

A Strategy for the NMFS Advanced Sampling Technology Working Group

Introduction

NOAA's National Marine Fisheries Service (NMFS) is responsible for the management, conservation, and protection of living marine resources (LMR) within the United States Exclusive Economic Zone. Additionally, advice and support is provided to marine resource management under state and international jurisdiction. NMFS is the lead federal agency that supports the NOAA mission goal to *protect, restore, and manage the use of coastal and oceanic resources through ecosystem-based management*.¹ To achieve this goal through new or innovative uses of sampling technologies, NMFS must: 1) establish a core of technological expertise that is integrated with the stock assessment process; 2) identify and rank measurement and sampling uncertainties, and define gaps in existing LMR assessments; 3) refine, develop, and evaluate advanced sampling technologies and methods for NMFS-wide application; and finally 4) implement advanced sampling technologies and methods. This document serves to establish the operational framework to advance technological innovation in support of the NMFS mission (Figure 1).

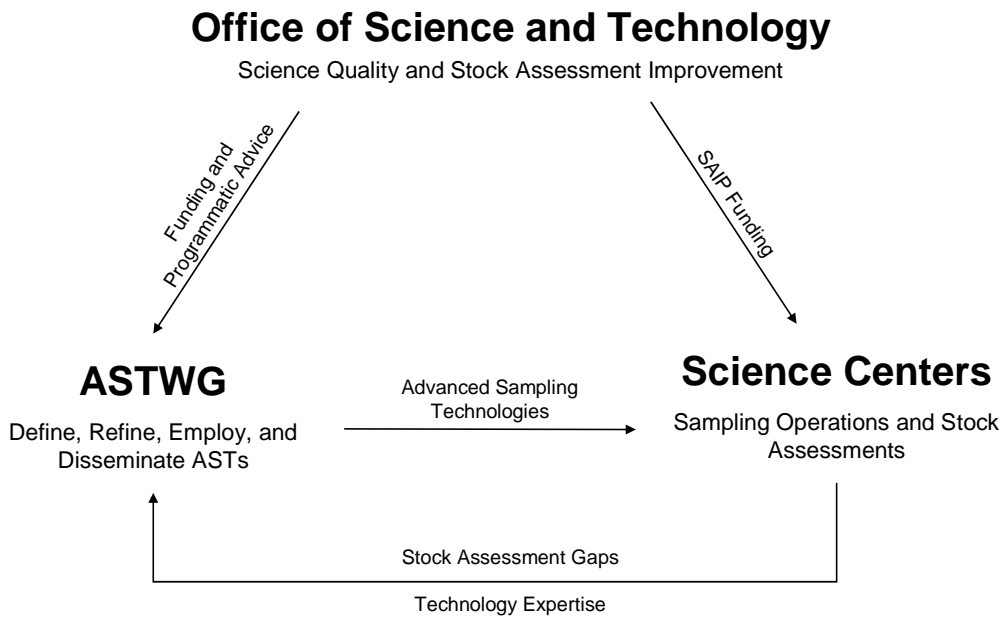


Figure 1. Schematic of information flow among the Science Centers, Advanced Sampling Technology Working Group (ASTWG), and the Office of Science and Technology.

1) Establish a core of technological expertise that is integrated with the stock assessment process

The Advanced Sampling Technology Working Group (ASTWG) was established by the NMFS Science Board to foster communications and collaborations among experts in sampling technology at the six Science Centers, increase technical staff capabilities, and expedite sampling technological development through synergy in their research endeavors. The thrust of the ASTWG mission is to improve the accuracy, precision, and efficiency of living marine resource assessments. Innovative technologies hold promise to reduce measurement and sampling uncertainties, and fill the gaps in the quantitative measures of stocks and their habitats - both for fishery-independent and fishery-dependent sampling.ⁱⁱ

The ASTWG will build infrastructure and technological capacity at each Science Center and engage stock assessment scientists in this process. The ASTWG will sponsor appropriately trained personnel, through permanent allocation of resources, to support the development, testing, and use of advanced sampling technologies. These experts will form the nucleus of advance sampling technology evaluation, development, and deployment, represent their Centers in the ASTWG, and thereby ensure national level support and coordination.

