Vision 2020 (v2.0):

Charting a Course for the Future of U.S. Marine Fisheries

Final Report of the
Marine Fisheries Advisory Committee
(Update of MAFAC Vision 2020 Report)

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U.S. Department of Commerce
National Oceanic and Atmospheric Administration

_____ 2012

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Executive Summary

[PD to draft]
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
[PD NEEDS TO UPDATE]
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." That report was completed in 2007. In 2012, MAFAC undertook a comprehensive revision of *Vision 2020*, updating data and information incorporating relevant revisions, and extending the document's reach to 2040.

The report is organized …

PROGRAM AREA 1: SUSTAINABLE COMMERCIAL AND RECREATIONAL FISHERIES

The U.S. commercial and recreational fishing sectors depend upon the long-term sustainability of fishery resources and their ecosystems. Commercial fishing provides a healthy source of food to society at large. In addition, commercial fishing is a unique way of life for many families, and is a distinct culture throughout the coastal U.S. In 2011, U.S. commercial fishermen landed 10.1 billion pounds of fish and shellfish in 2011, valued at $5.3 billion, an increase over 2010 of 1.9 billion pounds and more than $784 million[1].

Comment [PD1]: Question for NMFS Staff: Is there updated stats on total economic contribution (value added), jobs and income? From 2011 report, it was $70billion (including international), $32b in income and 1 million jobs.

Marine recreational fishing is also an economic powerhouse. According to NOAA Fisheries[2], in 2009 there were approximately 11 million recreational anglers across the U.S. who took 74 million saltwater fishing trips around the country. These anglers spent $4.5 billion on fishing trips and $15 billion on durable fishing-related equipment.

[1] Fisheries of the United States, 2011. National Marine Fisheries Service, Office of Science and Technology. August 2012. http://www.st.nmfs.noaa.gov/st1/fus/fus11/index.html
[2] National Marine Fisheries Service. 2010. Fisheries Economics of the United States, 2009. U.S. Dept. Commerce, NOAA Tech. Memo. NMFS-F/SPO-118, 172p. Available at: https://www.st.nmfs.noaa.gov/st5/publication/index.html

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Recent landings of U.S. commercial and recreational fisheries are still only slightly more than 60 percent of the long term potential yield. In order to maximize the sustainable harvest of fisheries, current efforts to rebuild stocks must continue and efforts to reduce, or control and account for, by-catch and mortality must be encouraged and increased. In addition, harvest and landing data need to be improved to account for all mortality. Fisheries, where possible, may be rationalized to help maintain sustainability and protect the stakeholders and communities. All these measures will be required to achieve optimum yield by 2040. [fr appen]

Comment [PD2]: Need updated number

RELATED TRENDS AND FINDINGS:

Catch Share programs are an increasingly used management tool.
Catch share programs have been used in U.S. federal fisheries since 1990. Programs have been implemented in the Mid-Atlantic, Alaska, Florida, the Gulf of Mexico, New England and the West Coast, each managed by their respective fishery management councils. The NOAA Catch Share Policy, effective in 2010, provides guidance and direction for future catch share programs as a fishery management tool to build and maintain sustainable and prosperous U.S. fisheries and healthy ocean ecosystems. Although there is now an overarching policy, the transition from traditional management to catch share programs has proven problematic in some regions. Implementation of some catch share programs occurred without the attendant accountability measures such as socioeconomic analysis of the effects of catch shares. (fr appen)

In the United States, catch shares may be helping to eliminate overfishing and achieve annual catch limits. In addition, some catch share programs help commercial fishermen maximize the prices they are paid for their product. Catch share programs may also improve fishermen's safety, in that fishermen may be able to choose to fish when weather is best. However, not all commercial fisheries are suitable for management by catch share programs, and some fisheries, in different regions of the country, oppose the implementation of catch share programs.

For certain catch shares, some of which have been in place for as much as twenty years, there has been significant financial investment made by those who participated in the fishery at the time the quota system was created, by those who continued to fish, by those who entered into the fishery by purchasing or leasing privileges and by those who have chosen to exit the fishery. Any regulatory changes in fisheries currently managed by catch share systems may have highly disruptive social and economic effects.

Annual catch limit requirements of Magnuson-Stevens Act.
The Magnuson-Stevens Fishery Conservation and Management Reauthorization Act amended the MSA to include new requirements for annual catch limits (ACL) and accountability measures (AM) and other provisions regarding preventing and ending overfishing and rebuilding fisheries. To guide the implementation these requirements, the National Standard 1 Guidelines were updated in 2009. National Standard 1, codified at 50 C.F.R. 600.310, relates to the Optimum Yield (OY) of a fishery, and states that "Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the OY from each fishery for the U.S. fishing industry." As of 2012, all of the Federal Fishery Management Plans have been amended to implement ACLs and AMs to end and prevent overfishing.

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Based on experiences gained from implementing the ACLs and AMs over the last several years, issues regarding the application of National Standard 1 guidelines were identified by stakeholders that warrant their revision. As a result, an Advanced Notice of Proposed Rulemaking was published in May 2012, to consider the revision of National Standard 1 Guidelines. These issues include:

- In some fisheries, implementation of the NS1 guidance has resulted in reductions in catch. However, questions have been raised about the relationship between ACLs and the objective of achieving the optimum yield (OY) for a fishery.
- Management of mixed-stock fisheries is challenging, because some stocks are relatively more abundant or are more or less susceptible to overfishing than others. However, some ACL and rebuilding requirements for certain species have prevented fishermen from accessing the full potential of healthy stocks.

The marine recreational fishing sector will stabilize and be on a recovery path as the economy improves and as science provides the foundation to better managed access opportunities. Recreational fishing continues to be one of the most popular outdoor sports. Anglers took nearly ~~75~~ 69 million saltwater trips in 2011~~0~~[3]. Better management of recreational fishing depends on dramatic improvements in the timeliness and accuracy of recreational harvest data, supported by technological innovations. Technological innovations will also assist the survival rate in catch and release fisheries. This should be closely monitored to quantify how successful release techniques are, and how frequently used, as especially relates to barotrauma. The value of the fisheries to the growing recreational fisheries sector goes beyond the measurable economic value, because of the role fishing and fish play in enhancing health and quality of life benefits to fishermen, their families, their social networks with whom they may share fish, and their communities.

As depleted stocks rebuild, managers will face new challenges. [from appen]
As the requirements of the Magnuson-Stevens Act are implemented and overfished stocks rebuild, these stocks will expand and reoccupy habitats in their historic range. This dynamic may result in new conflicts with fisheries targeting other stocks, including by-catch and dead discards of the rebuilding stock in other fisheries. In recreational fisheries, individual fish will weigh more as they rebuild, resulting in greater pounds of harvest with the same bag limit and season. This can lead to the perverse need to shorten seasons and reduce bag limits even as there is strong evidence that the stock is rebuilding.

As a result, managers will be pressured by both commercial and recreational sectors to allow increased catches as soon as possible. This will be coupled by rhe desire for increased economic activity. However, models that establish rebuilding plans fail to predict the extent and location of these new management challenges. Managers are left scrambling to respond with few tools and an inability to respond quickly.

International Regional Fisheries Management Organizations fail to implement necessary conservation measures.

[3] *Fisheries of the U.S.*, ~~*2010*~~*2011*, NMFS Report, 2012~~1~~. NMFS Current Fisheries Statistics No. ~~2010~~2012.

