201. COOPERATIVE DATA COLLECTION.

(a) Improving Data Collection And Analysis.—Section 404 (16 U.S.C. 1881c) is amended by adding at the end the following:

"(e) Improving Data Collection And Analysis.—

"(1) IN GENERAL.—Not later than 1 year after the date of enactment of the Modernizing Recreational Fisheries Management Act of 2017, the Secretary shall develop, in consultation with the science and statistical committees of the Councils established under section 302(g) and the Marine Fisheries Commissions, and submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Natural Resources of the House of Representatives a report on facilitating greater incorporation of data, analysis, stock assessments, and surveys from State agencies and nongovernmental sources described in paragraph (2), to the extent such information is consistent with section 301(a)(2), into fisheries management decisions.

"(2) CONTENT.—In developing the report under paragraph (1), the Secretary shall—

"(A) identify types of data and analysis, especially concerning recreational fishing, that can be used for purposes of this Act as the basis for establishing conservation and management measures as required by section 303(a)(1), including setting standards for the collection and use of that data and analysis in stock assessments and surveys and for other purposes;

"(B) provide specific recommendations for collecting data and performing analyses identified as necessary to reduce uncertainty in and improve the accuracy of future stock assessments, including whether such data and analysis could be provided by nongovernmental sources; and

"(C) consider the extent to which the acceptance and use of data and analyses identified in the report in fishery management decisions is practicable and compatible with the requirements of section 301(a)(2)."

THIS REPORT RESPONDS TO THIS CONGRESSIONAL REQUEST.

Introduction

Section 201 of the Modernizing Recreational Fisheries Management Act of 2018 (Modern Fish Act), as excerpted below, requires this report to Congress that addresses improvements in and analysis of data collections by States and non-governmental organizations.

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> "(C) consider the extent to which the acceptance and use of data and analyses identified in the report in fishery management decisions is practicable and compatible with the requirements of section 301(a)(2)."

The National Marine Fisheries Service (NMFS) has previously developed numerous documents that provide scientific guidance on standards for data, analysis, stock assessments, and surveys in accordance with the Magnuson-Stevens Fishery Conservation and Management Act (MSA). In particular, the National Standard 2 guidelines, described later in this document, provide standards for determining that fishery management is based upon the best scientific information available. This report describes current practice and guidance on the subject, and recommends further actions to streamline the incorporation of non-agency data into analyses and assessments.

Types of Data and Analysis Used in Fishery Management

NMFS uses a wide variety of data in stock assessments. Major categories of data include catch, abundance, biological, ecosystem, and socioeconomic data. Data sources also can be categorized into fishery-dependent data collected in the course of fishing operations, and fishery-independent

data collected from non-fishing surveys. In addition, NMFS has many cooperative data collection programs, which often collect data in combination with state agencies and the fishing industry. Fishery-dependent data are collected as part of commercial, recreational, or subsistence/cultural/tribal fishery activities. These data provide information on the landings and bycatch of the fishery as well as the biological composition of the catch (i.e., age, size, sex, and species). Fishery-independent data are collected using standardized scientific surveys, which use consistent methods over space and time to maintain objectivity and obtain an accurate perception of wild fish stock dynamics. These data include abundance, distribution, and demographics of fish stocks in their natural environments. NOAA has invested heavily in fishery-dependent and fishery-independent data collection in order to produce long time series of information from numerous sources, which can be used in stock assessments. The following sections briefly describe these data types, along with important types of related analyses.

