

Executive Summary

- The Stock Assessment Improvement Plan is the report of the National Marine Fisheries Service (NMFS) National Task Force for Improving Fish Stock Assessments, and is a component of the Science Quality Assurance Program. The Task Force consisted of one representative from NMFS Headquarters and 1-2 representatives from each of the five NMFS Science Centers. The report also addresses recommendations made in the National Research Council study on Improving Fish Stock Assessments (NRC 1998a).
- Improvements in stock assessments are required for several reasons, including: that management entities are “managing at the edge” for many species, and therefore require the most accurate and precise stock assessments possible; it is no longer permissible to overfish; and there are currently increased demands for adopting a “precautionary approach” and incorporating “ecosystem considerations” into stock assessments and fisheries management. This report discusses these and other factors that define NMFS’ stock assessment mandate.
- Although the NRC study on Improving Fish Stock Assessments (NRC 1998a) focused on improving assessment methodology, the Task Force agreed that the greatest impediment to producing accurate, precise, and credible stock assessments is the lack of adequate input data, in terms of the quantity, quality, and type of data available.
- For most stocks, there is at least basic information on landed catch and the size frequency of the catch. However, for more than 40% of the 904 stocks listed in the 1999 Report to Congress on the Status of Fisheries of the United States (NMFS 1999a), there is no fishery-independent or fishery-dependent index of abundance, which makes it extremely difficult to conduct a meaningful assessment. Other factors, such as the need to prioritize the stocks to be assessed, result in a total of about 60% of the stocks (545 stocks) lacking assessments sufficient to evaluate stock status relative to overfishing. On the other hand, although there are relatively few stocks with comprehensive input data, a total of 119 stocks are routinely assessed using state-of-the-art age or size structured models, some of which may also incorporate spatial and oceanographic effects. With a few exceptions, all of the high-valued, high-volume, or high-profile species are routinely assessed, while most of the unassessed species contribute little or nothing to total landings.
- Stock assessments conducted by NMFS are rarely, if ever, the product of a single individual, and peer review is an integral part of the processes related to provision of scientific advice in support of fisheries management that are carried out by fisheries scientists from within and outside of NMFS. All five Science Centers have systems in place for peer review of stock assessments.
- The most important programmatic needs vary by region, and even by species groups within regions. Overall, the two most important needs are research vessel surveys designed to produce fishery-independent indices of abundance and to collect related information on spatial and temporal distributions, associated species, habitat, and oceanographic variables; and observer programs that provide information on species composition, amounts of each species kept and discarded, and fishing effort.
- Assessment scientists are faced with many demands. Within a given year, an individual assessment scientist may be expected to: (i) participate in fishery-independent surveys or other field work, (ii) provide input and advice on sampling designs for research surveys and other fishery-independent data collection activities, (iii) spend time on commercial or recreational fishing vessels, (iv) provide input and advice on the development of data collection objectives and protocols for observer programs and other fishery-dependent data collection activities, (v) conduct quality control or other preprocessing of data, (vi) conduct stock assessments, (vii) conduct research into stock assessment methods, (viii) present assessment results to peer review panels and constituent groups, (ix) participate on peer review panels, (x) participate in fishery management plan development or evaluation teams, (xi) defend a stock assessment in a court of law, (xii) research and write scientific papers for primary publication, (xiii) attend colleagues’ seminars and offer critical review, (xiv) conduct formal, written peer reviews of articles submitted for publication in scientific journals, (xv) participate on committees to advance approaches to stock assessment and fisheries management, (xvi) undertake training to stay abreast of new methodologies, (xvii) run courses or workshops to train others, (xviii) participate in national and international meetings and conferences to enhance professional development, and (xix) undertake a variable amount of administrative duties depending on supervisory level. With limited exceptions, there is insufficient scope for individual scientists to focus on just one or a few of these activities due to an overall short-

age of assessment scientists. A survey of assessment scientists indicated that there is insufficient time to devote to important activities such as research to improve the basis for assessments, professional development, and interactions and cooperative research with national and international peers. The same is likely to be true for individuals involved in data collection, data processing, and data management.

