

December 16, 2015

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**RE: Comments on the September 9, 2015 discussion draft of the Ecosystem-Based Fisheries Management Policy**

Dear Dr. Link and Ms. Sagar,

The Pew Charitable Trusts (Pew) appreciates the opportunity to comment on the draft NOAA Fisheries Ecosystem-Based Fisheries Management (EBFM) Policy.<sup>1</sup> We commend the agency on this important step towards modernizing fisheries management in the United States, and for its forward-thinking outreach and inclusion of Councils and stakeholders in the development of this policy. We agree with the agency that EBFM is a necessary evolution of fisheries management to better protect ocean wildlife and habitats, and fully support the agency's commitment to incorporating EBFM through agency and regional fishery management council (Council) actions. This policy is a necessary step toward realizing lasting sustainability for our ecosystems and the fishing industry that depends on them. While we strongly support this policy, we do have suggestions for how to improve it. We look forward to continuing to work with the agency to implement EBFM.

The draft EBFM Policy is an excellent start and a strong statement about the importance of transitioning to EBFM. However, we feel the policy could be improved, and along with our suggestions in this letter we have attached redline text recommendations where appropriate.

Our comments include the following issues:

- The EBFM Policy does not connect EBFM and optimum yield (OY), despite both concepts sharing significant overlap.
- Other agency policies currently under review or development (notably, the proposed revisions to National Standards 1, 3, and 7) must also include EBFM principles to facilitate operationalizing EBFM. If implemented as proposed, the NS1 guidelines will subvert the gains that the U.S. has achieved from improved single species management

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<sup>1</sup> National Marine Fisheries Service Policy Directive. Ecosystem-Based Fisheries Management Policy. Sept 9, 2015 discussion draft.

[https://www.st.nmfs.noaa.gov/Assets/ecosystems/ebfm/Draft\\_EBFM\\_Policy\\_9.9.2015\\_for\\_release.pdf](https://www.st.nmfs.noaa.gov/Assets/ecosystems/ebfm/Draft_EBFM_Policy_9.9.2015_for_release.pdf)

while failing to operationalize EBFM. Thus the proposed guidelines would undercut this EBFM Policy.

- The agency should do more to dispel the myths that EBFM is unattainable with current data availability and funding levels in this policy and through continued outreach to Councils, fishermen, and stakeholders.
- The policy needs to define “societal benefits,” so that the goals and objectives of EBFM are clear.
- The policy should do more to promote the protection of forage fish and essential fish habitats.
- Fishery Ecosystem Plans should include recommendations for conservation and management actions.
- Changing ocean conditions from stressors like climate change are causing fish populations to shift their range, and the policy should acknowledge that these populations may be more vulnerable and need more precautionary management.

Again, while Pew broadly supports the EBFM Policy, implementation will be the real test. We understand the agency is simultaneously working on an EBFM Roadmap, which will detail how it will execute the principles described in the policy. We hope to have an opportunity to comment on the Roadmap, and recognize that some of our comments here (primarily in section 3) may be more easily integrated into that document than into the EBFM Policy.

## **Section 1 – Thematic comments on the EBFM Policy**

### ***1.1 Pew strongly supports the development of an EBFM Policy, as it will move the agency towards comprehensive management of trust resources.***

Pew firmly believes EBFM is the necessary next step for fisheries management. The current U.S. fisheries management system typically regulates fishing on individual populations or groups of similar populations, though some Councils have made progress towards multi-species, ecosystem approaches. Although improvements to the Magnuson-Stevens Fishery Conservation and Management Act in 1996 and 2006 have helped to end overfishing on many species and to rebuild a number of depleted populations, they do not sufficiently address the bigger picture. Each marine species is a link in overlapping food chains that form an interconnected food web of plants and animals dependent on habitats and ecosystem quality. Ignoring these connections can lead to serious, long-term consequences and cause dramatic shifts in the health of the ocean.

To implement EBFM, managers will need to: maintain healthy levels of forage fish to support their role as a food source for other wildlife; identify, protect, and restore essential habitats; better account for and minimize bycatch; evaluate the potential effects of new fisheries and gear types and develop appropriate management measures before allowing them to commence in order to ensure that, at the outset, they will be sustainable from an ecosystem perspective;

and create management plans with goals, objectives and recommended conservation measures for the ecosystem, not just one fish stock.

While the mandate for EBFM should be more clearly stated in the Magnuson-Stevens Act, many requirements of the Act support the move in this direction. The “Legal Authorities and Mandates” section of the EBFM Policy well-describes these requirements. Among them – preventing overfishing, rebuilding fish stocks, achieving optimum yield (OY), managing stocks as a unit, minimizing bycatch and bycatch mortality, identifying and conserving habitat, and considering the importance of the resource to fishing communities. Additional requirements from the Endangered Species Act, National Environmental Policy Act, and Marine Mammal Protection Act further support the authority for a comprehensive approach to fisheries management.

While we acknowledge that the agency’s mandates and authorities do not extend to all ocean wildlife and habitats, we encourage looking beyond trust resources when applying this policy. The agency should take a leadership role to implement EBFM principles when consulting on actions with other governmental bodies (including federal, state, interstate commissions, and tribal authorities with jurisdiction over coastal and ocean resources).

Numerous expert panels have called for greater integration of ecosystem considerations in fisheries management.<sup>2</sup> The scientific literature presents a compelling case for including ecosystems in management<sup>3</sup>, including new articles by NOAA Fisheries staff in the last year – one of which supported the idea that making EBFM operational is not far-fetched or unattainable,<sup>4</sup> and another connecting the goals of EBFM to the mandate to achieve OY.<sup>5</sup> Further, numerous Councils are taking steps to implement EBFM or an Ecosystem Approach to Fisheries Management (EAFM) in their fisheries, though adoption of these techniques is uneven across councils. This policy, and the subsequent EBFM Roadmap, should move the agency and Councils forward in sync, so that best practices and innovative solutions can be developed and disseminated among managers and management bodies.

Thus, we strongly support the development of this policy. However, we feel the policy could be made more robust with targeted changes, which we cover in the remainder of this document.

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<sup>2</sup> See Report to Congress of the Ecosystem Principles Advisory Panel (1999), National Research Council (1999), Pew Oceans Commission (2003), U.S. Commission on Ocean Policy (2004).

<sup>3</sup> For example, see Pikitch *et al.* 2004, Francis *et al.* 2007, Heltzel *et al.* 2011, Pikitch *et al.* 2012

<sup>4</sup> Wesley S. Patrick & Jason S. Link (2015) Myths that Continue to Impede Progress in Ecosystem-Based Fisheries Management, *Fisheries*, 40:4, 155-160, DOI: 10.1080/03632415.2015.1024308

<sup>5</sup> Wesley S. Patrick & Jason S. Link (2015) Hidden in Plain Sight: Using Optimum Yield as a Policy Framework to Operationalize Ecosystem-Based Fisheries Management, *Marine Policy* 62, 74–81.

### **1.2 The EBFM Policy fails to tie EBFM to optimum yield.**

EBFM is intended to address the shortcomings of traditional single-species fisheries management by integrating consideration of broader ecosystem and socioeconomic factors not addressed by the concept of Maximum Sustainable Yield (MSY). The concept of Optimal Sustainable Yield was proposed at the first United Nations Law of the Sea Conference in 1958 as an overall objective that incorporates important factors not considered by MSY. Optimum yield, as it subsequently came to be known, is generally understood as allowing for inputs of economic, social, and biological values rather than being limited to maximizing net profits or maximizing sustainable yield.<sup>6</sup> In effect, EBFM could be described as a management strategy for more fully operationalizing and achieving OY.

The achievement of OY, and in turn, EBFM, includes biological reference points to prevent overfishing and rebuild fish stocks, as well as relevant ecological and socioeconomic considerations. Such considerations include accounting for a species' role as prey, addressing indicators of species health such as population age structure or sex ratio, or balancing differing objectives in recreational, commercial, and subsistence fisheries. Furthermore, decision support tools like management strategy evaluation and integrated ecosystem assessments can help improve the evaluation of management options to achieve OY in an open and transparent manner.