Catch: Catch refers to the removals of fish of a given stock (or stock complex) due to fishing and other factors. Total catch is an important component of all stock assessments because it indicates the scale of fishing mortality imposed on a stock by commercial, recreational, or tribal fishing efforts and is required to account for annual catch limits under the MSA. The two main types of catch data are commercial and recreational, although subsistence and tribal fisheries in much smaller amounts also contribute to total removals for some stocks. Commercial sources of catch data include: reports from ports, markets, and dealers; observer programs; vessel monitoring systems; and self-reports (including logbooks, trip tickets, and dealer reports). Generally, catch is measured as a census of landings receipts and at-sea discards are estimated from observer coverage for a subset of the fishing trips. Recreational sources of catch and effort data are provided through the Marine Recreational Information Program (MRIP), the national data collection program for recreational data (except for Alaska and Texas which use similar data collection tools to estimate recreational harvest). To estimate the amount of recreational fishing effort in a region, MRIP conducts phone or mail surveys of registered recreational fishermen. Additionally, in-person shore-side surveys (called "intercept surveys") are conducted to estimate the catch and effort associated with individual trips. Finally, multiplying total effort estimated from the phone/mail surveys by the estimated average catch/effort for each trip provides estimates of the total recreational catch. Different methods involving on-site collection of both effort and catch are utilized on the Pacific coast, and self-reporting of catch and effort is utilized in some for-hire fisheries and specialized applications.

Abundance: Data on stock abundance over time are important for evaluating a stock's response to fishing and other factors. Stock assessments that do not include abundance data are considered data-limited. Abundance data may be relative (e.g., percent change in stock size over time) or absolute (total) abundance (e.g., measures of stock size in terms of total numbers or weight). When available, absolute abundance estimates are preferred, mainly because they provide a solid foundation for stock assessment analyses by anchoring the assessment model at a scale that reflects actual stock biomass. Fishery-dependent catch per unit effort (CPUE) can serve as a proxy for changes in relative fish abundance, but with less confidence than fishery independent survey data, due to changes in industry fishing methods over time. Advanced technology and

advanced statistical methods are beginning to provide ways to improve the calibration of fishery-dependent CPUE.

Biological: Biological samples of fish collected to support stock assessments can provide information on age, length, weight, sex, reproduction (e.g., maturity and fertility or fecundity), genetic information, and natural mortality (i.e., not caused by fishing). Fish samples are collected from both fishery-dependent and fishery-independent sources. Genetic data (or genomics) may be used to determine stock structure (i.e., the spatial boundaries of a stock) and evaluate whether the definition for a managed stock is consistent with the biological stock. New genetics methods such as environmental DNA and others hold promise for improvements in abundance estimation.

Ecosystem and Socioeconomic: Other types of data include information about ecosystem and socioeconomic dynamics. For instance, fluctuations in ecosystem productivity directly influence fish stock productivity and the location and effectiveness of fishing may be influenced by changing ecosystems, market dynamics, and fishing strategies. Thus, as we continue to improve our understanding of the connections between fish, fisheries, and their ecosystems, a clear opportunity emerges to improve assessments by expanding their scope to incorporate important ecosystem and socioeconomic connections.

Analyses: Stock assessment analyses incorporate data from fisheries, surveys, and biological studies into population models to characterize the status of a fish stock with respect to overfishing and overfished limits, and to provide catch and stock forecasts. These forecasts are used by the Councils' Scientific and Statistical Committees to establish the acceptable catch levels and overfishing limits according to sustainable harvest policies developed by the Councils in fishery management plans. Finally, the Councils set Annual Catch Limits that are approved and implemented by NMFS.

Although stock assessments are the primary analyses used to determine catch limits, other forms of analysis may inform managers, including those providing information about stock structure, range, productivity, as well as socioeconomic studies on fishing patterns and behavior, as well as economic impacts of management decisions.

The Inclusion of State and Non-governmental Sources

The current data collection process for inclusion of state and non-governmental data into stock assessments is sophisticated, transparent, and effective. State and non-governmental data are frequently incorporated into fisheries management decisions through cooperative data collection programs, such as the Fishery Information Networks (FINs), MRIP state supplemental surveys, Research Set-Aside programs (in the Northeast and Mid-Atlantic) or cooperative fishery-independent survey programs such as the Southeast Area Monitoring and Assessment Program (SEAMAP). Additionally, non-governmental data sets, most frequently those collected by state agencies, can be *and are* incorporated into stock assessments. Some regions have data workshops, during which different institutions and stakeholders collaboratively review numerous data sources to consider for inclusion in stock assessments. In other regions, states or external entities may submit their data to the stock assessment process for consideration. In all

circumstances, the data must undergo a rigorous peer review (more information to follow) prior to its inclusion in an assessment.

