

VISION 2020:

The Future of U.S. Marine Fisheries



TABLE OF CONTENTS

Executive Summary.....	3
Trends and their Impact on Marine Fisheries.....	3
General Recommendations.....	7
Demand and Quality.....	10
Commercial Fishing.....	12
Recreational Fishing.....	18
Aquaculture.....	20
Management Tools for the Future.....	23
Bibliography.....	30

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Executive Summary

This draft document was prepared in response to a request from the Assistant Administrator of NOAA National Marine Fisheries Service (NOAA Fisheries) to the Marine Fisheries Advisory Committee (MAFAC) (Appendix 1 Description of MAFAC). The request was “to create, in clear, simple, non-jargon language, a stakeholders’ consensus on the desired future state of domestic and international fisheries.” To meet this request, MAFAC members have prepared a draft document containing trends, their potential impact on marine fisheries and recommendations for NOAA Fisheries. This report contains the views of individuals with a wide range of expertise, including but not limited to, commercial and recreational fishing, aquaculture, seafood processing, seafood marketing and sales, coastal communities, and environmental advocacy. We have included recommendations, which are the outgrowth of the sections in this report regarding a vision of the future of our Nation’s marine fisheries.

TRENDS and their Impact on Marine Fisheries

The dynamics of marine, fisheries utilization and management have been documented in a number of international and domestic scientific reports. While marine fisheries harvest has peaked, the demand for fish and shellfish continues to grow world wide due to population growth and the desire to consume more seafood in the diet. Today, fish and shellfish on average provide 25% of protein consumption in developing countries and 18% in developed countries. Consumption is increasing in the U.S. on a per capita consumption basis as well. Consumption is expected to increase as the health benefits of a diet rich in seafood protein continues to be recognized. As a result increases in per capita consumption are expected to continue based in part on consumer confidence that seafood safety programs are in place.

A panel at the annual meeting of the American Association for the Advancement of Science (AAAS) confirmed that continuing rising global demand for safe seafood has exceeded wild capture fisheries' ability to provide the fish meals demanded by consumers. Domestic consumption will continue to exceed domestic supply. Barring a significant expansion of domestic aquaculture to meet increasing demand, the nation's seafood trade deficit will continue to increase.

Wild commercial fish stocks in the United States are improving (in this year's SOS report, more stocks were experiencing overfishing). NOAA Fisheries Service statistics reveal that more than 80 percent of our nation's fish stocks attained sustainable levels. However, both the domestic and foreign commercial harvesting sector, in the United States and elsewhere, is still plagued with overcapacity issues. In 2006, the U.S. fishing capacity of the existing fleet exceeded the target catch levels of many stocks of fish. Overcapacity has created a race for fish which has contributed to lower economic returns. This has impacted the economic and social livelihoods of many coastal communities dependent on marine fisheries. As harvesting costs continue to rise from inflation necessary management measures could result in additional costs that may further impact our coastal communities. The Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (MSRA) in 2006 provides Councils with new management tools to meet fishery conservation goals of the Nation inclusive of overcapacity reductions. In addition, provisions mandating catch limits and catch accountability should improve fish stocks and enhance fishing opportunities. Aggressive fishery management will continue to play an important role in fisheries beyond 2020.

Ecosystem-based management is necessary to improve and augment the single species stock management. The relationship between stock status and the health of surrounding habitats, and among various interdependent species in the same system, are increasingly identified as a limiting factor in the systems ability to sustain levels of production. For ecosystem-based management to succeed, a significant expansion in the type and quantity of data collected must occur. Furthermore, timely accessibility to these new and different kinds of high quality data is critical to success. Science and management will need to

focus on providing the data necessary for ecosystem-based management and determining more comprehensively the status of the stocks. Ecosystem research and analyses will use the new data to create analytical models and assessments of the factors that influence ecosystem status, and predict environmental and social impacts of various management approaches. Using these tools, techniques, and ecosystem indicators, NOAA Fisheries and state and regional management partners can simultaneously consider multiple objectives, identify risks, factor in uncertainty, and integrate and accurately forecast the cumulative environmental impact.

The marine recreational fishery sector continues to grow as our population grows, lives longer and has more leisure time. In 2006, marine and freshwater fishing combined was the most popular outdoor activity in the U.S. This increase in recreational anglers will create allocation disputes between commercial fishers and recreational anglers and among sport fishermen. By 2020 continued growth in recreational angling will require that recreation anglers will need to focus more on the fishing experience and less on the number of fish landed. As the number of recreational fishermen continues to increase, increased and improved efforts will be necessary to monitor and assess the fishing activity of recreational anglers. Development of a national registry to collect data required by management was directed by the MSRA. Technological innovations will continue to assist the survival of fish in catch and release fisheries.