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Although the United States has management authority for several HMS most are managed cooperatively by RFMOs. 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 RFMOs themselves are considering means to make the international management of highly migratory fish stocks more effective. [fr appen]

SUMMARY RECOMMENDATIONS

*With regards to the implementation of **catch share programs**, MAFAC recommends the following:*

- NOAA should not require the use of catch shares in any particular fishery or sector, but may promote and encourage the careful consideration of catch shares as a means to achieve the conservation, social and economic goals of sustainable fishery management.
- In the proposed development of any new catch share program NOAA and Councils should specify sufficient catch share design characteristics during the scoping phase for a proposed FMP or amendment, such that stakeholders can understand the potential impacts. Any future reallocation of quota should be built into the management plan from its onset. ALT: Management plans should include provisions to consider the future reallocation of quota based on a pre-established set of criteria.
- For those individual quota fisheries already implemented, NOAA should proceed deliberately in the consideration of any regulatory changes to existing programs. Issues, such as initial allocation, accumulation limits, transferability provisions, and restrictions on ownership are often highly controversial.
- Adequate resources should be secured to ensure appropriate accountability and enforcement of catch share programs, along with robust stock assessments needed to manage LAPP fisheries. (fr appen)
- Frequently, agreements regarding program elements are reached based on extensive discussion and compromise within the industry. NOAA should consider the history of the development of each quota/catch share plan, before initiating proposed regulatory changes.
- Periodic evaluation of the effectiveness of individual catch share programs should be undertaken to determine the effect on stock sustainability, community resilience and past, present, and future participants. (fr appen)

Comment [hbl3]: To be worked on – consider criteria, conditions for potential redistribution, initial investments of fishers, etc. Keep language broad, inclusive of possibilities.

*With regard to the implementation of **Annual Catch Limits**, MAFAC recommends the following:*

- ~~NOAA should pursue alternative definitions of overfishing that would take a longer, multi-year view of the impact of fishing on the stock's ability to produce maximum sustainable yield (MSY).~~ (Julie)

Comment [hbl4]: Offline discussion on this point.

Comment [PD5]: JM: I don't understand what the statement in the first bullet point means, so I suggest deleting it. Overfishing levels are set by SSC's not NOAA and their method for setting OFL is thoroughly vetted for each fishery. AM's can be based on a multiple year average of catch.

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- NOAA should more fully address economic and social considerations in the establishment of OY, and to more clearly describe the relationship between ACL and OY.
- NOAA should take further action to address how OY should be specified in order to balance the multiple considerations in mixed stock fisheries and prevent denying access by fisherman to healthy stocks.
- NOAA should re-examine whether scientific uncertainty and management uncertainty results in excessive constraints in setting annual catch targets.
- ~~NOAA must achieve and maintain sustainable levels of stocks important to fisheries.~~

*With regards to **recreational fishing**, MAFAC recommends the following:*

- Sale of recreationally-caught fish is a form of commerce and should be prohibited at state and federal levels.
- Emphasis must be placed on increasing the effectiveness of the Marine Recreational Information Program (MRIP) with close consideration given to the Registry and issues with data quality. The intent is to avoid the potential loss of valuable fishing opportunities if data are used improperly to make allocations ~~that disadvantage recreational anglers~~. (MLE)
- There should be continued effort to establish quality communications infrastructure between NOAA and the recreational fisheries community.
- ~~Fishery management plans should include analysis of quota transfer between recreational and commercial sectors and should incorporate market mechanisms where appropriate.~~ (MLE)
- Efforts should be directed to more fully assess the not so easily quantified social and cultural values of participation in recreational fisheries to fishermen, families, and communities.
- There needs to be continued socioeconomic study on a regional basis regarding the net benefits to the nation of recreational fishing.
- Regulation should be based on sound science and management of recreational fishing should be informed by a better understanding of fishermen's behavior in response to various management tools.

*With regards to **rebuilding stocks**, MAFAC recommends the following:*

- NOAA should improve rebuilding models increase their ability to advise managers regarding range extensions and conflicts with other fisheries.
- NOAA should shift recreational management to be based on the number of fish caught in contrast to number of pounds caught.
- NOAA should develop best practices for managing stocks while they are rebuilding and incorporate them into new tools and strategies that are shared through new training for fisheries scientists and fisheries managers.
- NOAA Fisheries should consider the role of underutilized species to meet current domestic demand after considering biological, ecological, socioeconomic, and technological implications. [fr appen]

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*[With regards to **international RFMO,** MAFAC recommends the following**:***

- All fisheries, domestic and internationally should be effectively managed to sustain long-term optimum yields.
- NOAA should provide assistance to RFMO to promote sustainable stocks using available political, economic and other strategic tools to ensure other countries successfully implement the recommendations of RFMO scientific staff. [fr appen]

PROGRAM AREA 2: SCIENCE AND TECHNOLOGY

RELATED TRENDS AND FINDINGS:

Accurate and timely data on harvest and stock status play a crucial role in fishery management. Fisheries managers require high-quality, timely catch data, reliable fisheries-independent data, and well supported predictions about species status and abundance. Presently, fishery managers and stakeholders are deeply concerned that the timeliness and accuracy of harvest (catch) and stock status data are insufficient to produce successful outcomes for fisheries management. However, the current investment in data is disproportionately low relative to the societal value of the resources under NOAA's stewardship. Inadequate funding for research and data collection hinders our understanding of the impacts of changing ocean conditions, and challenges our ability to manage commercial and recreational fisheries and aquaculture.

Technological innovations provide cost-effective tools for improving sustainable fisheries management, solving many of our current management challenges.
Many commercial and recreational fishermen utilize increasingly sophisticated technology during fishing operations to help obtain information to improve management, reduce by-catch and minimize habitat impacts caused by fishing. Each of these technological applications can enhance operational efficiencies and conservation objectives through cleaner fishing and minimizing fishing gear impacts on the environment.

Electronic equipment common in the wheelhouse includes state-of-the-art sonar equipment to locate target species, computer logbooks to provide real-time catch reporting and historical catch information and electronic net sensors to provide location data for nets on the ocean floor. Vessel monitoring systems (VMS) relay information about a vessel's location via satellite and are used to enforce management area closures. Video monitoring through mounted on-deck cameras is being studied as an alternative to placing observers onboard vessels, allowing for greater cost effectiveness and in some cases improved data quality. With the implementation of catch share systems, human observers have been placed aboard vessels. It varies throughout the nation what percentage of the fishery catch is actually observed, and how the observers are paid for, either by vessel owners or NOAA.

Cooperative research provides important contributions to fisheries science and technology.
NOAA science is strengthened through intra- and inter-agency coordination of science and technology programs, partnerships with universities and other marine research entities, and cooperative research with fishermen. 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 by-catch and mortality of non-target

species, and reduce impact of fishing gear on ocean habitat. In addition, NOAA Fisheries is increasing its efforts to assist in projects that outfit fishing vessels with acoustic or video equipment that enhances stock assessment capabilities and ocean monitoring equipment.

Technology is integral to NOAA Fisheries' science program.
NOAA's science mission is significantly enhanced through expanded use of satellite imaging, VMS, integrated ocean observing systems, acoustic surveys, Seagliders, and GIS mapping and assessment.

- Satellite imaging assists ocean observation and is an increasingly important tool for assessing fish and marine mammal stocks, identifying "by-catch hotspots," and mapping sensitive habitat.
- An integrated ocean observing system (IOOS) provides continuous, real-time observations that include acoustic readings to determine fish and marine mammal migrations and optical technologies to monitor ecosystem health. This technology will improve fishery survey work and can also be used to characterize the seabed.
- Autonomous underwater vehicles (AUVs), or Seagliders, small, free-swimming vehicles that are extremely energy efficient can be deployed for months at a time to record oceanographic measurements traditionally collected by research vessels, but at much less expense.
- GIS mapping and assessment technology allows managers to understand potential interactions and impacts of multiple ocean uses on specific ocean habitats and resources.

<u>*SUMMARY RECOMMENDATIONS*</u>

With regards to ***improving accurate and timely catch data*** *in fisheries management, MAFAC recommends the following:*

- NOAA should increase its funding for research into improving stock assessments in every budget cycle.
- NOAA's investment in timely, reliable data and predictive modeling capacity for living resource management should increase to match the societal value of the living resources under NOAA's stewardship.

With regards to ***research to improve harvest efficiencies and habitat protection****, MAFAC recommends the following:*

- NOAA should prioritize to implementation of technological innovations that increase fishing efficiency and timely data reporting while decreasing fishing impacts on habitat and non-target species.
- The regulatory process should be streamlined to allow for the ability to switch to more species specific and habitat friend gear types.
- NOAA Fisheries and the commercial fishing industry should continue to develop industry partnerships such as its Cooperative Research Programs and By-Catch Reduction Engineering Programs.
- Onboard electronic /video observing and reporting of catch should be implemented as soon as possible, and, in the interim, that NOAA implement a uniform policy and that NOAA pay for the cost of observers aboard vessels at sea. In fact, greater investment in

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video observation may reduce costs of on board observers, resulting in an overall cost savings for NOAA.