- In fact, staffing needs associated with the production of stock assessments go well beyond stock assessment scientists *per se*, who represent only the “tip of the iceberg.” Far greater numbers of staff are needed for deployment in critical data collection activities, such as commercial or recreational catch and effort data, port sampling for biological data, observer programs, and fishery-independent resource surveys. Additional staff are also required to process biological samples (e.g. to determine fish ages from hard structures, construct age-length keys, develop growth curves, construct maturity ogives, and possibly to identify and count eggs and larval fish from ichthyoplankton surveys, and to examine stomach contents), and to enter, audit, integrate, and preprocess data from the myriad of data collection activities.
- The Task Force defined three Tiers of Assessment Excellence, which can be summarized as:

Tier 1 — Improve stock assessments using existing data

- (a) for core species, conduct assessments that are more comprehensive, more thorough, more timely, better quality-controlled, and better communicated;
- (b) for species of currently “unknown” status, mine

existing databases of research vessel survey data and/or commercial and recreational statistics for archival information for new analyses to evaluate status determination criteria.

Tier 2 — Elevate stock assessments to new national standards of excellence

- (a) upgrade assessments for core species to at least Level 3 [the Task Force defined six levels at which assessments are conducted, ranging from 0 to 5; Level 3 assessments comprise analytical models in which ages or species are aggregated];
- (b) conduct adequate baseline monitoring for all federally-managed species (including rare species).

Tier 3 — Next generation assessments

- (a) assess all federally-managed species or species groups at a minimum level of 3, and all core species at a level of 4 or 5 [size, age or stage-structured models, possibly including spatial and seasonal considerations, species associations, and oceanographic effects];
- (b) explicitly incorporate ecosystem considerations such as multispecies interactions and environmental effects, fisheries oceanography, and spatial and seasonal analyses.

- A large part of the report specifies region-by-region program and staffing requirements needed to meet the three Tiers of Assessment Excellence. These are summarized in **Table 8** of the report, which is reproduced here.

Table 8. Total Full-Time Equivalent (FTEs) required to meet the three Tiers of Assessment Excellence for each Science Center and all Centers combined. Estimated current FTEs include in-house staff, contractors such as observers, and “other,” which includes state government biologists, and employees or contractors associated with various regional, national, and international commissions. Numbers should be cumulated across tiers.

Activity	Current			Tier 1	Tier 2	Tier 1+2	Tier 3	All Tiers
	In-house	Contract	Other					
NEFSC	123	49	16	18	43	61	25	86
SEFSC	71	30	46	14	42	56	39	95
SWFSC	80	15	26+	27	60	87	66	153
NWFSC	18	33	59	13	74	87	39	126
AFSC	154	122	54	31	66	97	51	148
Summed FTEs	446	249	201	103	285	388	220	608
\$ \$ (FTE x \$150K)				\$15,450K	\$42,750K	\$58,200K	\$33,000K	\$91,200K

- Among other things, the Task Force recommends that NMFS should aggressively pursue a course of action focusing on new budget and staffing initiatives to modernize its data collection and assessment capabilities. At the minimum, NMFS should attempt to bring stock assessment science to at least Tier 2, and should initiate dialog both within house and with the public to determine how far-reaching and comprehensive Tier 3 should be. This will require hiring or contracting considerable numbers of additional qualified staff for data collection, data processing, data management, stock assessments, and evaluations of alternative management strategies, to ensure adequate data and analyses on which to base conservation and management decisions, now and into the future.
- It is also recommended that in order to develop more comprehensive and integrated future budget initiatives geared towards modernizing fisheries assessments and management, NMFS should prepare an umbrella plan that integrates all relevant existing documents on these themes; for example, the current Stock Assessment Improvement

Plan, the NOAA Fisheries Data Acquisition Plan (**Appendix 3**), the NMFS Strategic Plan for Fisheries Research (NMFS 2001b), the Proposed Implementation of a Fishing Vessel Registration and Fisheries Information Management System (**Appendix 8**), the NMFS Bycatch Plan (**Appendix 9**), the National Observer Program (**Appendix 10**), the Social Sciences Plan (**Appendix 11**), the Advanced Technologies Working Group (**Appendix 12**), and relevant fisheries oceanography initiatives (e.g. **Appendix 13**).

- In order to make substantial progress towards collecting the data needed to improve stock assessments, particularly next generation assessments, it is essential that NMFS continue to foster partnerships and cooperative research programs with other federal agencies, state agencies, private foundations, universities, commercial and recreational fishing organizations and individuals, environmental groups, and others with a vested interest in collecting similar types of data, although often for different purposes. Programs involving cooperative research with the fishing industry should continue to be developed and expanded as mechanisms for providing data relevant to improving the quality of stock assessments.

