

# **Vision 2020: The Future of U.S. Marine Fisheries**

**Final Report  
of the  
Marine Fisheries Advisory Committee**



U.S. Department of Commerce  
National Oceanic and Atmospheric Administration  
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## **FOREWORD**

The Marine Fisheries Advisory Committee (MAFAC) advises the Secretary of Commerce on all living marine resource matters under the purview of the Department of Commerce. MAFAC members evaluate and assess national programs, recommend priorities, and provide their views on future directions. MAFAC members have a wide range of expertise, including but not limited to, commercial and recreational fishing, aquaculture, seafood processing, seafood marketing and sales, consumer interests, coastal communities, and environmental advocacy. MAFAC was established in 1970 to serve as a federal advisory body, complying fully with the Federal Advisory Committee Act.

## **Introduction**

In September 2006, the Assistant Administrator of NOAA's National Marine Fisheries Service (NMFS) asked the Marine Fisheries Advisory Committee (MAFAC) to prepare a report on the desired future state of U.S. Marine Fisheries. The specific request from the Assistant Administrator to MAFAC was "...to create, in clear, simple, non-jargon language, a stakeholders' consensus on the desired future state of domestic and international fisheries." This report is MAFAC's response. It is organized into three sections:

*Section 1: Trends and their Impact on Marine Fisheries* that provides context and reference points for comparison with the future;

*Section 2: MAFAC Findings* based on these trends; and

*Section 3: Summary Recommendations* regarding fulfillment of MAFAC's vision of the future of our Nation's marine fisheries.

Appendices detailing the rationale behind the recommendations complete the report.

## **Section 1: Trends and their Impact on Marine Fisheries**

Marine fisheries have been, are, and will continue to be important to our Nation for a multitude of reasons. Marine fisheries provide employment and recreational opportunities as well as a food source. The passage of the Fishery Conservation and Management Act (FCMA) of 1976, P.L. 94-265,<sup>1</sup> (renamed in 1980 for the late Senator Warren Magnuson and in 1996 to include Senator Ted Stevens) and the establishment in 1983 of the exclusive economic zone (EEZ) ushered in a new era of federal fishery management. The United States has the largest EEZ in the world, 3.4 million square nautical miles. In addition, the United States' EEZ has a tremendous variety of fish stocks (in excess of 905 stocks<sup>2</sup>) and other living marine resources.

The dynamics of marine fish populations are affected indirectly by climate change, habitat availability, and water quality. They are also affected directly by human factors such as fishing and environmental degradation. Human fishing practices are affected by the dynamics of the marine ecosystem and fluctuations in fish abundance. Thus, a complex relationship exists between fish and fishermen that must be maintained to foster the existence of both. At the intersection of these complex interactions are fisheries managers who require high-quality observations and well supported predictions about species status and abundance. Accurate and precise biological, economic and social science data is required for management decisions. Presently, concerns arise if the biological, physical, social and economic data are deemed insufficient for managing marine fisheries sustainably.<sup>3</sup> The goal of fisheries management is to assure sustainable

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<sup>1</sup> The FCMA also created the eight regional fishery management councils.

<sup>2</sup> "Toward Rebuilding America's Marine Fisheries, Annual Report to Congress on the Status of U.S. Marine Fisheries 2006": <http://www.nmfs.noaa.gov/sfa/statusoffisheries/SOSmain.htm>

<sup>3</sup> "An Ocean Blueprint for the 21st Century", U.S. Commission on Ocean Policy: [http://www.oceancommission.gov/documents/full\\_color\\_rpt/welcome.html](http://www.oceancommission.gov/documents/full_color_rpt/welcome.html)

marine fisheries. In the simplest sense, sustainable use of a resource means that the resource can be used indefinitely.

**TREND: BASED ON STATUS OF STOCKS ASSESSMENTS, GLOBAL FISHERIES PRODUCTION WILL MOST LIKELY GROW SLOWLY, IF AT ALL, TO 2020.**

Most assessments on the world-wide status of marine fisheries indicate that on a species by species level, most species considered have reached or are near maximum sustainable exploitation levels<sup>4</sup>. Thus, wild marine fisheries harvest which has peaked, at approximately 93 million tons per year on a worldwide basis<sup>5</sup>, should not be expected to grow significantly.

**TREND: THE CONSUMER DEMAND FOR FISH AND SHELLFISH CONTINUES TO GROW.**

At the same time that marine fisheries harvest has plateaued or peaked, global consumption of fish has doubled since 1973<sup>6</sup>. Countries with rapid population growth, rapid income growth and rapid urbanization tend to have the largest increase in consumption of animal products including fish. The developing world has seen such increases. Today, fish and shellfish on average provide 25 percent of protein consumption in developing countries and 13 percent in developed countries. China, where income growth and urbanization are major factors, dominates consumption of fish products.

**TREND: SEAFOOD CONSUMPTION IS INCREASING IN THE U.S. ON A PER CAPITA BASIS.**

In 2006, Americans consumed 16.5 pounds (edible weight) per person, up from 16.2 pounds per person in 2005 and 0.9 lb higher than the 10-year average. Records were set in 2006 for per capita consumption of fillets and steaks, and shrimp in all forms of preparation.<sup>7</sup>

**TREND: CONSUMPTION, DOMESTIC AND WORLDWIDE, IS EXPECTED TO INCREASE AS THE HEALTH BENEFITS OF A DIET RICH IN SEAFOOD PROTEIN BECOME INCREASINGLY RECOGNIZED.<sup>8</sup>**

This trend of a rising demand for seafood was recently confirmed by a panel at the annual meeting of the American Association for the Advancement of Science (AAAS). The panel further noted that demand will continue to exceed wild capture fisheries' ability to provide the fish meals demanded by consumers.

