

Marine Fisheries Stock Assessment Improvement Plan

The National Marine Fisheries Service (NMFS) is responsible for the stewardship of the nation's living marine resources and their habitat. As part of this charge, NMFS conducts stock assessments of the abundance and composition of fish stocks in several bodies of water. At present, stock assessments rely heavily on human data-gathering and analysis. Automatic means of fish stock assessments are appealing because they offer the potential to improve efficiency and reduce human workload and perhaps develop higher-fidelity measurements. The use of images and video, when accompanied by appropriate statistical analyses of the inferred data, is of increasing importance for estimating the abundance of species and their age distributions. "Robust Methods for the Analysis of Images and Videos for Fisheries Stock Assessment" is the summary of a workshop convened by the National Research Council Committee on Applied and Theoretical Statistics to discuss analysis techniques for images and videos for fisheries stock assessment. Experts from diverse communities shared perspective about the most efficient path toward improved automation of visual information and discussed both near-term and long-term goals that can be achieved through research and development efforts. This report is a record of the presentations and discussions of this event.

The significance of habitat to sustainable management of the Nation's fisheries was acknowledged by the U.S. Congress in 1996. The Magnuson-Stevens Fishery Conservation and Management Act was amended by the Sustainable Fisheries Act of 1996 to include provisions for defining Essential Fish Habitat (EFH) as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity", applicable to all federally managed species and all of their life-history stages. The sheer magnitude of the EFH mandate and the general absence of dedicated funding prompted the agency to produce the Habitat Assessment Improvement Plan (HAIP) for marine fisheries. The HAIP had multiple objectives including the improvement and prioritization of habitat-science research activities related to stock assessments and EFH definitions. One of the key recommendations in the HAIP is that NMFS should develop criteria to prioritize stocks and geographic locations that would benefit from habitat assessments, meaning the process and products associated with consolidating, analyzing, and reporting the best available information on habitat characteristics relative to the population dynamics of fishery species and other living marine resources. This prompted formation of the national Habitat Assessment Prioritization Working Group (HAPWG) in 2011. The HAPWG developed national guidance for objectively scoring managed species/stocks on a standard set of rubrics. The prioritization process involved a sequential set of filters and scorable criteria intended to identify high, medium, and low priority stocks for future habitat assessments, both in terms of value to EFH designations and to address habitat-related uncertainty in stock assessments. A coordination team representing the Alaska Fisheries Science Center, the Alaska Regional Office, and the NMFS Office of Science and Technology adapted the generic prioritization process to the specific circumstances in the Alaska Region, assembled data and references to support online scoring, and arranged for the lead stock assessment authors to score their stock(s) from among the assembled list of managed stocks. As a result, a total of 69 stocks or stock complexes were individually evaluated by the stock-assessment authors including six crab stocks and one rockfish complex that are managed by the State of Alaska and three non-target species that were added at the request of the NPFMC Groundfish Plan Team. Fourteen stocks each in the stock assessment and EFH themes were identified as high priorities for habitat assessments, based on predetermined scoring thresholds for the Alaska Region. Overall, 17 different stocks were given high-priority status in one or the other theme and 11 stocks were prioritized in both themes. Upon completion, an internal review was conducted to assess the process and develop recommendations for future habitat-prioritization exercises. [doi:10.7289/V5/TM-AFSC-361 (<https://doi.org/10.7289/V5/TM-AFSC-361>)]

The collapse of cod, flounder, and haddock fish stocks in the Northeast United States has caused widespread concern among managers and fishers in the United States and Canada. The diminishing stocks have forced managers to take strict regulatory measures. Numerous questions have been raised about the adequacy of stock assessment science used to evaluate the status of these stocks and the appropriateness of the management measures taken. Based on these concerns, Congress mandated that a scientific review of the methodology and data used to evaluate these stocks be conducted. In this volume, the committee concludes that although there are improvements to be made in data collection, modeling uncertainty, and communicating between fishers, managers, and scientists, the scientific methods used in the Northeast stock assessments are sound. Recommendations are made on how the stock assessment process can be improved.

Under the Magnuson-Stevens Fisheries Conservation and Management Act (FCMA), managers are required to use the "best scientific information available" in the preparation of federal fishery management plans (National Standard 2 in the FCMA). However, the Act provides no further guidance as to how conformance to this standard should be determined. Because adherence to this standard has often been contentious, Congress has considered adding a definition for what constitutes "best scientific information available" in the reauthorization of the FCMA. This report examines both the current application and the controversy over the standard and concludes that a legislative definition would be too inflexible to accommodate regional differences and future advances in science and technology. Instead, the report recommends that NOAA Fisheries adopt procedural guidelines to ensure that the scientific information used in the development of fishery management plans is relevant and timely and is the product of processes characterized by inclusiveness, transparency and openness, timeliness, and peer review.