Even with the most effective management measures and rebuilt domestic stocks, the demand for marine fishery resources will continue to grow at a pace that far exceeds the wild harvest supply. Globally, the contribution of aquaculture to supplies of fish, crustaceans, mollusks and other aquatic resources continues to grow, increasing from 3.9 percent of total production by weight in 1970 to 27.1 percent in 2000 and 43 percent in 2004. Aquaculture continues to expand more rapidly than all other food-producing sectors. Worldwide, the sector has grown at an average rate of 8.8 percent per year since 1970, compared with only 1.2 percent for capture fisheries and 2.8 percent for terrestrial farmed meat production systems over the same period. Production from aquaculture has greatly outpaced population growth, with per capita supply from aquaculture increasing

from 0.7 kg in 1970 to 7.1 kg in 2004, representing an average annual growth rate of 7.1 percent. The development of a significant domestic, environmentally sound aquaculture industry is essential. Such an industry can supply an increasing share of fish and shellfish to meet increasing demand, assist in fishery stock recovery via enhancement, and decrease the seafood trade deficit which in 2005 surpassed eight billion dollars.

According to the UN Food and Agriculture Organization, global aquaculture production will need to nearly double by the year 2030 to maintain current per capita consumption due to population growth. To assure that the United States has this kind of aquaculture industry by 2020, a National Offshore Aquaculture Act must be implemented with financial and technical support provided to the domestic aquaculture industries similar to the support received by the agriculture industries.

In the future, international fisheries management issues will take on greater importance. The U.S. government and the U.S. fishing industry are actively involved in the operation of most of the international Regional Fishery Management Organizations (RFMOs). Many of the highly migratory species (HMS) caught by U.S. fishermen in the U.S. EEZ are also harvested in significant amounts by foreign fleets on the high seas. It is important for the U.S. government to exert every influence possible aimed at maintaining healthy highly migratory species stocks. “The U.S. shall cooperate directly or through appropriate international organizations with those nations involved in fisheries for highly migratory species with a view to ensuring conservation and shall promote the optimum yield of such species throughout their range, both within and beyond the EEZ.” (MSRA-Section 102. HMS)

Looking at overall current trends the following conclusions are realized:

1. Even if overfishing is eliminated, current environmental trends that undermine stock health and productivity, and the status of all our domestic stocks is optimal, demand will continue to exceed supply in both commercial and recreational sectors.
2. The commercial and recreational fishing sectors will continue to play an important role in the United States coastal economy and quality of life.

3. With sustainable, productive fish stocks and rationalized fisheries, allocation disputes will decrease.
4. Domestic fisheries alone are not meeting and cannot meet America's demands for seafood.
5. A robust domestic aquaculture industry must be part of the future of U.S. fisheries.
6. Finally, steps must be taken to integrate understanding of environmental trends into fishery management decisions.

GENERAL RECOMMENDATIONS

In response to trends and envisioning a future with healthy, sustainable fish populations, a robust fishing industry which includes an offshore aquaculture industry, ample recreational fishing opportunities, and numerous, vibrant coastal fishing communities, the following recommendations are proposed:

Seafood Quality

- I. Consumers domestically and world wide are informed about the wide array of health benefits from aquatic foods and empowered to tailor their consumption decisions to individual health needs, accurately informed conservation concerns and economic status.
- II. Both industry and government worldwide strengthen food safety programs, including cooperative efforts through CODEX.
- III. Continue free trade policies and pursue elimination of non-tariff trade barriers through WTO, bilateral and multilateral agreements.

Commercial Fisheries

- I. Achieve and maintain sustainable levels of stocks.
- II. Match fleet capacity with available, sustainable harvest.

- III. Limited access privilege programs should have tripled by 2020. Assignable fishing rights or limited access programs should be thoroughly analyzed for applicability in all fishery management plans for participants in the commercial and recreational sectors.
- IV. Commercial fishers, processing businesses, and trade associations working with NOAA Fisheries should seek ways to integrate wild stock production with aquaculture productions to maximize the value of domestic seafood production and related industries, including, but not limited to efforts to develop “niche” markets for value added products and wild products.
- V. Work with states and coastal communities to ensure continued infrastructure necessary to support viable seafood industry along our coasts.

Recreational Fisheries

- I. The value of recreational fishing as an economic engine for coastal communities should be recognized and exploited to a greater degree.
- II. A recreational registry must be implemented and used.
- III. Fishery management plans should include analyses of quota transfer between recreational and commercial sectors and should incorporate market mechanisms where appropriate.
- IV. Efforts should be directed to enhance a conservation ethic and pride of a national resource amongst all fishery user groups.
- V. The recreational fishing experience could rival or exceed recreational fishing catch, as a prime motivator for recreational fishing.

Management

- I. Coastal and ocean habitat protection must be a primary concern of fishery managers as a basic platform for robust and sustainable fish stocks.
- II. Ecosystem-based management, including assessments that integrate both habitat protection and multi-species interactions, should be the norm and not the exception for U.S. fisheries management.

- III. Cooperative management efforts among states, regional management authorities and federal managers should be maintained and enhanced as a basis for sound domestic fisheries management.
- IV. Stock status and catch data must be available to provide the information needed to make informed management decisions.
- V. Stock status and catch data must be accessible to all stakeholders.
- VI. Seafood safety and associated human health should be enhanced through enforcement, research, outreach and education.
- VII. Public health benefits of seafood should continue to be researched, understood and communicated.
- VIII. Subsistence fishing is recognized as an important source of protein for rural and native communities. However it needs to be accounted for as part of total catch with an efficient, comprehensive, and uniform method of data collection implemented to monitor catch.
- IX. The U.S. should exert strong leadership in the international forums that manage fish stocks beyond countries' Exclusive Economic Zones.