**TREND: ALTHOUGH DOMESTIC WILD-CATCH FISH STOCKS ARE IMPROVING, DOMESTIC DEMAND FOR SAFE<sup>9</sup> SEAFOOD WILL CONTINUE TO EXCEED DOMESTIC SUPPLY FROM WILD STOCKS.** In the United States, the domestic wild-catch of edible products is approximately 3.5 million

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<sup>4</sup> "Review of the state of world marine fishery resources", FAO report, 2005.

<http://ftp.fao.org/docrep/fao/007/y5852e/y5852e00.pdf>

<sup>5</sup> *Ibid.*

<sup>6</sup> "Fish to 2020: Supply and Demand in Changing Global Markets", International Food Policy Research Institute Report, 2003. <http://www.ifpri.org/pubs/books/fish2020/oc44front.pdf>

<sup>7</sup> "Fisheries of the U.S., 2006", NMFS Report, 2007. NMFS Current Fisheries Statistics No. 2006

<sup>8</sup> 2006 Seafood and Health Conference "Seafood is a low-fat source of high quality protein and the health benefits of eating seafood make it one best choices for growing children, active adults and the elderly."

<sup>9</sup> Seafood inspection and assurance of a safe product is becoming a more frequent domestic consumer concern. Congressional hearings and introduction of legislation reflect this growing interest.

mt<sup>10</sup>, while current U.S. supply of edible products including imports is more than 12.3 million mt. NOAA Fisheries Service statistics<sup>11</sup> reveal that more than 80 percent of our nation's fish stocks are already at sustainable levels (with some yearly variation). Even if all domestic fisheries were simultaneously managed to their long-term potential yield, total supply would be increased by only another 3.1 million mt.

**TREND: THE CONTINUATION OF POLICIES THAT DO NOT ADDRESS OVERCAPACITY WILL PLAGUE BOTH THE DOMESTIC AND FOREIGN COMMERCIAL HARVESTING SECTORS.** Excess fishing capacity (fishing capacity is the ability to catch fish or fishing power) and overcapitalization (capitalization, related to capacity, is the amount of capital invested in fishing vessels and gear) reduce the economic efficiency of fisheries and usually are precursors to overfishing. Overcapacity is difficult to manage indirectly, resulting in management regimes that encourage costly and unsafe race-to-fish competitions for limited fishery resources. In 2006, the U.S. fishing capacity of the existing fleet far exceeded the target catch level of many stocks of fish. This overcapacity has reduced economic efficiency and created a race for the fish. In addition, it has negatively impacted the economic livelihoods of many coastal communities dependent on marine fisheries. As harvesting costs continue to rise due to inflation and increasing energy and other business expenses, additional but necessary management restrictions could impact the economic viability of our coastal communities.

The Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (MSRA) in 2006 provided new guidance on the use of Limited Access Privilege programs that directly address the fishery conservation and overcapacity reduction goals of the Nation. Additional new provisions mandating catch limits and catch accountability should improve fish stocks and enhance fishing opportunities.

**TREND: THE MARINE RECREATIONAL FISHERY SECTOR WILL CONTINUE TO GROW AS OUR POPULATION GROWS, LIVES LONGER, AND HAS MORE LEISURE TIME.** Recreational fishing continues to be one of the most popular outdoor sports. Anglers took nearly 93 million saltwater trips in 2005. The increased size of the recreational fishing population creates disputes over allocation of limited resources between commercial fishermen and recreational anglers, and even within different sectors of the recreational community. Technological innovations, however, will continue to assist the survival rate in catch and release fisheries.

**TREND: THE CONTRIBUTION OF AQUACULTURE TO SUPPLY FISH, CRUSTACEANS, MOLLUSKS AND OTHER AQUATIC RESOURCES WILL CONTINUE TO GROW.** Aquaculture will supply an increasing proportion of the world's seafood supply. Globally, aquaculture has increased from 3.9 percent of total fisheries production by weight in 1970 to 27.1 percent in 2000 and 43 percent in 2004.<sup>12</sup> Aquaculture continues to expand more rapidly than all other

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<sup>10</sup> "Fisheries of the U.S., 2006". *op. cit.*

<sup>11</sup> "Report on the Status of the U.S. Fisheries for 2006", NMFS annual Report to Congress, <http://www.nmfs.noaa.gov/sfa/statusoffisheries/SOSmain.htm#07>

<sup>12</sup> "State of world aquaculture, 2006", FAO Report, <http://www.fao.org/docrep/009/a0874e/a0874e00.htm>

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 1.54 lb in 1970 to 15.6 lb in 2004, representing an average annual growth rate of 7.1 percent. Today, our domestic aquaculture industry provides 1.5 percent of the US seafood supply<sup>13</sup>. While foreign aquaculture production contributes to an ever increasing proportion of U.S. imports, particularly of shrimp, salmon, tilapia and a variety of bi-valves and mollusks. Total U.S. aquaculture production is about \$1 billion annually<sup>14</sup> compared to worldwide aquaculture production of about \$70 billion annually. According to the UN Food and Agriculture Organization,<sup>15</sup> global aquaculture production will need to double by the year 2030 to maintain current worldwide per capita consumption. An expanded U.S aquaculture industry can increase the production of fish and shellfish to meet increasing domestic and international demand, assist in fishery stock recovery via enhancement, and decrease the U.S. seafood trade deficit.