Congress has promoted fisheries science for over a century and its involvement in fisheries management took a great leap forward with passage of the Fisheries Conservation and Management Act of 1976. In the past decade, Congress has requested advice from the National Research Council (NRC) on both national issues (e.g., individual fishing quotas and community development quotas) and the assessments related to specific fisheries (Northeast groundfish). This report was produced, in part, in response to another congressional request, this time related to the assessments of the summer flounder stocks along the East Coast of the United States. Following the initial request, the NRC, National Marine Fisheries Service (NMFS), and congressional staff agreed to broaden the study into a more comprehensive review of marine fisheries data collection, management, and use.

Stock Assessment: Quantitative Methods and Applications for Small Scale Fisheries is a book about stock assessment as it is practiced. It focuses on applications for small scale or artisanal fisheries in developing countries, however it is not limited in applicability to tropical waters and should also be considered a resource for students of temperate fishery management problems. It incorporates a careful sample design, various mathematical models as a basis for predicting consequences for stock exploitation, and discusses the impact of exploitation on non-targeted species. This was a unique concept involving a collaborative effort between U.S. and host country scientists to address issues of regional and global concern through innovative research. Unlike other books on stock assessment that show mathematical models, this is the only book of its kind that discusses how an assessment is carried out. It looks at the field as a whole and includes sampling, age determination and acoustics. The book represents the culmination of a nine-year program financed by the United States Agency for International Development to provide new or improved methods of stock assessment for artisanal fisheries.

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estimating the abundance of species and their age distributions. Robust Methods for the Analysis of Images and Videos for Fisheries Stock Assessment is the summary of a workshop convened by the National Research Council Committee on Applied and Theoretical Statistics to discuss analysis techniques for images and videos for fisheries stock assessment. Experts from diverse communities shared perspective about the most efficient path toward improved automation of visual information and discussed both near-term and long-term goals that can be achieved through research and development efforts. This report is a record of the presentations and discussions of this event.

Fisheries science in North America is changing in response to a changing climate, new technologies, an ecosystem approach to management and new thinking about the processes affecting stock and recruitment. Authors of the 34 chapters review the science in their particular fields and use their experience to develop informed opinions about the future. Everyone associated with fish, fisheries and fisheries management will find material that will stimulate their thinking about the future. Readers will be impressed with the potential for new discoveries, but disturbed by how much needs to be done in fisheries science if we are to sustain North American fisheries in our changing climate. Officials that manage or fund fisheries science will appreciate the urgency for the new information needed for the stewardship of fish populations and their ecosystems. Research organizations may want to keep some extra copies for a future look back into the thoughts of a wide range of fisheries professionals. Fisheries science has been full of surprises with some of the surprises having major economic impacts. It is important to minimize these impacts as the demand for seafood increases and the complexities of fisheries management increase. The plan provided here is designed to provide the basis for improving NOAA Fisheries' protected species stock assessment.

"As part of the national program to improve and standardize stock assessment methods and to foster interaction among fisheries stock assessment scientists, the National Marine Fisheries Service (NMFS) Assessment Methods Working Group sponsored a three-day workshop on estimating natural mortality (M) for use in stock assessment applications. The workshop was held August 11-13, 2009, at the Alaska Fisheries Science Center in Seattle, Washington. A keynote presentation was delivered by Dr. Kai Lorenzen and 43 other scientists participated. The presentations and discussions covered biological aspects of mortality, methods for estimation of M, and best practices for use of M in assessment models"--Executive summary.

Ecosystem-based fishery management (EBFM) is rapidly becoming the default approach in global fisheries management. The clarity of what EBFM means is sharpening each year and there is now a real need to evaluate progress and assess the effectiveness and impacts. By examining a suite of over 90 indicators (including socioeconomic, governance, environmental forcing, major pressures, systems ecology, and fisheries criteria) for 9 major US fishery ecosystem jurisdictions, the authors systematically track the progress the country has made towards advancing EBFM and making it an operational reality. The assessment covers a wide range of data in both time (multiple decades) and space (from the tropics to the poles, representing over 10% of the world's ocean surface area). The authors view progress towards the implementation of EBFM as synonymous with improved management of living marine resources in general, and highlight the findings from a national perspective. Although US-centric, the lessons learned are directly applicable for all parts of the global ocean. Much work remains, but significant progress has already been made to better address many of the challenges facing the sustainable management of our living marine resources. This is an essential and accessible reference for all fisheries professionals who are currently practicing, or progressing towards, ecosystem-based fisheries management. It will also be of relevance and use to researchers, teachers, managers, and graduate students in marine ecology, fisheries biology, biological oceanography, global change biology, conservation biology, and marine resource management.

