NATIONAL MARINE FISHERIES SERVICE POLICY DIRECTIVE 01-104
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Fisheries Management

POLICY OF RISK AVERSION IN FACE OF UNCERTAINTY

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SUMMARY OF REVISIONS:

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, Maryland 20910

MAY - 8 1995

MEMORANDUM FOR: F/SEO - Andrew J. Kemmerer

FROM: F/CM - Richard H. Schaefer

Subject: NMFS Policy of Risk Aversion in Face of Uncertainty

On April 12, 1995, NMFS disapproved the Gulf of Mexico Fishery Management Council's proposed regulatory amendment to reduce the minimum size of red grouper for the commercial sector. This action was to be taken under a framework regulatory adjustment procedure established by the Fishery Management Plan for the Reef Fish Resources of the Gulf of Mexico. In our letter to the Council, we indicated that the primary basis for our decision was the scientific uncertainty about the effects of the proposed measure on the long-term productivity of the red grouper stock. Based on this uncertainty, we indicated that approval of the measure would amount to the unacceptable risk of allowing overfishing, and that it would be inconsistent with the agency policy of risk aversion in the face of uncertainty.

Your staff has requested clarification of the agency's policy of risk-averse decision making. I have provided answers to your staff's specific questions as follows:

1. Question: What is the NMFS definition of risk aversion?

   Answer: There is no formal agency definition of risk-averse decision making. However, this type of decision making is discussed in several NMFS publications. A succinct agency statement regarding the rationale and objectives of this type of decision making was presented publicly in the Strategic Plan of the National Marine Fisheries Service--Goals and Objectives, June 10, 1991. This statement still represents the formal agency position on this issue. Under Goal 2--Maintain Currently Productive Fisheries, there is a discussion of risk-prone and risk-averse decision making. This clearly explains that the agency advocates risk-averse fishery management decisions because they reduce the risk of overfishing and give the benefit of the doubt to conservation, particularly in the face of uncertainty about the effects of management actions on the managed fishery resources.

   Also, in "Our Living Oceans," December 1993, page 24, NMFS indicates that risk-averse decision making is a key elemen

in the development of any improved management system, and that this policy means that managers should err on the side of caution with respect to long-term resource health when making fishery management decisions. Making such decisions based on short-term objectives often places the resource's long-term health at risk.

Attached are copies of these texts.

2. Question: What is the level of uncertainty that triggers the policy of risk-averse decision making ? (e.g., at what point may a council anticipate that the policy will override its decision and substitute for the council's judgment ?).

Answer: There is no specifically fixed or established level of uncertainty, or even risk, that would trigger application of the agency's policy of risk-averse decision making. Each management action proposed by a council will be evaluated by the agency to determine the risk posed to the health of the subject fishery resource. Based on this evaluation, the supporting information provided by the council, and the best scientific information available, the agency will decide what level of risk to the resource is likely to result from the proposed action and whether this risk level warrants disapproval of the action. Clearly, where a proposed action has a reasonable probability of causing or continuing overfishing, the agency's policy would result in disapproval. Where best available scientific information presents significant uncertainty about effects on the resource, the risk-averse policy should result in a decision that reduces or even minimizes adverse effects on the condition of the fishery resource.

NMFS has formally articulated the factors that it expects the councils to consider in developing their proposed management measures under the Guidelines for Fishery Management Plans (50 CRF Part 602). Most relevant to the issue of risk-averse decision making is the agency's guidance regarding the application of the national standards for fishery conservation and management to proposed management actions. In particular, the guideline on National Standard 1 (preventing overfishing while achieving optimum yield) summarizes the agency's expectations regarding how the councils should consider risk and uncertainty in developing proposed measures, with particular emphasis on preventing overfishing and ensuring optimum yield from a healthy resource. This general discussion provides some additional guidance on how the agency views relationships among risk, uncertainty, and fishery management actions.

