

Overfishing and Stock Rebuilding Workshop

Background Information for 'Managing Our Nation's Fisheries II'

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Substantial improvements have been noted in the 2003 Report to Congress on the Status of U.S. Fisheries. Since the 2002 report, many stocks previously listed as overfished have rebounded and the number of stocks subject to overfishing or approaching an overfished condition has declined. The National Standard 1 guidelines may be revised to better address the control of fishery harvest rates and the timeframe for rebuilding depleted stocks. Draft legislation has also addressed concerns with respect to the definition and listing of overfished stocks and the timeframes and mechanisms for rebuilding depleted stocks. Improvements are being made yet many issues remain. Many stocks are still overfished, information is lacking on many stocks, and attempting to establish a one-size-fits-all approach may result in definitions that are not meaningful in certain applications and may complicate the development of optimal rebuilding plans. A report from the Pew Commission calls for “redefining overfishing in an ecosystem context.” It is still unclear how environmental variability should factor into assessments of sustainable stock sizes. How is Congress addressing these concerns in the re-authorization of Magnuson-Stevens Act and where do they fit within proposed revisions to the National Standard 1 guidelines? How do potential solutions interface with ecosystem-based management initiatives?

Background on Magnuson-Stevens Act National Standard 1

The Magnuson-Stevens Act contains definitions, National Standards, and requirements for rebuilding overfished fisheries which form the cornerstone for federal fishery management. However, a lack of specificity in the language has often led to different interpretations by fishery managers and conflicting direction in the resulting management actions. National Standard 1 (NS1) to the Magnuson-Stevens Fishery Conservation and Management Act (sec 303(a)(1)) states:

Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry

This standard has proven contentious to implement, due to potential or perceived conflicts between the mandate to provide optimum yield (OY) as defined in the law (MSA sec 3(28))¹ and the mandates to protect stocks from overfishing and to rebuild those stocks which are already overfished.

¹ The term ‘optimum’, with respect to the yield from a fishery, means the amount of fish which—

(A) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protections of marine ecosystems;

(B) is prescribed as such on the basis of the maximum sustained yield from the fishery, as reduced by any relevant economic, social or ecological factor; and

(C) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery.

To guide managers in adhering to NS1, NOAA Fisheries produced guidelines in May of 1998. By 2003, NOAA Fisheries and the Councils had accumulated five years of experience operating under the 1998 NS1 guidelines, and a NOAA Fisheries working group was established to examine possible revisions to those guidelines (Mace et al. 2003). Following recommendations from Mace et al. and extensive public comment, NOAA Fisheries is currently considering the possibility of revising the NS1 guidelines, primarily to clarify and simplify them. The most significant of the changes recommended by Mace et al. are as follows:

1. Strengthen the requirements for ending overfishing quickly.
2. Establish fishing mortality targets safely below the corresponding fishing mortality limits.
3. Increase the flexibility of rebuilding time horizons (where appropriate and within limits).

Discussion Topics

This workshop will discuss the current requirements for sustaining healthy fish stocks as well as the provisions for rebuilding depleted fish populations. Potential changes to National Standard 1 guidelines will be reviewed as well as draft legislation for the re-authorization of the Magnuson-Stevens Act (Table 1) and other recent reports which give over-arching guidance for managing fisheries (Table 2). The workshop will discuss the merits and problems associated with the various changes that have been proposed as well as other issues and ideas for maintaining sustainable fisheries and continued stock rebuilding. The issue topics pertaining to this workshop are divided into four themes: Determining Status of Stocks, Sustainability of Managed Stocks, Rebuilding Plans, and Ecosystem Considerations. For each issue some background information is provided and potential discussion items and questions are presented.

Determining Status of Stocks

The annual Report to Congress, mandated by the Magnuson-Stevens Act², describes the state of the nation's fisheries and the effectiveness of federal fisheries management (NOAA Fisheries 2004a). Critical in this description are the Status Determination Criteria (SDC) used as benchmarks for each fishery, as well as the identification of managed stocks and the degree of information available for each of them. Definitions contained in the Act and the NS1 guidelines are key, as it is upon these that determinations of "overfished" and "overfishing" are made. Potential NS1 guideline revisions as well as several legislative proposals contain revised definitions for some important terms. For example, it has been suggested that the term "overfished" should be changed to "depleted" (Mace et al. (2003); S 2066 introduced by Senator Snowe for the 108th Congress) and that the Report to Congress should specify whether a depleted stock's status is a result of fishing or other factors (HR 4749 introduced by Representative Gilchrest in the 107th Congress; draft bill to amend MSA introduced by Senator Kerry in the 107th Congress).

