

Introduction to EBFM

Ocean fish are among the planet's most valuable assets, but to maintain the global fisheries productivity and secure the future of the marine environment, The Pew Charitable Trusts (Pew) calls on the Parties to the UN Fish Stocks Agreement to prioritize implementation of a modern, more comprehensive and effective way of overseeing fisheries: Ecosystem-Based Fisheries Management (EBFM). This forward-thinking approach can build on progress in the United States and around the world but be implemented adaptively and cooperatively through international bodies like the Regional Fishery Management Organizations (RFMOs) and within nations.

Wild caught fish are renewable natural resources, but their ongoing productivity depends on the health of a dynamic environment where every change has ripple effects. The traditional model of sustainable fisheries management seeks to maximize the yield of individual fish stocks. But through EBFM, fishery leaders consider more than just a single stock at a time. Using this big-picture approach, they can make decisions that better reflect the best science, maintain interconnected food webs, protect habitats and help ensure sustainable fishing. This more adaptable and comprehensive approach is necessary to better provide for the world's growing demand for seafood

For more than two decades, Pew has led efforts to advance EBFM in the U.S. and internationally through an expanding portfolio of global initiatives designed to support healthy, resilient marine ecosystems over the long term. This paper seeks to share Pew's experience adopting and operationalizing EBFM, so that Parties to the UN Fish Stocks Agreement can build upon them to advance international fisheries management.

Pew's Work on EBFM

Since 1993, Pew has worked to protect U.S. ocean wildlife and ecosystems. After two major reauthorizations, the Magnuson–Stevens Fishery Conservation and Management Act (MSA), the U.S.'s primary federal law governing domestic fisheries, now includes strong conservation requirements and authorities to end overfishing and rebuild depleted fish populations. It requires managers to minimize bycatch and protect habitat to the extent practicable. And it provides the authority to set catch limits based on Optimum Yield (OY), which can go beyond the single-species measure of Maximum Sustainable Yield (MSY) to account for broader ecosystem considerations. The MSA and federal regulations also include discretionary authorities for EBFM.^{i,ii}

The U.S. shares many of the fisheries challenges faced by the Parties to the UN Fish Stocks Agreement. The Pew Ocean Commission and U.S. Commission on Ocean Policy in 2003-04 both issued urgent calls to shift to a more holistic and concerted approach to management, and while considerable progress has been made in recent years, it is not enough.^{iii,iv}

There are a variety of EBFM definitions used around the world. Pew views EBFM as a "Big Picture" approach and has focused on "Five Pillars" that must be applied based on governance structures and ecosystems themselves:

- Conserve forage fish, the primary food source for many larger fish species that support fisheries and for countless seabirds and marine mammals.
- Minimize bycatch, the catching or discarding of nontarget fish and other marine life, which results in largescale waste of natural resources and lost economic opportunity for fishermen.
- Protect fish habitat from destructive fishing practices and other damaging human activities to ensure that fish have safe places to breed, feed, grow, and shelter.
- Proceed with caution to ensure that new fisheries are sustainable from the start.
- Create fishery ecosystem plans that include a description of the ecosystem and the human and other interactions that affect it (such as changing ocean temperatures, acidity, pollution, and fishing), a list of indicators that track environmental and economic health, and measurable goals and objectives for restoring and maintaining it.

Advances in EBFM and the Urgent Need for Action

Working with partners both nationally and internationally we have made significant progress under each of these pillars, ranging from protections for deep-sea coral ecosystems to rules for alternative fishing gear. These examples demonstrate the real impacts and benefits of implementing EBFM. At next year's resumed review conference, Parties to the UN Fish Stocks Agreement should commit to advancing fishery management now through EBFM, nationally and internationally.

Conserving Forage Fish

One of the most important elements of EBFM is protecting food webs by improving the management of forage fish – the small, schooling, nutrient-rich species that are essential prey for many wild fish, mammals, and birds. It is crucial to maintain enough forage fish in the water to meet the dietary needs of predators. Even in situations where data is lacking to fully understand predator-prey relationships, there is strong science to support management actions. s.^v A precautionary approach is warranted for forage species whose collapse would have a cascading effect and cause widespread harm to species that depend on them. Forage fish conservation exemplifies the need to move beyond the traditional single-species, MSY method of fishery management and adopt an EBFM method that seeks broader solutions to keep both predator and prey populations healthy.

