STRATEGIC PLAN

OF THE

NATIONAL MARINE FISHERIES SERVICE

GOALS AND OBJECTIVES

June 10, 1991


NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

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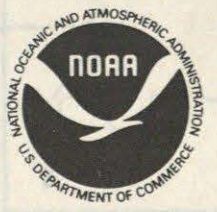
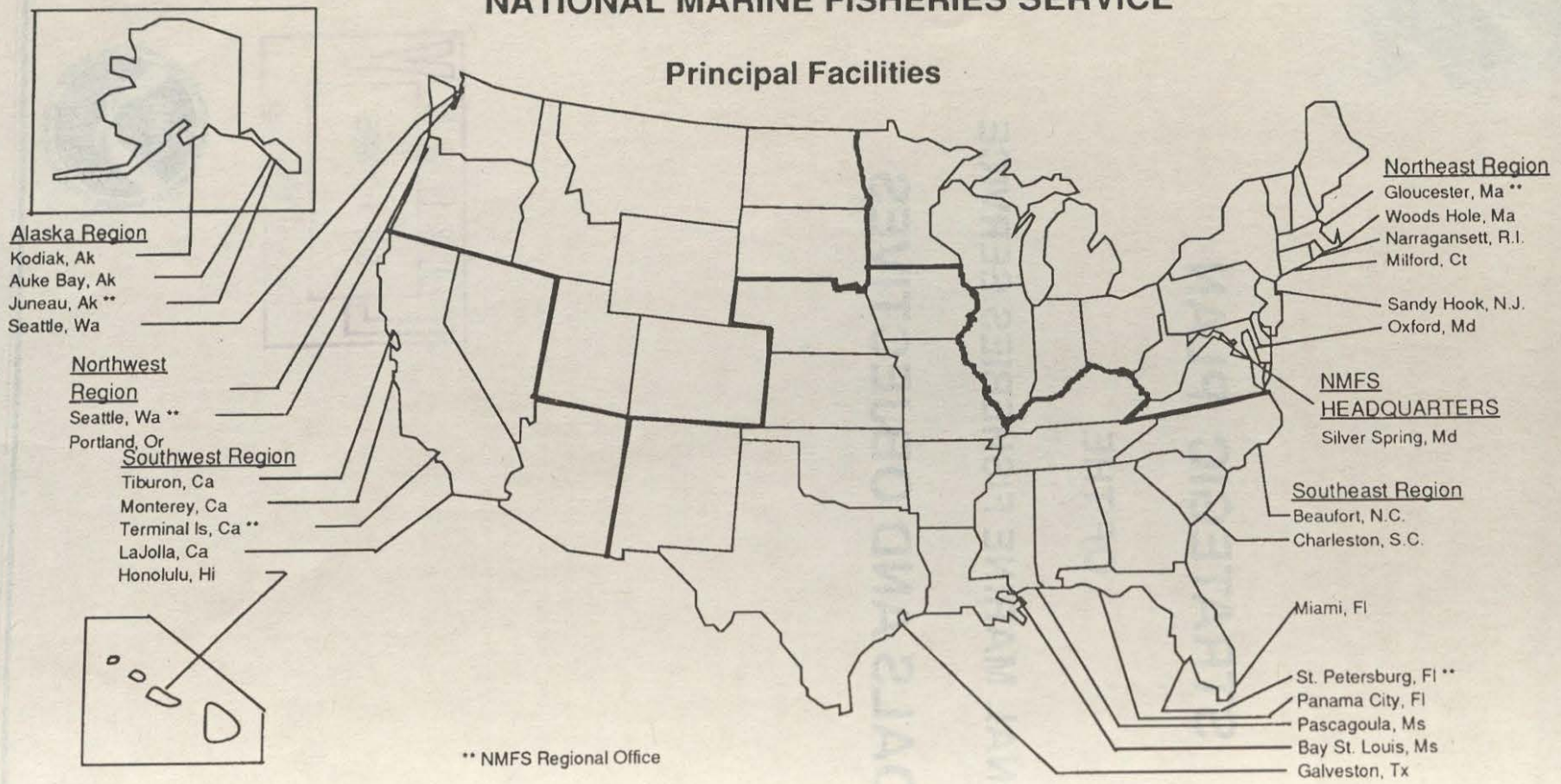


NATIONAL MARINE FISHERIES SERVICE

Principal Facilities



** NMFS Regional Office

PREFACE

This Strategic Plan was prepared under my direction. The Plan indicates principles that will guide the National Marine Fisheries Service (NMFS), and the program emphasis that is necessary for NMFS to fulfill its mission and support the NOAA Strategic Plan. Goals and objectives will be accomplished through implementation plans prepared by each Regional Office (RO), Regional Science Center (SC), and by Headquarters (HQ).

In addition to these multiyear documents, short-term management of NMFS will be through an Agency Annual Operating Plan (AOP), which interfaces with the NOAA AOP, and RO, SC and HQ current year operating plans. Performance will be evaluated through personnel performance plans, monthly operating reports and program reviews.