*With regards to **cooperative research**, MAFAC recommends the following:*

- NOAA should strengthen its science partnerships with other agencies, universities, marine research entities, and fishermen.
- For every research cruise NOAA look to contract with the commercial fishing fleet to use vessels as platforms and to retain commercial fishermen in the project design, implementation and execution as appropriate.

*With regards to **assessing ocean conditions**, MAFAC recommends the following:*

- Congress must adequately fund NOAA Fisheries' science and technology programs, in order to increase: protection and conservation of marine living resources, understanding of the ocean environment, effective fisheries management, and benefits for fishermen and fishing communities.

PROGRAM AREA 3: PROTECTED RESOURCES

RELATED TRENDS AND FINDINGS:

The conservation of marine turtles in U.S. waters and on U.S. beaches continues to be jeopardized by activities in other nations and on the high seas.
Cooperative gear research and innovative fishing gear modifications hold the potential to reduce incidental take of marine turtles. However, sea turtle protection in U.S. waters alone is insufficient to ensure species recovery. International treaties and agreements and national laws protect marine turtles, however harvest of eggs and adults and incidental capture in fishing gear continue to threaten recovery worldwide. Meanwhile, better information about biology, distribution, population status and threats allows revised U.S. recovery plans to focus on effective management efforts.

Warming ocean water, ~~and~~ acidification, pollution and ~~may~~ sedimentation~~-~~ place many coral species at risk, with few management tools able to effectively protect against these threats.
Coral~~s~~ reefs around the world are threatened by a swarm of ~~interrelated~~ conditions, some related to ocean warming and acidification (e.g., disease~~,~~ and bleaching), other related to coastal pollution (~~and~~ e.g., algal smothering and sedimentation), and some the result of overharvest of herbivorous fish. ~~.~~ Stressed corals are less resilient and slower to recover from natural disturbances[4]. Current and future petitions to list coral species as threatened or endangered in U.S. waters will require intense effort to determine the status of many poorly studied coral species. Furthermore, traditional ESA recovery and protection processes, including consultation on and regulation of the potential effects of fishing of coral species may be inadequate to protect corals from pollution, sedimentation, ocean warming and acidification.

Comment [PD6]: PC: maybe little to do with warming or acidification.

[4] "Confronting the coral reef crisis. "D. R. Bellwood**1**, T. P. Hughes**1,2**, C. Folke**3,4** & M. Nystro¨m**3** NATURE | VOL 429 | 24 June 2004 | Climate Change, Human Impacts, and the Resilience of Coral Reefs. T. P. Hughes,1* A. H. Baird,1 D. R. Bellwood,1 M. Card,2 S. R. Connolly,1 C. Folke,3 R. Grosberg,4 O. Hoegh-Guldberg,5,J. B. C. Jackson,6,7 J. Kleypas,8 J. M. Lough,9 P. Marshall,10 M. Nystro¨m,3 S. R. Palumbi,11 J. M. Pandolfi,12 B. Rosen,1, J. Roughgarden14. SCIENCE VOL 301 15 AUGUST 2003

The pace of new finfish species listings is accelerating with 10 species listed since 2000 and many more under consideration.
As a group, the Pacific salmonoids face threats related to dams, water diversions, depleted flows, inaccessible habitat, land uses that degrade habitat, entrainment, disease and genetic issues. Potential recovery actions have complicated social and economic costs. At the same time, experimental dam removals are showing strong potential for salmon recovery. Other listed finfish species declined from overfishing historically, but now face threats from incidental catches, habitat loss, dams and water control structures, and flow alterations.

The primary human-related threats facing marine mammals have changed over the past 100+ years.
Intentional killing (e.g., to reduce depredation on fish) and over-harvesting (for oil, meat or pelts) account for the population declines that resulted in threatened or endangered status for most of the marine mammals currently listed. More recently, incidental take (by-catch) and habitat degradation have become the primary human-related threats facing marine mammal populations.

Comment [hbl7]: Add recognition about cultural take

Number of protected species managed by NOAA, and the costs of management, is increasing.
The number of marine species listed as endangered or threatened species continues to rise, and with each new listing comes new management responsibilities pursuant to the Endangered Species Act. Choosing the correct taxonomic or population unit for evaluation is challenging and contentious, and the trend has been to split species into smaller and smaller units (e.g., a single pod of killer whales, AT1, is listed as a depleted population stock under the Marine Mammal Protection Act). In addition, as threats to some species increase, and as their populations decline, there is an increased likelihood of citizen petitions proposing new listing, and litigation over those petitions. Conversely, few species reach the point of delisting. As a result, implementation of the ESA becomes increasingly expensive. As citizen suits and court orders eventually lead to additional species conservation mandates, and assuming that budgets remain steady or decline, ESA implementation will require an increasingly large percentage of the overall NOAA budget.

Managers face difficult choices between protecting listed species and avoiding fishery closures.
As listed species numbers increase, so too does the risk increase that fisheries interacting with those species will face seasonal or area closures, to avoid jeopardy to the protected species. Closures, however, prove highly controversial due to their harmful economic consequences.

The regulatory burden can fall disproportionately on fisheries when protected species threats are macro-level oceanic changes.
Some of the increase in listed species will, inevitably, be attributable to macro-level oceanic changes associated with climate change, sea level rise, and ocean acidification. In some cases (for example, sensitive and rare coral or estuarine species) these problems may serve as the overwhelming reason for listing a species as endangered or threatened. Once listed, even though fishery interactions with that species might account for only a small percentage of the overall impact to a species, the limitations on take of species, and the need to avoid jeopardizing the continued existence of a listed species could require the fisheries to bear the burden of increased regulation, or even closures, despite the limited contribution of the fisheries to the overall problem.

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Aquaculture can play a role in protected species management.
As species become rarer, and as listed species face extinction, additional intervention may be necessary, such as the increased use of hatcheries or captive breeding. On the other hand, aquaculture has been cited as a potential threat to protected species through disease transmission and genetic introgression. For example, NOAA is currently considering whether to list the queen conch as a threatened or endangered species; yet that species is already the subject of aquaculture research.

The regulatory process surrounding listed species can be slow and burdensome.
Stakeholders, such as scientists needing scientific research and enhancement permits and others requesting incidental take authorization, have at times complained that the regulatory process is slow and burdensome, even for beneficial conservation biology oriented efforts. NMFS scientists are among those whose research and conservation activities have been delayed or derailed by an overly burdensome and at times capricious permit process. In May 2012, the U.S. Fish & Wildlife Service entered into an unprecedented agreement with the Florida Fish & Wildlife Commission pursuant to Section 6 of the Endangered Species Act. One aspect of that agreement allowed state-issued permits to satisfy federal legal requirements as well, thereby streamlining the regulatory process and reducing the workload burdens for both the government and the regulated community.

SUMMARY RECOMMENDATIONS

*In regards to the management of **protected resources**, MAFAC recommends the following:*

- NOAA should continue research on protected species, distribution, population status and threats, emphasizing cooperative gear research and innovative fishing gear modifications to reduce incidental take of protected species.
- NOAA should partner with federal and state agencies to remove structures and restore habitats and freshwater flows essential for the recovery of anadromous species listed as threatened and endangered.
- Absent statutory changes, staffing and budget for protected resources will need to increase. Alternatively, NMFS should plan to increase its use of the "warranted but precluded by higher priorities" designation; however, use of this latter approach means accepting the potential for decline or even extinction of the unprotected species.
- NMFS should engage in proactive measures to prevent species from becoming listed in the first place. For example, increased investment in by-catch reduction, and greater understanding of catch and release success, might reduce the growth in listed species.
- NMFS should increase transparency and scientific rigor in the selection of appropriate marine mammal conservation units for consideration under the Endangered Species Act in order to avoid either over- or under-protection.
- NMFS should educate the regional public about newly listed species, to increase awareness and to help the public and the stakeholders better understand regulatory decisions (e.g., fisheries closures) that may follow.
- To the extent possible, NMFS should avoid regulating the fishery where the real cause of the problem is elsewhere. However, if the Endangered Species Act forces this result, NMFS should use the opportunity to educate the public on how our inaction

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regional and global climatological threats is having real and immediate impacts to people and their local economies.