**TREND: DEMANDS WILL INCREASE FOR ADDITIONAL DATA AND SCIENCE NECESSARY TO SUPPORT ECOSYSTEM-BASED MANAGEMENT.** Humans are components of the ecosystems they inhabit and use. Their actions on land and in the oceans measurably affect ecosystems, and changes in ecosystems subsequently affect humans. Understanding and modeling this cycle of sustainability of fisheries and ecosystems at an acceptable level of certainty requires a much broader understanding of appropriate and effective science than has been encompassed by traditional, single-species fishery management. Ecosystem research and analyses will increasingly form the basis for new 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 will simultaneously be considering multiple objectives, identifying risk factors and uncertainty, and forecasting the cumulative environmental impact of policy choices.

**TREND: IN THE FUTURE, INTERNATIONAL FISHERIES MANAGEMENT WILL HAVE A GREATER IMPACT ON THE STATUS OF FISHERIES STOCKS WORLDWIDE.** 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. The U.S. government has responsibility to work with other nations to maintain healthy highly migratory and high seas stocks. Eliminating illegal, unregulated and unreported fishing practices is a global agenda. Multilateral policies, standards and guidance on achieving fisheries sustainability will be increasingly common and depend on consumer and market choices, and broader trade

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<sup>13</sup> Presentation by NOAA's Dr. Michael Rubino at February 2006 Aquaculture America Meeting: "Offshore Marine Aquaculture: Building on Policy, Technology and Research"

[http://www.lib.noaa.gov/docaqu/presentations/aa\\_offshorepanel\\_files/rubino\\_aa\\_06.pdf](http://www.lib.noaa.gov/docaqu/presentations/aa_offshorepanel_files/rubino_aa_06.pdf)

<sup>14</sup> "NOAA Ten Year Plan for Marine Aquaculture", NOAA Aquaculture Plan: U.S. Department of Commerce, National Oceanic and Atmospheric Administration, October 2007.

[http://aquaculture.noaa.gov/pdf/finalnoaa10yr\\_rweb.pdf](http://aquaculture.noaa.gov/pdf/finalnoaa10yr_rweb.pdf)

<sup>15</sup> "State of world aquaculture, 2006", FAO Report *op. cit.*

and economic sanctions in addition to traditional negotiations to achieve desired fisheries management outcomes.

## **Section 2: MAFAC Findings**

Considering the trends discussed above, the following findings and conclusions were reached:

1. Seafood demand will continue to exceed supply even if overfishing is eliminated, current environmental factors which adversely impact stock health and productivity are reversed, and the status of all our domestic wild stocks is optimal.
2. Domestic fisheries alone do not and are unlikely to meet America's demands for seafood.
3. Consumers must have confidence in the safety, quality, and labeling of seafood products worldwide.
4. Limited access privilege programs that protect the fishermen as well as the resource must be established where feasible as quickly as possible with extensive stakeholder input.
5. Recreational anglers will continue to increase in numbers and impact.
6. Sustainable, productive fish stocks and rationalized fisheries will be prerequisites to decrease allocation disputes between and among sectors.
7. The commercial and recreational fishing sectors will continue to play a major role in the economic viability of coastal communities
8. To meet the increasing demand for seafood products and to reduce our current trade deficit, a robust domestic aquaculture industry must be part of the future of U.S. marine fisheries.
9. Ecosystem-based management approaches will be a major part of the fishery decision-making process.
10. International fisheries will become more important in the future and the United States must continue to be engaged in international RFMOs.

Four recurring themes appeared in almost every analysis and discussion of issues.

1. Better data are necessary for management decisions. Every one of the issue areas examined requires more data, more timely data, and data of higher quality to achieve the outcomes desired for fisheries in 2020. In the absence of adequate data, wrong decisions or overly precautionary policies will have profound economic and environmental consequences. The current investment in data seems disproportionately low relative to the societal value of the resources under NOAA's stewardship. Fortunately one of NOAA's strengths is in its tremendous capacity for conducting scientific research and collecting data and information. Where this strength turns into value for the public is when the data and science are applied to management policies and decision making.
2. There are wide-spread opportunities to develop and adopt technology to assist in achieving the outcomes desired for 2020. Due to the scale and scope of the issues being addressed in fisheries, cost-effective solutions for 2020 will likely involve some form of

technology innovation. This will range from: engineering solutions that refine fishing gear selectivity; to improving the efficiency and success of aquaculture production; to adopting low-cost, modular, self-contained sensor packages that can be deployed in various environments to greatly increase sampling range and efficiency for research and monitoring of data required for ecosystem-based assessments. A focused look at internally and externally developed technology's potential role from a perspective other than a single discipline, line office or program point of view could result in substantial programmatic and cost breakthroughs.

3. Achievement of the Nation's ocean policies in 2020 must result from collaboration and partnerships across levels of government, sectors, and disciplines to advance the ecological, social, and security interests of present and future generations. NOAA must identify and promote opportunities that bring together different interests and expertise to communicate, coordinate, and collaborate on formulating sound environmental policies and sustainable ocean management. This will result in the vigorous exchange of science, engineering, technology and policy expertise both domestically and internationally.