Aquaculture

- I. Growth of an environmentally sound domestic aquaculture industry should be supported and facilitated by providing a coordinated and efficient regulatory process and additional government investments and funding. The National Offshore Aquaculture Bill should be passed by Congress and implemented immediately.
- II. The domestic aquaculture industry should receive similar financial and technical support to that available to the American agricultural industry.
- III. Efficient regulatory practices and comprehensive monitoring are needed to safeguard wild stocks and limit environmental impacts of facilities.

The remainder of this draft document contains the individual papers prepared by MAFAC members. The papers have been categorized under the following headers: Commercial Fishing, Recreation Fishing, Management, and Aquaculture. The papers provide more

details in support of the conclusions and recommendations noted above. Each paper was prepared using a specific outline and reviewed by both the MAFAC Vision 2020 work group and the Committee as a whole.

Demand and Quality

The first two papers prepared by MAFAC provide further information reinforcing the demand for more seafood and discuss the importance of a safe product.

I Issue Statement 1: Demand for fish and seafood continues to increase both domestically and worldwide due to population growth and growing recognition of the health benefits of seafood consumption.

II Background of Issue

Given the projected population growth worldwide over the next two decades, it is estimated that at least an additional 40 million tons of aquatic food will be required by 2030 to maintain the current per capita consumption (FAO Fisheries Technical Paper 500, 2006). Ongoing research is expanding our understanding of the positive cardiovascular and other health benefits of seafood. If this research continues in the same direction it will likely raise per capita consumption around the world and resulting demand.

III Current Situation

Americans consumed a record 16.6 pounds of seafood per capita in 2005 and health professionals are encouraging a doubling of this amount to two 6 oz. seafood meals per week. Globally, consumer demand for fish and shellfish continues to climb, especially in affluent, developed countries which in 2004 imported 33 million tons of aquatic food worth over \$61 billion.

IV Preferred State of Issue in 2020

Consumers worldwide have achieved optimum levels of aquatic seafood consumption which balance health and nutritional benefits, economic affordability and personal preferences.

V Proposed Actions to Accomplish Preferred State

(a) Educate consumers domestically and worldwide on the health and nutritional benefits of seafood; (b) Continue free trade policies and pursue elimination of non-tariff trade barriers through World Trade Organization, bilateral and multilateral agreements.

VI Proposed Entity(s) to Promote Action

(a) Department of Commerce's NOAA Fisheries Service and Foreign Commercial Service; (b) U.S. Department of Agriculture's Foreign Agriculture Service; (c) Department of Health and Human Services, National Institutes of Health (NIH) and the Food and Drug Administration; (d) the private sector; and (e) consumers.

I Issue Statement 2: The public is concerned regarding the safety of aquatic foods due to chemical and biological hazards and there is a lack of public understanding of the relative risks versus health benefits of seafood consumption.

II Background of Issue

Seafood causes food borne illness worldwide due to both naturally occurring and handling/processing induced pathogens, toxins and chemical contamination. Seafood safety programs (both public and private) can be inadequate in many countries; yet the U.S. imports over 70% of the fish and shellfish it consumes. Research over the past 25 years has identified major health benefits of seafood consumption causing health officials to encourage greater consumption (e.g. Americans should double their current seafood consumption levels). However, such increased demand in the U.S. and worldwide will put added stress on seafood safety programs.

III Current Situation

Seafood safety remains of paramount importance to consumers and public health officials. A strong seafood safety regime, in which the consumer has confidence, is essential. At the same time, the results of research by NIH and other public health professionals worldwide is identifying a broad array of health benefits from consumption of fish and shellfish and the public is beginning to learn about and understand this new scientific information. An effective seafood safety program,

coupled with great consumer knowledge and understanding of seafood's health benefits, would be a public health and economic benefit to the U.S.

IV Preferred State of Issue in 2020

Consumers are confident in the safety of both domestic and imported fish and seafood products due to improvements in public and private standards and infrastructure worldwide. Furthermore, consumers are taking advantage of the health benefits of seafood through increased consumption.

V Proposed Actions to Accomplish Preferred State

Both industry and governments worldwide strengthen food safety programs, including cooperative efforts through CODEX. Consumers are informed about the wide array of health benefits from aquatic foods and empowered to tailor their consumption decisions to individual health needs and economic status.

VI Proposed Entity(s) to Promote Actions

(a) NOAA Fisheries; (b) HHS's FDA, NIH and CDC; (c) U.S.DA's Food and Nutrition Service; and (d) the private sector.

Commercial Fishing

The U.S. commercial fishing industry depends upon the long-term sustainability of fishery resources and their marine ecosystems. Contributing over 60 billion dollars to the gross national product, the fishing industry provides an important food source for the nation, creates 65,336 jobs (Fisheries of the U.S. 2004), and affords a traditional way of life for many coastal communities. The U.S. is the largest consumer of seafood in the world and the fifth largest fishing nation. The U.S. fishing fleet totals approximately 23,000 vessels making it one of the largest fishing fleets in the world. Commercial fishermen nationwide have seen profound changes over time in stock abundance, markets, the stakeholder process, and allocation and management of the resource.