- NMFS scientists in the Protected Resources Division should increase their interaction with aquaculture scientists to determine criteria and threshold conditions under which industry techniques could be used in proactive conservation aquaculture initiatives to benefit protected resources.
- NOAA should clarify the potential role of aquaculture in species recovery and provide criteria for identifying the threshold conditions to consider hatchery and captive breeding interventions.
- To reduce the permitting workload for Protected Resources division, and to ease the regulatory process for stakeholders, NOAA Fisheries should pursue agreements with agencies from coastal states (such as the cooperative agreement between the USFWS and FWS in Florida) and seek other ways to streamline regulations to improve the process for obtaining permits.
- NOAA should put more effort into removing species from the endangered list (e.g., sperm whales) where appropriate to highlight their successes.

PROGRAM AREA 4: HABITAT CONSERVATION

RELATED TRENDS AND FINDINGS.

Essential Fish Habitat

Ensuring the availability of suitable fish habitat is an essential part of maintaining healthy fish populations and should be considered an integral component of effective fisheries management. The importance of fish habitat is recognized by society in myriad ways including, but not limited to, the habitat protection mandate contained in numerous federal and state acts, and the establishment of the National Fish Habitat Partnership – a broad network of regional partnerships focused on the conservation (including the protection, restoration and enhancement) of habitat of the nation's fish and aquatic communities.

NOAA has a particularly important role in leading the nation's efforts to conserve coastal, marine, and riverine habitat, which are among some of the most biologically rich and economically valuable areas on Earth. The Magnusson Stevens Act recognizes the importance of habitat and directs NOAA and the fishery management councils to identify the essential habitat for every life stage of each federally managed species using the best available scientific information. Once EFH has been designated, NOAA uses its authority to minimize the impacts of activities that threaten to alter, damage, or destroy these habitats. Through coordination, consultation, and recommendations NOAA works to minimize the impact of Federal and state agency actions that fall outside of its authority and that may adversely affect EFH.

EFH is one of NOAA's primary, yet underutilized, tools for conserving fish habitat. EFH is intended to recognize habitat that is most important for the productivity, and therefore sustainability, of fish populations and distinguish it from all habitats potentially used by the species. In order to realize the full potential of EFH as a fisheries management tool NOAA must invest in scientific studies that shed light on the functional relationship between habitat types and fish population productivity. The importance of scientific information for effective habitat

management was contemplated in the development of the MSA, which called for Councils to organize information on the habitat requirements of managed species using a four-tier, ranging progressively from basic information about the distribution of a species (level 1), to habitat specific production rate information (level 4). While EFH identified with Level 4 information would indeed represent the most important for the productivity of a species and allow managers to readily incorporate habitat into fishery management plans, it is the least available information. In fact the vast majority of EFH designated to date uses level 1 information, which hinders NOAAs ability to persuade, via coordination and consultation, other state and federal agencies to modify potentially impactful actions.

Continued loss of wetlands throughout the United States.
In spite of a mandate under the Clean Water Act for no net loss of wetlands, the United States has lost 32,00 acres per year since 2004 (Source: Status and trends of wetlands in conterminous United States 2004-2009.) Degradation of wetlands is one of the main causes of reduced fishery production.

Summary recommendations:

- By 2020 at least 50% of EFH designations should be based on level 3 or 4 of information EFH final rule (**Federal Register** / Vol. 67, No. 12 / Thursday, January 17, 2002) , that are based on habitat specific productivity of fish stocks.
- The federal government must enforce the Clean Water Act and stop wetland destruction in order to further support the rebuilding and protection of U.S. fisheries.

PROGRAM AREA 5: AQUACULTURE

RELATED TRENDS AND FINDINGS

Aquaculture production will continue to grow.
Global aquaculture has increased from 3.9 percent of total food fish production (by weight) in 1970 to 27.1 percent in 2000, and to 45.7 percent in 2008[5]. Globally, aquaculture is growing at an average rate of 8.3 percent per year, more rapidly than all other food-producing sectors. Aquaculture production will soon eclipse the contribution of capture fisheries to the worldwide food supply.

Today, domestic aquaculture provides only 5 percent of US seafood supplies and only 30 percent of that is of marine origin[6]. Foreign aquaculture production composes 55 percent U.S. fish imports—(primarily shrimp, salmon and tilapia). Total U.S. aquaculture is valued at about $1.2 billion annually[7], representing only 1.2 percent of global fish and shellfish production.

[5] *State of World Fisheries and Aquaculture, 2010*. FAO Report, http://www.fao.org/docrep/013/i1820e/i1820e.pdf.
[6] 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/docaqua/presentations/aa_offshorepanel_files/rubino_aa_06.pdf.
[7] 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

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According to the UN Food and Agriculture Organization[8], global aquaculture production will need to double by the year 2030 to maintain current worldwide per capita fish consumption. A significant expansion in the U.S. aquaculture production of fish and shellfish is needed to meet increasing domestic and international demand, and decrease the U.S. seafood trade deficit.

A robust domestic aquaculture industry ~~should be part of the future of~~ could significantly augment U.S. ~~marine fisheries to~~ seafood production and would help meet the increasing demand for seafood products. Increased domestic aquaculture production ~~will~~ would reduce our reliance on foreign sources of seafood, help reduce the ~~United States'~~ our national $10 trillion ~~dollar~~ seafood trade deficit, create jobs and improve food security. The following considerations should be kept in mind when growing aquaculture production in the U.S.:

- Domestic aquaculture products are produced under some of the most stringent food-safety and environmental regulations in the world.
- Increased availability of domestically produced aquaculture products will enhance consumer confidence and improve public health.
- The major obstacles to increased production of marine aquaculture products in the U.S. are permitting and regulatory roadblocks, as opposed to technical or financial challenges.
- There is no current legislative authority to grant aquaculture leases for federally managed species in federal waters, preventing aquaculture development outside of state waters and in the Pacific territories where the EEZ extends to the shore.

SUMMARY RECOMMENDATIONS

*In regards to increasing the role of **aquaculture** in the United States, MAFAC recommends the following:*

- The United States ~~must prioritize advancement of~~ should continue to support a domestic, environmentally-sound aquaculture industry for the production of safe and healthy seafood ~~to create jobs and support coastal communities, to strengthen important commercial and recreational fisheries, and to help restore species and habitat~~ [MLE].
- Wild fish stocks must be protected from genetic pollution [and the spread of disease] from ocean and estuary penned aquaculture farms.
- NOAA should work with federal and state partners to identify ways to streamline permitting, eliminate regulatory redundancy and uncertainty, and clarify policies to encourage private investment in sustainable production systems.
- The Department of Commerce and NOAA should implement the priorities of the 2011 department and agency aquaculture policies and establish a national framework for the expansion of sustainable domestic aquaculture.
- ~~The U.S. Government should prioritize aquaculture in grant and other financial assistance considerations.~~ (MLE)

Comment [PD8]: MLE willing to remove

Comment [PD9]: BR: These protections are already embodied in US laws and regulations, as well as state regs. We could say we support the continuation of these regulations, but that is implicit and redundant.

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[8] *State of world aquaculture 2006*. FAO Fisheries Technical Paper 500. Rome 2006. ftp://ftp.fao.org/docrep/fao/009/a0874e/a0874e00.pdf.

- ~~The domestic aquaculture industry should be eligible for financial and technical support similar to that available to the American agricultural industry.~~ [MLE]
- NOAA should provide continuous, comprehensive monitoring of marine aquaculture sites to safeguard wild stocks and minimize environmental impacts, enforce existing regulations and implement regulations that will meet these goals. ~~This can be accomplished through existing U.S. laws and regulations at the state and federal levels.~~
- NOAA should work with lawmakers to craft legislation establishing a regulatory framework to allow aquaculture leases in federal waters, or establish a workable leasing mechanism through the regional Fisheries Management Councils. [BR]

Comment [hbl10]: Request for discussion at MAFAC.