4. To obtain these predicted benefits will require additional resources. Implementing the recommendations for 2020 described in this report will sustain current resource values and, through rebuilding and recovery, will significantly increase the value of our nation's living marine resources. U.S. marine fisheries (commercial, recreational and aquaculture) are an economic engine for the nation.<sup>16</sup> There is a strong positive relationship between the public's interest in proper stewardship of our fisheries and the cost necessary for success. The return on investment for additional funding is high, readily supporting a business case for significantly increasing the nation's investment to satisfy the vision of safe seafood and efficient and sustainable fisheries in 2020.

### **Section 3: Summary Recommendations**

MAFAC envisions a future with healthy, sustainable fish populations, a robust fishing and marine offshore aquaculture industry, ample recreational fishing opportunities, numerous, vibrant coastal fishing communities, and a safe and healthy seafood supply for the nation. To achieve this vision, the following recommendations are proposed. (More specific details and rationale for each are found in the Appendices of the report.)

#### **Demand, Supply and Quality of Seafood Products**

1. Public health benefits of seafood should continue to be researched, understood and communicated. NOAA should help educate consumers domestically and world-wide about the wide array of health benefits from aquatic foods. The goal is to empower the public to tailor their consumption decisions to individual health needs while reflecting accurate and informed conservation concerns.

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<sup>16</sup> With every one pound increase in U.S. fish and shellfish supply, \$2.41 in value is added to the U.S. Gross National Product. Non-consumptive and recreational uses contribute billions of dollars to the economy as well.

2. NOAA should seek both industry and government commitments worldwide to strengthen seafood safety programs, including cooperative efforts through the United Nations/World Health Organization's Codex Alimentarius (food code standards).
3. NOAA should support the federal government's continuation of free trade policies for seafood, and pursue elimination of tariff and non-tariff trade barriers through the World Trade Organization, bilateral and multilateral agreements.
4. Seafood safety and associated human health should be enhanced through improved NOAA enforcement, research, outreach and education, and NOAA should establish itself as an unequivocal source of unbiased peer-reviewed scientific information.

### **Commercial Fisheries**

5. NOAA must achieve and maintain sustainable levels of stocks important to commercial fisheries.
6. NOAA must match fleet capacity with available, sustainable harvest.
7. Limited access privilege programs should be thoroughly analyzed for applicability in all fishery management plans for participants in the commercial and recreational sectors, with the goal of significantly increasing their use by 2020.
8. Commercial fishermen, processing businesses, trade associations and state and local government representatives working with NOAA Fisheries should seek ways to integrate wild stock production with aquaculture production 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. Integration of wild and farmed production can contribute to the development of a stable, year-round processing industry ensuring coastal community sustainability.
9. NOAA must work with states and coastal communities to ensure continued infrastructure necessary to support viable seafood industry along our coasts.

### **Recreational Fisheries**

10. NOAA must achieve and maintain sustainable levels of stocks important to recreational fisheries.
11. Sale of recreationally-caught fish is a form of commerce and should be prohibited at state and federal levels. Improved recreational harvest data are essential and a recreational registry must be implemented and used.
12. Fishery management plans should include analyses of quota transfer between recreational and commercial sectors, and should incorporate market mechanisms where appropriate.
13. Efforts should be directed to enhance a conservation ethic and pride of a national resource amongst all fishery user groups.

### **Aquaculture**

14. The development of a significant domestic, environmentally sound aquaculture industry is essential for the production of safe and healthy seafood, assisting in the rebuilding of depleted stocks, and providing employment opportunities in coastal communities.

15. National offshore aquaculture legislation providing a coordinated, cohesive and efficient regulatory process should be passed by Congress and implemented immediately.
16. The domestic aquaculture industry should receive financial and technical support similar to that available to the American agricultural industry.
17. Continuous, comprehensive monitoring of offshore aquaculture sites must be included to safeguard wild stocks and assure environmental impacts of facilities are insignificant.

### **Management**

18. Coastal and ocean habitat protection must be a primary concern of fishery managers as a basic requirement for robust and sustainable fish stocks.
19. 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.
20. Cooperative management efforts among states, regional management authorities and federal managers should be maintained and enhanced as a basis for sound domestic fisheries management.
21. Stock status and catch data must be accessible to all stakeholders and provide the information needed to make informed management decisions.
22. Subsistence fishing is recognized as an important source of protein for rural and native communities. However it needs to be included in the calculation of total catch with an efficient, comprehensive, and uniform data collection method.
23. The United States should exert strong leadership in the international forums that manage fish stocks beyond countries' Exclusive Economic Zones.
24. The U.S. government must exert every influence possible aimed at maintaining healthy highly migratory species stocks and barring IUU fish from entering the global market place.

Appendices II-VI of this report contain individual papers prepared by MAFAC members categorized under the following headers: Demand, Supply and Quality of Seafood Products; Commercial Fishing; Recreational Fishing; Aquaculture; and Management. These papers provide more details in support of the conclusions and recommendations noted above. Each paper was prepared using a standard template and reviewed by a MAFAC Vision2020 work group, the Committee as a whole, and circulated for public review.

## **APPENDICES**

### **APPENDIX I. PREPARATION OF REPORT**

In September 2006, the Assistant Administrator of NOAA's National Marine Fisheries Service (NMFS) asked MAFAC to prepare a report on the desired future state of U.S. Marine Fisheries. The specific request from the Assistant Administrator to MAFAC 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 formed a subcommittee composed of MAFAC members to draft a concept paper of what should be included in such a report. The concept paper was circulated and input was received from all MAFAC members regarding a long list of topics to be considered. In December 2006, a MAFAC writing group met in New York to categorize the input received. After review and consideration, the committee organized the input into four subject categories. The committee circulated their proposal to the full committee and the concept and categories were unanimously accepted, and a draft report was subsequently prepared.