William W. Fox, Jr. Ph.D.
Assistant Administrator for Fisheries
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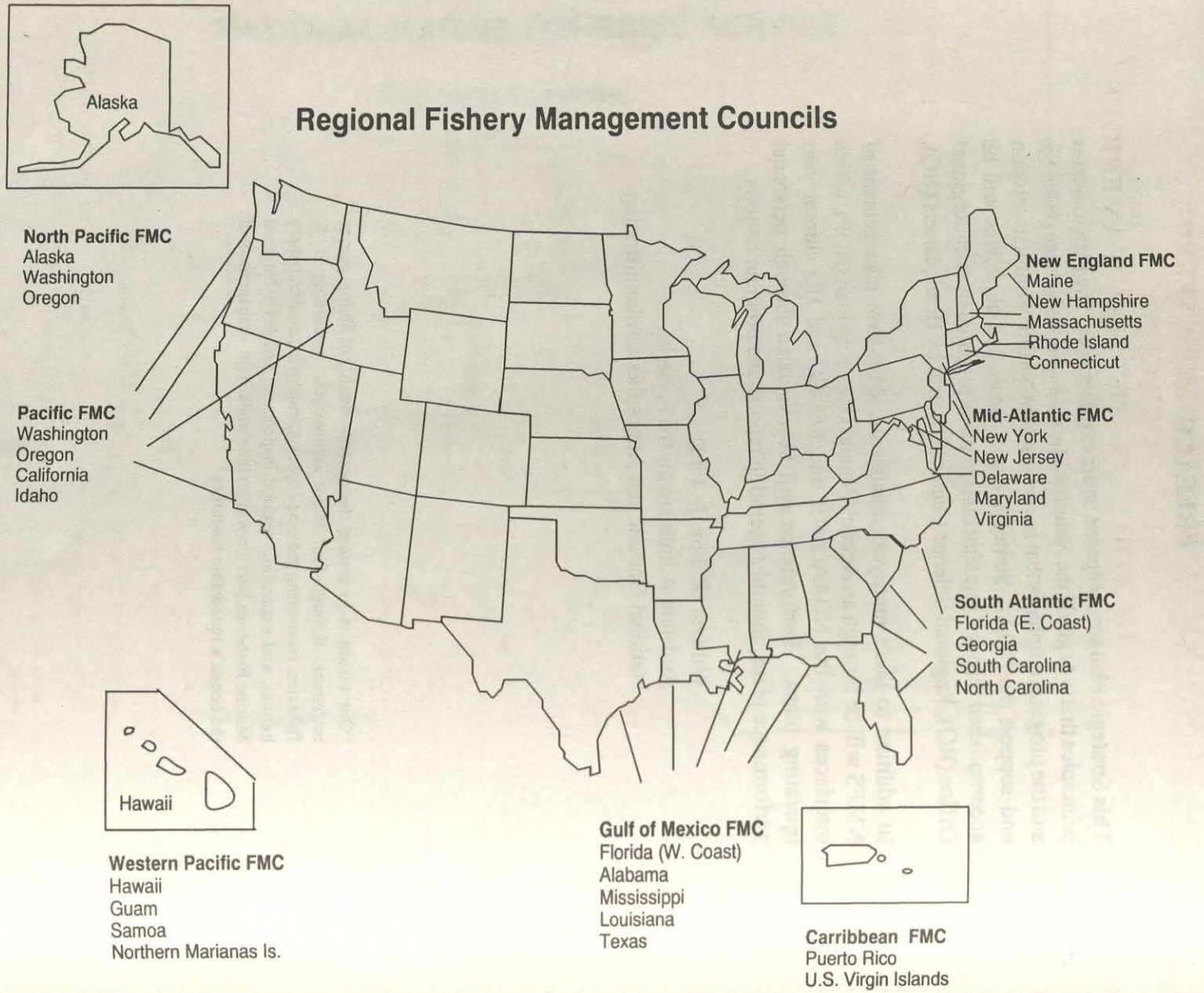
"Our vision is to restore the ocean's wealth of living marine resources, through four major approaches: rebuilding U. S. fisheries, recovering protected species, improving coastal fishery habitat, and expanding seafood inspection. NOAA's National Marine Fisheries Service will set the standard for management of the ocean's renewable resources."


Regional Fishery Management Councils
Alaska
North Pacific FMC
Alaska
Washington
Oregon
Pacific FMC
Washington
Oregon
California
Idaho
New England FMC
Maine
New Hampshire
Massachusetts
Rhode Island
Connecticut
Mid-Atlantic FMC
New York
New Jersey
Delaware
Maryland
Virginia
South Atlantic FMC
Florida (E. Coast)
Georgia
South Carolina
North Carolina
Hawaii
Western Pacific FMC
Hawaii
Guam
Samoa
Northern Marianas Is.
Gulf of Mexico FMC
Florida (W. Coast)
Alabama
Mississippi
Louisiana
Texas
Carribbean FMC
Puerto Rico
U.S. Virgin Islands

NATIONAL MARINE FISHERIES SERVICE STRATEGIC PLAN FOR THE CONSERVATION AND WISE USE OF AMERICA'S LIVING MARINE RESOURCES: Goals and Objectives

The mission of the National Marine Fisheries Service (NMFS) is stewardship of the Nation's Living Marine Resources. Through conservation and wise use, these resources and their habitat can be managed to benefit the Nation without jeopardizing options for the future.

The need has never been more urgent for NMFS to fulfill its mission. There are mounting problems that threaten U.S. fisheries, and living marine resources (LMRs) and the habitat upon which they depend. Since 1977, when the U.S. extended its jurisdiction seaward to 200 miles, domestic fisheries have expanded to almost entirely displace once-dominant foreign fleets. But the replacement of foreign fleets has not eliminated overfishing. Continued expansion of domestic fishing capacity not only adds to the stress on LMRs, it also undermines the economic well being of some fisheries. One manifestation of the expansion of fishing capacity and overfishing is conflicts between user groups, which ultimately must be addressed through difficult allocation decisions. Options for allocation are often limited by the non-selective nature of many types of fishing gear. In addition, the U.S. is now fishing more species than ever before, and scientific information on many of these species is lacking.