2) Identify and rank measurement and sampling uncertainties, and define gaps in existing LMR assessments

NMFS strives to better understand marine ecosystems and their LMR. Stock assessment uncertainty, including both measurement and sampling error, can result from inaccurate, imprecise, and insufficient data. The most important sources of uncertainty in stock assessments must be identified and ranked by Science Center stock assessment scientists and collaboratively addressed by the ASTWG with innovative sampling technologies. Reduction of the primary sources of uncertainty should motivate advanced sampling technology initiatives, not vice-versa. It should be recognized that use of advanced technologies may be necessary to adequately quantify measurement and sampling errors and data gaps. To this end, existing and emerging technologies must be evaluated and candidates assessed for known benefits, limitations, and costs.

Key to this strategy is the involvement of quantitative scientists involved in LMR stock assessments. Input may be garnered from a single stock assessment scientist assigned to liaise with the ASTWG, from a panel of scientists representing each of the Centers, or from the scientific community.

The Science Centers will identify and prioritize gaps or constraining levels of uncertainty in stock assessments and habitat inventories for each region and identify candidate technologies to reduce uncertainty and fill the gaps. Prioritization should be based on the magnitude of the uncertainty, the tractability of addressing this uncertainty, and the overall improvement relative to agency stock assessment improvement plans.

3) Refine, develop, and evaluate advanced sampling technologies and methods for NMFS-wide application

Once the Science Centers identify their priority stock assessment gaps and uncertainties, the ASTWG will identify commonalities in needs and applicable technologies. This process will follow the annual timing indicated in the ASTWG terms of referenceⁱⁱⁱ. That is, the Science Center ASTWG representatives will present their respective Center's analyses to the ASTWG at its annual spring meeting for consideration and prioritization. National prioritization of regional information needs will be based on mutual requirements among Centers. This priority list will be used to develop a Request for Proposals (RFPs). Following release of the RFP and before the fall meeting, ASTWG members will coordinate development of full proposals within or among the Science Centers. Full proposals will be considered by the ASTWG at its annual fall meeting. Each candidate technology must be evaluated for sources of uncertainties, cost, and the probability of successfully transitioning from research to application, resulting in a ranking of proposals. In consultation with the Office of Science and Technology, the ASTWG will use the final ranking and attendant recommendations to develop national funding priorities and spending plan development. Commensurate with an approved spending plan, the ASTWG will evaluate candidate technologies through proof of concept studies.

The ASTWG will periodically review and update error assessments and technological needs based on input from the Science Centers and progress-to-date on improving ecosystem-based assessments. Through the process of refining, developing, and employing innovative sampling technologies, NMFS will not only be better equipped to meet its stewardship obligations, but it will be staged to support inter-agency initiatives such as the Integrated Ocean Observing System (IOOS).

4) Implement advanced sampling technologies and methods

The ASTWG will disseminate information from its work on developing and evaluating new technologies to the Science Centers and to the marine research community in general. For proven or particularly promising technologies, the ASTWG will facilitate the transition from research and evaluation to common usage that improves the effectiveness of NMFS in meeting its mandates.

ⁱ National Marine Fisheries Service (NMFS). 2004. *Priorities for the 21st Century: NOAA Fisheries' Strategic Plan, Updated for FY2005-FY2010*. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, NMFS, Silver Spring, Maryland.

ⁱⁱ Mace, P.M., N.W. Bartoo, A. B. Hollowed, P. Kleiber, R. D. Methot., S. A. Murawski, J. E. Powers, and G. P. Scott. 2001. Marine Fisheries Stock Assessment Improvement Plan. Report of the National Marine Fisheries Service National Task Force for Improving Fish Stock Assessments. NOAA Technical Memorandum NMFS-F/SPO-56.

ⁱⁱⁱ http://www.st.nmfs.gov/st7/areas_of_emphasis.html#area4