The draft report was a major agenda item of the June 2007 MAFAC meeting. By the end of the meeting, MAFAC had reached a consensus on the contents of the report. In August the draft report was transmitted to NMFS, and to receive stakeholder input the report was placed by MAFAC on a dedicated website [Fish2020](#) for review. At the December 2007 MAFAC meeting all MAFAC members reviewed the public input and collectively revised the report to reflect the accepted comments. This final report reflects the input of all MAFAC members as well as input from various stakeholders.

## **APPENDIX II - DEMAND, SUPPLY AND QUALITY OF SEAFOOD PRODUCTS**

***Issue Statement 1: Demand for fish and seafood continues to increase both domestically and worldwide due to population growth, growth of income and growing recognition of the health benefits of a seafood rich diet.***

***Background:*** 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<sup>17</sup> Research is expanding our understanding of the health benefits of a diet rich in seafood<sup>18</sup>. If research continues in the same direction, it will likely raise per capita consumption around the world creating an even larger demand for seafood.

***Current Situation:*** Americans consumed a record 16.6 pounds of seafood per capita in 2004 and health professionals are encouraging a doubling of the recommended 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.

***Preferred State in 2020:*** Consumers worldwide have adequate supplies of sustainable seafood to satisfy demand for health and nutritional benefits, which are economically affordable and meet personal preferences.

***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.

***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 (USDA) Foreign Agriculture Service; (c) Department of Health and Human Services (HHS), National Institutes of Health (NIH) and the Food and Drug Administration (FDA); (d) the private sector; and (e) consumers.

***Issue Statement 2: The public is concerned regarding the safety of aquatic foods due to chemical and biological hazards. The public lacks the necessary understanding of the relative risks versus health benefits of a diet rich in seafood.***

***Background:*** Seafood causes food borne illness worldwide due to both naturally occurring and handling/processing induced pathogens, toxins and chemical

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<sup>17</sup> "State of world aquaculture, 2006", FAO Report: *op. cit.*

<sup>18</sup> See for example web sites of Seafood and Health Alliance <http://www.seafoodandhealth.org/> and National Seafood Educators <http://www.seafoodeducators.com/home.html>

contamination. Seafood safety programs (both public and private) may be inadequate in many countries; yet the U.S. imports over 70 percent of the fish and shellfish consumed domestically. 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, increases in demand domestically and/or worldwide basis, will place additional stress on seafood safety programs as well as wild capture fisheries.

***Current Situation:*** Seafood safety remains of paramount importance to consumers and public health officials, yet strong seafood safety programs in which the consumer has confidence are lacking.

***Preferred State 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 inspection infrastructure worldwide. Furthermore, more consumers are taking advantage of the health benefits of seafood through increased consumption.

***Proposed Actions to Accomplish Preferred State:*** Effective seafood safety programs, coupled with great consumer education on the health benefits of a diet rich in seafood products, would be a beneficial for health and economic reasons. Both industry and governments worldwide need to strengthen food safety programs, including cooperative efforts through the United Nations/World Health Organization's Codex Alimentarius (food code standard). Consumers are informed about the wide array of health benefits from aquatic foods and empowered to tailor their consumption decisions to individual health needs.

***Proposed Entity(s) to Promote Actions:*** Congress would need to appropriate additional funds at a minimum to strengthen the seafood safety and inspection program. The Administration entities include: (a) NOAA Fisheries; (b) HHS's FDA, NIH and Centers for Disease Control; (c) USDA's Food and Nutrition Service; and (d) the private sector.

## **APPENDIX III. COMMERCIAL FISHING**

The U.S. commercial fishing industry depends upon the long-term sustainability of fishery resources and their ecosystems. Contributing over 35 billion dollars to the Gross National Product, the fishing industry provides an important food source for the nation, creates over 65,000 jobs<sup>19</sup>, and affords a traditional way of life for many coastal communities. The U.S. is the world's fifth largest fishing nation and its fleet of approximately 23,000 vessels roams all of the world's oceans. Commercial fishermen nationwide have seen profound changes over time in stock abundance, markets, the stakeholder process, and management of the resource. MAFAC members identified the following four issues to be considered for the future of the commercial fishing community.

***Issue Statement 1: Our Nation's fisheries need to be managed to meet sustainable fishery goals, but even if fully achieved they are unable to meet domestic demands for many fish products.***

***Background:*** Some marine fisheries continue to be under stress from overexploitation, habitat degradation, or both. Various factors, both natural and human-related, affect the status of fish stocks and their ecosystems. Such factors include: environmental changes, pressure from commercial fishing effort, and loss of habitat.

The long term potential yield of the fisheries within the U. S. EEZ is estimated to be 8.1 million tons per year<sup>20</sup>. 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. To help meet demand, by-catch and unaccounted mortality will need to be continually reduced to help meet conservation goals. Harvest and landings data need to be improved to account for all mortality. In addition, the current domestic fishing fleet capacity exceeds what is necessary to obtain the target catch level for most fisheries. Fisheries must be rationalized to assure sustainability and protect the fishermen by elimination "the race for the fish." All these measures will be required to approach the long-term potential yield by 2020.