The U.S. has achieved several promising state and federal forage fish conservation measures. They are particularly important because single-species management has often failed, and many of the Nation's managed forage species are declining. At the state level, the Atlantic States Marine Fisheries Commission established the first-ever coast wide catch limit for Atlantic menhaden and a 25% catch reduction in 2013.^{vi} This action helped catalyze a widespread, broadly recognized recovery, including increased sightings of humpback whales feeding just offshore from the United Nations headquarters in New York City.^{vii} The Commission is now preparing to adopt ecosystem-based catch limits.

At the federal level, in 2018 New England fishery managers significantly reduced catch of declining Atlantic sea herring to allow this key forage species to recover. Managers also established a Harvest Control Rule (HCR) in concert with stakeholders.^{viii} The HCR includes pre-agreed guidelines for setting catch levels based on stock status and is the operational component of a harvest strategy. These kinds of precautionary management tools will help

managers respond to future changes in forage fish populations. U.S. fishery management councils and RFMOs can use EBFM approaches to prioritize adoption and implementation of precautionary harvest strategies of stocks under their jurisdictions.

Pew has also led efforts to work with the international managers in charge of biodiversity in the Antarctic South Ocean to protect Antarctic krill, a keystone species for the region. While Antarctica does not fall under the purview of the UN Fish Stocks Agreement, the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) is developing a long-term EBFM approach to protect krill and the predators that rely on krill as a main source for food. CCAMLR's decision to establish an EBFM system shows that international efforts to advance forward thinking approaches like EBFM are being used and are working.

Minimize Bycatch

Bycatch, the unnecessary catching or discarding of nontarget fish and other marine life, is a widespread global problem that EBFM can help address. In the U.S., the MSA requires that bycatch be minimized to the extent practicable. Other federal laws, such as the Endangered Species Act (ESA) and Marine Mammal Protection Act (MMPA), as well as state laws, play an important role in the success of this effort. Although bycatch remains a major problem in the U.S., EBFM focused solutions are showing progress and parties to the UN Fish Stocks Agreement should consider using many of these technologies and methods.

For example, U.S. Pacific coast fishery managers have authorized use of deep-set buoy gear, an innovative alternative to drift gillnets, designed to catch swordfish while reducing the mortality of whales, endangered turtles, and other marine life.^{ix} Southeastern U.S. fishery managers are increasing the use of descending devices in commercial and recreational fisheries.^x These simple, affordable, and reusable devices enable fishermen to release deeper-water fish safely and improve the animals' chances of survival. Along the U.S. east coast and Canada, experts are working with the fishing industry to develop and test ropeless systems in commercial lobster and crab fisheries in an urgent effort to protect endangered right whales.^{xi}

Internationally, some countries have recognized the dire consequences for ocean ecosystems if shark populations continue to plummet. Some of those countries have established domestic shark conservation and management measures, including shark sanctuaries that restrict fishing and ban the retention of shark bycatch within their waters.

RFMOs have been slow to act to protect and manage sharks and often do not implement tools to prevent bycatch of sharks until it's too late. In addition to setting and enforcing science-based catch limits, more protections may be needed, including time and area closures and no-retention measures for vulnerable species; and bycatch mitigation measures, such as banning wire leaders or requiring circle hooks. A global effort also requires increased observer coverage to improve data collection and ensure compliance with these measures. Through EBFM, it is easier for managers to address a wide-ranging suite of solutions.

Protect Fish Habitat

The MSA requires fishery managers to identify Essential Fish Habitat (EFH) and create fishery management plans that can include Habitat Areas of Particular Concern (HAPCs) for areas in need of special protection. With an eye towards EBFM, U.S. managers have used these and other tools to protect deep-sea coral ecosystems, fish spawning grounds, and other critical ocean habitat by limiting the use of damaging fishing gear and activities. In recent years, managers have collectively protected hundreds of thousands of square miles of fragile deep-sea coral and sponge areas where the damage from a single trawl could take centuries to

rebuild.^{xii,xiii,xiv} In each case, managers led a process that engaged fishermen, conservationists, scientists, and others to develop area boundaries and management measures.

RFMOs can benefit from EBFM approaches to protect fish habitat, including nursery and spawning areas of the species they have responsibility to conserve and manage. State parties to the Fish Stocks Agreement should prioritize protection of fish habitats in their own waters and their respective RFMO waters.