PROGRAM AREA 6: ENFORCEMENT

The NOAA Office of Law Enforcement is responsible for carrying out more than 35 federal statutes, including the Magnuson Stevens Act, Endangered Species Act, Marine Mammal Protection Act, National Marine Sanctuary Act, and the Lacey Act. The agency's jurisdiction spans more than 3 million square miles of open ocean, more than 85,000 miles of U.S. coastline, the country's 13 National Marine Sanctuaries and its Marine National Monuments. It's also responsible for enforcing U.S. treaties and international law governing the high seas and international trade.

RELATED TRENDS AND FINDINGS

There is a lack of trust by fishing industry in NOAA enforcement.
Although fishing regulations are complex, in some regions NOAA, in at least the past decade, has appeared overly rigid and inconsistent in its interpretation and application of provisions of regulations. This has contributed to a sense of lack of trust by the fishing industry in NOAA enforcement. It will take more than a year or two for this perception to change.

A 2010 Inspector General Report evaluated the current state of NOAA's enforcement program.
In a Final Review of NOAA Fisheries ~~on~~ Enforcement Programs and Operations (U.S. Department of Commerce, Office of Inspector General, September 2010) multiple complaints from the commercial fishing community were confirmed to have a legitimate basis in fact regarding discriminatory and inconsistent enforcement of fishery violations and imposition of fines and penalties throughout the nation. The Inspector General also reported that NOAA had taken multiple measures to improve its fisheries enforcement program with needed transparency and accountability. These include the following immediate actions and longer term strategies, including:

- The improvement of NOAA leadership and management in enforcement and litigation,
- Requiring high-level review of all proposed charges for alleged violations and of all settlements by the General Counsel for NOAA,
- Development and implementation of new penalty policies and better internal financial controls,
- A plan to provide greater outreach to fishermen and fishing communities.

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NOAA has undertaken numerous steps in response to the IG's report. In April 2012, NOAA released its National and Division Enforcement Priorities for 2012. This report was a follow-up to the National Enforcement Summit in August 2010. Although national priorities remain the same (to support sustainable fisheries and safe seafood, and to support healthy marine and coastal species and habitat), the report reflects significant regional differences as to which regulations and statutes should take precedence in enforcement efforts.

With the increase in catch share programs and other complicated fisheries management plans, the need for fair, efficient and reliable enforcement will be important.
Stakeholders will need to have confidence in enforcement practices in order to buy into new management plans. Because of the complicated nature of these new programs, the penalties for violations need to be carefully measured. Enforcement will need to be able to answer stakeholders question in a timely and accurate manner, and effective and efficient enforcement mechanisms (including electronic systems) must be developed. NOAA's enforcement division needs to have the trust of all stakeholders that it is operating in an evenhanded and equitable way.

SUMMARY RECOMMENDATIONS

*In regards to **enforcement programs** required in fisheries management, MAFAC recommends the following:*

- NOAA should recommit to changing the perceived culture of unfairness in some divisions in the agency and also commit to restoring integrity to its enforcement procedures. Regional administrators could be instrumental in providing a positive interactive environment between ocean resource users and enforcement personnel
- NOAA should to commit agents to be involved in the regional fishery management councils and outreach into the fishing communities, and to build upon the positive changes being implemented by the agency.
- Change takes time, and continued commitment to improvement in enforcement is needed and across future administrations to affect lasting change.
- In order for LAPP and other management tools to work in achieving sustainability, NOAA Enforcement needs to develop cost effective and dependable electronic monitoring programs.
- Enforcement should provide reliable and timely answers to regulatory questions and reach out to stakeholders by relaxing penalties for first time offenses that lack intent.

PROGRAM AREA 7: SEAFOOD SAFETY AND INSPECTION

RELATED TRENDS AND FINDINGS

Consumer demand for safe fish and shellfish continues to grow.
Consumers must have confidence in the safety, quality, and labeling of seafood products worldwide. Global marine capture fisheries have plateaued at approximately 80 MMT, however,

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global fish consumption has doubled since 1973[9]. This trend is most apparent in countries with rapid growth in population and income. Fish and shellfish provide 25 percent of protein in developing countries, but only 13 percent in developed countries. China, where population, income growth and urbanization are major factors, has recently become a net importer of fishery products. (cite?)

Seafood consumption is increasing in the U.S. on a per capita basis.
In 2010, Americans consumed 15.8 pounds of seafood (edible weight) per person, a slight reduction of 0.2 pounds per person from the 10-year average of 16.0 pounds per person. However, the per capita use of all edible and industrial fishery products in 2010 was 63.6 pounds, up 2.1 pounds compared with 2009. Increased public awareness of the health benefits of seafood and fish oil in the diet will likely maintain this trend[10].

Summary Recommendations

*In regards to the **seafood demand, supply and safety**, MAFAC recommends the following:*

- NOAA should continue to document and communicate the wide array of public health benefits of seafood.
- NOAA should seek commitments from industry and governments worldwide to strengthen seafood safety programs and ensure accurate labeling.
- NOAA should support cooperative international food safety and policy initiatives efforts through the United Nations/World Health Organization's Codex Alimentarius.
- NOAA should support the federal government's free trade policies for seafood and aggressively seek to eliminate tariff and non-tariff trade barriers through the World Trade Organization, bilateral and multilateral agreements.
- NOAA should enhance seafood safety and human health through improved inspection, enforcement, research, outreach and education.
- NOAA should take action to support the 2012 Safety and Fraud Enforcement for Seafood Act (SAFE Seafood Act).

Comment [hbl11]: Potentially rephrase to focus on the issues addressed in the act.

Cross-Cutting Area 1: Changing Oceans

Related Trends and Findings

Climate Change is leading to changing ocean conditions and negative impacts on estuarine environments.
For fisheries managers, global climate change presents an especially challenging problem because of rising sea levels, ocean acidification, ocean warming and subsequent effects on coastal estuaries. In has been reported that fish populations are shifting with temporal zones and

[9] *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

[10] *Fisheries of the U.S., 2010*. NMFS Current Fisheries Statistics No. 2010. (2011).

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in some cases moving toward the poles[11,12]. In the U.S., as fish populations shift the management of those species under the regional fisheries management councils can become increasingly challenging[13]. The future extent to these of these spatial shifts is currently unknown, along with the potential impacts on fishing communities. In addition, the acidity of the world's ocean has increased 30% over the past century and this change in ocean chemistry is impacting organism with calcium carbonate exoskeletons and associated ecosystems[14]. Determining which -of the physical and biological effects in the marine environment are likely to have the largest socioeconomic impacts on commercial and recreational fisheries will be important in guiding research resources to their most efficient use, and will aid in developing an adaptation and mitigation strategy.

~~In addition~~Finally, rising sea levels are having a visible impact on estuarine environments around the U.S. albeit at different rates[15]. For example, rates of sea level rise are increasing three-to-four times faster along portions of the U.S. Atlantic Coast than globally[16]. Natural tidal marsh accretion is not keeping pace with sea level rise, causing a loss of marsh and estuarine ecosystems, which serve as nurseries for many marine species and are vital to many recreational and commercial fisheries.

NOAA needs to fully understand what effects changing oceans and rising sea levels will have on the ocean, fish and other marine organisms, habitat, and the marine environment and plan for future adaptation needs.

Changing conditions in the Arctic will focus attention on development of both fishery and non-fishery resources.

As of September 2012, Arctic sea ice appeared to have reached its minimum extent for the year of 3.41 million square kilometers (1.32 million square miles). This is the lowest seasonal minimum extent in the satellite record since 1979 and reinforces the long-term downward trend in Arctic ice extent[17]. Recent models indicate an accelerating decline in the summer sea ice during the 21st century, with the potential loss of ice by 2037[18]. This potentially drastic change will have an impact on the management of the resources in the Arctic, including fisheries management. For example, the North Pacific Fishery Management Council has already declared the EEZ waters in the Arctic Ocean under their jurisdiction as closed to commercial fishing. If fish stocks in the Aleutian Islands continue a northward extension of their range into Arctic

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[11] Nye JA, Link JS, Hare JA, Overholtz WJ (2009) Changing spatial distribution of fish stocks in relation to climate and population size on the Northeast United States continental shelf. Mar Ecol Prog Ser 393:111-129

[12] Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds. Climate Change 2007: Impacts, Adaptation and Vulnerability: Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. M.L. Cambridge University Press, Cambridge, UK, 976 pp

[13] Link, Jason S; Nye, Janet A; Hare, Jonathan A. Guidelines for incorporating fish distribution shifts into a fisheries management context. Fish & Fisheries. Dec2011, Vol. 12 Issue 4, p461-469.