***Current Situation:*** Three principal strategies that are available to or used by fishery managers to manage fishery yields are: regulating fishing effort, restoring habitats, and increasing recruitment. The first two methods are the basis for currently managing our fisheries. Recent landings of U.S. commercial and recreational fisheries are still only slightly more than 60 percent of the long term potential yield. Current management measures are designed to maintain sustainable fisheries stocks, to rebuild depleted stocks to meet the potential long term yield and consumer's demand for fish products.

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<sup>19</sup> "Fisheries of the U.S.,2006". *op. cit.*

<sup>20</sup> "Our Living Oceans: Report on the Status of U.S. Living Marine Resources, 1999", NOAA Report, <http://spo.nwr.noaa.gov/olo99.htm>

***Preferred state in 2020:***

- (a) Our Nation's fisheries are actively being rebuilt and are at or approaching sustainable conservation goals.
- (b) Technological advancements and market demands have resulted in reductions in undesired bycatch and in increased use of marketable underutilized species.
- (c) Our U.S. fisheries are close to achieving long term potential yield.
- (d) Coastal commercial infrastructures is maintained or enhanced to support sustainable fisheries and communities.

***Proposed Actions:***

- (a) NOAA Fisheries should consider the role of underutilized species to meet current domestic demand after considering biological, ecological, socioeconomic and technological implications.
- (b) Incentives or market development should occur only when research is completed.
- (c) Rebuild all depleted stocks by 2020.
- (d) Data used for managing marine fisheries must be relevant, reliable, timely, and have stakeholders' confidence.

***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.***

***Background:*** Many commercial stocks, such as tuna, are highly migratory species which spend most of their life in the open ocean. They are harvested by U.S. commercial and recreational fishermen and by foreign fishing fleets. Although the United States has management authority for several HMS species, most are managed cooperatively by Regional Fisheries Management Organizations (RFMOs).

***Current Situation:*** The performance of RFMOs is uneven, with regard to effective management of stocks under their jurisdiction. 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 fishermen can be unfairly accused of inadequate commitment to sustainability. Finally, U.S. fishermen frequently are required to significantly reduce harvests without similar measures being adhered to by foreign fishing fleets. Total harvest reductions are 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 highly migratory fish stocks more effective.

***Preferred State in 2020:*** All fisheries, domestic and international, are effectively managed to sustain long term optimum yields.

**Proposed Actions:** The U.S. government provides assistance to RFMOs to promote sustainable stocks using available political, economic and other strategic tools to ensure other countries follow the recommendations of RFMO scientific staff.

**Issue Statement 3: Overcapitalization has been and continues to be a serious concern in a number of U.S. fisheries. Too many fishermen racing for too few fish has resulted in more restrictive, highly complex and often ineffective 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.**

**Background:** U.S. commercial landings were relatively stable at about 3 million tons per year from 1935 to 1977 when the U.S. extended its jurisdiction to 200 miles. With the passage of the Fishery Conservation and Management Act in 1976 and other policies, the federal government provided incentives to rehabilitate and expand the domestic fishing fleets. These incentives took two forms: open access management which allowed unrestricted entry to the fisheries, and a number of direct and indirect subsidies to the fishing industry. The goal of these incentives was to ensure full domestic utilization. Since 1977, landings have more than doubled. However, for many fisheries fishing effort grew more rapidly than was sustainable, resulting in overcapacity and in some cases overfishing.

**Current Situation:** 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.

**Preferred state in 2020:** By 2020 we will have reached the goal of rebuilding sustainable fish populations while maintaining productivity and biodiversity. This will result in increased biomass, providing greater harvesting and processing opportunities for domestic 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 (LAPPs) will be in place in most applicable U.S. fisheries, providing market mechanisms to match capacity with available harvest levels.

**Proposed Actions:**

- (a) 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.
- (b) NOAA should play a leadership role by at least tripling the number of fisheries under LAPP management by 2020.

***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.***

***Background:*** 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.

***Current Situation:*** 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. The projects are numerous and ongoing, such as: 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 efficiency while enhancing selective fishing practices which minimize ocean habitat impacts.

***Preferred state in 2020:*** By 2020 advances in technology will not only result in more sophisticated products, but also the application of the technology can be used for scientific purposes as well as commercial purposes. Advances in gear and monitoring technologies can help obtain information to 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 is 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.

***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 include: (a) Technology research and

development to create more environmentally friendly fishing gear and practices. These designs would improve the performance of fishing gear to help reduce bycatch and minimize habitat impacts, and support additional data collection programs that enhance management, stock assessments and ocean monitoring.

(b) NOAA Fisheries and the commercial fishing industry should continue to develop industry partnerships such as its Cooperative Research Programs and Bycatch Reduction Engineering Programs.

## **APPENDIX IV: RECREATIONAL FISHING**

***Issue Statement 1: Growth in 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 recreational fishing continues to increase, recreational fishermen will request increases in fish allocated to the recreational sector.***

***Background:*** According to a NOAA report<sup>21</sup>, 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 from 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 percent per year. The value of recreational fishing as an economic engine for coastal communities should be recognized and exploited to a greater degree. The recreational fishing experience could rival or exceed recreational fishing catch as a prime motivator for recreational fishing.