MAFAC members identified the following three issues to be considered by the commercial fishing community.

I Issue Statement I: Our Nation's fisheries are managed to meet sustainable fishery goals, but even if fully achieved they are unable to meet domestic demands for many fish products.

II Background of Issue

Some marine species are under stress from overexploitation, habitat degradation, or both. Various factors, both natural and human-related, affect the status of fish stocks and their environment.

The long term potential yield of the fisheries within the U. S. EEZ is estimated to be 8.1 million tons per year round weight (What percentage used for industrial?). However, to reach and harvest sustainably at this level, current efforts to rebuild stocks must be extended to all overfished stocks and rebuilding completed. Efforts to reduce bycatch must be increased. Catching accounting needs to be improved so that all mortality is accounted for. Finally, fisheries must be rationalized to assure that the cycle of racing for fish does not accelerate with improved stock levels. The status of underutilized stocks must be accompanied with allowable harvest levels that remain sustainable. All these activities will be required in order to approach maximum sustainable harvest levels by 2020. To help meet demand, by-catch and unaccounted mortality will need to be continually reduced to help meet conservation goals.

III Current Situation of Issue

Three principal tactics are available to fishery managers to manage fishery yields: regulating fishing effort, restoring degraded habitats, and increasing recruitment. The first two methods are the basis for the current approach to managing our fisheries. Recent average commercial and recreational yield of all U. S. fisheries resources is still only slightly more than 60 percent of the best estimate of the long term potential yield. Current management practices are designed to rebuild stocks in order to meet the potential long term yield estimates and consumer demand for fish products.

IV Preferred state of the Issue in 2020

Our Nation's fisheries are meeting sustainable conservation goals. Technological advancements and market demands have resulted in increased use of underutilized species. Our U.S. fisheries are close to achieving long term potential yield.

V Proposed Actions

Provide incentives for increased retention and use of underutilized species with accompanying research and management to ensure sustainable stocks.

I Issue Statement 2: Some international Regional Fisheries Management Organizations (RFMOs) fail to implement necessary conservation measures to ensure maintenance of healthy stocks, thus reducing the total amount of seafood available to the nation's population.

II Background of Issue

Many commercial stocks, such as tuna, are highly migratory with preferred habitat existing outside countries' Exclusive Economic Zone (EEZ), sometimes called the high seas. These stocks are managed cooperatively by RFMOs.

III Current Situation of Issue

The performance of RFMOs is uneven, with regard to effective management of the stocks for which they are responsible. This unevenness impacts the U.S. in several ways. First, because the U.S. imports a significant amount of seafood, any mismanagement of stocks on the high seas will ultimately reduce the amount of seafood available for American consumers. Second, because consumers often do not distinguish between poorly managed fisheries overseas and well managed fisheries in the U.S., domestic fishing companies and fishers can be unfairly accused of inadequate commitment to sustainability. Finally, U.S. Fishermen frequently are required to significantly reduce harvests without other comparable efforts occurring by other nations necessary to effectively improve the health of these stocks.

The United Nations and the RFMOs themselves are considering means to make the international management of fish stocks more effective.

IV Preferred State of the Issue in 2020

Our globe's fisheries are effectively managed to meet present and future demands.

V Proposed Actions

The U.S. government should lead international efforts to ensure sustainable stocks managed by RFMOs, using available political, economic and other strategic tools to force other countries to follow the recommendations of RFMO scientific staff.

I Issue Statement 3: Overcapitalization has been a serious concern in a number of U.S. fisheries. Too many fishermen racing for too few fish has resulted in more restrictive and often highly complex management regimes. The race for fish, coupled with other factors has increased operating costs. The result has been lower net economic returns in a number of commercial fisheries.

II Background of issue

U.S. commercial landings were relatively stable at about 2 million tons per year from 1935 to 1977 (? Please check), when the U.S. extended its jurisdiction to 200 miles. At that time, U.S. policy encouraged expansion of domestic fishing fleets in an effort towards full domestic utilization. Since 1977, landings have more than doubled. However, for many fisheries fishing effort grew more rapidly than the information on which to base sustainable harvest levels, resulting in overcapacity and in some cases overfishing.

III Current Situation of Issue

Today, fisheries managers utilize a number of “command and control” management measures to control fishing effort such as limits on fishing days, gear restrictions and trip limits. In addition, most fisheries have some form of limited access. Increasingly managers and fishermen alike are looking at other ways to more effectively reduce and manage fishing capacity including buyback programs, permit stacking programs and limited access privilege programs with assignable fishing privileges.

IV Preferred state of issue

By 2020 we will have reached the goal of rebuilding sustainable fish populations while maintaining productivity and diversity. This will result in increased biomass, providing greater harvesting and processing opportunities for domestic commercial fisheries and increased supply to consumers. Fishing capacity will be at a level to both efficiently and sustainably harvest domestic fisheries and provide greater economic returns to participants and fishery-dependent communities. Limited access privilege programs will be in place in most U.S. fisheries; providing market mechanisms to match capacity with available harvest levels.

