

MAFAC Climate and Ecosystems Subcommittee
DRAFT Recommendation on NOAA Fisheries Revised Ecosystem-Based Fisheries
Management Road Map Update

August 16, 2024

The Marine Fisheries Advisory Committee (MAFAC) appreciates the opportunity to offer the following comments on the draft Ecosystem Based Fisheries Management (EBFM) Road Map update (hereinafter referred to as the Road Map). Overall, the Road Map is a robust document that lays out important processes and guidelines necessary for improving fisheries management. The revised Road Map is a significant advancement from the 2016 Road Map and an important document to better unify the efforts of staff and programs across NOAA that are working to advance our understanding of ecosystem dynamics and enhance our ability to act upon that information. We appreciate the clear intent to ensure the Road Map more directly includes climate change. We understand that the agency is still preparing an assessment of the implementation of the 2016 Road Map, and we look forward to continuing to work with the agency to identify how the guidelines, goals, and actions of the revised Road Map can leverage those results. MAFAC strongly supports the Road Map and encourages the Agency to ambitiously implement the approaches described therein.

As MAFAC highlighted in our [November 2023 letter](#), fisheries, fishing communities, and ecosystems are facing unprecedented challenges due to changing ocean conditions, and management processes are struggling to adapt to these changes. The revised Road Map is a crucial evolution of the first Road Map, incorporating a decade of research and appropriately iterating to build on that progress. Our primary concern is that the Road Map alone is insufficient to accelerate action to address climate impacts on our fishing-dependent communities, marine species, and the ecosystems that support and depend upon them, and that NOAA Fisheries needs to take additional steps (whether through the Road Map or through other actions) to ensure fisheries, fishing communities, and ecosystems are sustainable and resilient in the face of climate change. We further recognize that the adoption of EBFM by fishery managers has been slow. Therefore, MAFAC's recommendations emphasize actions that could enhance the implementation of EBFM and climate-ready fisheries with the required urgency. Our current recommendations expand upon the insights provided in our earlier document, "On the Need for a Climate Ready Fisheries Policy." Our recommendations on additional improvements to the Road Map are below.

Climate change impacts on ecosystems and communities demand urgent action from NOAA Fisheries

A primary focus of MAFAC's Climate and Ecosystems Subcommittee is to advise the agency on how to accelerate implementation of management actions that address impacts that climate change poses to our marine ecosystems and coastal communities. The agency has indicated that the Road Map is intended to be the framework for addressing climate impacts in fisheries. We agree that full implementation of the Road Map would increase the likelihood that actionable climate information is provided to fishery managers. For instance, the Road Map could significantly increase consideration of ecosystem, climate, and social and economic factors in fisheries management, as well as to advance tools and approaches for addressing fundamental questions of how to manage our fisheries sustainably. This is significant, given the increasing nonstationarity of our ecosystems. While the Road Map describes broadly the approaches scientists and managers could use to grapple with climate impacts on fisheries, it fails to provide the momentum, timeline, or vision needed to impose the immediate use of climate-ready management approaches. Collectively, we should be in "moonshot" levels of ambition to address climate impacts on the nation's fisheries. Our marine ecosystems and the people who depend on them are already experiencing more frequent and severe fishery disasters, disrupted ecosystem functions, declining marine species, and devastating coastal community impacts. In some cases, new opportunities will be created as a result of climate impacts but there is limited ability for resource users to rapidly adapt to these opportunities.

MAFAC considers EBFM to describe *methodologies for* managing fisheries, while climate-readiness refers to fishery management *objectives*. **EBFM is a management system; climate-readiness is a desired state**. In our previous comments, we highlighted four key principles that describe climate-ready fisheries. In summary, we identified:

- **Long-term sustainability:** Ensuring the enduring viability of fisheries and communities.
- **Science and knowledge-based:** Supported by robust scientific research and inclusive of Traditional Knowledges.
- **Adaptive management:** Adaptively managed to minimize and mitigate risks and increase the resilience of stocks, ecosystems, and communities.
- **Equitable sharing:** Ensuring the equitable distribution of costs and benefits of management.

Those principles describe both the approaches and the desired outcomes of successful climate-ready management. The revised Road Map describes *approaches* that can help managers achieve long-term sustainability, implement the latest science, determine ways to increase resilience, or consider aspects of equity. However, it does not identify that managers *must prioritize such*

actions. Taking those steps is necessary to meet statutory requirements, identify mitigation strategies, and avoid exacerbating stresses on fish populations and fishing communities, and to equip U.S. fisheries towards the best possible outcomes in a climate-disrupted future.

While MAFAC greatly appreciates the additional work done within the revised Road Map to incorporate our previous comments, we suggest that more agency action and leadership is needed within and beyond the Road Map to advance climate-ready fisheries. The time to act is now and managers need a common purpose and understanding of priorities to overcome system inertia and the challenges of making decisions while uncertainty increases; providing this direction should increase demand for the tools and approaches described in the Road Map. Additionally, the agency should find ways to increase the likelihood of fisheries management systems to provide opportunity for autonomous adaptation by fishery participants in ways that confer both sustainability and flexibility to fishery systems and participants.

Feedback on the definition of climate-ready fisheries

MAFAC recommends better distinguishing between the discrete yet complementary functions of climate-ready fisheries (as an objective) and ecosystem-based fishery management (as a methodology) in bringing about sustainability and resilience in fishery systems. Taking the metaphor of a road map to heart, the Road Map provides many pathways and processes through which managers could consider and act on ecosystem and climate information. It does not provide guidance on how to make decisions in those processes in order to arrive at a particular destination. Introducing an emphasis on climate-readiness in fisheries can help managers, stakeholders, and members of the scientific community arrive at shared understandings of the “destination” or desired outcome of the application of EBFM to an ecoregion. As described above, MAFAC sees an urgent need for the agency to better articulate the outcomes needed from management in order to ensure our fisheries, communities, and ecosystems can bear the weight of climate-induced challenges and make the most of any new opportunities.