As explained by Wesley Patrick and Jason Link in a 2015 article in *Marine Policy*, OY and EBFM are essentially identical: "Overall, the comparison shows that OY and EBFM are essentially identical in concept: (1) each suggests there is an integrated process whereby (2) the ecological, economic, and social objectives of fisheries can be balanced to (3) provide the greatest benefit to the nation or society."<sup>7</sup> We urge NMFS to explicitly acknowledge the similarities of OY and EBFM in the policy and EBFM Roadmap. The Councils and Science Centers should be encouraged to view EBFM as a tool to consider and explicitly include OY factors (economic, social, and ecological) in management, as required by National Standard 1.<sup>8</sup>

### **1.3 The agency should ensure other policies under its review and in development also advance EBFM.**

EBFM is integral for improving fisheries management in the United States. By taking a more comprehensive approach, the agency and Councils will better understand and account for the trade-offs between management options and build on the successes of recent years while tackling new challenges. Unfortunately, even if the EBFM Policy is perfectly drafted, it won't

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<sup>6</sup> U.N. FAO (1995), Reference Points for Fisheries Management, Fisheries Technical Paper 347, p. 4. At: <ftp://ftp.fao.org/docrep/fao/003/v8400e/v8400e.pdf>.

<sup>7</sup> Wesley S. Patrick & Jason S. Link (2015) Hidden in Plain Sight: Using Optimum Yield as a Policy Framework to Operationalize Ecosystem-Based Fisheries Management, *Marine Policy* 62, at 75.

<sup>8</sup> 16 U.S.C. § 1851(a)(1); 50 C.F.R. 600.310



preserve food web structure and function.<sup>16</sup> Management, in particular setting catch levels, of forage fish should consider and factor in the relative contribution of each forage species to the diets of predators, particularly in response to population trends and ocean conditions, identification of oceanographic features that correlate with high relative densities of forage stocks and their predators, and the results of modeling analyses that identify the potential ecological effects of alternative catch strategies.

The NS1 proposal also moves backwards on the management of bycatch species, suggesting that no accountability measures are necessary to control bycatch of fish stocks which are at such low population levels that the directed fishery for those stocks is closed.<sup>17</sup> Further, the agency promotes the use of aggregate maximum sustainable yield (MSY) strategies,<sup>18</sup> a recent scientific method for which the management implementation is still fairly undeveloped and which comes with a high risk of individual populations collapsing.<sup>19</sup> We have further comments on aggregate MSY later in this document.

The one exception where the proposed guidelines take steps to advance EBFM is in the case of habitat. The agency instructs Councils to consider the value of maintaining productive habitat when calculating OY,<sup>20</sup> and recommends Councils consider restoring habitat for species that are failing to rebuild.<sup>21</sup> Pew strongly supports these habitat-related additions. When stocks are failing to recover, identifying, conserving, and restoring habitats important to those species increases the effectiveness of rebuilding efforts.

Further, the agency fails to address the increasing threats to the marine environment from the impacts of stressors like climate change, pollution, and increased demand on ocean resources. Ocean acidification may profoundly disrupt food webs. And as oceans become warmer, fish populations are shifting toward the poles, and to deeper waters, in search of cooler temperatures.<sup>22</sup> This could cause fish populations to shift from one Council's geographic

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<sup>16</sup> Lenfest Forage Fish Task Force. "Little Fish, Big Impact: Managing a Crucial Link in Ocean Food Webs" (2014)

<sup>17</sup> NOAA Fisheries. Status of Stocks 2014 Annual Report to Congress on the Status of U.S. Fisheries. (2015) [http://www.nmfs.noaa.gov/sfa/fisheries\\_eco/status\\_of\\_fisheries/archive/2014/2014\\_status\\_of\\_stocks\\_fi nal\\_web.pdf](http://www.nmfs.noaa.gov/sfa/fisheries_eco/status_of_fisheries/archive/2014/2014_status_of_stocks_fi nal_web.pdf), p 17.

<sup>18</sup> NOAA Fisheries "Red-line document," p 8 and 13.

<sup>19</sup> Gaichas S, Gamble R, Fogarty M, Benoît H, et. al. (2012) Assembly rules for aggregate-species production models: simulations in support of management strategy evaluation. *Mar Ecol Prog Ser* 459:275-292.

<sup>20</sup> NOAA Fisheries "Red-line document," p 11.

<sup>21</sup> NOAA Fisheries "Red-line document," p 10 and 22.

<sup>22</sup> Malin L. Pinsky *et al.*, "Marine Taxa Track Local Climate Velocities," *Science* 341 (September 2013), 1239–1242, doi:10.1126/ science.1239352.

authority to another's, as may be the case with blueline tilefish<sup>23</sup> and Atlantic mackerel<sup>24</sup> off the Atlantic coast. Yet the agency gives no guidance on how managers should identify the threats of changing oceans, resolve impending management confusion, and build the resilience of stocks before environmental change further disrupts their ecosystems. As written, the proposed guidelines leave the Councils to deal with these changes by reacting to a cascading series of emergencies, as opposed to advising them on how to proactively prepare for the predicted period of disruption and uncertainty.

We submitted detailed recommendations on the proposed NS1 guidelines during the comment period. We encourage you to review and consider our comments on the proposed NS 1 revised guidelines– and those of many other organizations and individuals who had similar concerns – as you finalize the agency's EBFM Policy so that a disconnect between these important directives is avoided.

## **Section 2 – Comments on the text of the policy, by section**

Below are our comments on each section of the EBFM Policy. In many cases, we have suggested text modifications (in red) to support our positions – these are included within these comments where appropriate, and the full redline can be found as an appendix to this document.

**2.1 Policy Statement** – Pew supports the policy statement as drafted. EBFM will help managers make better-informed decisions by presenting a comprehensive view of the ecosystem, so that potential effects of decisions can be assessed. We strongly support the phrase “while maintaining resilient and productive ecosystems” as written.

**2.2 Background** – We support the background section as drafted.

**2.3 Purpose** – Pew supports the purpose section as drafted. However, we note the historical component of the fifth bullet point in this section – “Build on the agency's past progress and clarify the agency's commitment to integrating its management programs for living marine resources and their habitats under changing climate, ecological and ocean conditions” – should be more strongly reflected in the rest of the document. In particular, the policy only briefly touches on the past progress made by the agency and the Councils advancing EBFM in the “Context” section.

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<sup>23</sup> NOAA Fisheries. Blueline Tilefish Emergency Action: Environmental Assessment and Regulatory Impact Review. (2015).

<http://www.greateratlantic.fisheries.noaa.gov/regs/2015/June/14tileblemergencyactionea.pdf>; South Atlantic Fishery Management Council. News Release: Federal Fishery Managers Address Proposed Regulations During Meeting Week. March 12, 2015. [http://safmc.net/sites/default/files/News%20Releases/pdf/2015/Rev\\_NR\\_SAFMC\\_Mar2015Meeting\\_31215.pdf](http://safmc.net/sites/default/files/News%20Releases/pdf/2015/Rev_NR_SAFMC_Mar2015Meeting_31215.pdf)

<sup>24</sup> See “Atlantic mackerel” at <http://nefsc.noaa.gov/ecosys/current-conditions/species-dist.html>

When we discuss EBFM with Council members, fishermen, and other stakeholders, many express concerns that EBFM will be impossible without significant amounts of new data and a great deal more funding. But we can begin implementing EBFM now if existing data is better incorporated into the management system. The agency has taken steps to dispel some of these myths,<sup>25</sup> but could do more to assuage those concerns in this policy. We suggest adding some language to address this in the “Context” section, but encourage the agency to expand upon this topic both in this document and external to it. The effort to dispel these misconceptions must continue with the Councils and other stakeholders.

**2.4 Definition** – Pew supports the definition of EBFM, but suggests the agency should also define “societal goals.” Our concern is two-fold: first, it should be clearer what the agency is trying to achieve; second, “social factors” are one of the three factors required to be considered when specifying OY, and, without a clear definition for “societal goals”, the two terms could be conflated.

As OY corresponds well to the objectives of EBFM, we suggest using similar language to define “societal goals.”