V Proposed Actions

Commercial fishing interests and other stakeholders should work with regional fishery management councils and NOAA Fisheries to develop regionally-appropriate plans to (1) reduce overcapitalization and (2) match fishing capacity to sustainable harvest levels through the use of LAPPs, industry buyback programs and other appropriate mechanisms. NOAA should play a leadership role in at least tripling the number of fisheries under LAPP management by 2020.

I Issue Statement 4: Technology offers a myriad of benefits to fishermen, some of which have significant environmental benefits. In many cases, technology can complement and enhance federal conservation and management goals and objectives. The commercial fishing industry and NOAA Fisheries should continue cooperative activities to promote responsible technology innovation.

II Background of issue

Overview of the Role of Technology in Promoting Conservation and Maximizing Efficiency in Commercial Fishing Operations.

Many commercial fishermen utilize increasingly sophisticated technology during fishing operations. Electronic equipment common in the wheelhouse today includes state of the art sonar equipment to locate target species, computer logbooks and electronic net sensors. Enhanced sonar capability promotes selective fishing and increases operational efficiencies, including fuel efficiency. Onboard computer logbooks are an important reference tool providing historical catch information and can allow for real-time reporting. Electronic net sensors deployed with the gear can provide important data on proximity to the ocean floor, net profile and the filling rate of fish in the cod end. Each of these technological applications can enhance operational efficiencies and conservation objectives through cleaner fishing and minimizing fishing gear impacts on the environment.

In addition, in recent years many fishery management plans have mandated the use of vessel monitoring systems (VMS) as a management tool. VMS, or onboard satellite tracking systems, provides managers increased flexibility in developing management measures that can be adequately monitored and enforced.

III Current Situation of Issue

In recent years, cooperative research involving NOAA Fisheries, the fishing industry, universities and the private sector has produced fishing gear innovations to increase retention of target species, minimize bycatch of non-target species and reduce impact of fishing gear on ocean habitat. While projects are numerous and ongoing, of note are: turtle excluder devices (TEDs) in shrimp trawls, chain modifications to reduce flatfish bycatch in the scallop fishery, modified footropes to reduce bottom contact, and technologies to deter seabirds from taking baited fish hooks.

Technological innovation is critical in enabling U.S. fishermen to increase efficiently while enhancing selective fishing practices that minimize ocean habitat impacts.

IV Preferred state of Issue in 2020

By 2020 advances in technology will not only result in more sophisticated products, but the application of the technology can be used for scientific purposes as well as commercial purposes. Advances in gear and monitoring technologies can help attain information to help improve management, reduce bycatch and minimize habitat impacts caused by fishing. NOAA Fisheries is able to increase its efforts to assist in projects that outfit fishing vessels with acoustic equipment that enhances, stock assessment capabilities. Also, programs that equip fishing vessels with ocean monitoring equipment are greatly expanded. NOAA's overall science program will be significantly enhanced by utilizing alternative industry research platforms. NOAA Fisheries should continue to place a high priority on expanding its cooperative research program.

V Proposed Actions

Actions Necessary to Achieve the Goal of Employing State-of-the-Art Technology in Commercial Fishing Operations to Enhance Efficiency and Promote Conservation of Living Marine Resources:

- Too often, technology is employed now to help harvest fish faster, rather than placing the emphasis on developing more environmentally friendly fishing practices. Commercial fishing interests should give greater consideration to the development of Limited Access Privilege Programs (LAPPs), which can end the often wasteful "race for fish."
- NOAA Fisheries and the commercial fishing industry should continue to develop

cooperative research programs, including conservation engineering programs designed to improve the performance of fishing gear to help reduce bycatch and minimize habitat impacts, and data collection programs that enhance management, stock assessments and ocean monitoring.

Recreational Fishing

I Issue Statement 1: Growth in coastal populations and coastal tourism are resulting in increasing numbers of recreational fishermen. Therefore, the impact these fishermen are having on fish stocks is increasing. As this demand for fish continues to increase, recreational fishermen will continue to request an increase in the number of fish allocated to the recreational fishing sector.

II Background of Issue

A 2005 NOAA-NOS report titled, Population Trends Along The Coastal United States: 1980-2008, states that an estimated 153 million people lived in coastal counties in 2003. This population represents an increase of 33 million people or 28 percent from 1980. In addition, a review of NOAA sponsored Marine Recreational Fisheries Statistical Survey data, (MRFSS), during the years 1981 to 2005 shows a near doubling nationally of marine recreational anglers from 6.9 million to 11.2 million or a growth rate of approximately 3% per year.

III Current Situation of Issue

If the rate of increase of recreational fishermen continues at the twenty-five year average of 3% per annum, by the year 2020 the number of recreational fishermen will increase by 7.3 million to a projected level of 18.5 million fishermen. This change will result in a significant increase of fishing effort and mortality.

IV Preferred State of Issue in 2020

While post release mortality in catch and release fisheries is usually low, often 2-5%; as fishing effort continues to increase, post release mortality will have an increasing effect on total mortality. It is conceivable that the cumulative total of post release mortality could increase to levels equal to the total allowable mortality for a fishery.