The current NS1 guidelines distinguish between two status determination criteria: a maximum fishing mortality threshold (MFMT) and a minimum stock size threshold (MSST). In any given year, these criteria are used to make two status determinations: The first determination is based on the relationship between the current fishing mortality rate and the MFMT. If the current fishing mortality rate is greater than the MFMT, a determination is made that the stock is being subjected to "overfishing." The second determination is based on the relationship between the current stock size and the MSST. If the current stock size is less than the MSST, a determination is made that the stock is "overfished." Mace et al.

² "The Secretary shall report annually to the Congress and the council's on the status of fisheries within each council's geographic area of authority and identify those fisheries that are overfished or approaching a condition of being overfished." Sec 304(e)(1) Magnuson-Stevens Act

(2003) recommended that the MFMT and MSST be renamed fishing mortality limit (F_{lim}) and biomass limit (B_{lim}), respectively. Mace et al. also recommended clarifications pertaining to the use of B_{lim} and suggested situations in which alternative methods of status determination should be permissible. Under the Magnuson-Stevens Act, maximum sustainable yield (MSY) serves the important purposes of providing an upper limit on the specification of OY and defining the target biomass for a rebuilding plan in the case of an overfished fishery. Under the current NSI guidelines, MSY is defined as the largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological and environmental conditions. The current NSI guidelines also state that estimates of MSY should, among other things: 1) be based on the best scientific information available, 2) incorporate appropriate consideration of risk, 3) be made for each fishery (and preferably for each stock in a mixed-stock fishery), and 4) be re-estimated as required by changes in environmental conditions or new scientific information. What these “environmental conditions” are, how they vary, and who determines when they have changed are subjects of debate (see also the section on ecosystem considerations). At least one piece of proposed legislation has suggested that the National Academy of Sciences should be the ultimate authority in developing some of these definitions (HR 4749 introduced by Representative Gilchrest for the 107th Congress).

Discussion items:

- *How well do proposed changes to NSI guidelines and legislative proposals address the clarifications and other changes needed in the definitions of status determination criteria?*
- *Are additional clarifications needed and, if so, what are they?*
- *How should changes in “prevailing ecological and environmental conditions” be determined?*
- *Should prevailing technological conditions also play a role in specification or estimation of MSY and, if so, how?*

Sustainability of Managed Stocks

Managing marine fisheries, particularly those involving multiple stocks, is inherently problematic. National Standard 2 requires that management be based upon the best available scientific information, but the best information may still be inadequate for some stocks. In a mixed-species fishery, a primary challenge is to avoid jeopardizing those stocks for which the least information exists. Reporting the status of mixed-species fisheries is also complicated, as NOAA Fisheries has traditionally reported status on the basis of individual stocks even in cases where the status determination criteria are defined only for the fishery as a whole, thus leading to confusion regarding the “known” and “unknown” status of many stocks and the relative priority the agency should give to these. Mace et al. (2003) recommended distinguishing between “core” stocks and stock “assemblages,” with assessment and management of each depending on the information available. Even where data limitations preclude establishment of stock-specific status determination criteria, it may be possible to establish meaningful status determination criteria for an overall assemblage, particularly if the assemblage includes one or more “indicator” stocks characterized by a high level of information availability. However, this approach could prove non-precautionary if unproductive, data-poor stocks are inappropriately included in an assemblage with a productive, data-rich indicator stock.

Discussion items:

- *How should mixed-stock fisheries be managed?*
- *How should the status of mixed-stock fisheries be reported?*
- *What protections exist for stocks with limited information?*

Rebuilding Plans

Section 304(e) of the Magnuson-Stevens Act details the requirements for development of rebuilding plans. This section specifies that, within one year of being notified that a fishery is overfished or approaching a condition of being overfished, a Council is to prepare a fishery management plan, plan amendment, or proposed regulation to end overfishing and rebuild affected stocks or to prevent overfishing from occurring. The Act requires each rebuilding plan to include specification of a time period, not to exceed 10 years except under certain circumstances, within which overfishing is to end and the fishery is to be rebuilt. The 10-year limit has been criticized as being arbitrary or insufficiently cognizant of biological realities. The method of implementing the 10-year limit in the current NS1 guidelines has been criticized on similar grounds. Mace et al. (2003) proposed a modified method of implementing the 10-year limit, while some pieces of proposed legislation have suggested modifications of the limit itself (Table 2: S 2066; HR 3645; S 482). The Act's use of MSY biomass as the rebuilding target has also caused concern, in part because this quantity can be difficult to estimate and in part because these estimates are subject to change. The Act does contain provisions for modification of existing rebuilding plans, but these deal only with cases where an existing plan has been found to result in inadequate progress toward ending overfishing and rebuilding affected stocks. Mace et al. (2003) suggested other circumstances under which modification of an existing rebuilding plan may be warranted, such as the accrual of new information leading to substantial revisions in estimates of target stock size or other rebuilding parameters.