3. Question: When did NMFS adopt the policy?

Answer: The agency's policy was formally adopted in its Strategic Plan of the National Marine Fisheries Service--Goals and Objectives. The Plan was published June 10, 1991. Also, the policy was stated for public information in the Analysis of the Potential Economic Benefits from Rebuilding U.S. Fisheries, NMFS Senior Scientist's Office, in April 1992). On page 1, this paper indicates that, in particular, given the uncertain status of 34% of U.S. fishery resources, NMFS will reduce the risk of overfishing by making management decisions that err toward conservation of the fishery resource. It also indicates that, at the same time, NMFS will reduce the uncertainty in fishery management by significantly expanding the scientific information upon which decisions are based.

4. Question: Is the NMFS policy in writing and, if so, is it available for distribution?

Answer: It is available in the NMFS Strategic Plan and is further referenced and endorsed in NOAA's 1995-2005 Strategic Plan, published July 15, 1993. Refer to the attached material copied from these documents. This material may be distributed.

Attachments

Drafted by D.A. Hays
H:POLICY
5-5-95

STRATEGIC PLAN

OF THE

NATIONAL MARINE FISHERIES SERVICE

GOALS AND OBJECTIVES

June 10, 1991

Thus, the first goal of the National Marine Fisheries Service is: **Rebuild the Nation's overfished resources.**

Objectives to achieve this goal are:

1. ***Reduce fishing effort on overfished stocks.*** This is the bottom line on what is necessary to correct overfishing. In most cases, it will require controls on catch and the amount of fishing.

2. ***Implement Magnuson Act 602 Guidelines for Prevention of Overfishing.*** These guidelines require Fishery Management Plans (FMPs) to include quantifiable definitions of overfishing, Stock Assessment and Fishery Evaluation (SAFE) reports to determine which fisheries are overfished, and rebuilding plans for depleted fishery resources.

3. ***Reduce bycatch of overfished stocks.*** In some cases, bycatch contributes to overfishing, and may jeopardize recovery of a depleted stock (e.g., Gulf of Mexico red snapper). In other cases, bycatch also results in wasteful discarding of potential yield. If bycatch is a problem, fishing technologies and/or practices may need to be modified.

Planned actions by NMFS to accomplish these objectives include:

- Conduct a national evaluation to determine which resources are overfished, including non-FMP (Fishery Management Plan) fisheries. At present, decisions not to develop an FMP are potential gaps that permit overfishing without scrutiny. Atlantic halibut is an example of a depleted fishery resource that has not been considered by an FMP.

- Work with Regional Fishery Management Councils and interstate Marine Fisheries Commissions to implement effective Fishery Management Plans,, and with the Coast Guard and states to ensure compliance.

- Determine the short-term loss of benefits that will accompany rebuilding of overfished stocks, and identify options to minimize adverse effects. Some short-term loss is inevitable if overfishing is to be corrected; for example, reducing allowable catches will make some fishing operations unprofitable. Thus, losses must be anticipated, and options for mitigating them considered, if management is to withstand pressure from potentially affected segments of the fishing industry.

- Determine the magnitude of bycatch of overfished stocks, and options to reduce it. Options to reduce bycatch may require the design of new types of fishing gear that are more selective for the targeted species. This approach is known as "conservation engineering." In other cases, bycatch can be reduced by controlling fishing practices (e.g., how, when, and where fishing takes place).

GOAL 2. MAINTAIN CURRENTLY PRODUCTIVE FISHERIES.

It is better to prevent overfishing than to suffer the losses necessary to reverse it. The Nation still has many productive fisheries, including Alaska pol-

lock, Mid-Atlantic surf clams, Gulf of Mexico butterfish, Pacific salmon and most Pacific coast rockfish.

There are several reasons why productive fisheries become overfished and unproductive. It is often economically advantageous for individual fishermen to favor short-term benefits over conservation. This situation is reinforced by the open access nature of most fisheries. As more vessels enter a fishery, their owners try to offset declining profits by catching more fish than the resource can sustain, unless the fishermen are restrained by management. Management is complicated by the uncertainty resulting from natural variability in LMRs and the scientific complexity of assessing them. In the face of uncertainty and pressure from the fishing industry, fishery managers have often tended to base their decisions on an optimistic view of the condition of fishery resources. These "risk-prone" decisions eventually result in overfishing.