[14] National Research Council. *Ocean Acidification: A National Strategy to Meet the Challenges of a Changing Ocean*. Washington, DC: The National Academies Press, 2010.

[15] E. Robert Thieler, Jeff Williams, Erika Hammar-Klose. National Assessment of Coastal Vulnerability to Sea-Level Rise. Woods Hole Field Center, Woods Hole, MA http://woodshole.er.usgs.gov/project-pages/cvi/

[16] Sallenger Jr., AH, Doran KS & Howd PA. Hotspot of accelerated sea-level rise on the Atlantic coast of North America. *Nature Climate Change*. (2012) doi: 10.1038/nclimate1597.

[17] National Snow and Ice Data Center, September 19, 2012

[18] Wang, M., and J.E. Overland (2009): A sea ice free summer Arctic within 30 years? *Geophys. Res. Lett.*, *36*, L07502, doi: 10.1029/2009GL037820

waters, and the Arctic is closed to commercial fishing, then these fish stocks of Aleutian Islands-origin would potentially remain unharvested. Changes in the Arctic ~~will~~ may allow for fisheries development and non-fishery resource development by 2040 and will require planning ~~and vigilance to maintain policies that maintain and~~ to support environmental sustainability.

SUMMARY RECOMMENDATIONS

In regards to ***changing oceans and estuaries****, MAFAC recommends the following:*

- Changing ocean conditions will inherently require adaptive management approach, with periodic reevaluation and adjustment as necessary to maintain sustainable marine ecosystems and protect coastal communities dependent on these resources.
- These issues, and especially any efforts at mitigation and adaptation, cannot be left to a disconnected set of local solutions. Regional, national and international planning and management is needed.
- NOAA needs to ~~gather the necessary data to measure~~fully understand the rate and impact of sea level rise and the trend in ocean warming and acidification, which varies across the U.S. ocean regions. NOAA should also measure the impacts of these changes on living marine resources and their habitats.
- NOAA Fisheries, in coordination with regional fishery management councils, should develop an approach for managing fish stocks that may shift across council jurisdictions.
- NOAA should ensure habitat conservation programs are adequately funded and allow for sea level rise adaptation.

Comment [PD12]: PC: Already has the data, no net increase in acceleration of SLR

Comment [PD13]: PC: Projected rise In acidificaiton less than the diurnal change

CROSS-CUTTING AREA 2: OCEAN GOVERNANCE

RELATED TRENDS AND FINDINGS

Demands will increase for additional data and science necessary to support ecosystem-based management.

Based on the current trend, ecosystem-based approaches to management will be the norm and not the exception by 2040. The ecosystem-based management approach is defined as management that is adaptive, geographically specified, takes account ecosystem knowledge and uncertainties, considers multiple external influences, and strives to balance diverse societal objectives. It must be based on high quality and 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. [fr appen]

In addition, 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. Using these tools, techniques, and ecosystem indicators, as well as programs such as marine spatial planning, NOAA Fisheries and state and regional management

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partners will simultaneously be considering multiple objectives and ocean uses, identifying risk factors and uncertainty, and forecasting the cumulative environmental impact of policy choices.

Water quality and sustainable practices on land will grow in importance.
The connection between the ocean and land reaches far beyond the coastline. The health of the ocean depends in part on the health of its estuaries, which in turn depend on the water quality of freshwater flows. As a result, activities on lands that alter freshwater quality and the quantity and timing of freshwater flows can have substantial effects on coastal estuaries and the ocean. In particular, nitrogen from municipal effluent, as well as nitrogen and phosphorus that enter waterways from dispersed or nonpoint sources such as agricultural and urban runoff create threats of eutrophication, algal blooms, dead zones, habitat loss, and other adverse impacts to fish, shellfish, and living marine resources.

Implementation of the Clean Water Act, which regulates watershed pollution, continues to move slowly, while also growing increasingly complicated. The process of improving water quality can take decades, requiring the development of scientifically appropriate water quality standards, and implementation of technologies and best management practices to achieve compliance with those standards. While point source pollution can be regulated through permit conditions, there are greater difficulties regulating non-point source pollution, and it requires greater creativity, especially for agricultural pollution. In fact, the adverse water quality consequences of non-point source pollution from intense land-based agriculture may cause greater environmental impacts than even point source pollution from coastal or ocean based aquaculture operations. In some cases, such as shellfish aquaculture, marine-based food production may even be beneficial for water quality.

SUMMARY RECOMMENDATIONS

*In regards to changing **ocean governance**, MAFAC recommends the following:*

- Coastal and ocean habitat protection must be a primary concern of fishery managers as a basic requirement for robust and sustainable fish stocks.
- 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. Adequate funding must be appropriated in order for this to be achieved.
- NOAA should continue to provide coastal municipalities with encouragement, and funding or technical expertise as appropriate, to develop improved technologies for preventing and treating agricultural and urban runoff. In addition, NOAA should engage in greater coordination with the U.S. Environmental Protection Agency as it develops policies and regulations to abide by the Clean Water Act or to address ocean acidification.
- NOAA should establish itself as an unequivocal source of unbiased peer-reviewed scientific information.
- In a coordinated effort with the U.S. Department of Agriculture, and the U.S. Environmental Protection Agency, NOAA should engage in selected studies to compare the environmental impacts of terrestrial agriculture against marine aquaculture.

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APPENDICES

Comment [hbl14]: Review info in each appendix, consider for inclusion in the main document, in consideration of potentially deleting the 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, circulated their proposal to the full committee, the concept and categories were unanimously accepted, and a draft report was subsequently prepared.

The draft report was discussed at 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 the public input was reviewed and the report was revised to reflect the accepted comments. That final report reflected the input of all MAFAC members as well as input from various stakeholders.

In 2009, MAFAC undertook an update of *Vision 2020* in light of the evolving changes in fisheries management and national ocean policy direction. The proposed additions and revisions of a small working group did not progress to a full Committee discussion and acceptance. Many of these changes, however, have been adapted for inclusion in this proposed *Vision 2040* document.

In 2011, MAFAC agreed that a more comprehensive and longer-range revision of the original *Vision 2020* was in order, and work was begun by an ad hoc working group. The changes suggested by members of that subcommittee are included in this document, which is renamed *Vision 2040*. It was finalized in _____, 2012,……..

Comment [hbl15]: This is a short history of what has been done so far --a more comprehensive summary of the Vision 2040 process/work can be included.

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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, of increased incomes 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[19]. Research is expanding our understanding of the health benefits of a diet rich in seafood[20]. 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.

Comment [KM16]: Possible to update? This was 8 years ago.

Comment [HBL17]: Accurate?

Preferred State in 2040: 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~~Some consumers are concerned*** ***concerned regarding the safety of aquatic foods due to chemical and biological hazards.*** ***~~The public lacks the necessary understanding of the~~Consumers need to be educated in regard to*** ***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 contamination. Seafood safety

[19] *State of world aquaculture, 2006*. FAO Report: *op. cit.*

[20] See for example web sites of Seafood and Health Alliance http://www.seafoodandhealth.org/ and National Seafood Educators http://www.seafoodeducators.com/home.html

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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 2040: 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 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.

Comment [KM18]: Accurate labeling of seafood products

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.

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APPENDIX III. COMMERCIAL FISHING

The U.S. commercial fishing industry depends upon the long-term sustainability of fishery resources and their ecosystems, contributing 70 billion annually to the nation's economy along with yielding 32 billion in income from 1million Jobs. (http://stateofthecoast.noaa.gov/com_fishing/welcome.html). 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: As of 2012, (insert number) of the federally managed commercial species have established annual catch limits. Only (insert number) species remain in the overfished designation. ~~Some marine fisheries continue to be under stress from over exploitation, habitat degradation, or both.~~ Various factors, both natural and human-related, affect the status of fish stocks and their ecosystems. Such factors may include: environmental changes, ~~pressure from~~ commercial and recreational fishing effort, introduction of hatchery species, aquaculter, 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[21]. However, to reach and harvest sustainably at this level, current efforts to rebuild stocks must be extended to all over-fished stocks and rebuilding completed. Efforts to reduce, or control and account for, by-catch and mortality must be encouraged and increased. ~~To help meet demand, bycatch and unaccounted mortality need to be reduced to help meet conservation goals.~~ Harvest and landing 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, where possible, ~~must~~ may be rationalized to help maintain sustainability and protect the ~~elimination~~ stakeholders and communities ~~("the race for the fish")~~. All these measures will be required to achieve optimum yield by 2040.