#### DEFINITION OF ECOSYSTEM-BASED FISHERIES MANAGEMENT

NOAA Fisheries defines EBFM as *a systematic approach to fisheries management in a geographically specified area that ensures the resilience and sustainability of the ecosystem<sup>26</sup>; recognizes the physical, biological, economic, and social interactions among the affected components of the ecosystem, including humans; and seeks to optimize benefits among a diverse set of societal goals.*

For the purposes of this policy, EBFM includes considerations of interactions among fisheries, protected species, aquaculture, habitats, and other ecosystem components, including the human communities that depend upon these ecosystem services. **“Societal goals” should consider and include any relevant economic, social, and ecological factors.**

**2.5 Context** – As mentioned above, we encourage the agency to add additional text to this section to more fully describe the current capabilities of the agency and Councils for implementing EBFM, so that the policy explicitly dispels the notion that managers can’t begin implementing EBFM now with existing data and capabilities. We also have some concern that Councils may interpret this policy and the developing EBFM Roadmap as a discouragement to continue current efforts to include ecosystem considerations in their management until the policy and Roadmap are finalized. Of course, the same sections of the law that encourage EBFM

<sup>25</sup> Wesley S. Patrick & Jason S. Link (2015) Myths that Continue to Impede Progress in Ecosystem-Based Fisheries Management, *Fisheries*, 40:4, 155-160, DOI: 10.1080/03632415.2015.1024308

<sup>26</sup> In the NOAA Fisheries context, the term “ecosystem” means a geographically specified system of fishery resources, the persons that participate in that system, the environment, and the environmental processes that control that ecosystem’s dynamics. (c.f. Murawski and Matlock, 2006, NMFS-F/SPO-74)

and that are cited in the “Legal authorities and Mandates” section applies to the actions the Councils are taking now. Thus we suggest additional language in the policy supporting the continuation of ongoing actions with additional guidance on how to harmonize them with the policy.

#### CONTEXT OF ECOSYSTEM-BASED FISHERIES MANAGEMENT

Within NOAA Fisheries, managers and scientists frequently describe EBFM as one level along a continuum of ecosystem approaches to management: 1) ecosystem approach to fisheries management (EAFM), 2) EBFM, and 3) ecosystem-based management (EBM). NOAA Fisheries and its partners (such as the Fishery Management Councils, State Fishery Commissions, Tribes, and others) are already making progress in implementing EAFM through Magnuson-Stevens Fishery Conservation and Management Act (MSA) Fishery Management Plans (FMP), Marine Mammal Protection Act (MMPA) Take Reduction Plans, and Endangered Species Act (ESA) Recovery Plans. These efforts include incorporating ecosystem and environmental factors into single species management actions or stock assessments, enhancing understanding of living marine resource and coastal community dynamics, protecting key ecosystem components, and better informing management decisions for a particular stock. **These activities are occurring with existing data and funding and serve as the first steps in implementing EBFM. The implementation of this policy will build upon these efforts. Existing and developing projects to fulfill conservation obligations that incorporate ecosystem considerations should not be abandoned or delayed because of this policy, but instead harmonized with the guiding principles herein. EBFM is based on sound single-species management that prevents overfishing and rebuilds overfished stocks.** Implementing EBFM supports NOAA’s broader goals for EBM across multiple sectors and mandates to wisely manage multiple ecosystem goods and services, and with other agencies, to maintain productive and resilient ecosystems.

**2.6 Benefits** - Pew generally supports the text of the benefits section, but suggests the following:

- replacing “societal benefits” with “societal goals,” so the same term is used uniformly throughout the document
- replace “quantification” of trade-offs with “consideration,” as quantification of many ecological benefits is difficult and often under-valued
- acknowledge the connection of EBFM to OY more clearly.

#### BENEFITS

Implementing EBFM can help NOAA Fisheries and its partners optimize ~~societal~~ benefits **among a diverse set of societal goals** across its multiple federal mandates by considering environmental and ecological factors and identifying trade-offs among its trust resources, including fisheries, protected species, and their habitats. Through EBFM, NOAA Fisheries and its partners can better evaluate management options and their effectiveness. Additionally, it can help communicate risks, uncertainties, and implications of management decisions across marine fisheries and a range of affected

species. Better understanding, articulation and **quantification consideration** of the trade-offs will ensure more transparent decision processes, outcomes, and more efficient use and management of NOAA Fisheries and partner resources.

Management advice from EBFM will be more comprehensive, accurate, and help reduce uncertainty, by taking into consideration interacting elements in the ecosystem. EBFM can maintain ecosystem function, and fishery sustainability, which support economic and social stability and fishing community well-being. **For example, EBFM is a means to achieving the optimum yield of a fishery by accounting for the relevant economic, social, and ecological factors and providing the greatest overall benefit to the nation.** EBFM applies the best available scientific information to improve decision-making via consideration of the holistic impact of management decisions. EBFM also can use forecasts of future ecosystem conditions and services, incorporating natural variability, anthropogenic forcing, and change in climate and ocean conditions to predict and evaluate outcomes from a range of alternative management strategies. Combined, there are stability and efficiency outcomes for business and regulatory planning that come from adopting EBFM.

**2.7 Guiding principles** - Pew supports the broad guiding principles proposed in this policy. While we have comments on the individual components of the principles, in general we believe the agency has appropriately identified the necessary principles and concur with the strategy that the “principles flow from the foundational basis of science, through strategic planning, prioritization, and tradeoff analyses, and into management advice, all with the ultimate aim of maintaining productive and resilient ecosystems.”

We do suggest better connecting the text of the principles to that in the illustration. In our detailed comments below, we suggest carrying the question prompts into the principles text. We also suggest changing the first prompt from “foundational science” to simply “science.” Here again, this proposed change stems from our concern that this policy frames EBFM as a new concept, rather than as an approach that has been advocated for several decades and is a natural evolution from single-species management. A great deal of foundational science already exists, so we suggest simplifying that prompt.

**2.7.1 Advance our understanding of ecosystem processes** - We agree that EBFM will be advanced by establishing a better scientific understanding of the ecosystem, its interactions, drivers, and threats, and how those dynamics affect fish and fisheries. However, we note that EBFM also requires an understanding of how our fisheries in turn affect, positively or negatively, those very same ecosystem dynamics; for example food web structure and function, size/age structure of stocks, habitat integrity and diversity. Some of our suggestions result from review of the subsequent sections of the policy with an eye to ensuring the science necessary to implement principles like risk prioritization and analysis to optimize benefits is represented in this section. Other suggestions identify missing pieces from this section.

- Forage fish are crucial components of the ecosystem and need enhanced protections to preserve food web structure and function.<sup>27</sup> In order to effectively manage these species, managers need a better understanding of the relative contribution of each forage species to the diets of key predators and the response of forage populations to oceanographic features. Because of their importance, forage fish deserve more recognition in this policy. We recommend adding forage fish in several places, including studying the economic value of forage fish left as prey to other recreationally and commercially important fish and the impacts of forage fish depletion.
- A great deal of the science listed under this section suggests a need to better understand an ecosystem in an undisturbed state. But few ecosystems are undisturbed, and there is a need to better assess the effect of fishing on habitat, species diversity, age-structure, and trophic interactions.
- There is also a need to better understand and describe the vulnerability, susceptibility, and resilience of ocean wildlife, habitats, and ecosystems. While this concern is included under the third principle (“prioritize vulnerabilities and risks to ecosystems and their components”), there is still a need to develop and/or advance some of the science that will enable prioritization to occur.
- Invasive species, like lionfish, can significantly alter ecosystem function and may become a larger threat as the effects of climate change and other ocean stressors magnify. Basic research is needed to understand the spread and effect of invasive species on wildlife, habitats, and coastal communities.
- While we support increasing domestic seafood supply and food security, we suggest adding an acknowledgment of the needs of ecosystems.
- Interactions between fisheries create effects that span ecological, economic, and social considerations, and a better understanding of the interplay between fisheries will be necessary to conduct analyses to optimize benefits.
- Traditional knowledge is a vital source of data on the biological, ecological, economic and social state of fisheries, with a unique perspective on the resilience of resources and with information stretching back well before modern fishery records were kept. We encourage the agency to explicitly include traditional knowledge as a source of information in this policy.
- We suggest including management strategy evaluations along with integrated ecosystem assessments; application of both techniques will benefit from additional scientific development.
- We fully support improving monitoring systems for fisheries management, but suggest that the term “sufficient” is too vague. We recommend replacing it with “statistically-significant” to ensure investments in monitoring are yielding data useful to managers.
- Finally, the agency plays an important role in encouraging and directing scientific studies through its grant-making authorities and cooperative research programs. We suggest

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<sup>27</sup> Lenfest Forage Fish Task Force. “Little Fish, Big Impact: Managing a Crucial Link in Ocean Food Webs” (2014) <http://www.lenfestocean.org/en/research-projects/lenfest-forage-fish-task-force>

the agency actively work with partners, including Councils, SSCs, and academic institutions beyond what it's currently doing to help fulfill the science needs listed in this section.