The relationship between fisheries and marine mammals and endangered species is also problematic. As populations of some marine mammals and endangered species recover, they are more frequently taken incidentally in fishing operations. It is also possible that fisheries contribute to the failure to recover of some other marine mammal and endangered species. In some cases, efforts to protect marine mammals and endangered species may require valuable fisheries to be terminated.

There are other serious threats, as well. Habitat degradation continues to threaten some LMRs. And growing concerns for the health risk from seafood threaten the industry.

The NMFS Strategic Plan establishes eight goals:

1. **Rebuild overfished marine fisheries.**
2. **Maintain currently productive fisheries.**
3. **Advance fishery forecasts and ecosystem models.**
4. **Integrate conservation of protected species and fisheries management.**
5. **Improve seafood safety.**
6. **Protect living marine resource habitat.**
7. **Improve the effectiveness of international fisheries relationships.**
8. **Reduce impediments to U.S. aquaculture.**

The NMFS Strategic Plan to address these urgent and critical problems reflects a fundamental departure from past approaches. In particular, in the face of uncertainty, NMFS will reduce the risk to LMRs by making decisions that err toward conservation, not overfishing; NMFS will reduce uncertainty by greatly expanding the scientific information upon which decisions are based; and it will advocate management practices that enhance the economic well being of fisheries.

BACKGROUND

The National Oceanic and Atmospheric Administration (NOAA) is America's "Earth System Agency". NOAA's fundamental mission is to observe, describe and predict the natural variability of the global earth system--the ocean, the atmosphere, and features of the solid earth and near-space environment--and to identify any changes in the earth system caused by human activity. Living marine resources (LMRs) are part of the earth system and the NOAA Strategic Plan assigns responsibility for research on LMRs and their conservation to the National Marine Fisheries Service.

The National Marine Fisheries Service carries out its charge under many laws and mandates from Congress. Most of its responsibilities emanate from six statutes: the Magnuson Fishery Conservation and Management Act of 1976, which regulates fisheries within the U.S. Exclusive Economic Zone (EEZ); the Endangered Species Act, which protects species determined to be threatened or endangered; the Marine Mammal Protection Act, which regulates taking or importing marine mammals; the Lacey Act, which prohibits fishery transactions that violate state, Federal, American Indian or foreign laws; the Fish and Wildlife Coordination Act, which authorizes NMFS to collect fisheries data and to advise other government agencies on environmental decisions which affect LMRs; and the Agricultural Marketing Act, which authorizes a voluntary seafood inspection program. There are more than 100 other statutes and international conventions and treaties that authorize NMFS' mission.

The National Marine Fisheries Service administers its research and management responsibilities through its headquarters in Silver Spring, Maryland, and five Regions: Northeast, Southeast, Southwest, Northwest, and Alaska. Resource management is directed from each Regional Office, under the Regional Director; research to support management and other NMFS objectives is performed by each NMFS regional Science and Research Center, under the direction of its Science Director. NMFS is made up of about 1800 career staff with diverse professional, educational, ethnic and racial backgrounds.

The National Marine Fisheries Service also works closely with other NOAA line offices, especially in emerging NOAA-wide research efforts, such as the Coastal Ocean, Climate and Global Change, and Environmental Data Management Programs , as well as the Marine Resources and Ocean Sciences 2000 Program. Moreover, NMFS enforcement officers serve NOAA in other capacities, such as protection of NOAA marine sanctuaries.

Eight Regional Fishery Management Councils (FMCs) are partners with NMFS in the management of the Nation's fisheries. These bodies are made up of representatives of state governments, commercial and recreational fisheries, environmental and consumer groups and other interests. They prepare Fishery Management Plans (FMPs) defining how fisheries should be regulated in view of biological, social and economic factors, for consideration by the Secretary of Commerce. The FMPs contain objectives for each fishery and appropriate management measures. NMFS ensures that these Plans comply with legal and policy requirements, and, with the cooperation of the

Coast Guard and state governments, implements the Plans.

The National Marine Fisheries Service has also entered into agreements and relationships with numerous state, interstate, Federal, and international organizations to fulfill its legal mandates. For example, it has agreements and relationships with interstate Marine Fisheries Commissions for management of interjurisdictional fisheries, the U.S. Fish and Wildlife Service to protect endangered and threatened sea turtles, most coastal states for enforcement under provisions of the Lacey Act, the Army Corps of Engineers under provisions of the Fish and Wildlife Coordination Act, the Departments of Defense and Agriculture for voluntary seafood inspection, the U.S.-Canada Pacific Salmon Commission for conservation of Pacific salmon, and the International Whaling Commission for conservation of whales.

A valuable role in advising NMFS of fishery needs and issues is performed by the Marine Fisheries Advisory Committee (MAFAC). The Committee represents all sectors of the fishing industry and fishery management agencies, as well as conservation groups and academia.

WISE USE OPTIONS FOR LIVING MARINE RESOURCES

Options for "wise use" include: sustainable recreational, commercial, and subsistence fishing; aquaculture; passive viewing; and preservation to protect intangible values and genetic and species diversity of ecosystems. These activities should be carried out in a manner that maximizes benefits to the Nation. Wise use also implies that fishery products should be wholesome, and in particular, they should be safe to eat.