Fish habitat extends beyond federal and international waters, so Pew is taking its EBFM approach to nearshore habitats as well. Recently, the organization has begun efforts to protect and restore foundational coastal habitats such as seagrass, oysters, kelp, and salt marsh. These habitats serve as important nursery and feeding grounds for fish and numerous marine species. They are essential for the production of seafood and are vital to local economies and cultures. Through the Parties to the Paris Agreement, Pew also seeks to protect coastal wetlands to help reduce carbon emissions and build resilience to the impacts of climate change. EBFM guides these efforts and will help managers see big-picture possibilities for these big-picture problems.

Proceed with Caution

EBFM requires proactive, rather than reactive, plans to manage fisheries. In the face of substantial environmental changes to oceans due to climate change and other stressors, fishery managers must help establish more resilience in fisheries and ocean ecosystems. To get ahead of those challenges and growing human demands for ocean resources, managers in several regions of the U.S. and Canada have put precautionary catch thresholds in place for unmanaged forage species before they could be targeted on a large scale.^{xv,xvi} These regulations ensure regional managers have an opportunity to proactively assess scientific information about any new or expanded directed fisheries and consider potential impacts to existing fisheries, fishing communities, and the structure and function of marine ecosystems.

A useful example of international caution and successful cooperation occurred in 2018 when nine nations and the European Union agreed to the first proactive ecosystem-based approach for fisheries conservation in high seas of the central Arctic Ocean. The Arctic hosts some of the world's most pristine marine areas, but they are threatened by climate change and resultant pressures to increase industrialization. Stakeholders including government officials, scientists, the fishing industry, indigenous leaders with traditional knowledge, and conservation groups supported postponing industrial fishing in the region, where diminishing Arctic ice is opening new waters to commercial activity. This international agreement prevents unregulated fishing in the high seas of the Central Arctic Ocean for at least 16 years unless science-based measures are agreed upon and established.^{xvii,xviii,xix}

Additionally, several RFMOs have updated their underlying charters to require application of the precautionary approach in fisheries management, which embodies many of the principles under the five EBFM pillars. And in many fisheries, leaders are also looking to modernize management through use of electronic catch documentation and electronic monitoring. These forward-thinking approaches should move forward with urgency.

Create Fishery Ecosystem Plans

Fishery Ecosystem Plans (FEPs) can be used to tie each of the five EBFM pillars into one overarching plan and serve as a roadmap for incorporating fishery, habitat, and other ecosystem considerations into scientific assessment and management of marine fish. These

plans often include a description of the ecosystem, current and emerging threats, a list of indicators that track environmental and economic health, and measurable goals and objectives for restoring and maintaining ecosystems. Most regions of the U.S. have developed FEPs or are in the process of doing so to help guide EBFM efforts. Parties to the UN Fish Stocks Agreement and RFMOs should consider developing fishery ecosystem plans to guide and strengthen international governance of marine resources.

A Global Vision for EBFM

Pew calls on Parties to the UN Fish Stocks Agreement to embrace a more holistic approach to fisheries management within their national boundaries and globally by acting on the five pillars of EBFM. While EBFM definitions vary globally, embracing the principles embodied in the five pillars will lead to healthier fish stocks and more fishing industry jobs as depleted fish populations recover and the world achieves greater food security for the millions of people who depend on fish for a primary source of protein. Managers around the world have established practical ways to make the transition to EBFM, building on decades-long experiences with single-species management. Still, more must be done to advance EBFM. Internationally, combined efforts to promote biodiversity, marine protected areas, and innovations in fisheries management such as harvest strategies and bycatch reduction methods are all essential to protecting marine wildlife and providing for growing human demands upon rapidly changing oceans. We call on all nations to prioritize implementation of EBFM in their own waters, through RFMOs, and during the resumed review conference of the UN Fish Stocks Agreement next year.