### 1) **Science: Advance our understanding of ecosystem processes**

NOAA Fisheries shall work to better understand the broader suite of ecosystem processes, drivers, threats, and status of the nation's marine ecosystems to inform all levels of management advice, including:

- Conducting science to understand ecosystem processes, drivers, and threats including:
  - Measurable biogeochemical, biophysical, and ecological factors, processes, and interactions
    - Population dynamics of living marine resources
    - Trophic relationships (including predator-prey relationships and forage fish dynamics)
    - Oceanographic features and other environmental factors (including climate change and ocean acidification)
    - Habitat status and predominant threats to ongoing habitat quality, and linking habitat to production
    - Effects of fishing on fish habitat, species diversity, age-structure, and trophic interactions
    - Ecosystem productivity patterns
    - Vulnerability, susceptibility and resilience of ocean wildlife, habitats, and ecosystems
    - Effects of invasive species on ecosystem function
  - Social and economic considerations
    - Social and economic drivers factors that influence fishers and other users of the marine environment
    - Economic welfare and social well-being of resources users
    - Community vulnerability and resilience
    - Non-market and existence values of marine mammals, turtles, seabirds, and other marine resources, including the value of forage fish as prey in the ecosystem and the social and economic impacts of forage fish depletion on dependent fish and fisheries
    - Employment
      - Long-term social and economic impacts of resource depletion
  - Increase domestic seafood supply and security while maintaining robust ecosystems
  - Interactions between fisheries
  - Ocean use sectors beyond fisheries (e.g., mining, energy, shipping, non-fishing recreational use)
- Integrate traditional knowledge as a source of ecological, economic, and social data
- Developing Integrated Ecosystem Assessment and Management Strategy Evaluation (MSE) science capabilities and products to provide more ecosystem-level management advice
- Maintaining sufficient-statistically-significant and increasingly efficient monitoring systems

- Conducting process-oriented research to understand key mechanisms and relationships
- Providing regular ecosystem status updates and reports to better inform regional decision-making processes
- **Encourage partners and academic institutions to conduct research that advances EBFM through existing grant-making processes and cooperative research programs.**

**2.7.2 Implement ecosystem planning** – Pew strongly supports the use of Fishery Ecosystem Plans (FEPs) to guide EBFM implementation. An FEP is an operational road map for a comprehensive management system that includes the latest science on the important connections among ecosystem components, including predators, prey, habitat, and human activities. These plans can help Councils assess an ecosystem to: identify its interacting parts, including the role of fishing; determine crucial indicators of its overall environmental and economic health; set goals for protecting and enhancing its functions; and establish strategies for maintaining stated goals and objectives. This information can improve the management of individual species by allowing managers to better identify risks to populations and interacting fisheries and to take appropriate action to protect the health of ecosystems and local economies. Effective FEPs include recommendations for conservation and management actions, to be implemented through fishery management plans (FMPs), to achieve the goals and objectives of the ecosystem plan.

We recommended the following modifications to strengthen this section:

- We suggest the agency support FEPs as not just umbrella planning documents, but also repositories for important ecosystem information. This may include a description of: the geographical extent of the ecosystem; the biological, physical, chemical, and socioeconomic aspects of the ecosystem; the structure and function of the food web and key habitats; indicators of ecosystem health; and the impacts of fishing and non-fishing activities on the ecosystem.
- We suggest greater focus on establishing ecosystem reference points that trigger management responses. In particular, we support the development of system-level measures or indices of ecosystem status to help maintain ecosystem structure and function, and provide managers advance warning of potential negative thresholds being reached, tipping points being crossed and/or regime shifts.
- We suggest adding language calling for FEPs to include recommended conservation and management actions for FMPs that will meet FEP goals and objectives.
- We encourage expanding on the action point to account for ecosystem structure and function by giving examples of what this may include – for instance, accounting for the role of forage fish, and the importance of spawning aggregations sites, hard-bottom substrate, and deep-sea corals.
- Fish are already responding to climate change by shifting their range and moving to waters that better match their preferred temperature profile. During this time of unprecedented transition, we may see new fisheries develop (or previously small

- fisheries expand, as has been the case with chub mackerel in the mid-Atlantic<sup>28</sup>) on species moving into new jurisdictional areas, shifting to new areas within regions, or with new gear types. We recommend that these fisheries be evaluated against the goals, objectives, and priorities of the FEP, prior to being authorized, to ensure ecological and societal goals are being achieved.
- State fishery management commissions are important partners, so we suggest adding them more explicitly.
  - We recommend that the final point about facilitating partner participation in EBFM be expanded to include minimizing the adverse effects of both fishing activities and non-fishing activities on marine wildlife and habitats. A great deal of fishing takes place in state waters, outside of federal jurisdiction, and effective EBFM will require close coordination between the relevant interests.

## **2) Objectives: Implement ecosystem-level planning**

NOAA Fisheries supports the use of Fishery Ecosystem Plans (FEPs) or similar documents to describe ecosystem goals, objectives, and priorities for fisheries and ecosystem research, conservation, and management across multiple fisheries within an ecosystem. These include:

- Supporting FEPs as umbrella strategic planning documents to guide coordination and trade-off evaluation among FMPs **and to provide decision-makers with summary information about ecosystem structure and function**
- Seeking long-term ecological, economic, and social goals, objectives, and priorities for FEPs that are based on the results of inclusive strategic planning with diverse stakeholders
- Basing regular reviews and updates of FEPs on indicators established for measuring progress toward established goals and objectives
- **Establishing actionable ecosystem reference points for key indicators that will trigger management responses designed to ensure achievement of ecosystem goals and objectives.**
- **Collaborating with Councils to identify and recommend conservation and management measures in the FEP, to be implemented through FMPs, which would achieve the goals and objectives of the FEP**
- Taking into account the direct effect of fisheries on trust LMR and habitats, and the cumulative impact of fisheries on the entire ecosystem
- Taking into account the ecosystem functional and structural roles of trust LMR and habitats **(e.g., the role of forage fish; the importance of spawning aggregation sites, hard-bottom substrate, and deep-sea corals)**
- Taking into account past and possible future changes in climate and ecosystem conditions
- **Evaluating the effects of proposed new or expanding fisheries (in new areas or with new gear types) and recommend FMP management measures to ensure the new or expanded fisheries meet FEP goals, objectives, and priorities**

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<sup>28</sup> Mid-Atlantic Fishery Management Council. Unmanaged Forage Action. Presentation on Oct 7, 2015. [http://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/561565ede4b07160ee08f0e4/1444242925749/10\\_Forage\\_Oct2015.pdf](http://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/561565ede4b07160ee08f0e4/1444242925749/10_Forage_Oct2015.pdf)

- Facilitating the participation of external federal, state (including territories), **commission**, and tribal partners in the EBFM process by assessing the cumulative effects of human activities on marine ecosystems to help partners minimize the **adverse** effects of **fishing and** non-fishing activities on trust LMR and habitats

**2.7.3 Prioritize vulnerabilities and risks to ecosystems and their components** – We recommend clarifying what criteria the agency will consider when determining what pressures pose the “most risk” to resources and communities.

**3) Priorities: Prioritize vulnerabilities and risks to ecosystems and their components**

NOAA Fisheries should evaluate and address the individual and cumulative drivers for the physical, chemical, biological, social, and economic components of marine ecosystems. This should take into account the comprehensive and systematic risk, vulnerability and susceptibility of LMRs and ecosystems, including:

- Identifying the living marine resource assets and associated fisheries communities in each region/jurisdiction and their relative vulnerability to human and natural pressures
- Identifying the individual and cumulative pressures that pose the most risk (**e.g., severely impairing ecosystem processes**) to those vulnerable resources and dependent communities
- Developing and evaluating management strategies within each region or jurisdiction to address or account for those pressures

**2.7.4 Explore and address trade-offs of fisheries management alternatives to achieve ecosystem objectives** - Pew supports this section without modification.