The fisheries of the United states are a vast resource that provides the Nation food, income, employment and recreation. The U.S. has more than 90 thousand miles of shoreline and a 2-million-square-mile Exclusive Economic Zone (EEZ), the largest of any nation.

The following facts illustrate the current importance [1] of U.S. marine fisheries:

- In 1989, the U.S. commercial catch was 10.7 billion pounds, worth more than $3.6 billion to fishermen. The total contribution (in value added) of commercial fisheries to the U.S. Gross National Product was $17.2 billion.
- In 1989, the most recent year for which statistics are available, the U.S. fishery yield ranked sixth in volume among fishing nations of the world.
- An estimated 274,000 men and women engage in commercial fishing full time.
- 92,900 commercial fishing craft were used in 1988.
- 17 million Americans fished recreationally in 1989. They made 58 million fishing trips, caught 470 million pounds of fish, and spent $7.2 billion on fishing.
- U.S. seafood consumption in 1990 was 15.5 pounds per person, and $26.7 billion was spent on fishery products.
- In spite of the large U.S. catch, total imports of fishery products in 1989 reached a record $9.6 billion, exceeding exports by $4.9 billion.

[1] The values that follow are from *Fisheries Statistics of the U.S. 1989*. NMFS, NOAA. 111 pp; and *Fisheries Statistics of the U.S. 1990*. NMFS, NOAA. 110 pp.

The total value of U. S. aquaculture production of marine species in 1988 was $194 million, an increase of 28% over 1987. Although aquaculture is still a relatively small industry in the U.S., it is important for some species and in some regions. Also important are subsistence fisheries, which fulfill economic and cultural needs of some communities.

Living marine resources are also valuable for passive viewing. For example, whale watching and diving on coral reefs are valuable forms of recreation which contribute to the U.S. economy. The intangible value of some LMRs, such as marine mammals, also benefits the Nation.

Some species are so rare that their future existence is in jeopardy. These "endangered species" may not now be valuable for fishing or passive viewing, but may become so when more numerous. Nevertheless, they are valuable members of ecosystems since they maintain genetic and species diversity, and contribute to the ecosystems' overall well-being.

The potential contribution of U.S. LMRs in the future is even larger. Some fisheries could contribute more if overfished stocks were rebuilt. Fisheries for other species could be further developed. Improvements in competitiveness of U.S. products in global seafood markets and aquaculture could also enhance the contribution of U.S. fisheries. Passive viewing industries could expand, and endangered species might be restored.

CONSERVATION AND MANAGEMENT

Living marine resources can be harvested at a sustainable level, without jeopardizing wise use options, because they are renewable resources. The rate of renewal is known as their production rate, and depends on the stock size of LMRs. Conservation and fisheries management are concerned with the balance between fishing effort and the production rate of LMRs, and with achieving a desired level of stock size. Fishing effort determines the catch that will be taken from a particular stock size. The amount of fishing effort and the stock size are major determinants of the economic benefits of fishing.

While the theoretical basis of conservation and management is well developed, in practice, there are many complexities that need to be taken into account:

- Production is highly variable as a result of environmental fluctuations. This makes it difficult to predict future stock size, and to estimate the relationship between stock size and production.

- LMRs interact with each other through competition and predation. These interactions may involve fishery resource species, marine mammals, and endangered species. Although these interactions are known to occur, they are very difficult to account for in fisheries management decisions.

- Many methods of fishing are nonselective. This results in bycatch of some species, including marine mammals and endangered species, while fishing for other species. Bycatch results in at-sea discarding of a large portion of the catch in some fisheries.

- Production also depends on the quality and quantity of habitat, which are affected by a wide array of natural and human activities. About half of all Americans now live in coastal areas, and the number is growing [2]. So, too, is the potential impact on habitat.

[2] Cullihan, T.J., M.A. Warren, T.R. Goodspeed, D.G. Remer, C.M. Blackwell, and J.J. McDonough. 1990. Population Change OAD. OMA, NOS, NOAA. 41 pp.

- Many factors in addition to stock size determine the relationship between fishing effort and catch, such as the type of fishing gear, number of fishermen, and fishing practices. These factors also determine the cost of fishing.

- Traditionally, any American who wanted to fish could do so. This "open access" situation led to a "race for the fish", resulting in overcapitalization and wasted economic benefits.

- The benefits from recreational fishing and passive viewing also depend on the stock size of LMRs. If stocks are depleted by overfishing, natural fluctuations, or habitat degradation, benefits will be diminished, since fewer people will participate in these activities.

To cope with these complexities, wise use decisions for conservation and fisheries management depend on a comprehensive, scientifically sound research information base. In addition, the U.S. cannot make wise use decisions in isolation. Management of many LMRs must be international because the resources migrate between jurisdictions, and there are many global issues that need to be considered: climate change, which affects fishery habitats; global seafood markets, which influence the U.S. fishing industry and consumers; rapid expansion of foreign aquaculture, which competes with U.S. wild fisheries and aquaculture production; and other nations' fisheries research, which is at least as advanced as U.S. research.

GOALS AND OBJECTIVES

The National Marine Fisheries Service has eight goals and several objectives within each goal. These are not mutually exclusive; many objectives serve more than one goal. There are also embedded issues, which are not stated explicitly, but which are necessary to fulfill goals, and objectives. For example, NMFS must maintain and improve its human resources as a prerequisite for achieving any of its goals and objectives.