Ocean harvests have plateaued worldwide and many important commercial stocks have been depleted. This has caused great concern among scientists, fishery managers, the fishing community, and the public. This book evaluates the major models used for estimating the size and structure of marine fish populations (stock assessments) and changes in populations over time. It demonstrates how problems that may occur in fisheries data--for example underreporting or changes in the likelihood that fish can be caught with a given type of gear--can seriously degrade the quality of stock assessments. The volume makes recommendations for means to improve stock assessments and their use in fishery management.

This book really began in 1980 with our first microcomputer, an Apple II +. The great value of the Apple II + was that we could take the computer programs we had been building on mainframe and mini-computers, and make them available to the many fisheries biologists who also had Apple II + 's. About 6 months after we got our first Apple, John Glaister came through Vancouver and saw what we were doing and realized that his agency (New South Wales State Fisheries) had the same equipment and could run the same programs. John organized a training course in Australia where we showed about 25 Australian fisheries biologists how to use microcomputers to do many standard fisheries analyses. In the process of organizing this and subsequent courses we developed a series of lecture notes. Over the last 10 years these notes have evolved into the chapters of this book.

Fluctuations and declines in marine fish populations have caused growing concern among marine scientists, fisheries managers, commercial and recreational fishers, and the public. Sustaining Marine Fisheries explores the nature of marine ecosystems and the complex interacting factors that shape their productivity. The book documents the condition of marine fisheries today, highlighting species and geographic areas that are under particular stress. Challenges to achieving sustainability are discussed, and shortcomings of existing fisheries management and regulation are examined. The volume calls for fisheries management to adopt a broader ecosystem perspective that encompasses all relevant environmental and human influences. Sustaining Marine Fisheries offers new approaches to building workable fisheries management institutions, improving scientific data, and developing management tools. The book recommends ways to change current practices that encourage overexploitation of fish resources. It will be of special interest to marine policymakers and ecologists, fisheries regulators and managers, fisheries scientists and marine ecologists, fishers, and concerned individuals.

NMFS has a difficult and complex task in managing U.S. marine fisheries. Despite some successes, too many stocks continue to decline. Over the past decade, several problems have been identified that have contributed to the current dissatisfaction with how marine fisheries are managed. This dissatisfaction is evident from the large number of lawsuits filed by the fishing industry and environmental organizations. One central problem is overfishing. Overfishing issues have been discussed in a series of NRC reports, and these reports identify overcapitalization, and technological and gear improvements as some of the causes. The reports recommend ways to stem these problems and to advance the practice of fishery science at NMFS. This report reiterates some of these recommendations, and makes new recommendations to enhance the use of data and science for fisheries management.

Marine Fisheries Stock Assessment Improvement Plan Report of the National Marine Fisheries Service, National Task Force for Improving Fish Stock Assessment MARINE FISHERIES STOCK ASSESSMENT IMPROVEMENT PLAN... U.S. DEPARTMENT OF COMMERCE... OCTOBER 2001 Improving Fish Stock Assessments National Academies Press

Because marine mammals (MM), such as whales and dolphins, often inhabit waters where commercial fishing occurs, they can become entangled in fishing gear, which may injure or kill them. The 1994 amend. to the MM Protection Act

(MMPA) require the Nat. Marine Fisheries Serv. (NMFS) to establish take reduction teams for certain MM to develop measures to reduce their incidental takes. This report determines the extent to which NMFS: (1) can accurately identify the MM stock that meet the MMPA's requirements for establishing such teams; (2) has established teams for those stocks that meet the requirements; (3) has met the MMPA's deadlines for the teams subject to them; and (4) evaluates the effectiveness of take reduction regulations.

The National Marine Fisheries Service (NMFS) employs many fishery scientists with diverse skills. The agency finds that the supply of fishery biologists is adequate to meet most of its demand. However, increasing demands on the agency to understand fish populations and the social and economic conditions in fishing communities have created a need for additional experts in the fields of fisheries stock assessment and social sciences. NMFS has developed plans for meeting its anticipated staff needs in stock assessment and social sciences and asked the National Research Council (NRC) to convene a workshop to discuss the plans and suggest other actions the agency might take to ensure an adequate supply of experts in these fields. Approximately 30 individuals gathered in Woods Hole, Massachusetts on July 17, 2000 under the auspices of the NRC's Ocean Studies Board to discuss NMFS' plans. This document summarizes the presentations and discussions at that one-day workshop. No attempt was made to reach consensus among the participants; thus, the suggestions recorded in this summary represent the personal views of workshop participants, as summarized by NRC staff.

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