Other reasons why productive fisheries may become unproductive include implementing fishery management regulations which are by their very nature difficult to enforce (this may reflect yet another type of risk-prone decision), inadequate enforcement of even well designed fishery management regulations, habitat degradation, and natural fluctuations in the environment.

Therefore, the second National Marine Fisheries Service goal is: **Maintain currently productive fisheries.**

Objectives to achieve this goal are:

1. *Reduce the risk of overfishing.* This will require a scientifically based limit on fishing pressure. Because fishery management is uncertain, there is virtually always a risk of overfishing. This risk can be reduced by giving the benefit of the doubt to conservation, (i.e., "risk-averse" decisions), instead of erring toward overfishing.

2. *Reduce uncertainty in stock assessments.* By achieving this objective, the loss of short-term benefits that results from risk-averse decisions can be reduced.

3. *Improve compliance with fisheries management regulations.* Compliance can be improved by making regulations more enforceable, increasing enforcement capability, increasing penalties, and gaining industry support for regulations.

4. *Advocate conversion from open access to fisheries to controlled access.* "Property rights" systems of fisheries management, such as individual transferable quotas (ITQs), are a form of access control. Theoretically, access control is not required to prevent overfishing, but it helps prevent the "race for the fish" that makes fisheries economically inefficient. In addition, experience indicates that the economic inefficiency which results from open access fisheries reinforce pressure to overfish.

5. *Correct ineffective elements of the management processes.* It is critical to learn from past mistakes, which might have resulted from inadequate scientific information, from flaws in institutional structures for making conservation and allocation decisions, or from lack of compliance.

Planned actions by NMFS to accomplish these objectives include:

- Critically evaluate Fishery Management Plans to determine if they are working, and if not, why.

- Improve communication between scientists and fishery managers.

- Obtain authority to charge user fees for access to fisheries. If access to fisheries is controlled or property rights are assigned, managers should consider how benefits will be distributed. There are few other industries that have free access to the Nation's natural resources.

- Improve knowledge of stock structure and migrations. One uncertainty in fisheries management is in the determination of which fish belong to the stock that is being managed. This problem is particularly important for species that migrate across international boundaries, such as Atlantic swordfish, several species off New England and Atlantic Canada, Bering Sea "Donut Hole" pollock, Pacific halibut, and king mackerel in the Gulf of Mexico.

- Increase the precision and accuracy of resource surveys. Resource surveys are a critical element of stock assessments. They can be made more precise by increasing sampling, using more efficient designs, and improving sampling technology.

- Develop efficient regional fisheries data collection and data management programs, integrating state activities as appropriate. Fisheries data are another critical element of stock assessments and management decisions, and included are commercial and recreational fisheries statistics, at-sea fishery observer data, and socioeconomic information. In general, more and better fisheries data are needed. Comprehensive collection and data base management programs are needed for stock assessments and management, including data collected by states, instead of piecemeal efforts that may result from individual FMPs. The degree to which enforcement and stock assessment data can be collected simultaneously must be evaluated.

- Conduct biological and ecological research on LMRs that integrates appropriate state research activities, for example, growth and mortality rates, reproductive rates, and habitat requirements. Much is known about these parameters for exploited species, but they are still a source of uncertainty in stock assessments and fishery management.

- Employ state-of-the-art technology and stock assessment methods to improve accuracy and precision of scientific information. For example, hydroacoustics may be used to improve the precision of resource surveys, and molecular biology may be used to define stocks.

- Assess the degree of compliance with fisheries management regulations, evaluate the factors that have contributed to non-compliance, and correct problems.

National Oceanic and Atmospheric Administration

1995 - 2005 STRATEGIC PLAN

July 15, 1993

NOAA

1995 - 2005 Strategic Plan

July 1993

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stability of some regions depend on sustainable use of fishery resources. For many developing countries, sustainable use requires technical assistance from the U.S.