**2.7.5 Incorporate ecosystem considerations into management advice** - We support this section, with a minor modification to acknowledge the NEPA requirement to identify alternative management actions.

**5) Actions: Incorporate ecosystem considerations into management advice**

NOAA Fisheries recognizes the value of placing its resource management efforts into a broader ecosystem context. LMR management should consider best available ecosystem science in decision-making processes, including:

- Encouraging living marine resource assessments, control rules, and management decisions to incorporate the appropriate (as determined from the risk analysis under item 3 above and as feasible) ecosystem considerations (inclusive of those factors noted under item 1)
- Supplementing our species-by-species recovery and rebuilding efforts by considering the effects of biogeochemical, ecological, and biophysical processes, other human activities, and other drivers on **managed species within** marine ecosystems
- Evaluating and adopting integrated management processes and features that can be applied systematically and efficiently across all trust living marine resource species

in an ecosystem

- Developing best practices for bringing ecosystem considerations into assessments of and management advice for all LMRs stocks, particularly those in data-poor fishery situations
- Evaluating cumulative impacts of proposed management actions for trust resources and their ecosystems **and identifying alternative actions that achieve societal goals**

**2.7.6 Develop operating protocols to maintain resilient ecosystems** – Pew supports this section, but recommends minor modifications to include habitat areas of particular concern (HAPCs) and expand the evaluation of habitats to go beyond managed species and include whether the area provides important ecosystem services.

**6) Outcomes: Develop operating protocols to maintain resilient ecosystems**

NOAA Fisheries recognizes that its mandates are intended to sustain resilient and productive LMR populations and habitats, to maintain overall ecosystem structure and function, and to support the contributions that fisheries make to the socio-economic resiliency of coastal human communities. Actions in support of these mandates include:

- Assessing and appropriately accounting for uncertainty when making management decisions for trust LMR
- Evaluating **marine habitats, including but not limited to essential fish habitat and habitat areas of particular concern (EFH and HAPC; MSA and EFH Guidelines)** and critical habitat (ESA), throughout the ecosystem for those habitat types and areas that may be essential to multiple taxa **including but not limited to managed species, provide important ecosystem services, be** unique within the larger ecosystem, or **are** particularly vulnerable to the negative effects of human uses
- Minimizing or eliminating discards within individual fisheries while moving toward whole ecosystem assessments of total **non-target** species removal levels
- Evaluating ecosystem-level measures of resilience to ensure core ecosystem structure, biodiversity, production, energy flow, and functioning are maintained
- Evaluating the effects of EBFM action on coastal fishing community well-being

**2.8 Legal authorities and mandates** – We recommend more explicit alignment of EBFM with the requirement to achieve OY.

The **Magnuson-Stevens Fishery Conservation and Management Act (MSA)**, 16 U.S.C. §§ 1801 *et seq.*) authorizes federal fishery management within the U.S. exclusive economic zone by regional fishery management councils (Councils) and NOAA Fisheries. The MSA provides for: 1) integrating ecosystem considerations into fishery conservation and management actions, 2) minimizing the impacts of fishing on ecosystem components, and 3) conserving important ecosystem components from non-fishing threats. The MSA also authorizes NOAA Fisheries to provide technical advice and assistance to the Councils to develop and design regional EBFM programs (16 U.S.C. § 1882). The MSA's National Standards (16 U.S.C. § 1851) provide overarching requirements for conservation and management measures, including EBFM-supporting measures that

shall prevent overfishing, while achieving optimum yield; be based on the best scientific information available; to the extent practicable, manage interrelated stocks as a unit or in close coordination; take into account the importance of fishery resources to fishing communities; and to the extent practicable, minimize bycatch and bycatch mortality. Optimum yield, in particular, aligns well with the comprehensive approach of EBFM, as both consider the economic, social, and ecological factors of a fishery with the goal of achieving the greatest benefit from the resources. The MSA also stipulates that FMPs must identify and describe EFH, minimize to the extent practicable adverse effects from fishing on EFH and its ability to support fishery ecosystems, and identify other actions to encourage conservation and enhancement of EFH (16 U.S.C. § 1853(a)(7)). In addition, the Act requires rebuilding of overfished fish stocks (16 U.S.C. § 1854), and as noted above, requires that FMPs be consistent with the National Standards. The Act provides authority for FMPs to include measures to protect deep sea corals and to conserve target and non-target species and habitats (16 U.S.C. § 1853(b)(2), (12)).

### **Section 3 – Comments on Implementation**

#### ***3.1 NOAA Fisheries should evaluate the current status of EBFM in the regions, and establish a reporting system for tracking progress.***

Given the importance of implementing EBFM, and the current uneven progress in the regions, we recommend the agency establish a process for tracking the performance of Councils and regional Science Centers in implementing EBFM. Using the principles in this policy as a guide, the agency should perform a baseline assessment soon after the EBFM Roadmap is released. The Roadmap should contain a schedule for updating these progress assessments. By tracking the incremental steps forward, the agency can more easily identify the emergence of innovative solutions and disseminate them to other areas, or analyze what resources and tools regions may need to fully implement the policy. NOAA Fisheries should also maintain formal contact with the Councils and stakeholders on a regular basis to evaluate and discuss progress on implementing EBFM in each region.

#### ***3.2 Transparency will be crucial to ensuring stakeholder buy-in for EBFM.***

As EBFM is implemented through the Councils, Regional Offices, and Science Centers, we recommend that stakeholders should be engaged early and regularly to provide a feedback loop on EBFM activities. Fisheries management is a complex subject, but it is also a participatory one. It is important that agency and Council actions are clear and well-justified, and that as EBFM considerations are incorporated into stock assessments, habitat protections, catch specifications, and analyses for optimizing societal benefits of our fisheries. Further, the record of those decisions should be readily available and accompanied by plain-language explanations. The EBFM Roadmap could include recommendations for directly engaging Councils, fishermen, and other stakeholders.

### **3.3 Management with EBFM must still prevent overfishing and recover overfished stocks.**

While not in the EBFM Policy, we wish to address one concept of EBFM – the idea of using aggregate MSY to manage species. This concept was included in the proposed revisions to the NS1 guidelines. While the intent is likely that aggregate MSY would serve as a precautionary cap on removals (research shows that these values are often ~25% less than the sum of individual MSYs<sup>29</sup>), we are concerned that some methods of implementing an aggregate MSY would lead to overfishing on individual stocks in a complex. One study noted that “simulation testing of the performance of full multispecies models (Worm *et al.*, 2009) and aggregate production models (Gaichas *et al.*, 2012) clearly indicate that the vulnerability of weak-link stocks must be carefully considered prior to the application of any aggregate reference points.”<sup>30</sup> Thus, if species groups are constructed without considering individual life histories and productivities to identify species that are susceptible to overfishing, interactions among species such as predator-prey dynamics, and environmental influences, aggregate or full-system MSY may lead to overfishing.<sup>31</sup> Evaluations of existing model estimates indicate that the level of fishing mortality corresponding to an aggregate MSY can result in severe depletion of as many as 40% of stocks within the complex.<sup>32</sup>

Thus, Pew is concerned that this approach, as suggested by the agency, has so far not been accompanied by sufficient side bars to ensure overfishing will be prevented and the requirements of the Magnuson-Stevens Act against allowing overfishing are upheld. We strongly recommend that, should the agency include this methodology in the EBFM Roadmap, it contain specific direction for what safeguards must be in place to protect vulnerable stocks overfishing.

### **Section 4 – Concluding thoughts**

The Pew Charitable Trusts appreciates the opportunity to share these thoughts with you on the draft EBFM Policy. We applaud the agency for its strong statement that EBFM is core to making further progress in sustainably managing the nation’s ocean ecosystems and the fisheries that depend on them. This policy will strengthen and expand on the progress made in managing our ocean’s resources sustainably. EBFM is an attainable, logical next step from single-species management to a more comprehensive system that considers and conserves the components of the ecosystem. Pew agrees that consideration of interactions among fisheries, protected

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<sup>29</sup> Fogarty, M. J., Overholtz, W. J., and Link, J. S. “Aggregate surplus production models for demersal fishery resources in the Gulf of Maine.” (2012) *Marine Ecology Progress Series*. 459:247-258. DOI: 10.3354/meps09789.