***Current Situation:*** The current rate of increase in the angling population creates new management concerns. If the rate of recreational fishermen continues to increase at 3 percent per annum, by 2020 the number of recreational fishermen will increase by 7.3 million to a projected level of 18.5 million. This change will result in a significant increase of fishing effort and catch (i.e., mortality), all else equal. By 2020 continued growth in recreational angling will require that anglers focus more on the fishing experience and less on the number of fish landed. However, while post-release mortality in catch and release fisheries is usually low (often 2-5 percent), as fishing effort increases, post-release mortality will become an increasing proportion of 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. As the number of recreational fishermen continues to increase, improved monitoring will be necessary to assess the fishing effort and catch. A national saltwater angler's registry under development will be a necessary tool to collect data.

***Preferred State in 2020:*** Many recreational species have limited population growth rates and are too valuable to be caught only once. By 2020, catch and release fishing is emphasized and accounted for in specific species assessments. The proper techniques for release are refined and disseminated to lower post release mortality. For other fisheries, minimum size limits and reduced daily bag limits are sufficient management measures to maintain healthy standing stocks. Additional seasonal closures are considered to eliminate or redirect effort. By 2020, angler satisfaction is derived from the recreational fishing experience rather than the take or "kill" fish. To achieve optimum yield, adaptive management measures such as a temporary reallocation of quota is available to managers. For example, if commercial quota is not harvested, managers are able to temporarily

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<sup>21</sup> "Population Trends along the Coastal United States: 1980-2008", 2005 NOAA report, <http://marineeconomics.noaa.gov/socioeconomics/assessment/population.html#Download>

reassign the under harvested quota to provide additional recreational opportunity, and vice versa.

***Proposed Actions to Accomplish Preferred State:***

- (a) Improve collection of recreational catch, release, and harvest data,
- (b) Create and use the recreational angler registry.
- (c) Continue to promote catch and release fisheries,
- (d) Reduce daily bag limits and implement minimum or maximum size limits when necessary for those fish stocks where resorting to total catch and release is not necessary,
- (e) Promote research to accurately quantify and minimize post release mortality,
- (f) Increase the length of seasonal closures when necessary and encourage the recreational community to maximize the profitability of open seasons,
- (g) Amend fishery management plans to allow for timely conversion of unused commercial allocation to the recreational sector and vice versa;
- (h) Implement a variety of programs and incentives to enhance the conservation ethic of recreational anglers.

***Proposed Entity(s) to Promote Actions:***

- (a) The leadership of the recreational fishing community should promote the total recreational fishing experience, instill a conservation ethic, and de-emphasize landings.
- (b) Industry and NOAA Fisheries should continue to support research and technology designed to reduce post release mortality.
- (c) Management (councils, commissions, NOAA Fisheries) 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.

## **APPENDIX V. AQUACULTURE IN THE UNITED STATES**

In 2004, the U.S. Commission on Ocean Policy<sup>22</sup> 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<sup>23</sup> and a proposal for the **National Offshore Aquaculture Act of 2007**.

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

***Background:*** 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<sup>24</sup>.

***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<sup>25</sup>

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<sup>26</sup>.

Global supply of seafood from wild-caught stocks has plateaued, while demand continues to increase. Aquaculture now provides 43 percent of the world's seafood. Nutritionists encourage Americans to double their present consumption of seafood to benefit their health.

### ***Preferred State in 2020:***

(a) 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

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<sup>22</sup> "An Ocean Blueprint for the 21<sup>st</sup> Century", *op. cit.*

<sup>23</sup> NOAA Aquaculture Plan *op. cit.*

<sup>24</sup> "An Ocean Blueprint for the 21<sup>st</sup> Century" *Ibid.*

<sup>25</sup> "Recommendations for an Operational Framework for Offshore Aquaculture in U.S. Federal Waters." Cicin-Sain, B. et al., 2005

<sup>26</sup> "State of world aquaculture, 2006", FAO Report, *op. cit.*

rights, and provides traceability in the market to protect against the substitution of illegally taken wild stocks.

(b) 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.

(c) 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.

(d) Consumers and the public will be accurately informed about aquaculture and will support sound public policy on its behalf

**Proposed Actions:** Both statutory and regulatory actions are necessary for a robust domestic marine aquaculture industry by 2020.

Statutory actions:

(a) Develop and codify a statutory framework for marine aquaculture in the U.S. EEZ. Perfect, as needed, the statutory framework for marine-offshore aquaculture.

(b) Identify NOAA as the lead federal agency for all offshore marine aquaculture.

(c) Develop economic policies that encourage environmentally sound and economically viable marine aquaculture, include exploring options to promote community and fisherman entry into aquaculture through the use of specific access privileges, cooperatives, and other statutory or regulatory changes

(d) In addition, modify current financial assistance and development programs at the state and federal level to facilitate creation of aquaculture operations similar to the support received by the agriculture industries.

(e) Authorize regional pilot projects involving commercial fishing families to provide a mechanism for fishermen's involvement as well as an educational and outreach tool.

Regulatory actions:

(a) Encourage states to utilize CZMA section 309 funds to accomplish comprehensive planning for aquaculture development in the territorial sea.

(b) Provide sufficient financial support for research and development on all aspects of marine aquaculture including evaluation of best management practices to minimize ecosystem impacts.

(c) Consider establishment of aquaculture zones within the EEZ which would reduce the burden on applicants to submit *new* applications for every proposed project.

(d) Promote outreach and education to enhance public understanding of marine aquaculture.