1.4 WHAT ARE THE PROGRAM ELEMENTS?

Fulfilling the NOAA vision of greatly increasing the Nation's wealth by rebuilding U.S. fisheries requires new approaches to fisheries management, as described in the 1991 National Marine Fisheries Service's Strategic Plan for the Conservation and Wise Use of America's Living Marine Resources. The Strategic Plan calls for a commitment to making risk-averse decisions in the face of uncertainty, reducing uncertainty in management decisions, controlling access to fishery resources, developing more selective fishing practices to reduce waste. It also seeks to reduce impediments to aquaculture, improve international relationships, and ensure safe seafood.

In order to fulfill the plan and restore fisheries productivity and to ensure the economic health of the fishing industry, NOAA proposes seven strategic actions:

- assess the status of fishery resources,
- advance fishery predictions,
- manage for economic growth and a healthy fishing industry,
- ensure adequate compliance,
- reduce bycatch,
- accelerate growth of U.S. aquaculture, and
- promote global stewardship by fulfilling UNCED commitments

1.5 WHAT ARE THE EXPECTED BENEFITS FOR THE NATION?

This plan is structured on a fishery-by-fishery basis to achieve the full potential benefits from U.S. fishery resources. Summed over all fisheries, the potential increase in net revenues is estimated as $2.9 billion per year. The annual impact on the national economy (direct, indirect and induced) associated with rebuilding fisheries is about $25 billion, including an $8 billion impact on the Gross Domestic Product (GDP), and about 300,000 jobs. This will lead to increased tax revenues of about $1 billion from the harvesting sector alone as it becomes profitable; much more if the flow of fisheries profits to other investments is included. In addition, aquaculture and stock enhancement have the potential to produce billions of dollars of economic growth and hundreds of thousands of new jobs. Also, aquaculture production can stabilize the availability of fish to seafood processors as producers market their fish at times of natural shortages, when prices are high. This works to flatten out price changes, stabilize employment and reduce the welfare costs of providing unemployment benefits. Additional benefits include:

- A healthy fishing industry
- Less loss of life and property during commercial fishing by eliminating the dangerous and wasteful "race for the fish."

OUR LIVING OCEANS

REPORT ON THE STATUS OF U.S. LIVING MARINE RESOURCES, 1993

December 1993
NOAA Tech. Memo. NMFS-F/SPO-15

U.S. DEPARTMENT OF COMMERCE

Ronald H. Brown
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NATIONAL MARINE FISHERIES SERVICE

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Many of the issues and problems described in this national overview and in more detail in the individual fishery units to follow, have existed for many years in U.S. and indeed world fisheries. The many case studies in fisheries management both inside and outside the United States and the large body of scientific information now available, which makes a document such as "Our Living Oceans" possible, is pointing the way to solutions to many of our fishery management problems. The NOAA Strategic Plan (1993) has as goals, with respect to marine resources, to build sustainable fisheries for the long-term benefit of the Nation, recover protected species, and promote healthy ecosystems. The strategic plan advocates conversion of fisheries management from open access to controlled access (recognizing that it is the prerogative of the relevant Council to decide when such measures need be instituted); rapid expansion of scientific information; and risk-averse decisions on management actions. These three general strategies relate to each of the issues discussed above. Controlling fisheries access addresses the problems of management controls, overcapitalization, allocation, and jurisdiction. An increase in scientific information addresses the approximately 30% of stock groups whose status is unknown, and provides a stronger basis for the development of future management controls and recovery plans for protected species. In addition, improved scientific information will be essential for ensuring ecosystem health and addressing habitat concerns. Risk-adverse decision-making is a key element in the development of any improved management system. This means that managers should err on the side of caution with respect to long-term resource health when making decisions. Making decisions based on short-term goals often places long-term health at risk. The NOAA Strategic Plan and the NMFS are tasked with managing living marine resources for the sustained benefit of the Nation. We are moving in the right direction and there is great promise for increased benefits for the domestic fishing industry, recreational anglers, the general public, and future generations.