GOAL 1. REBUILD OVERFISHED MARINE FISHERIES.

Overfishing is a national problem, although it is most severe along the Atlantic Coast and in the Gulf of Mexico. Fisheries are overfished when fishing pressure exceeds a sustainable level and when abundance has been reduced so that production is much lower than the potential. A recent review by NMFS scientists indicates that at least 78 species are overfished. For example, New England groundfish, including haddock, cod, and flounders, have declined about 80 percent since the 1960s [3]. Other depleted resources are Atlantic swordfish, many southeastern U.S. snappers and groupers, and Pacific ocean perch.

Overfishing is not only a threat to the fishery resource, but it results in a large economic waste. The78 overfished species noted above account for about $1 billion, or 25% of revenue to fishermen, in 1989. But they could account for much more. For example, a recent study [4] concluded that revenue from New England groundfish alone could be increased by $350 million if depleted stocks were allowed to recover. It also concluded that 14,000 jobs were lost because of the depletion of New England groundfish.

Some of these depleted resources are also valuable for recreational fishing. Their depletion wastes potential economic benefits and reduces the quality of life for a significant number of Americans. For example, the opportunity to catch striped bass has been severely limited over the last decade.

[3] Anonymous. 1990. Status of the Fishery Resources Off The Northeastern U.S. for 1989. NOAA Tech. Memo. NMFS-F/NEC-72.

[4] Massachusetts Offshore Groundfish Task Force. 1990. New England Groundfish in crisis -- Again, State of Massachusetts Publication No. 16-551-42-200-1-91-Cr. 33pp.

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.

GOAL 3. ADVANCE FISHERY FORECASTS AND ECOSYSTEM MODELS.

Accurate and precise fishery forecasts and ecosystem models will allow resource management and business decisions to be more proactive and comprehensive, and enhance wise use. Decision-makers will be able to anticipate resource opportunities and problems (as they relate to environmental and habitat changes or fishing), and consider indirect effects of management on other components of the ecosystem.

One important use of better ecosystem models is determining to what degree depleted fisheries and protected species can be rebuilt (Goals 1 and 4). For example, if depleted species have been ecologically replaced, which may have happened on Georges Bank where dogfish and skate have offset the reduction in biomass of commercial groundfish, they may not rebuild even if fishing is stopped. Similarly, if habitat has been degraded, controlling fishing may not be enough to allow rebuilding.

The third National Marine Fisheries Service goal is, therefore: **Advance fishery forecasts and ecosystem models..**

Objectives to achieve this goal are:

1. *Describe functional relationships and processes that control fishery systems.* For example, how do the size of smolts and the migratory behavior of Pacific salmon interact with oceanic processes to control survival of the young fish, especially during periods of transition from natal streams to the ocean? Or, what effect does fishing forage species, such as coastal herrings in the Gulf of Mexico, have on valuable predator species, such as king and Spanish mackerel?

2. *Develop higher-order forecasting models for living marine resource populations, ecosystems, and fishery systems.* For example, NMFS research has shown that an "El Nino" affects many Pacific Coast resources, with most effects lasting only a year or so. A higher-order model would be one that could predict long-term effects of an El Nino on the ecosystem, with implications for the fisheries, should climate change affect the frequency of El Nino events.

3. *Maximize participation in NOAA-wide programs.* These programs are team efforts by all of NOAA's five line offices. They are the Climate and Global Change (CGC) Program, Coastal Ocean Program (COP), Environmental Data Management Program, and Marine Resources and Ocean Sciences 2000 Program. These programs are particularly relevant to NMFS' goal of advancing fishery forecasts and ecosystem models, and they are germane to several other goals as well.

Planned actions by NMFS to accomplish these objectives include:

- Conduct research on predator-prey interactions among LMRs. NMFS must develop models that appropriately quantify the relationship between predator-prey interactions and mortality and growth rates.

- Reduce uncertainty in fishery management associated with recruitment of young fish to the fishery. This uncertainty is two-fold: it relates to recruitment variability caused by environ-

mental factors, and to the difficulty in determining the relationship between stock size and average recruitment.

- Apply nontraditional scientific disciplines to fishery science. That is, encourage scientists, such as those in mathematics, statistics, physics, bioengineering, artificial intelligence, economics, and sociology, to apply their knowledge toward solving fishery problems.

- Evaluate the applicability of adaptive management to fisheries as a means to improve understanding of fishery systems.

- Encourage collection of long time-series of data, and subject data to state-of-the-art analysis.

- Co-chair the elements of NOAA's Coastal Ocean Program involving Coastal Fisheries Ecosystems; Toxics; and Estuarine Habitats.

- Lead the Ecosystem Dynamics Research project of the NOAA Climate and Global Change Program.

- Develop a program prospectus for modernizing NOAA marine programs.

- Form cooperative arrangements with universities and state agencies.

GOAL 4. INTEGRATE CONSERVATION OF PROTECTED SPECIES AND FISHERIES MANAGEMENT.

Living marine resources that are afforded protection under the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA) are known as "protected species". Fishery resources and protected species are interactive members of the same ecosystems. Protected species are sometimes taken in fishing operations, and some of these animals eat the same species that fishermen catch. NMFS has legislative mandates to conserve, manage, and protect both fishery resources and protected species. These responsibilities, and the activities that support them, must be integrated to be effective.