<sup>30</sup> *Id.*

<sup>31</sup> Link, Jason S. et. al. “Synthesizing lessons learned from comparing fisheries production in 13 northern hemispheres ecosystems: emergent fundamental features.”(2012) *Marine Ecology Progress Series*. 459:293-302. DOI: 10.3354/meps09829.

<sup>32</sup> Gaichas, Sarah, et al. “Assembly rules for aggregate-species production models: simulations in support of management strategy evaluation.” (2012) *Marine Ecology Progress Series*. 459:275-292. DOI: 10.3354/meps09650.

species, and habitats, as well as a systematic approach to ensure resilience and sustainability of ecosystems, are critical to achieving sustainable and productive ecosystems and thriving fishing communities.

Again, we appreciate your consideration of our comments, and look forward to working with you to implement EBFM in U.S. fisheries.

Sincerely,

A handwritten signature in blue ink that reads "Lee R. Crockett". The signature is written in a cursive style with a large initial "L".

Lee Crockett  
Director, U.S. Oceans  
The Pew Charitable Trusts

Appendix: Complete redline of the draft EBFM Policy

<b><i>NATIONAL MARINE FISHERIES SERVICE POLICY DIRECTIVE [number] [EFFECTIVE DATE]</i></b>	
<b><i>Fisheries Management</i></b>	
<b><i>Ecosystem-Based Fisheries Management Policy</i></b>	
<b>NOTICE:</b> This publication is available at: <a href="http://www.nmfs.noaa.gov/op/pds/index.html">http://www.nmfs.noaa.gov/op/pds/index.html</a>	
<b>OPR:</b> F (J. Link) <b>Type of Issuance:</b> Initial	<b>Certified by:</b> F (J. Link)
<b>SUMMARY OF REVISIONS:</b>	

**Ecosystem-Based Fisheries Management Policy  
of the  
National Marine Fisheries Service  
National Oceanic and Atmospheric Administration**

**POLICY STATEMENT**

NOAA’s National Marine Fisheries Service (NOAA Fisheries) strongly supports the implementation of Ecosystem-Based Fisheries Management (EBFM), to better inform decisions and help achieve and optimize the benefits from marine fisheries by evaluating trade-offs among and between fisheries (commercial, recreational, and subsistence), aquaculture, protected species, biodiversity, and habitats, while maintaining resilient and productive ecosystems.

**BACKGROUND**

NOAA believes ecosystem-based management (EBM<sup>33</sup>) will assist the agency in better meeting its mandates to sustainably manage the nation’s trust living marine resources

<sup>33</sup> EBM is defined as “geographically specified, adaptive, takes account of ecosystem knowledge and uncertainties, considers multiple external influences, and strives to balance diverse societal objectives.” NOAA 2004. New Priorities for the 21st Century- NOAA’s Strategic Plan: Updated for FY 2005-FY 2010, 28 pp.

(LMR). In this context, NOAA Fisheries has taken several steps to advance the ecosystem-based fisheries management (EBFM) portion of this strategic EBM goal<sup>34</sup>. Coordinated implementation of EBFM across mandates will lead to greater efficiency and will enable NOAA Fisheries to explicitly consider trade-offs between fisheries, fishery species, and other ecosystem components (e.g. other species, habitats, humans) and processes that affect, or are affected by, fisheries.

## PURPOSE

The purpose of this policy is to:

- Define EBFM;
- Describe the benefits of EBFM;
- Clarify how EBFM relates to existing LMR management legal authorities and requirements;
- Establish a framework of guiding principles to enhance and accelerate the implementation of EBFM within NOAA Fisheries, and in cooperation with NOAA Fisheries partners, when EBFM would further improve fisheries decision-making, and/or ecological outcomes; and
- Build on the agency's past progress and clarify the agency's commitment to integrating its management programs for living marine resources and their habitats under changing climate, ecological and ocean conditions.

## DEFINITION OF ECOSYSTEM-BASED FISHERIES MANAGEMENT

NOAA Fisheries defines EBFM as *a systematic approach to fisheries management in a geographically specified area that ensures the resilience and sustainability of the ecosystem<sup>35</sup> ; recognizes the physical, biological, economic, and social interactions among the affected components of the ecosystem, including humans; and seeks to optimize benefits among a diverse set of societal goals.*

For the purposes of this policy, EBFM includes considerations of interactions among fisheries, protected species, aquaculture, habitats, and other ecosystem components, including the human communities that depend upon these ecosystem services. **“Societal goals” should consider and include any relevant economic, social, and ecological factors.**

## CONTEXT OF ECOSYSTEM-BASED FISHERIES MANAGEMENT

Within NOAA Fisheries, managers and scientists frequently describe EBFM as one level along a continuum of ecosystem approaches to management: 1) ecosystem approach to

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<sup>34</sup> Ibid.

<sup>35</sup> In the NOAA Fisheries context, the term “ecosystem” means a geographically specified system of fishery resources, the persons that participate in that system, the environment, and the environmental processes that control that ecosystem's dynamics. (c.f. Murawski and Matlock, 2006, NMFS-F/SPO-74)

fisheries management (EAFM), 2) EBFM, and 3) ecosystem-based management (EBM). NOAA Fisheries and its partners (such as the Fishery Management Councils, State Fishery Commissions, Tribes, and others) are already making progress in implementing EAFM through Magnuson-Stevens Fishery Conservation and Management Act (MSA) Fishery Management Plans (FMP), Marine Mammal Protection Act (MMPA) Take Reduction Plans, and Endangered Species Act (ESA) Recovery Plans. These efforts include incorporating ecosystem and environmental factors into single species management actions or stock assessments, enhancing understanding of living marine resource and coastal community dynamics, protecting key ecosystem components, and better informing management decisions for a particular stock. **These activities are occurring with existing data and funding and serve as the first steps in EBFM. The implementation of this policy will build upon those efforts. Existing and developing projects to fulfill conservation obligations that incorporate ecosystem considerations should not be abandoned or delayed because of this policy, but instead harmonized with the guiding principles herein. EBFM is based on sound single-species management that prevents overfishing and rebuilds overfished stocks.** Implementing EBFM supports NOAA's broader goals for EBM across multiple sectors and mandates to wisely manage multiple ecosystem goods and services, and with other agencies, to maintain productive and resilient ecosystems.

## BENEFITS

Implementing EBFM can help NOAA Fisheries and its partners optimize ~~societal~~ **benefits among a diverse set of societal goals** across its multiple federal mandates by considering environmental and ecological factors and identifying trade-offs among its trust resources, including fisheries, protected species, and their habitats. Through EBFM, NOAA Fisheries and its partners can better evaluate management options and their effectiveness. Additionally, it can help communicate risks, uncertainties, and implications of management decisions across marine fisheries and a range of affected species. Better understanding, articulation and ~~quantification~~ **consideration** of the trade-offs will ensure more transparent decision processes, outcomes, and more efficient use and management of NOAA Fisheries and partner resources.

Management advice from EBFM will be more comprehensive, accurate, and help reduce uncertainty, by taking into consideration interacting elements in the ecosystem. EBFM can maintain ecosystem function, and fishery sustainability, which support economic and social stability and fishing community well-being. **For example, EBFM is a tool for achieving the optimum yield of a fishery by accounting for the relevant economic, social, and ecological factors and providing the greatest overall benefit to the nation.** EBFM applies the best available scientific information to improve decision-making via consideration of the holistic impact of management decisions. EBFM also can use forecasts of future ecosystem conditions and services, incorporating natural variability, anthropogenic forcing, and change in climate and ocean conditions to predict and evaluate outcomes from a range of alternative management strategies. Combined,

there are stability and efficiency outcomes for business and regulatory planning that come from adopting EBFM.

## GUIDING PRINCIPLES

The implementation of EBFM should reflect the following six guiding principles. These principles flow from the foundational basis of science, through strategic planning, prioritization, and tradeoff analyses, and into management advice, all with the ultimate aim of maintaining productive and resilient ecosystems (Figure 1).