Improving Accuracy and Precision of Data and Stock Assessments

NMFS and its partners recognize that improvements can always be made to its scientific and management processes, including the incorporation of peer reviewed data from our state, academic, and other non-governmental partners. Data collection is the essential component of the stock assessment enterprise, and is the largest portion of NMFS scientific budget. Despite the high-quality data collection and monitoring programs that NMFS operates, additional, peer reviewed data can improve assessments, provided the data are useful to the stock assessment models and meet scientific standards that can be formatted in accordance with stock assessment modeling requirements. Increased use of nongovernmental data can provide cost efficiencies to NMFS as well as increase transparency and communication with partners.

NMFS has improved the incorporation of additional nongovernmental data sources into stock assessments. The most recent update to the Stock Assessment Improvement Plan (SAIP), "Implementing a Next Generation Stock Assessment Enterprise"[1] had numerous recommendations related to data collection, including collecting more data, especially in cost efficient ways which can include the use of new technologies as well as the use of partnerships. The SAIP includes recommendations on maintaining data collection programs, expanding the use of new technologies, as well as expanding partnerships. For example, partnerships with industry, state, or academic partners to operate surveys can help fill gaps in survey coverage. The agency is currently implementing the recommendations of the SAIP.

NMFS has also improved recreational catch estimation based on strategic external reviews. MRIP was originally established in 2008 to address the recommendations in the National Research Council's 2006 *Review of Recreational Survey Methods* [2] for improvements to earlier surveys designed to produce statistics describing marine recreational fishing catch and effort nationally. MRIP's Strategic Plan[3], adopted in 2017, maintains the program's commitment to continuous improvement of survey designs and results, including strategies and tactics that address the following goal:

"Goal 4—Ensure Sound Science
Maintain a strong science foundation for the program that includes robustness, integrity, transparency, and innovation, and that develops and incorporates new advancements in survey design and data collection and analysis."

The tactics that accompany Goal 4 include seeking periodic "independent reviews of current and proposed survey designs, estimation methods, and data collection technologies that are on the MRIP Certification Track." NMFS has established a framework[4] for addressing the recommendations that resulted from the 2006 NRC review and a more recent 2017 review of

[1] https://spo.nmfs.noaa.gov/sites/default/files/TMSPO183.pdf
[2] http://dels.nas.edu/Report/Review-Recreational-Fisheries-Survey-Methods/11616
[3] https://www.fisheries.noaa.gov/resource/document/mrip-strategic-plan-2017-2022
[4] https://www.fisheries.noaa.gov/resource/document/mrip-framework-addressing-2017-national-academies-recommendations

MRIP by the National Academies of Science, Engineering, and Medicine, and will be reporting to Congress on progress, as required by the Modern Fish Act.

Best Scientific Information as Basis for Fishery Management

National Standard 2 Guidelines

MSA National Standard 2 (NS2) states that "conservation and management measures shall be based upon the best scientific information available." Under NS2, NMFS holds its fisheries science and management enterprise to the highest scientific standards, including the use of external peer review and the use of Scientific and Statistical Committees (SSC) in the management process. Guidelines for NS2 on the processes and standards to ensure science quality were completed in 2013. The NS2 Guidelines are not overly prescriptive, but lay out the widely accepted criteria for evaluating best scientific information available: inclusiveness, objectivity, transparency, timeliness, verification, validation, and peer review.

The NS2 Guidelines acknowledge the high quality standards of data collection, as well as address gaps in government data collection. A few selected sections which relate to data standards include:

- Under Transparency, "Scientific information products should describe data collection methods, report sources of uncertainty or statistical error, and acknowledge other data limitations. Such products should explain any decisions to exclude data from analysis…Finally, such products should openly acknowledge gaps in scientific information."
- Under Timeliness, "Sufficient time should be allotted to audit and analyze recently acquired information to ensure its reliability. Data collection methods are expected to be subjected to appropriate review before providing data used to inform management decisions."
- Under Verification and Validation, "Methods used to produce scientific information should be verified and validated to the extent possible. Verification means that the data and procedures used to produce the scientific information are documented in sufficient detail to allow reproduction of the analysis by others with an acceptable degree of precision. External reviewers of scientific information require this level of documentation to conduct a thorough review.