The National Marine Fisheries Service's fourth goal is, therefore: **Integrate conservation of protected species and fisheries agreement.**

Objectives to achieve this goal are:

1. ***Identify and resolve conflicts between MMPA, ESA and fisheries.*** For example, listing of some salmon populations under the ESA might, in the worst case, require closure of Pacific coast salmon fisheries, since listed populations are visually indistinguishable from unlisted stocks. It is also possible that continued growth of protected marine mammal populations may reduce fishery production, or that development of fisheries on forage species may jeopardize recovery of endangered marine mammal populations. Legislative action may be required to resolve conflicts.

2. ***Determine the status of protected species.*** In some cases, as with Hawaiian monk seals and humpback whales, status reviews are mandated under the ESA. This information is also needed to determine the significance of human activities, including fishery take.

3. ***Monitor marine mammal "take" by fisheries and assess its significance. Some bycatch of marine mammals in commercial fisheries is inevitable.*** The MMPA requires that NMFS monitor it and assess its significance.

4. ***Implement Endangered Species Recovery Plans. This is a requirement of the ESA for species listed as endangered.*** The objective will involve summarizing what is known about the species, what research is needed and what needs to be done to improve the chances of recovery. When species recover, they should be delisted.

5. ***Reduce fishery and passive viewing impacts on protected species.*** One option to reduce fishery impacts involves alternative gears or fishing practices. NMFS used this approach to decrease the dolphin take in the Eastern Tropical Pacific tuna purse seine fishery. Another example is the mandated use of Turtle Excluder Devices (TEDs) in the southeastern U.S. shrimp trawl fisheries. Other options may involve restrictions on fishing areas and seasons. Regulation of activities such as whale watching may also be necessary to reduce human impacts upon wild animal populations.

Planned actions by NMFS to accomplish these objectives include:

- Expand protected species population assessments. This will require more comprehensive surveys.

- Improve knowledge of population biology and ecology (e.g., growth, mortality and reproductive rates, and habitat requirements) of protected species. This information is needed to determine the significance of interactions with fisheries and as a basis for NMFS advice on habitat decisions (see Goal 6).

- Establish Endangered Species Recovery Teams.

- Conduct at-sea observer programs for fisheries that "take" protected species. Information from at-sea observers is necessary to determine how bycatch can be decreased, and to monitor incidental take levels. In some cases, near-real-time communications may be needed to support management decisions.

- Monitor strandings of protected species and conduct scientific studies on stranded animals to provide information on their population biology and species interactions (e.g., food preferences).

- Develop a scientific consensus on criteria to define "species", relative to ESA. With advances in technology, it is now possible to detect genetic differences between closely related animals, such as salmon from different

branches of the same stream. But should they be considered different species from the perspective of ESA?

GOAL 5. IMPROVE SEAFOOD SAFETY.

Most seafood is safe, wholesome, and of high quality. However, improper handling and contaminants can lessen quality and threaten human health. The perception of human health risks can cause significant economic loss, for example, as when the perceived contamination following an oil spill reduces consumer demand. Unsafe products may result from contamination by biotoxins, chemicals and bacteria in the environment, by poor handling onboard fishing vessels; during processing; shipping or retailing; or by restaurants and consumers.

Thus, the fifth goal of the National Marine Fisheries Service is: **Improve seafood safety**.

Objectives to achieve this goal are:

1. ***Implement a seafood inspection program, with emphasis on reducing health risks from microbial, biotoxin, and chemical sources, and on providing consumer information about quality.*** Both the public and the fishing industry want seafood inspection.

2. ***Evaluate options and establish mechanisms other than inspection to reduce human health risk.*** In some cases, inspection is not a viable option, for instance, with recreationally caught fish. Possible options include better consumer education, alternative processing methods or product forms, and restrictions on the time and place of harvest.

Planned actions by NMFS to accomplish these objectives include:

- Establish agreements with other Federal agencies and states to implement effective seafood inspection. Individual states and several Federal agencies have a role in seafood inspections. Their efforts must be integrated into a single plan to be effective, incorporating a recent agreement with the Food and Drug Administration to apply an inspection regime known as HACCP (Hazard Analysis Critical Control Point).

- Conduct risk assessments and calculate benefit-cost ratios to determine priorities for seafood inspection.

- Develop statistically rigorous designs for inspection programs that consider contaminant type and the risk to human health; species and tissue; location, season, and year; and scale of patchiness (for example, how variable is the level of contamination within a bushel of clams?). This information is required in order to design effective seafood inspection.

- Evaluate health risks that are not controlled by seafood inspection (e.g., recreationally caught fish).

- Educate the public about seafood safety, and what consumers can do to reduce the risk.

- Evaluate the legal authority to restrict fishing in order to protect human health. For example, NMFS has used the

Magnuson Act to close fisheries to protect human health, as with the New England surf clam resource contaminated by paralytic shellfish poisoning (PSP). Is additional authority for closures needed?

- Improve techniques to detect biotoxin, microbial, and chemical contaminants. Some methods are cumbersome, expensive or imprecise. Testing for PSP in clams, and ciguatera in reef fish, requires use of live animals, and is time-consuming and expensive. It should be possible to develop rapid, inexpensive "litmus paper"-like tests.

- Conduct research on the sources and distribution of contaminants, and their bioaccumulation. Information on the source of contaminants and their accumulation in animal tissues might lead to predicting when a health risk will occur.

GOAL 6. PROTECT LIVING MARINE RESOURCE HABITAT.

