

V. Recommendations

1. NMFS should aggressively pursue a course of action focusing on new budget and staffing initiatives to modernize its data collection and assessment capabilities. As a minimum, NMFS should attempt to bring stock assessment science to at least Tier 2 (**Section IVB**), 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 evaluation of alternative management strategies, to ensure adequate data and analyses on which to base conservation and management decisions, now and into the future.
2. In order to improve the credibility of its stock assessment science, in addition to acquiring the resources needed to produce the best possible science, NMFS must improve its public image, both with constituents and within NOAA itself. There appears to be little awareness that NMFS employs the largest collection of world-renowned fisheries scientists of any agency, university, or other organization worldwide, and that fisheries science is a field where new and useful methodologies have mostly originated within government agencies (including those of foreign governments), rather than within academia.
3. NMFS also needs to make fishers, politicians, and the public aware of the benefits of truly precautionary management which will reduce the risks of overexploiting fisheries resources and associated species, and will ultimately lead to greater stability in the fishing industry.
4. Another avenue of public awareness which NMFS should pursue is to educate and discuss with interested parties (especially constituents and congressional aides) the implications of calls to incorporate ecosystem considerations into fisheries assessment and management. In particular, NMFS should request input on what different groups of people actually mean by “ecosystem considerations,” and then jointly evaluate the costs and benefits of adopting such approaches. NMFS needs to work harder to align public expectation with reality.
5. NMFS needs to be more proactive in communicating the fact that the methodologies employed to conduct stock assessments are far less problematic than is the quality, quantity, and type of data available for analysis. NMFS needs to seek out and develop cooperative arrangements with stakeholders to improve the quality, quantity, and type of data provided.
6. In order to make substantial progress towards collecting the data needed to improve stock assessments, particularly next generation assessments, it is essential that NMFS develop further 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 other purposes. Many such partnerships already exist (**Appendix 21**), but many more are needed. Programs involving cooperative research with the fishing industry (**Appendix 22**) should continue to be developed and expanded as mechanisms for providing data relevant to improving the quality of stock assessments.
7. In order to enhance progress in the development of new models and methodologies for conducting stock assessments, performing risk analyses and stock projections, and constructing multispecies and ecosystem models, NMFS must free up more time for existing quantitative staff to pursue such research and engage more fully in professional development activities which, in turn, implies the need to also hire or contract additional qualified quantitative staff.
8. In order to ensure a future supply of quantitative scientists to perform stock assessments and related activities, NMFS must augment existing programs that fund graduate study in appropriate fields.
9. In order to maintain the high caliber of current analytical staff, NMFS must develop a comprehensive training program to enhance the quantitative skills of in-house staff.

10. 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 Pro-

posed 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**).