Overall, the NS2 Guidelines allow for, and encourage, the use of nongovernmental sources of data, as long as those data undergo the same rigorous review to be considered best scientific information available (BSIA). Under Inclusiveness, "Alternative scientific points of view should be acknowledged and addressed openly when there is a diversity of scientific thought." And "Relevant local and traditional knowledge (*e.g.,* fishermen's empirical knowledge about the behavior and distribution of fish stocks) should be obtained, where appropriate, and considered when evaluating the BSIA." Also, under FMP Development, "An FMP should identify scientific information needed from other sources to improve understanding and management of the resource, marine ecosystem, the fishery, and fishing communities."

The Guidelines state that "The information submitted by various data suppliers should be comparable and compatible, to the maximum extent possible." And "Scientific information that is used to inform decision making should include an evaluation of its uncertainty and identify gaps in the information."

Peer review is an important element of the NS2 Guidelines and they adopt many of the Office of Management and Budget (OMB) peer review standards (OMB, 2004). These standards include balance in expertise, knowledge, and bias; lack of conflicts of interest; independence from the work being reviewed; and transparency of the peer review process. The NS2 Guidelines recognize that varying degrees of independence may be required for various reviews depending on the novelty, controversy, and complexity of the review. For example, an assessment update may be sufficiently reviewed with only regional expertise, while a review of emerging methods or controversial topics may require a more rigorous, independent peer review process. Deciding on an appropriate scope for the review is linked with how best to balance the need for a high quantity of assessments for timely management decisions with the need for rigorous peer reviews when necessary.

NMFS also has published a decision in the *Federal Register*[5] on peer review, which recognizes the five regional peer review processes as compliant with NS2. Each Council and their respective SSCs incorporate both internal and external peer reviews of their respective stock assessments. The regional peer review processes vary, though all meet NS2 requirements. These processes have mechanisms in place for incorporating new data into assessments.

SAIP Recommendations

As previously discussed, the SAIP recognizes the high-quality data standards and peer review in place in the fisheries science and management system. It also recognizes sources for improvement, including creating more partnerships to improve data collection as well as streamlining the peer review process through the formalization of research vs. operational assessments. For research assessments (which include major changes to data sources or model configurations), the SAIP recommends that:

- "Stakeholder involvement is also encouraged so outside data, analyses, and ideas can be evaluated, and trust in potential changes is built from the beginning.
- New procedures, data sets, and configurations are made available to conduct new assessments, address issues with operational assessments, or make general improvements.
- For research assessments to be accepted into the next operational assessment there must be a long-term commitment to collect and provide the accepted data and methods.
- New procedures, data, and findings with application to particular stocks should be fully documented to support use and serve as reference in future operational assessments."

The SAIP also recognizes that "On occasion, entities other than NMFS conduct assessments of federally managed stocks. These assessments may be well integrated into the management

[5] https://www.federalregister.gov/documents/2016/08/16/2016-19522/magnuson-stevens-act-provisions-national-standard-2-scientific-information-regional-peer-review

process or outside normal procedures. Typically, external assessments are commissioned by a stakeholder either to fill a data gap that is not being addressed or to provide an alternative perspective in an ongoing assessment. External assessments can be helpful when they provide advice for stocks that cannot be assessed in a timely fashion, thereby assisting with the assessment workload, or when they contribute additional analyses for consideration in an ongoing assessment. However, external assessments can also be disruptive, especially when they are provided late in the management process or without sufficient documentation to critically evaluate the approach. In these cases, the assessment tends to compete or conflict with the federal stock assessment without being subject to an equivalent level of peer review. As the contribution of external assessments continues to increase, many Councils have developed, or are developing, protocols for including these assessments in the management process."