The long-term viability of LMRs depends on protection of their habitat. The Magnuson Act requires that habitat be considered in FMPs. The Marine Mammal Protection Act, the Endangered Species Act, and other legislation require the agency to represent the resources' interests in habitat decisions made by regulatory and development agencies, such as the Environmental Protection Agency and the Army Corps of Engineers. Superfund, and the Oil Pollution Act, require damage assessment and restoration of habitat. Finally, Presidential policy calls for "no net loss of wetlands".

The effects of habitat degradation are often insidious, and some losses are not well understood. However, some effects are apparent. For example, dams for hydroelectric power generation and water diversion for agriculture have eliminated valuable anadromous fish runs, and chemical contaminants in Boston Harbor and Puget Sound probably cause neoplasms in winter flounder and English sole, respectively.

Thus, the sixth NMFS goal is: **Protect living marine resource habitat.**

Objectives to achieve this goal are:

1. ***Use authority of the Fish and Wildlife Coordination Act, Magnuson Act, Marine Mammal Protection Act, Endangered Species Act, Oil Pollution Act, Superfund, and other legislation to implement a cohesive strategy to protect and restore habitat of LMRs.*** There are many opportunities for NMFS to influence decisions that affect LMR habitat. NMFS needs a strategy to maximize the positive impact of its efforts.

2. ***Quantify the effects of habitat modifications and contaminants on populations of living marine resources.*** Scientific information of this nature will make NMFS' advice more effective and improve the ability to successfully manage LMRs.

3. ***Determine if artificial or restored habitat fulfills essential habitat needs of LMRs. Artificial habitats, such as reefs, or habitat restoration may be used to mitigate development.***

4. ***Restore depleted stocks that have been adversely impacted by habitat modifications.*** For example, several popula-

tions of salmon have been depleted due to loss of spawning habitat. These stocks may be restored by encouraging habitat restoration or supplementing production by aquaculture (Goal 8).

Planned actions by NMFS to accomplish these objectives include:

- Review, revise and implement arrangements (e.g., MOUs) with regulatory and development agencies, and states, to increase the effectiveness of NMFS' advice on habitat decisions. If necessary, amendments to legislation governing habitat decisions should be proposed.

- Fully implement habitat conservation provisions of the Magnuson Act in order to elevate the stature of NMFS' habitat advice. Since approval of FMPs is ultimately the responsibility of the Secretary of Commerce, information about the relationship between LMRs and their habitat, and advice expressed in FMPs on habitat issues, must be given serious consideration by regulatory and development agencies.

- Prepare scientific syntheses of information on important habitat issues.

- Expand research on the biological effects of habitat modification and contaminants. This research should emphasize effects on growth, maturation, reproduction, survival and other factors that control populations of LMRs. Population models should be extended to include these biological consequences in addition to the effects of fishing.

- Conduct research to determine the critical habitat requirements that limit population size of LMRs. For example, research has shown that most Atlantic right whales (there are only a few hundred) migrate through a channel between Cape Cod and Georges Bank on the way to their summer feeding ground. As a result, NMFS has advised the U.S. Department of Interior (DOI) that this area is essential habitat, and DOI has decided not to allow oil and gas exploration in the area.

- Take advantage of opportunities to conduct research cooperatively with regulatory and development agencies when the research supports LMR habitat protection. For example, there are opportunities to cooperate with the Army Corps of Engineers to evaluate artificial reefs and restored habitat.

- Develop implementation plans to apply Oil Pollution Act and Superfund settlements to habitat restoration.

GOAL 7. IMPROVE THE EFFECTIVENESS OF INTERNATIONAL FISHERIES RELATIONSHIPS.

Conservation, fishery research, and seafood trade require effective international relationships. The fishery management and protected species jurisdiction of the U.S. is not wide enough to unilaterally conserve all living marine resources important to the Nation. Many LMRs, such as swordfish, pollock, salmon, haddock, tuna, sea turtles and marine mammals are trans-jurisdictional. In addition, there are important scientific advances that occur outside the U.S., yet the results may be applied to solve America's fishery problems. Events in global seafood markets also affect the competitiveness and economic health of the U.S. fishing industry, and benefit the Nation.

Thus, the seventh NMFS goal is: **Improve the effectiveness of international fisheries relationships.**

Objectives to achieve this goal are:

1. *Use international agreements to conserve LMRs and their habitat*. Agreements are needed with Pacific Rim nations for Pacific albacore, with Canada for Georges Bank fisheries, for controls on the pollock fishery in the Central Bering Seas and for marine debris cleanup and high-seas driftnet monitoring. Existing agreements need to be fully utilized.

2. *Establish and improve international agreements to promote scientific research and communication.* The international Council for Exploration of the Sea (ICES) is an example of a successful organization that has benefited the U.S. for many years. And MEXUS-Gulf and MEXUS-Pacifico are agreements that promote cooperative research between the U.S. and Mexico. Steps are being taken to establish the North Pacific Marine Science Organization (known as PICES), which would fulfill similar needs.

3. *Influence international trade negotiations to achieve a more competitive position for U.S. seafood products.*

Planned actions by NMFS to accomplish these objectives include:

- Monitor the effectiveness of international agreements.
- Develop mechanisms to coordinate Fishery Management Council FMPs with international management agreements.
- Examine the effectiveness of the agency's organization for handling international research, management and enforcement needs.
- Improve international systems to collect and/or obtain access to LMR data.
- Provide more scientific resources to support international agreements.
- Collect information which will facilitate U.S. competitiveness of fishery products in global markets.
- Work with others to implement scientific activities under PICES.