Many recreational species have limited population growth rates and are too valuable to be caught only once; and catch and release fishing must be emphasized and applied to those species. For others, minimum size limits and reduced daily bag limits may provide sufficient management constraints to maintain healthy standing stocks. The proper techniques for release should continue to be refined and developed to lower post release mortality. Additional seasonal closures should be considered to eliminate or redirect effort. In the future, angler satisfaction must be derived from the recreational fishing experience rather than the take or “kill” of current levels of harvest. To achieve optimum yield, adaptive management measures such as a temporary reallocation of quota should be available to managers. For example, if commercial quota is not harvested, management should be prepared to temporarily reassign the under harvested quota to provide additional recreational opportunity and vice versa.

V Proposed Actions to Accomplish Preferred State

(a) Continue to promote catch and release fisheries, (b) reduce daily bag limits and implement minimum or maximum size limits when necessary for those fish stocks where restoring to total catch and release is not necessary, (c) Promote research to accurately quantify and minimize post release mortality, (d) increase the length of seasonal closures when necessary and encourage the recreational community to maximize the profitability of open seasons, (e) amend fishery management plans to allow for timely conversion of unused commercial allocation to the recreational sector and vice versa.

VI Proposed Entity(s) to Promote Actions

(a) The leadership of the recreational fishing community should promote the total recreational fishing experience and de-emphasize landings, (b) Industry and NOAA Fisheries should continue to support research and technology designed to reduce post release mortality, (c) management should consider extending closed seasons to reduce mortality, (d) management, (councils, commissions, NOAA Fisheries), should amend fishery management plans to allow, when appropriate, the conversion of commercial quota onto recreational quota and vice versa.

Aquaculture in the United States

In 2004, the U.S. Commission on Ocean Policy expressed concern about America's seafood trade deficit and noted the increasing importance of aquaculture products in seafood trade. It noted also that new developments in technology made aquaculture possible in the open waters of much of the U.S. Exclusive Economic Zone (EEZ), where it might now be done on a large enough scale to make a meaningful impact on the trade deficit. Accordingly, it directed NOAA to develop a comprehensive, environmentally sound permitting and regulatory program for marine aquaculture in the EEZ, to which NOAA responded with a 10 year Marine Aquaculture Plan and a proposal for the National Offshore Aquaculture Act of 2007. MAFAC has reviewed and discussed this work as it has proceeded and finds as follows:

I Issue Statement 1: Growth of American marine and offshore aquaculture should be supported by government and facilitated by providing an efficient regulatory system and sufficient funds to achieve this goal.

II Background of Issue

Development of marine aquaculture in the U.S is hampered by confusing or overlapping laws, regulations and jurisdictions. Aquaculture operations in offshore waters lack a clear, timely and efficient regulatory regime, and questions about exclusive access have created an environment of uncertainty that is detrimental to investment in this industry. (U.S.COP-2004)

III Current Situation

The U.S. has not yet developed the necessary policies for locating, (siting), conducting, and monitoring offshore aquaculture operations. A new governance framework is necessary if offshore aquaculture is to succeed.(Cicin-Sain, B et. al. – 2005)

Aquaculture expansion is supported by the U.S. Government, but there is public concern about environmental impacts including possible pollution, escapes, competition with wild fish, disease transmission and food safety. This concern has been heightened

by misinformation about aquaculture in the news media. (FAO Fisheries Technical paper 500.)

Global supply of seafood from wild-caught stocks has plateaued, while demand continues to increase. Aquaculture now provides 43% of the world's seafood and more aquaculture is the only way in which seafood supplies can be increased further. Farm raised shrimp, salmon, tilapia, catfish and several shellfish species make up an ever increasing proportion of American's seafood diet, mostly imported from aquatic farms in other countries. While catfish farming in freshwater and shellfish farming in certain nearshore coastal waters are American aquaculture success stories, broader development of U.S. marine aquaculture lags other countries. This is mainly due to competition for space in sheltered near shore waters or, in the case of Alaska, a state ban on marine finfish farming.

Americans consumed 16.6 pounds (edible weight) of seafood per person in 2005, up from 16.3 pounds in 2004. Nutritionists encourage Americans to double their present consumption of seafood to benefit their health. Of the approximately 6.5 mmt/yr (live weight) of seafood eaten by Americans each year, 1.5 mmt/yr is provided by domestic commercial fisheries and 0.5 mmt/yr is provide by domestic aquaculture. To meet the additional demand, the U. S. imports almost 76 percent of its seafood, or 4.5 mmt/yr, about half of which is from aquaculture. The current U.S. seafood trade deficit is almost \$8 billion.

IV Preferred State of Issue in 2020

- ❖ A mature statutory framework will exist for the efficient development of aquaculture in the U.S. EEZ, which protects both the environment and private aquaculture property rights, and provides traceability in the market to protect against the substitution of illegally taken wild stocks.
- ❖ States will have developed comprehensive nearshore aquaculture plans with technical assistance from NOAA using funds provided by section 309 of the Coastal Zone Management Act. These state plans will protect existing nearshore aquaculture from adverse effects of coastal

development and will identify and preserve areas with good potential for future aquaculture development. They will also provide coordinated and efficient regulation.

- ❖ Aquaculture will be recognized an instrument of national food security policy and will be validated by appropriate incentives and a business climate that encourages good aquaculture practice.
- ❖ Consumers and the public will be accurately informed about aquaculture and will support sound public policy on its behalf.