Discussion items:

- *How well do rebuilding targets and timelines address the conservation needs of depleted stocks?*
- *How can rebuilding plans best incorporate short-term and long-term changes in recruitment and stock status due to environmental variability?*
- *Under what conditions, and to what extent, should rebuilding plans be revised?*

Ecosystem Considerations

As improved scientific information has been gained on climate variability, oceanographic processes, and fish population dynamics, more consideration has been given to ecosystem concerns in the context of fisheries management. Quantifying environmental variability in stock assessments is a difficult undertaking at best. Some proposed legislation would require that environmental variability be explicitly considered in developing definitions for terms such as overfishing and MSY (HR 4749 introduced by Representative Gilchrest for the 107th Congress). These definitions are currently tied to "prevailing ecological and environmental conditions," yet appropriate methods of determining changes therein remain elusive.

In the gradual evolution toward ecosystem-based management, concern has grown over the effectiveness of single-species management, for example, the single-species basis of current status determination criteria. Scientists grapple with holistic approaches to stock assessment and the incorporation of ecosystem considerations, striving to consider the effects of fishing on the ecosystem as well as the effect of environmental change on fish stocks (Mace 2003; Boldt 2004). The Pew Commission report calls for overfishing to be defined in "an ecosystem context." Some NOAA Fisheries scientists have suggested the need for national guidelines for determining "ecosystem overfishing," using model-based approaches along with statistical and comparative empirical approaches (Mace 2003). These ideas circulate within the context of national initiatives calling for fishery ecosystem plans (FEPs) and the inclusion of a broader scope of ecosystem considerations in fisheries management.

Discussion items:

- *How can we improve upon existing strategies for incorporation of environmental variability in status determination criteria?*
- *Should environmental variability be explicitly considered in developing definitions for, or estimates of, quantities such as MSY?*
- *Redefining overfishing in an ecosystem context: Can it be done? Should it be done?*

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Table 1 Overview of proposed legislation

Issues	S 2066 Snowe Fishery Conservation & Mgmt Amds Act of 2004	HR 4749 Gilchrest MSA Amds of 2003	HR 3645 Young Bill to amend MSA, 2003	S 482 Collins Fisheries Science & Mgmt Improvement Act of 2003	Kerry/Snowe Fisheries Improvement Act, 2002	Kerry Draft Bill to amend MSA, 2002
Determining Status of Stocks						
Definitions	Change 'overfished' to 'depleted' Define 'overfishing' Change definition of 'optimum' (delete reference to rebuilding)	Define 'overfished', 'overfishing' SoC to contract with NAS to develop overfishing definitions, MSY definition		Define 'overfished', 'overfishing', 'MSY', 'surplus production', 'carrying capacity' Change definition of 'optimum' from 'as reduced by' to 'as modified by'		Change the definition of 'overfishing' when depletion is not the result of fishing
Status of Stocks Report to Congress		Distinguish in report to congress if status is due to fishing				Distinguish in report to congress if status is due to fishing
Rebuilding Plans						
Timeframe			Rebuilding time frame extension beyond 10 years justified (if possible overfishing of multispecies fishery)	Change timing of notification from 1 to 3 years Change 'end overfishing' to 'address overfishing' Eliminate 10 year timeframe for rebuilding, change to 'brief as practicable'	SoC flexibility to extend the timeline for existing rebuilding plans (under justifications for why target biomass should be increased)	
Other	F-rates specified for depleted fisheries (cannot exceed 80% of Fmsy) Specify biomass thresholds and limits below which F-rate must be adjusted in FMP			If information unknown on status of a stock, institute co-op research to determine SoC reviewer of best scientific info in rebuilding plan If SoC determines rebuilding plan ineffective, option available to institute co-op research		SoC to guarantee refinancing obligations during stock rebuilding programs
Ecosystem Considerations and other issues						
Environmental variability		NAS to consider variability in developing definition of overfishing		'carrying capacity' changes with environment		
Other		FMP measures also to consider limiting impact of fishing on spawning populations by area		Peer review requirement for stock assessments		Fishery Ecosystem Plans to identify multispecies interactions and account for in management

Table 2 Additional policy-level report recommendations

U.S. Commission on Ocean Policy:

- Ecosystem Based Management Initiatives: stressed the importance of balancing rebuilding timelines with concerns for economic hardship
- SSC advice to Councils could include stock status and health

Pew Oceans Commission Report:

- Redefine overfishing in an ecosystem context
- Concerns for “Fishing Down the Food Web” (Pauly et al. 1998; Pauly et al. 2002)
- Overfishing often removes top predators and can result in dramatic changes in the structure and diversity of marine ecosystem (Dayton et al. 2002)
- Objective of fisheries policy to protect the ecosystem
- Bycatch management: unreported bycatch contributes to overfishing

Ocean Action Plan:

- Establish guidelines and procedures for the use of science in management