Comment [KM19]: 1999?!

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 the current management of 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 fishery stocks and to rebuild depleted stocks to meet the potential long term yield and consumer demand for fish products.

Comment [HBL20]: Reference? Accurate?

Comment [HBL21]: Reference? Accurate? I thought it was 80 – see page 5

Comment [HBL22]: Reference? Accurate?

Preferred state in 2040:

[21] *Our Living Oceans: Report on the Status of U.S. Living Marine Resources, 1999*. NOAA Report, http://spo.nwr.noaa.gov/olo99.htm

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(a) Our Nation's fisheries are actively being rebuilt and are at or approaching sustainable ~~goals~~levels.
(b) ~~Technological~~Catch share programs, technological advancements and market demands have resulted in reductions in undesired by-catch and discards and have increased use of marketable underutilized species.
(c) Our U.S. fisheries are close to achieving long term potential yield.
(d) Coastal commercial infrastructures are 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 2040.
(d) Data used for managing marine fisheries must be of high quality, 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 (HMS) 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 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 RFMOs themselves are considering means to make the international management of highly migratory fish stocks more effective.

Preferred State in 2040: 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.

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Issue Statement 3: ***From 1976 to the mid 90's, many federal fishery management policies allowed unrestricted growth and effort in the commercial fisheries.*** ~~***Over-capitalization has been and continues to be a serious concern in a number of U.S. fisheries. Too many fishermen competing for too few fish has resulted in more restrictive, highly complex, and often ineffective management regimes. Increased effort (capitalization), coupled with other factors has increased operating costs. The result has been lower net economic returns in a number of commercial fisheries.***~~

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Background: U.S. commercial landings were relatively stable at about three million tons per year from 1935 to 1977 when the U.S. extended its jurisdiction out 200 miles from the shore. With the passage of the Fishery Conservation and Management Act in 1976 and other policies, the federal government provided incentives to rehabilitate and expand 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. (such as? Need some actual examples, here. One example is the Capital Construction Fund, which allows fishermen to purchase new, or reconstruct older vessels using tax deferred money.) The goal of these incentives was to ensure full domestic utilization. Since 1977, landings have more than doubled. However, for ~~many~~ some fisheries fishing effort grew more rapidly than was sustainable, resulting in overcapacity and in some cases overfishing.

Comment [HBL23]: Better metric?? Reference?

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.

Although there is now an overarching policy, the transition from traditional management to LAPPs and catch share programs has proven problematic in some regions. Implementation of some catch share programs occurred without the attendant accountability measures such as socioeconomic analysis of the effects of catch shares ~~and observer programs in Gulf fishing communities which could result in catch and bycatch data that is unusable or misleading~~.

Comment [KM24]: Gulf of Alaska? Gulf ratz? Not implemented but now back on the table. How is a socioeconomic analysis an accountability measure? This section is confusing.

Preferred state in 2040: By 2040 we will have achieved rebuilding of sustainable fish populations while maintaining productivity and biodiversity. This will result in increased biomass, greater harvesting and processing opportunities for domestic fisheries, and increased supply to consumers. Fishing capacity will sustain efficient and sustainable harvest of domestic fisheries, provide greater economic returns to participants, and result in greater community resilience in fishery-dependent coastal communities.

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 over-capitalization.

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(2) Match fishing capacity to sustainable harvest levels through the use of LAPPs, catch shares, industry or government-funded buyback programs, and other appropriate mechanisms.

(b) Adequate resources should be secured to ensure appropriate accountability and enforcement of LAPPs and catch share programs currently implemented, along with robust stock assessments needed to manage LAPP fisheries.

(c) Periodic evaluation of the effectiveness of individual catch share programs should be undertaken to determine the effect on stock sustainability; community resilience; and past, present, and future participants,

Comment [KM25]: MSA requires 5 year reviews

Issue Statement 4: Technology offers myriad 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 include 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 catch 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 and catch shares share programs have mandated the use of vessel monitoring systems (VMS) as a monitoring tool. VMS, or onboard satellite tracking systems, provide managers increased flexibility in developing management measures that can be adequately monitored and enforced. Electronic monitoring (video) can also replace or supplement human observers where appropriate, allowing for greater cost effectiveness and in some cases improved data quality.

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 and mortality of non-target species, and reduce impact of fishing gear on ocean habitat. In addition, commercial fishermen currently work cooperatively with scientists to assist in stock assessments, and identification of critical habitat. The projects are numerous and ongoing, such as: improvements to turtle excluder devices (TEDs) in shrimp trawls, chain modifications to reduce flatfish by-catch in the scallop fishery, modified foot-ropes to reduce bottom contact,; development of excluders to reduce salmon and halibut by-catch in trawl groundfish fisheries, 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 2040: By 2040, advances in technology will not only result in more sophisticated products, but also the application of the technology can be used for scientific

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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 or video equipment that enhances stock assessment capabilities. Also, programs that equip fishing vessels with ocean monitoring equipment are greatly expanded. as are the data transmission capabilities of the vessels. 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 by-catch 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 By-catch Reduction Engineering Programs.

(c) NOAA should help develop electronic monitoring technologies to improve management efficiencies and ~~removeremove~~reduce the need ~~forr~~for ~~emove~~ human observers for better cost effectiveness where possible.

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APPENDIX IV: RECREATIONAL FISHING

Issue Statement 1: Growth in coastal populations and 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[22], an estimated 153 million people lived in coastal counties in 2003. This 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, 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.

Comment [HBL26]: Update references where possible.

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.*, fishing mortality), all else equal. By 2040, 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 increases, improved monitoring will be necessary to assess fishing effort and catch. The national saltwater angler's registry will be a necessary tool collecting data.

Comment [HBL27]: Still accurate to 2002?? Should this be estimated through 2040? Likely would not equal 3%/yr that far out.

Preferred State in 2040: Many recreational species have limited population growth rates and are too valuable to be caught only once. By 2040, 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 2040, angler satisfaction is derived from the recreational fishing experience rather than the take or "kill" of fish. To achieve optimum yield, adaptive management measures such as temporary reallocation of quota is available to managers. For example, if commercial quota is not harvested, managers are able to temporarily 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.

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[22] *Population Trends along the Coastal United States: 1980-2008*. NOAA report. 2005. http://marineeconomics.noaa.gov/socioeconomics/assessment/population.html#Download

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(b) Expand the use of the recreational angler registry.
(c) Continue to promote catch and release fisheries in stocks where the catch resulting in release mortality is low.
(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 [area] 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.~~

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APPENDIX V. AQUACULTURE IN THE UNITED STATES

In 2004, the U.S. Commission on Ocean Policy[23] 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 and environmentally sound, permitting and regulatory program for marine aquaculture in the EEZ, to which NOAA responded with a 10-year Marine Aquaculture Plan[24] and a proposal for the National Offshore Aquaculture Act of 2007.

Issue Statement 1: Growth of American marine 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[25].

Current Situation: The U.S. has not yet developed the necessary guidance for locating, siting, conducting, and monitoring offshore aquaculture operations. A new governance framework is necessary if offshore aquaculture is to succeed[26].

Comment [HBL28]: True? Or is this part of the national policies.

Aquaculture expansion is supported by the U.S. Government, but there is legitimate public concern about environmental impacts including possible pollution, escapes, competition with wild fish, disease transmission, and food safety. Any expansion of aquaculture can only be achieved by working with other open ocean interests: the public, commercial and recreational fisheries sectors, shipping, tourism, the environmental community, and ocean energy, among others.~~This concern has been heightened by misinformation about aquaculture impacts in the news media.~~

Global supply of seafood from wild-caught stocks has plateaued, while demand continues to increase. Aquaculture now provides nearly half (45.6 percent) of the world's food fish consumption, compared with 33.8 percent in 2010[27]. Nutritionists encourage Americans to double their present consumption of seafood to benefit their health.