V *Proposed Actions to Accomplish Preferred State*

a. STATUTORY ACTIONS:

- ❖ Develop and codify a statutory framework for marine aquaculture in the U.S. EEZ.
- ❖ Perfect, as needed, the statutory framework for marine and offshore aquaculture in domestic waters.
- ❖ Develop economic policies that encourage environmentally sound and prosperous aquaculture in the U.S.EEZ., for example by making the resources of the Fisheries Finance Program and the Capital Construction available to aquaculture businesses.

b. REGULATORY ACTIONS:

- ❖ Validate NOAA as the lead agency for all marine aquaculture.
- ❖ Encourage states to utilize CZMA section 309 funds to accomplish comprehensive planning for aquaculture development in state marine waters.
- ❖ Provide sufficient financial support for research and development on all aspects of marine aquaculture including evaluation of best management practices to minimize ecosystem impacts.
- ❖ Consider establishment of aquaculture zones within the EEZ that would reduce the burden on permit applicants to submit de *nov*o applications for every proposed project.

- ❖ Promote outreach and education efforts to enhance public understanding of marine aquaculture.

VI *Proposed Entity(s) to Promote Actions*

- ❖ Congress for statutory actions with input from the Executive Branch and the public (including industry interests).
- ❖ State authorities responsible for implementing the Coastal Zone Management Act for coordinating the development of comprehensive aquaculture plans with CZMA 309 funding.
- ❖ Executive Branch, primarily through the NOAA Aquaculture Program and the Joint Subcommittee on Aquaculture, for regulatory actions with input from the industry, the public, the regional fishery councils and fisheries commissions, and the coastal states.

Management Tools for the Future

Based on the current trend, ecosystem-based approaches to management will be the norm and not the exception by 2020. The ecosystem-based management approach is defined as management that is adaptive, geographically specified, takes account of ecosystem knowledge and uncertainties, considers multiple external influences, and strives to balance diverse societal objectives. An ecosystem-based approach to management is incremental and collaborative since the authorities for ecosystem management are distributed across many levels of government, and management requires participation of many different stakeholder groups in public and private sectors.

Ecosystem-based management approaches must be based on high quality, reliable scientific data. It is essential to initiate new data collection programs, particularly those utilizing advanced technology, and to expand and improve existing data collection programs.

MAFAC Members identified the following issues to be considered when discussing management tools for the future.

I Issue Statement 1:

Place based management approaches are gaining acceptance in dealing with a variety of ocean use issues, including protection of unique habitat, location of industrial and scientific research facilities, and conservation and management of living marine resources.

Various state and federal regulatory agencies and private sector interests will become more involved. Traditional fisheries management entities need to recognize the addition of these new and in some cases influential broad based stakeholders.

II Background of Issue

Marine Managed Areas (MMAs), an example of place-based marine resource management, have been proven an effective tool to supplement traditional management techniques. Examples include seasonal fisheries closures, Marine Protected Areas (MPA's), and No Transit Zones.

III Current Situation

In progress: Number of MPA's and results. Allocations and mitigations/ conflicts expected.

IV Preferred State of Issue in 2020

Unique habitats, essential fish or marine mammal critical habitat, and rarely occurring marine ecosystems are protected with MMA's developed with stakeholder advice and support.

V Proposed Actions to Accomplish Preferred State

Place based management involving living marine resources must remain under the jurisdiction NOAA Fisheries.

VI Proposed Entity(s) to Promote Actions

NOAA Fisheries should champion place-based management in partnership with NGOs, fishermen and other marine resource stakeholders.

I Issue Statement 2: Technology plays a vital role in ecosystem-based marine resource conservation and management and in the development of responsible aquaculture practices. Continued improvements in technology will further enhance sustainable marine resource management efforts. Both Congress and NOAA Fisheries

should place a priority on applying technological innovations to strengthen science and management programs within the agency.

II Background of Issue/Current Situation

Technology is integral to NOAA Fisheries' science program, and it plays a significant role in the agency's enforcement and monitoring efforts. Here are some examples of how technology is currently being utilized.

- Satellite imaging assists ocean observation and is an increasingly important tool for assessing fish and marine mammal stocks, identifying "bycatch hotspots," and mapping sensitive habitat.
- In the Alaska Region, scientists attach satellite transmitters to marine mammals to collect information on diving patterns. This data is then used to determine the animals' foraging and migratory characteristics, and it assists managers in developing conservation and management measures designed to minimize competition for prey between marine mammals and fishing activities.
- Vessel Monitoring Systems (VMS) employ electronic transmitters on fishing vessels. These transmitters relay information about a vessel's location via satellite. VMS is used not only to enforce management area closures, but is utilized on the west coast for depth-based management for commercial and recreational groundfish fishing.
- Satellite communications assist in fisheries monitoring and enforcement. Federal fishery observers communicate vessel catch data to a central data base on a daily or weekly basis, and this catch accounting is essential to ensure that total allowable catch (TAC) levels are adhered to. Also, video monitoring through mounted on-deck cameras is being considered as a less expensive option to placing observers onboard vessels.
- The agency continues to work on state-of-the-art acoustic technology to improve fishery survey work, which is a key component of stock assessment. In fact, NOAA has launched two new research vessels believed to be among the most technologically advanced research vessels in the world to replace the aging vessels in its fleet, and two more research vessels are under construction.