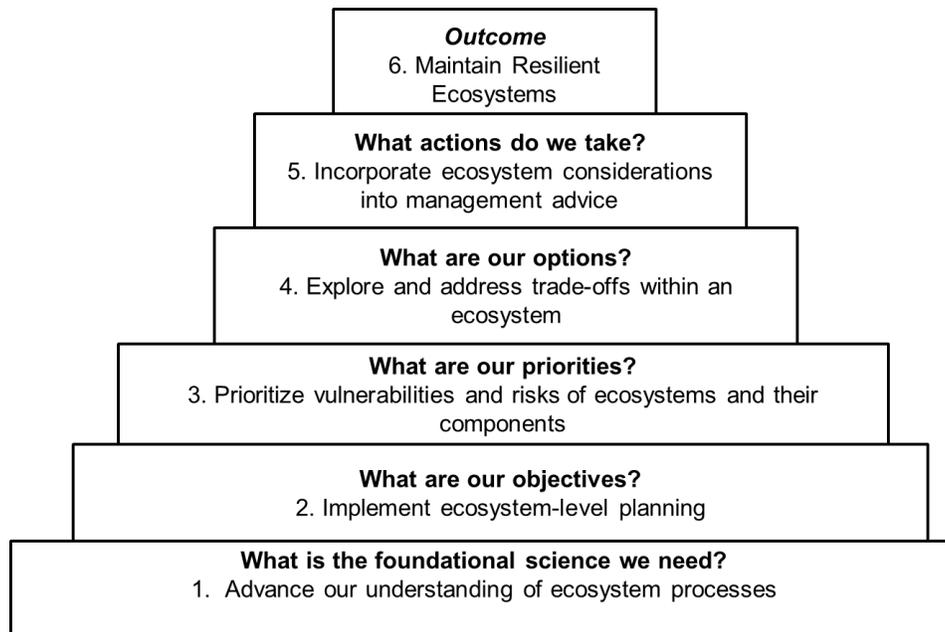


Figure 1. Illustration of the interconnected and interdependent nature of the major EBFM guiding principles.

To meet its policy supporting increased implementation of EBFM, NOAA Fisheries will, to the extent practical:

### 1) **Science: Advance our understanding of ecosystem processes**

NOAA Fisheries shall work to better understand the broader suite of ecosystem processes, drivers, threats, and status of the nation's marine ecosystems to inform all levels of management advice, including:

- Conducting science to understand ecosystem processes, drivers, and threats including:
  - Measurable biogeochemical, biophysical, and ecological factors, processes, and interactions
    - Population dynamics of living marine resources
    - Trophic relationships (including predator-prey relationships and forage fish dynamics)

- Oceanographic features and other environmental factors (including climate change and ocean acidification)
    - Habitat status and predominant threats to ongoing habitat quality, and linking habitat to production
    - **Effects of fishing on fish habitat, species diversity, age-structure, and trophic interactions**
    - Ecosystem productivity patterns
    - **Vulnerability, susceptibility and resilience of ocean wildlife, habitats, and ecosystems**
    - **Effects of invasive species on ecosystem function**
  - Social and economic considerations
    - Social and economic drivers factors that influence fishers and other users of the marine environment
    - Economic welfare and social well-being of resources users
    - Community vulnerability and resilience
    - Non-market and existence values of marine mammals, turtles, seabirds, and other marine resources, **including the value of forage fish as prey in the ecosystem and the social and economic impacts of forage fish depletion on dependent fish and fisheries**
    - Employment
    - **Long-term social and economic impacts of resource depletion**
  - Increase domestic seafood supply and security **while maintaining robust ecosystems**
  - **Interactions between fisheries**
  - Ocean use sectors beyond fisheries (e.g., mining, energy, shipping, non-fishing recreational use)
- **Integrate traditional knowledge as a source of ecological, economic, and social data**
- Developing Integrated Ecosystem Assessment **and Management Strategy Evaluation (MSE)** science capabilities and products to provide more ecosystem-level management advice
- Maintaining **sufficient-statistically-significant** and increasingly efficient monitoring systems
- Conducting process-oriented research to understand key mechanisms and relationships
- Providing regular ecosystem status updates and reports to better inform regional decision-making processes
- **Encourage partners and academic institutions to conduct research that advances EBFM through existing grant-making processes and cooperative research programs.**

**2) Objectives: Implement ecosystem-level planning**

NOAA Fisheries supports the use of Fishery Ecosystem Plans (FEPs) or similar documents to describe ecosystem goals, objectives, and priorities for fisheries and ecosystem research, conservation, and management across multiple fisheries within an ecosystem. These include:

- Supporting FEPs as umbrella strategic planning documents to guide coordination and trade-off evaluation among FMPs **and to provide decision-makers with summary information about ecosystem structure and function**
- Seeking long-term ecological, economic, and social goals, objectives, and priorities for FEPs that are based on the results of inclusive strategic planning with diverse stakeholders
- Basing regular reviews and updates of FEPs on indicators established for measuring progress toward established goals and objectives
- **Establish actionable ecosystem reference points for key indicators that will trigger management responses designed to ensure achievement of ecosystem goals and objectives.**
- **Collaborating with Councils to identify conservation and management measures in the FEP, to be implemented through FMPs, which would achieve the goals and objectives of the FEP**
- Taking into account the direct effect of fisheries on trust LMR and habitats, and the cumulative impact of fisheries on the entire ecosystem
- Taking into account the ecosystem functional and structural roles of trust LMR and habitats **(e.g., the role of forage fish; the importance of spawning aggregation sites, hard-bottom substrate, and deep-sea corals)**
- Taking into account past and possible future changes in climate and ecosystem conditions
- **Evaluating the effects of proposed new fisheries (in new areas or with new gear types) and recommend FMP management measures to ensure the new or expanded fisheries meet FEP goals, objectives and priorities**
- Facilitating the participation of external federal, state (including territories), **commission**, and tribal partners in the EBFM process by assessing the cumulative effects of human activities on marine ecosystems to help partners minimize the **adverse** effects of **fishing and** non-fishing activities on trust LMR and habitats

### **3) Priorities: Prioritize vulnerabilities and risks to ecosystems and their components**

NOAA Fisheries should evaluate and address the individual and cumulative drivers for the physical, chemical, biological, social, and economic components of marine ecosystems. This should take into account the comprehensive and systematic risk, vulnerability and susceptibility of LMRs and ecosystems, including:

- Identifying the living marine resource assets and associated fisheries communities in each region/jurisdiction and their relative vulnerability to human and natural pressures

- Identifying the individual and cumulative pressures that pose the most risk (e.g., **severely impairing ecosystem processes**) to those vulnerable resources and dependent communities
- Developing and evaluating management strategies within each region or jurisdiction to address or account for those pressures

**4) Options: Explore and address trade-offs of fisheries management alternatives to achieve ecosystem objectives**

In close cooperation with its partners, NOAA Fisheries supports the consideration of and efforts to take into account various trade-offs when considering the cumulative effects of decision-making processes on the ecosystem, including:

- Analyzing trade-offs on optimizing benefits from fisheries within each ecosystem or jurisdiction, taking into account ecosystem-specific policy goals and objectives, cognizant that ecosystems are composed of interconnected components
- Developing and monitoring ecosystem-level reference points to inform LMR management efforts
- Developing management strategy evaluation capabilities to better conduct ecosystem-level analyses that provide ecosystem-wide management advice

**5) Actions: Incorporate ecosystem considerations into management advice**

NOAA Fisheries recognizes the value of placing its resource management efforts into a broader ecosystem context. LMR management should consider best available ecosystem science in decision-making processes, including:

- Encouraging living marine resource assessments, control rules, and management decisions to incorporate the appropriate (as determined from the risk analysis under item 3 above and as feasible) ecosystem considerations (inclusive of those factors noted under item 1)
- Supplementing our species-by-species recovery and rebuilding efforts by considering the effects of biogeochemical, ecological, and biophysical processes, other human activities, and other drivers on **managed species within** marine ecosystems
- Evaluating and adopting integrated management processes and features that can be applied systematically and efficiently across all trust living marine resource species in an ecosystem
- Developing best practices for bringing ecosystem considerations into assessments of and management advice for all LMRs stocks, particularly those in data-poor fishery situations
- Evaluating cumulative impacts of proposed management actions for trust resources and their ecosystems **and identifying alternative actions that achieve societal goals**