GOAL 8. REDUCE IMPEDIMENTS TO U.S. AQUACULTURE.

The importance of aquaculture, both in the U.S. and throughout the world, is widely recognized. The limits of wild stocks are being reached and estimates of future world fishery production for the year 2000 suggest that much will come from aquaculture. In many countries, aquaculture is progressing more rapidly than in the U.S. Imports of cultured products, such as salmon and shrimp, are competing successfully with U.S. wild production.

There is a significant potential to increase U.S. aquaculture production. However, in some cases American aquaculture has been impeded by concerns that it might adversely affect habitat quality and wild stocks. NMFS has scientific expertise that can help to reduce these and other impediments to U.S. aquaculture development, thus

improving opportunities for growth. Expansion of domestic aquaculture production has the potential to narrow the gap between the demand for seafood products and the production of wild stocks. Aquaculture techniques are an option to aid rebuilding of some depleted stocks, as in the case of Columbia River salmon.

Therefore, the eighth goal of NMFS is to **reduce impediments to U.S. aquaculture.**

Objectives to achieve this goal are:

1. ***Determine the impacts of aquaculture on habitat and wild populations, and how to reduce adverse effects.*** For example, if accumulation of uneaten food and other debris under culturing pens degrades the natural habitat, these effects may be reduced by placing pens in well-mixed water bodies.

2. ***Develop means to permit cultured products in the marketplace without jeopardizing conservation of wild stocks.*** For example, most states prohibit the sale of striped bass from wild stocks. NMFS has developed a method to distinguish cultured striped bass from wild stocks, thus removing an impediment to culture of this species.

3. ***Determine the potential for aquaculture to enhance recovery of protected species and depleted fisheries.*** NMFS is already attempting to enhance the stock of Kemp's ridley sea turtles in a program known as "Headstart", but its effectiveness is not yet known.

4. ***Re-evaluate NMFS' role in U.S. aquaculture.*** It may be beneficial to expand it in the future.

Planned actions by NMFS to accomplish these objectives include:

- Conduct research and provide information on the effects of aquaculture on habitat, and encourage environmentally safe alternatives.

- Evaluate the risks to wild stocks and their habitats from the introduction of cultured species.

- Develop the capability to distinguish cultured stocks from wild populations.

- Develop techniques to use aquaculture to enhance recovery of protected or depleted LMRs.

- Develop effective coordination with the Department of Agriculture, and other Federal and state agencies involved in marine aquaculture.

IMPLEMENTATION

Effective management of NMFS is a prerequisite for implementation of this strategic plan. The agency will need to exercise strong leadership within NOAA and the Federal government, with Regional Fishery Management Councils, and in the development of national policy relevant to fisheries. Its communications must be clear internally, and with NOAA, other government agencies, Congress, the fishing industry and the public. It must accurately, and in a timely manner, account for the use of its fiscal and human resources.

NMFS need to pay particular attention to maintaining and improving its human resources. The agency's most important products are credible scientific information and sound conservation decisions. These products are dependent on the people that make up NMFS. In spite of budget constraints, NMFS must invest in staff training and development. It must routinely infuse itself with new ideas by hiring recent university graduates and professionals who have gained experience outside of the Agency. New mechanisms need to be develop to allow greater opportunity for the best ideas of the staff to influence NMFS' future direction. NMFS must also develop cooperative programs with academic institutions, and encourage creative collaboration. Training, hiring and cooperative program activities must stress Equal Employment Opportunities and Affirmative Action, since the proportion of white males entering the workforce over the next decade is expected to decrease significantly.[5] Thus, NMFS will develop a plan to improve human resources.

NMFS will evaluate options for reprogramming resources to achieve high-priority goals and objectives. But the Strategic Plan cannot be fulfilled without additional resources, including personnel, operating budgets and days at sea to conduct research. In 1976, the Department of Commerce adopted the "Plan for the Nation's Fisheries"[6], which envisioned a two-thirds increase in budget (in deflated dollars) by 1985. In fact, however, the NMFS budget has been stagnant (in deflated dollars) since 1976, while responsibilities and the need for conservation have grown. Many of the urgent problems that threaten U.S. fisheries, and living marine resources and their habitat, would have been prevented, had the 1976 plan been fulfilled. The U.S. cannot afford to neglect its valuable LMRs in the future.

Several specific steps will be taken to implement the Strategic Plan. These include:

- Develop Regional and Headquarters five-year implementation plans that indicate how the Strategic Plan will be fulfilled, recognizing that a transition period may be required.

- Develop Regional and Headquarters Current Year Operating Plans that relate milestones, events and activities to Strategic Plan Goals and Objectives, and develop a system to monitor performance.

- Develop budget initiatives and participate in NOAA-wide programs, to provide the additional resources that are needed to fulfill the Strategic Plan.

- Conduct scientific and management reviews to evaluate how well NMFS is accomplishing its Goals and Objectives. The timetable for review will be established in the Regional and Headquarters Office plans.

- Recognize that strategic planning is a continuous process, and make the development of new strategies in response to progress, changes, and emerging issues, a systematic activity.

[5] Johnston, W.B. and A.E. Parker. 1987. Workforce 2000. Hudson Institute, Inc., 95 pp.

[6] U.S. Department of Commerce. 1976. A Marine Fisheries Program for the Nation. U.S. Printing Office. Washington, D.C. Stock Number 003-020-00123.