(e) A Programmatic Environmental Impact Statement (PEIS) for aquaculture projects should consider cataloguing local species and habitat; identifying potential risks to sensitive habitats, fish and wildlife; review of potential wastes, chemicals, and biological pollutants and the anticipated ramifications for local fish and wildlife populations; relevant information on marine ecosystems from the use of feeds; design and placement

of aquaculture facilities and expected impact; and expected effect on the human environment including impacts on small businesses and coastal communities.

***Proposed Entity(s) to Promote Actions:***

(a) Congress for statutory actions with input from the Executive Branch and the public (including industry interests).

(b) State authorities responsible for implementing the Coastal Zone Management Act for coordinating the development of comprehensive aquaculture plans with CZMA 309 funding.

(c) Executive Branch, primarily through NOAA and the Joint Subcommittee on Aquaculture, for regulatory actions with input from the industry, the public, the regional fishery councils, fisheries commissions, and the coastal states.

## **APPENDIX VI: MANAGEMENT**

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. For ecosystem-based management to succeed, a significant expansion in the type and quantity of data collected and analyzed must occur. Furthermore, timely accessibility by managers to these new and different kinds of high quality data is critical to success. It is essential to initiate new data collection programs, particularly those utilizing advanced technology, and to expand and improve existing data collection and delivery programs. MAFAC members identified the following issues to be considered when discussing management tools for the future.

***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.

***Background:*** 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.

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

***Preferred State in 2020:*** Unique habitats, essential fish or marine mammal critical habitats, and rare marine ecosystems are protected with MMA's developed with stakeholder advice and support.

***Proposed Actions:*** (a) Place-based management must be better coordinated within NOAA.

(b) If Marine Managed Areas involving living marine resources are designated, they should be based on the best scientific information available.

(c) Criteria for assessing the costs and benefits of closing an area must be identified, assessed and considered before a decision is made.

(d) The area should be monitored. A timetable should be established for review of the closed area's performance that is consistent with the purposes of the closed area.

***Proposed Entity(s) to Promote Actions:*** (a) NOAA Fisheries should champion place-based management in partnership with NGOs, fishermen and other marine resource stakeholders.

***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.***

***Background and 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 levels are not exceeded. Also, video monitoring through mounted on-deck cameras is being studied as an alternative to placing observers onboard vessels.
- Work is continuing 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 that are 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.

***Preferred State in 2020:*** NOAA will be utilizing 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.

(a) In conjunction with other federal agencies and non-federal partners, NOAA will have implemented an integrated ocean observing system (IOOS), including the placement of biophysical moorings that perform myriad tasks. IOOS systems provide continuous, real-time observations that include acoustic readings that help determine fish and marine mammal migrations and optical technologies that help monitor ecosystem health.

(b) Research in life history, stock structure, brood-stock considerations, spawning, rearing and release of juveniles and ecological concerns will have advanced such that stock enhancement, using hatchery reared juveniles to supplement wild production, is a widespread viable management tool to be considered for rebuilding depleted marine stocks. Research and development of stock enhancement should have expanded such that by 2020 the U.S. can take a role in developing international guidelines and standards. U.S. efforts should have proceeded on a regional basis with a focus on stocks that most greatly impact current and future fisheries management and harvest.

(c) NOAA will be employing Geographic Information System (GIS) tools throughout the country 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.

(d) NOAA scientists will be routinely utilizing acoustic technology to characterize the seabed. Historically, the process for learning more about seabed composition (a critical aspect of the marine habitat) required removal of core samples. This work technology will also be in place serving NOAA's hydrographic survey mission, working across scientific disciplines to use acoustic technology to perform both habitat research and navigational chart updates.

(e) NOAA Fisheries will be widely employing 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 will routinely employ Seagliders to record oceanographic measurements traditionally collected by research vessels, but at much less expense.

**Proposed Actions:** (a) Both Congress and NOAA Fisheries should place a priority on applying technological innovations to strengthen science and management programs within the agency.

(b) 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.

(c) 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.

***Proposed Entity(s) to Promote Actions:*** Congress, NOAA leadership, academia.

***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.***

***Background:*** Allocation of fisheries between and among sectors has historically been done through political forces exerted on councils or Congress; this has often been a difficult and contentious process. Where assignable fishing rights have been created, market forces rather than regulations have determined fishery entry and exit decisions. Some allocation issues, including those between commercial and recreational fishermen, could be better resolved through limited access privilege programs (LAPs) and all councils should evaluate these mechanisms available to them.

***Current State:*** Individual Transferable Quotas (ITQs) 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.

ITQs are successfully in place on all three coasts of the U.S. Although the North Pacific Fisheries Management Council has successfully implemented ITQs programs for several of its commercial fisheries, the first attempt to implement ITQs 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 risk allowing market forces to play out.

***Preferred State in 2020:***

- (a) LAPs are widely used in both commercial and recreational sectors to provide the right incentives, address overcapacity and address allocation issues within the sectors and across the sectors.
- (b) Reliable catch reporting systems are in place to support stock assessments, fisheries management, and allocation decisions.

***Proposed Action:***

(a) NMFS needs to work with councils to deploy the new assignable rights authority contained in the MSRA.

(b) Proactive involvement by NMFS with councils during the development stage will help ensure adherence to required processes and standards, resulting in approvable plans.

(c) Continue efforts to promote the value of assignable rights based approaches and publicize success stories in cooperation with the councils.

***Proposed Entity(s) to Promote Actions:*** NMFS, councils, commercial and recreational organizations and other interested stakeholders.