**6) Outcomes: Develop operating protocols to maintain resilient ecosystems**

NOAA Fisheries recognizes that its mandates are intended to sustain resilient and productive LMR populations and habitats, to maintain overall ecosystem structure and function, and to support the contributions that fisheries make to the socio-economic resiliency of coastal human communities. Actions in support of these mandates include:

- Assessing and appropriately accounting for uncertainty when making management decisions for trust LMR
- Evaluating **marine habitats, including but not limited to** essential fish habitat **and habitat areas of particular concern** (EFH and HAPC; MSA and EFH Guidelines) and critical habitat (ESA) throughout the ecosystem for those habitat types and areas that may be essential to multiple taxa **including but not limited to managed species, provide important ecosystem services, be** unique within the larger ecosystem, or **are** particularly vulnerable to the negative effects of human uses
- Minimizing or eliminating discards within individual fisheries while moving toward whole ecosystem assessments of total **non-target** species removal levels
- Evaluating ecosystem-level measures of resilience to ensure core ecosystem structure, biodiversity, production, energy flow, and functioning are maintained
- Evaluating the effects of EBFM action on coastal fishing community well-being

#### LEGAL AUTHORITIES AND MANDATES

Multiple laws, executive orders and policies authorize NOAA Fisheries to implement ecosystem-based fisheries management. This policy summarizes a subset of the authorities used by NOAA Fisheries and our partners to take actions that directly affect fisheries-associated ecosystems' structure and function. This policy also recognizes other NOAA Fisheries authorities and responsibilities and those of other federal natural resource management agencies, Regional Fishery Management Councils, interstate marine fisheries commissions, states, tribes, and advisory bodies. A systematic and coordinated approach must be taken to fully execute our authorities within and across all authorities to effectively implement EBFM.

The **Magnuson-Stevens Fishery Conservation and Management Act** (MSA), 16 U.S.C. §§ 1801 *et seq.*) authorizes federal fishery management within the U.S. exclusive economic zone by regional fishery management councils (Councils) and NOAA Fisheries. The MSA provides for: 1) integrating ecosystem considerations into fishery conservation and management actions, 2) minimizing the impacts of fishing on ecosystem components, and 3) conserving important ecosystem components from non-fishing threats. The MSA also authorizes NOAA Fisheries to provide technical advice and assistance to the Councils to develop and design regional EBFM programs (16 U.S.C. § 1882). The MSA's National Standards (16 U.S.C. § 1851) provide overarching requirements for conservation and management measures, including EBFM-supporting measures that shall prevent overfishing, while achieving optimum yield; be based on the best scientific information available; to the extent practicable, manage interrelated stocks as a unit or in close coordination; take into account the importance of fishery resources to fishing communities; and to the extent practicable, minimize bycatch and bycatch mortality.

Optimum yield, in particular, aligns well with the comprehensive approach of EBFM, as both consider the economic, social, and ecological factors of a fishery with the goal of achieving the greatest benefit from the resources. The MSA also stipulates that FMPs must identify and describe EFH, minimize to the extent practicable adverse effects from fishing on EFH and its ability to support fishery ecosystems, and identify other actions to encourage conservation and enhancement of EFH (16 U.S.C. § 1853(a)(7)). In addition, the Act requires rebuilding of overfished fish stocks (16 U.S.C. § 1854), and as noted above, requires that FMPs be consistent with the National Standards. The Act provides authority for FMPs to include measures to protect deep sea corals and to conserve target and non-target species and habitats (16 U.S.C. § 1853(b)(2), (12)).

The **Marine Mammal Protection Act** (MMPA) protects all marine mammals. NOAA Fisheries manages cetaceans (whales, porpoises, and dolphins) and pinnipeds (seals and sea lions) under the Act, while the U.S. Fish and Wildlife Service (USFWS) manages walrus, polar bears, manatees, sea otters, and dugongs, with support from NOAA Fisheries. The primary objective of the MMPA specifies that marine mammals should not be allowed to diminish beyond the point at which they cease to be a significant functioning element in the ecosystem of which they are a part (16 U.S.C. § 1361). The MMPA further notes that marine mammals are resources of great international aesthetic, recreational, and economic significance. As such, the primary objective of their management should be to maintain the health and stability of the marine ecosystem and to obtain an optimum sustainable population, commensurate with the carrying capacity of the habitat. In furtherance of this objective, the MMPA prohibits the “taking” or importing of marine mammals except in certain limited circumstances (16 U.S.C. § 1371). Among other provisions, the MMPA requires NOAA Fisheries to prepare assessments of marine mammal populations (16 U.S.C. § 1386) and includes a framework for reducing the incidental mortality and serious injury of marine mammals during the course of commercial fishing operations (16 U.S.C. § 1387). The MMPA allows for intentional lethal taking of individually identifiable pinnipeds that are having a significant negative impact on the decline or recovery of salmonid stocks, including those listed as threatened or endangered under the Endangered Species Act (16 U.S.C. § 1389).

The **Endangered Species Act** (ESA, 16 U.S.C. §§ 1531-1543) provides for the conservation of threatened and endangered species and their ecosystems. The listing of a species as endangered makes it illegal to “take” (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to do these things) that species. Similar prohibitions usually also extend to threatened species. It is meant to provide “a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved...” and directs NOAA Fisheries and the USFWS to designate “critical habitat”, for instance, by identifying areas that contain physical or biological features essential for the conservation of the species. Federal agencies are directed under ESA section 7 to utilize their authorities to carry out programs for the conservation of threatened and endangered species. Federal agencies must also consult

with NOAA Fisheries on activities that may affect a listed species (e.g., Federal commercial fisheries).

Under the **National Aquaculture Act** (NAA; 16 U.S.C. §§ 2801-2810), NOAA Fisheries supports the development of the U.S. marine aquaculture industry, an increasingly important economic component of marine ecosystems. Under the **Coral Reef Conservation Act** (CRCA; 16 U.S.C. §6401), NOAA Fisheries maps, monitors, assesses, restores, and conducts scientific research to benefit the understanding, sustainable use, and long-term conservation of coral reef ecosystems and cooperatively conserves and manages coral reef ecosystems with local, regional, and international programs and partners. Under the **Federal Power Act** (FPA; 16 U.S.C § 811), NOAA Fisheries has the authority to prescribe safe, timely, and effective fish passage at federal hydropower projects to ensure access to upstream and downstream spawning grounds and other habitats. Several sections in the NAA, CRCA, and FPA address ecosystem issues, including sections 2803 of the NAA; sections 203, 204, and 207 of the CRCA; and sections 10j, 18, and 30 of the FPA (16 U.S.C. §§ 803(j), 811, 823a).

The **National Environmental Policy Act** (NEPA) of 1969 (42 U.S.C. §§ 4321 *et seq.*) is a procedural statute that seeks to encourage productive and enjoyable harmony between man and his environment, promote efforts to prevent or eliminate damage to the environment, and enrich understanding of ecological systems and natural resources important to the Nation (42 U.S.C. § 4321). Pursuant to NEPA and its implementing regulations (40 C.F.R. §§ 1501 *et seq.*), NOAA Fisheries prepares environmental impact statements (EIS) for major federal actions significantly affecting the quality of the human environment (42 U.S.C. § 4332), and in other instances, prepares environmental assessments (EA). Through an EIS or EA, NOAA Fisheries analyzes the ecological, economic and social effects of proposed actions, alternatives to the proposed actions, and emphasizes cumulative impacts of actions on LMRs and their habitats, connections, and ecosystems. NOAA Fisheries also evaluates the environmental effects of federal actions on fishery resources through the MSA, ESA, and **Fish and Wildlife Coordination Act** (FWCA; 16 U.S.C §661 *et seq.*). Under the FWCA, NOAA Fisheries evaluates impacts of proposed activities to fish species and their habitats that fall outside the scope of the MSA (including many forage species that serve as prey for federally managed fisheries), and provides comments to other federal agencies to reduce environmental impacts.

#### NOAA FISHERIES RESPONSIBILITIES

NOAA Fisheries' Leadership, including the Assistant Administrator for Fisheries, the Deputy Assistant Administrators for Regulatory and Scientific Programs, the Regional Administrators and Science Directors, and the Agencies' ST level Senior Scientists, are responsible for agency-wide implementation of this policy.

This policy is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or in equity by any party against the United States, its

departments, agencies, or entities, its officers, employees, or agents or any other person.