ⁱ United States Code. 2011. Magnuson-Stevens Fishery Conservation Act. 16 U.S.C. §§1801-1891d. Available online at: <https://www.govinfo.gov/content/pkg/USCODE-2011-title16/html/USCODE-2011-title16-chap38.htm>

ⁱⁱ National Oceanic and Atmospheric Administration. 2016. Magnuson-Stevens Act Provisions. National Standard 1 - Optimum Yield. 50 CFR 600.305. Available online at: <https://www.fisheries.noaa.gov/national/laws-and-policies/national-standard-guidelines>

ⁱⁱⁱ Pew Oceans Commission. 2003. America's Living Oceans: Charting a Course for Sea Change. Summary Report. May 2003. Pew Oceans Commission, Arlington, Virginia. Available online at: https://www.pewtrusts.org/-/media/assets/2003/06/02/poc_summary.pdf

^{iv} U.S. Commission on Ocean Policy. 2004. An Ocean Blueprint for the 21st Century Final Report. Washington, DC 20004. Available online at: https://govinfo.library.unt.edu/oceancommission/documents/full_color_rpt/welcome.html

^v Pikitch, E., Boersma, P.D., Boyd, I.L., Conover, D.O., Cury, P., Essington, T., Heppell, S.S., Houde, E.D., Mangel, M., Pauly, D., Plagányi, É., Sainsbury, K., and Steneck, R.S. 2012. Little Fish, Big Impact: Managing a Crucial Link in Ocean Food Webs. Lenfest Ocean Program. Washington, DC. 108 pp. Available online at: https://www.lenfestocean.org/-/media/assets/extranets/lenfest/len_little_fish_big_impact.pdf

^{vi} Atlantic States Marine Fishery Commission, 2019. Review of the Atlantic States Marine Fisheries Commission Fishery Management Plan and State Compliance for Atlantic Menhaden (*Brevoortia tyrannus*). Pg 2. Available online at: http://www.asafc.org/uploads/file/5d64183cAtlanticMenhadenFMPReview_2019.pdf

^{vii} Nature Conservancy. 2020. Return of the Most Important Fish in the Sea: Collaborative Management Leads to Marine Life Diversity Along the Atlantic Coast: Available online at: <https://www.nature.org/en-us/about-us/where-we-work/united-states/new-york/stories-in-new-york/menhaden-whales-return-new-york/>

^{viii} New England Fishery Management Council. 2019. Atlantic Herring Fishery Management Plan. Available online at: Amendment 8: https://s3.amazonaws.com/nefmc.org/Herring-A8-FEIS.FINAL_191007_135918.pdf

^{ix} Pacific Fishery Management Council. 2019. Decision Summary Document, September 13-18, 2019, pp 7-8. Available online at: <https://www.pccouncil.org/documents/2019/10/september-2019-decision-document.pdf/>

^x South Atlantic Fishery Management Council. 2019. Regulatory Amendment 29 to the Snapper Grouper Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. Available online at: https://safmc.net/download/Briefing%20Book%20Council%20Mtq%20Sep%202019/TAB%2003%20-%20Snapper%20Grouper/TAB03_A03b_SG_SGReg29Draft.pdf

^{xi} Ropeless Consortium. 2019. Ropeless Annual Meeting, 13 November 2019, Portland, Maine, USA. Available online at: <https://ropeless.org/2019-ropeless-agenda-and-presentations/>

^{xii} Mid-Atlantic Fishery Management Council 2016. Amendment 16 to the Atlantic Mackerel, Squid, and Butterfish Fishery Management Plan: Measures to Protect Deep Sea Corals from Impacts of Fishing Gear. Available online at: https://www.mafmc.org/s/DeepSea-Corals-EA_Signed-FONSI.pdf

^{xiii} National Oceanic and Atmospheric Administration. 2019. Final Rule for Amendment 28 to the Pacific Groundfish Fishery Management Plan. Document 84 FR 63966. Available online at: <https://www.federalregister.gov/d/2019-24684>

^{xiv} New England Fishery Management Council. 2020. Omnibus Deep-Sea Coral Amendment Including a Final Environmental Assessment. Available online at: https://s3.amazonaws.com/nefmc.org/200102_Coral_Amendment-final-with-IRFA-edits.pdf

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- ^{xvi} National Marine Fisheries Service. 2016. Final Rule for Comprehensive Ecosystem-Based Amendment 1; Amendments to the Fishery Management Plans for Coastal Pelagic Species, Pacific Coast Groundfish, U.S. West Coast Highly Migratory Species, and Pacific Coast Salmon. Document 81 FR 19054. Available online at: <https://www.federalregister.gov/d/2016-07516>
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