Citizen Science Guidance

Other types of outreach and collaboration programs generate data for use in science, including cooperative research, indigenous and local ecological knowledge, and citizen science. The Crowdsourcing and Citizen Science Act (2017) provides authority for federal agencies to conduct citizen science projects to advance agency missions. NOAA has several citizen science programs and projects which support agency missions ranging from weather forecasting, to mapping the seafloor, to supporting living marine resource management and is working to expand citizen science at NOAA from outreach and education to a recognized, supported component of research.

The NOAA Science Advisory Board recently published a report on "Potential for Citizen Science in Support of Data Needs for Ecosystem-Based Science." This report recognized that "data from CS programs can be integrated with information from surveys, cruises and sensors deployed by agencies and academic scientists. However, there is a need for careful program design, data review, and quality control to ensure that citizen science efforts produce valuable data that is accepted by the mainstream scientific community."

MRIP

MRIP has been expanded recently to include regionally specialized surveys conducted by state partners. To ensure recreational catch and effort data are consistent across the nation's fisheries and derived from methods that are scientifically robust, MRIP established a certification process for catch and effort survey methods which has been formalized recently in the NMFS Policy Directive 04-114.[6] Certified survey and estimation methods meet a shared set of standards, undergo independent peer review, and receive approval from the MRIP Executive Steering Committee and NMFS leadership. Once certified, new surveys are eligible for MRIP funding and consideration in federal stock assessments and fisheries management. A certification review can also be requested by a sponsor for legacy surveys already in use that are either seeking recommendations for survey design improvements or are planning to implement changes.

[6] https://www.fisheries.noaa.gov/national/laws-and-policies/science-and-technology-policy-directives

In addition to the current general surveys outlined above, MRIP has investigated the suitability of mandatory and voluntary or opt-in mobile applications by which anglers can self-report data for consideration in stock assessments. Findings and recommendations to date are included in NMFS' Report to Congress on electronic reporting options.[7]

Recommendations

The current fisheries scientific and management system can sufficiently address and incorporate state agency and nongovernmental data sources. Provided that these data, analyses, assessments, and surveys undergo the same rigorous scientific review as governmental products, they currently can be, and are, incorporated into fisheries management decisions. Nonetheless, NMFS recognizes that there could be greater incorporation and there is sometimes a perception that these other sources are ignored or not used. A few recommendations follow:

For State or Nongovernmental Partners:

1. To the extent practicable, acceptable assessment data should be based on: a) sampling within a plan for covering the entire stock range, b) relatively long time-series and commitment to maintain data collection for the foreseeable future, and c) peer-reviewed sampling design.
2. Partners designing scientific studies should reach out early and often to stock assessment staff. In these cases, it allows assessment staff to help shape the sampling strategy and output indicators that work best with their models. It also provides sufficient time to review the data.
3. To the extent practicable, data and analyses should be delivered in the format most appropriate for intake into assessments models or management systems, and for publishing in publicly available federal data systems.

For NMFS and Fishery Management Councils (and their SSCs)

1. Develop and document a clear process for reviewing new data prior to incorporation into an assessment, particularly a new assessment or a research/benchmark assessment. This process could be similar to the public data review workshops (such as SEDAR in the Southeast), and could include the SSCs, or other methods. While peer review of assessments includes review of the data used, having a prior review step could facilitate the incorporation of new data.
2. Consider identifying a liaison at NMFS Science Centers or Councils to assist non-governmental entities in designing studies and/or connect them with the appropriate assessment staff at the appropriate steps in the assessment process for the consideration of their data.
3. Liaisons could develop communication and outreach regarding data needs and data collection programs, and work with cooperative research staff and grant programs, as

[7] https://www.fisheries.noaa.gov/feature-story/noaa-fisheries-explores-electronic-reporting-supplemental-source-recreational-fishing

well as integrate Council Research Priority Plans, and/or Science Center Science Plans.

4. Capitalize on existing grant programs, such as Saltonstall-Kennedy, as well as regional programs, such as the Marine Fisheries Initiative (MARFIN) or North Pacific Research Board as venues for communicating about research and data collection programs, as well as research and data needs.