III Preferred State of Issue in 2020

NOAA is poised to utilize technology to increase dramatically our understanding of the ocean environment, protect and conserve marine resources and provide direct and measurable benefits for the fishing community. Here is a sample of technology-driven programs that are being developed and deployed by the agency.

- In conjunction with other federal agencies and non-federal partners, NOAA is planning and implementing an integrated ocean observing system (IOOS) through the placement of biophysical moorings that perform myriad tasks. IOOS systems provide continuous, real-time observations that, among other benefits, enhance weather prediction and increase understanding of climate change. This technology integration includes acoustic readings that help determine fish and marine mammal migrations and optical technologies that help monitor ecosystem health.
- Stock enhancement, using hatchery reared juveniles to supplement wild production is another management tool to be considered for rebuilding depleted marine stocks. Research in life history, stock structure, brood-stock considerations, spawning, rearing and release of juveniles and ecological concerns is on going. Stock Enhancement projects are already in place in the Atlantic, Gulf and Pacific regions as well as in the international arena. Depleted stocks of Pacific salmon have been successfully rebuilt using similar supplementation strategies. Research and development of stock enhancement should be expanded to be a viable tool by 2020 and the U.S. can take a role in developing international guidelines and standards. U.S. efforts should proceed on a regional basis with a focus on stocks that most greatly impact current and future fisheries management and harvest.
- NOAA is employing Geographic Information System (GIS) tools through a series of pilot projects intended to identify the basic science and management mapping needs for further improving ecosystem-based management. GIS software allows for visual representation of important ecosystem attributes in map form. Mapping has a number of effective applications for marine resource management, including identifying bycatch hotspots.

- Until recently, the process for learning more about seabed composition—a critical aspect of the marine habitat—required removal of core samples. NOAA scientists are now utilizing acoustic technology to characterize the seabed. This work is also useful to NOAA’s hydrographic survey mission. NOAA is working across scientific disciplines to use acoustic technology to perform both habitat research and navigational chart updates.
- NOAA Fisheries is using autonomous underwater vehicles (AUVs), or Seagliders, to enhance its science program. Seagliders are small, free-swimming vehicles that are extremely energy efficient and can be deployed for months at a time. Working jointly with university scientists, NOAA is employing Seagliders to record oceanographic measurements traditionally collected by research vessels. Seagliders, however, can be utilized at much less expense than survey research vessels.

IV Proposed Actions to Accomplish Preferred State

- Future administrations of NOAA should continue the emphasis placed by the current administration on intra-agency and inter-agency coordination of science and technology programs. NOAA’s future leadership should also continue to seek partnerships with universities as well as other entities engaged in marine research.
- Congress must adequately fund NOAA Fisheries’ science and technology programs, recognizing that ecosystem-based management objectives, including an enhanced understanding of the ocean environment, cannot be achieved without investments in technological innovations.

I Issue Statement 3: Allocation disputes currently confound the management of many fisheries. Councils often are faced with making difficult allocation decisions with little scientific information to guide these decisions. Councils should have the option to use assignable fishing rights to resolve allocation issues between commercial and recreational sectors, and within sectors.

II Background of Issue

Allocation of fisheries between and among sectors has historically been done through political forces exerted on management councils or Congress; this has often been a difficult and contentious process. Where assignable fishing rights have been created, market forces appear to have been effective in determining who the participants are. Some have advocated that some allocation issues, including those between commercial and recreational could be better resolved through market forces...and all councils should have such mechanisms available to them.

III Current State

IFQs and harvesting cooperatives have enabled industry to consolidate, and provided a mechanism to allocate fisheries to those placing the highest values on the fishery (willing to pay the most). To date these tools have only been deployed in commercial sectors. Acceptance of rights based approaches varies among regions, with strong positions held on both sides. New England for example has been instrumental in the past in obtaining a nationwide moratorium on new IFQ programs.

Although the NPFMC has successfully implemented rights based programs for its commercial fisheries, the first attempt to implement IFQs for the for-hire halibut sector failed after more than six years of work, due to resistance from the recreational community. Concerns include ability to outbid the commercial sector, ability to pay off their shares, and the potential for migration of recreational shares into the commercial sector. The lack of accurate catch histories complicates initial allocation. Given the proven political clout of the recreational sector, many see it easier and cheaper to compete for allocation through the political process of the councils and Congress, rather than gamble with market forces.

IV Preferred State of Issue in 2020

LAPPs are widely used in both commercial and recreational sectors in order to provide the right incentives, address overcapacity and address allocation issues within the sectors and across the sectors. Reliable catch reporting systems are in place to support stock assessments, fisheries management, and allocation decisions, regardless if done through assignable rights.

V Proposed Actions to Accomplish Preferred State

NMFS needs to work with councils to deploy the new assignable rights authority contained in the most recent MSA re-authorization. Proactive involvement by NMFS with councils during the development stage will help ensure adherence to required processes and standards, and result in approvable plans. Continue efforts to promote the value of assignable rights based approaches and publicize success stories in cooperation with the councils.

IV Proposed Entity(s) to Promote Actions

NMFS, councils, commercial and recreational organizations.

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