Comment [PD29]: Citation?

Preferred State in 2040:

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[23] *An Ocean Blueprint for the 21st Century*. *op. cit.*
[24] NOAA Aquaculture Plan. *op. cit*.
[25] *An Ocean Blueprint for the 21st Century*. *Ibid*.
[26] Recommendations for an Operational Framework for Offshore Aquaculture in U.S. Federal Waters. Cicin-Sain, B. *et al*., 2005.
[27] *World aquaculture 2010*. FAO Fisheries and Aquaculture Department. Technical Paper. No. 500/1. Rome, FAO. 2011.

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

(b) States will have developed comprehensive near-shore 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 near-shore 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, as warranted, will support sound public policy on its behalf.

(e) Wild fish stocks will be protected from genetic pollution and the spread of disease from aquaculture facilities.

Comment [PD30]: : In the commercial sector, federal management holds that access to the ocean for removal of a natural resource is a privilege , not a right. There is a legal distinction between the two, which is significant. A statutory framework for aquaculture might provide a privilege for access, but cannot establish a "right."

Proposed Actions: Both statutory and regulatory actions are necessary for a robust domestic marine aquaculture industry by 2040.

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.~~ (DW)

(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 agriculture industries~~.

~~(e) Authorize regional pilot projects involving commercial fishing families to provide a mechanism for fishermen involvement, as well as educational and outreach tools.~~

Comment [PD31]: MLE: Not willing to endorse as a policy, without specific examples. Subsidies to agriculture, in some cases, have proved highly detrimental.

Regulatory actions:

Comment [HBL32]: Are these really 'regulatory'?

(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 using coastal and marine spatial planning to establish aquaculture zones within the EEZ which would reduce the burden on applicants to submit *new* applications for every proposed project.~~ (MLE)

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

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(e) A Programmatic Environmental Impact Statement (PEIS) for aquaculture projects should consider cataloging 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.

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APPENDIX VI: MANAGEMENT

Based on the current trend, ecosystem-based approaches to management will be the norm and not the exception by 2040. The ecosystem-based management approach is defined as management that is adaptive, geographically specified, takes account 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 and 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. Improved geographical information systems (GIS) and its analysis as part of marine spatial planning are important and the preferred decision support tools to assist priority setting and arbitration of potential conflicting uses.

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, are a proven effective tool to supplement traditional management techniques. Examples include seasonal fisheries closures, marine protected areas (MPAs), and no-transit zones.

Current Situation: The National Ocean Policy has prioritized the value of coastal and marine spatial planning to….

Comment [HBL33]: Expand

Preferred State in 2040: Unique habitats, essential fish or marine mammal critical habitats, and rare marine ecosystems are protected with MMAs and MPAs developed with stakeholder advice and support.

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Proposed Actions:

(a) Place-based management is better coordinated within NOAA.
(b) If marine managed areas involving living marine resources are designated, they are based on the best scientific information available.
(c) Criteria for assessing the costs and benefits of closing an area to fishing and other activities must be identified, assessed, and considered before a decision is made.
(d) MMA or MPAs 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: 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~~whichvessels which~~ to 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 four new research vessels that are among the most technologically advanced research vessels in the world to replace the aging vessels in its fleet. Although still in its infancy, underwater video cameras are also being used in survey projects.

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Integrated mapping and assessment of many of these data sets is possible using state-of-the-art GIS systems that allow managers to better understand potential interactions and impacts of multiple ocean uses on specific ocean habitats and resources.

Preferred State in 2040: NOAA will 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.

(a) In conjunction with other federal agencies and non-federal partners, NOAA is implementing 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 expand such that by 2040 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.
(c) NOAA will employ GIS tools throughout the country to further improve ecosystem-based management. GIS software allows for visual representation of important ecosystem attributes in map form. Effective application of mapping will be used for marine resource management, including identifying bycatch hotspots.
(d) NOAA scientists will routinely utilize acoustic technology to characterize the seabed. Historically, learning more about seabed composition (a critical aspect of the marine habitat) required removal of core samples. Acoustic technology will also serve NOAA's hydrographic survey mission, working across scientific disciplines to perform both habitat research and navigational chart updates.
(e) NOAA Fisheries will widely employ 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 to emphasize intra- 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

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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 are often 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 (LAPPs) and all councils should evaluate these mechanisms available to them.

Current State: ~~Individual transferable quotas (ITQs)~~ Catch shares and harvesting cooperatives have enabled industry to consolidate and provided a mechanism to allocate fisheries to those placing the highest values on the fishery (*i.e.*, those 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~~ Catch shares are in place on all three coasts of the U.S. Although the North Pacific Fishery Management Council has implemented ITQs programs for several of its commercial fisheries, the first attempt to implement ~~ITQs~~ catch shares 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 complicated initial allocation. Given the proven political clout of the recreational sector, many see it to be 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 2040:

(a) If fishery sectors within a region so desire, ~~C~~catch share and limited access privilege programs ~~are widely~~may be used in both commercial and recreational sectors to provide the right incentives and address overcapacity and allocation issues within and across the sectors.

(b) Reliable monitoring and catch reporting systems are in place to support stock assessments, fisheries management, and allocation decisions.

Proposed Action:

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

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(b) Proactive involvement by NMFS with councils during the development stage of catch share programs 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.

Issue Statement 4. As depleted stocks rebuild, managers will face new challenges.

Background:

- Rebuilding stocks will expand and reoccupy habitats in their historic range creating conflicts with fisheries targeting other stocks. One of these conflicts will be bycatch and dead discards of the rebuilding stock in other fisheries.
- In recreational fisheries, individual fish will weigh more as they rebuild, resulting in greater pounds of harvest with the same bag limit and season. This can lead to the perverse need to shorten seasons and reduce bag limits even as there is strong evidence that the stock is rebuilding.
- Managers will be pressured by both commercial and recreational sectors to allow increased catches as soon as possible. Managers will understand that allowing increased catches too soon will reduce the long term capacity for rebuilding. Anglers will see only that catches are better ever (in their recent memory) and express willingness to forgo the potential rebuilding in favor of immediate increases in catches.
- The desire for increased economic activity will add pressure for rapid increase in catches. The credibility of the scientific basis of rebuilding plans will be called into question.
- The allocation among sectors of additional harvest due to rebuilding will be contested.

Current State: Models that establish rebuilding plans fail to predict the extent and location of these new management challenges. Managers are left scrambling to respond with few tools and an inability to respond quickly. Commercial quota holders for the rebuilding stock are reluctant or unable to provide quota to harvesters in the expanded range of the rebuilding stock.

Preferred State in 2040: Rebuilding models improve their ability to advise managers regarding range extensions and conflicts with other fisheries. Recreational management shifts to be based on the number of fish caught in contrast to number of pounds caught. Best practices for managing stocks while they are rebuilding are incorporated into new tools and strategies shared through new training for fisheries scientists and fisheries managers.

Issue Statement 5. Living marine resources suffer adverse effects from large watersheds and activities well beyond the activities managed by NOAA. Marine habitats and ecosystems continue to be destroyed and degraded. Partnerships and collaborations with governments and private organizations are essential to reverse these trends.

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Background and Current State: Restoration plans are lacking for many large marine ecosystems. Land use changes and freshwater habitat loss occur disconnected from knowledge of the downstream effects in the marine environment. At the same time, the extent of coastal wetland losses, in particular large marine ecosystems, is not tabulated and evaluated in a way that is useful to managers. The ability of coastal wetlands, mangroves, and seagrasses to sequester carbon (blue carbon) is not a consideration when permits to remove coastal wetlands are considered. When coral reefs are directly damaged, there are no standard protocols for mitigating the harm. Invasive marine species pose ecosystem management challenges that require effective collaboration across agencies and private partners.

Preferred State in 2040: Restoration plans are in place for each large marine ecosystem in the U.S. EEZ. Watershed management plans include criteria and goals that address the downstream effects on living marine resources. Permits for destruction of coastal wetlands are considered in the context of the cumulative regional loss of wetlands, marine restoration plans, and the important role that coastal wetlands play in carbon sequestration. Effective partnerships and collaborations result in timely coordinated responses to challenges.

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