The agency’s definition of “climate-ready trust resource management decision making” is a starting point, but does not provide enough clarity. As noted in discussions with the agency, there are a lot of definitions of climate-ready fisheries being offered by other parties; this only further supports the need for the agency to articulate their own vision and intentions for management, as NOAA Fisheries is mandated to manage these trust resources for the long-term good of the nation. But at present, the Road Map only provides a footnote to define “climate-ready trust resource management decision-making” rather than emphasizing this critical concept. Instead, the definition of *climate-ready management* should be in the main body of the document and explain characteristics of climate-ready fisheries management and what benefits that confers to commercial, recreational, subsistence, and cultural fishing. Bringing these concepts into the

document and expanding upon the use of EBFM to achieve climate-ready fisheries will better provide guidance to the Councils and other management partners on what their climate informed management work should achieve. This is critically important now as Councils work to implement their climate-ready initiatives under the Inflation Reduction Act. Below are recommendations for amending the current definition, but we recommend the agency review [our previous comments for content](#) for this additional section of the Road Map.

~~Climate-ready fisheries trust resource management decision-making~~ *operationally considers and manages for the effects on, mitigation of, and adaptation to the many ways in which climate change can affect targeted and other trust resource populations, fisheries, and the communities that rely on associated with them. This management should maintain abundant populations that withstand and recover from climate disruptions, preserve ecosystem functions despite changing climate conditions, support the ocean’s long-term ability to provide food and support businesses, recreation and culture, and enhance the ability of fishery participants to equitably access these opportunities.*

Describing the initial steps for how fisheries can incorporate climate-readiness into management is important but needs clarity

MAFAC is encouraged by the focus in the Road Map of identifying “management on-ramps” for ecosystem and climate information. However, in MAFAC’s discussion, we found that there was not a shared understanding of what is meant by an “on-ramp” or how it would work. It is important that this concept be explained clearly, as our experience suggests others involved in fisheries may not understand how to take the initial steps to adopt a more adaptive and responsive management system.

One of the barriers to more frequent incorporation of ecosystem based information in fisheries management is that the existing, largely single-species focused management system is rigidly structured to flow from stock assessment to the setting of annual catch limits. Managers, scientific and statistical committees, and the fishing public do not have a shared understanding of the mechanisms through which ecosystem, social, and economic information can be incorporated into the existing system to promote better management results. For example, stock assessments are often seen as the only way to bring in new information. However, other mechanisms – such as risk tables and policies, buffers, optimum yield considerations, pre-set responsive harvest control rules, and more – can increase a management plan’s responsiveness to ecosystem, social, and economic indicators. Fishery managers should find ways to leverage the expertise of the Integrated Ecosystem Assessment teams, the Climate, Ecosystems, and Fisheries Initiative (CEFI) Decision Support Teams, and ecosystem subcommittees or advisory bodies, to react more quickly to changing ocean conditions. MAFAC recommends adding language to the Road Map that explains some options for initial management steps. Additionally,

MAFAC suggests that NOAA Fisheries develop technical guidance for managers and materials useful for a broad audience.

Additionally, we highlight that climate-readiness in fisheries necessitates not only the introduction of climate-related information into fisheries management decision-making processes, but also the development and implementation of approaches to fisheries management that provide latitude for autonomous, real-time adaptation by fishery participants in response to changing climatic conditions. The importance of this second element is not obvious in the “on-ramp” framework. Therefore, we encourage NOAA Fisheries to be explicit in the Road Map about the importance of *both* elements of climate-ready fisheries, and to contemplate ways in which the agency and its partners can continuously evaluate, increase confidence around, and drive momentum towards this second element of climate-readiness in fisheries.

Harmonization with existing NOAA strategies and initiatives

It would be helpful to NOAA Fisheries partners to provide more guidance and clarity on the intersection of CEFI, the Equity and Environmental Justice (EEJ) Strategy, and other NOAA Fisheries guidance into the Road Map. Additionally, a harmonization of the definitions is needed between the Road Map (and Policy) and other NOAA guidance documents. We highlight a few considerations here:

NOAA Guidance and Best Practices for Engaging and Including Indigenous Knowledge in Decision-Making

MAFAC notes that the Road Map almost exclusively chooses a Western Science approach as the basis for decision making. While there are some mentions of Tribes and Indigenous communities, the Road Map misses the opportunity to align with NOAA’s acknowledgement that Indigenous Knowledge is “a cumulative body of knowledge, practice and belief evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment.” As is clear from this definition, Indigenous Knowledge and Practices are fundamentally ecosystem-based approaches. Tribes, Indigenous, and native peoples have stewarded and continue to steward ecosystem resources through integrated knowledge and management traditions that have been developed over millennia but were disrupted, replaced, and sometimes criminalized by the establishment of colonial management practices that have become institutionalized in our modern day government structures.

MAFAC notes that the White House has made a [commitment](#) to the greater use of Indigenous Knowledge in research, policy and decision-making, and NOAA has adopted a

set of [“Best Practices](#) for Engaging and Including Indigenous Knowledge in Decision-Making.” However, neither of these valuable pieces of guidance are reflected in the revised Road Map. As Tribes and Indigenous fishers are uniquely vulnerable to climate change and continue to be excluded from management decisions regarding their traditional fishing grounds and practices, further inclusion in the Road Map is important for ensuring greater consideration of their concerns in the implementation of the Road Map. MAFAC recommends the Road Map acknowledge that traditional practices are EBFM approaches and that greater advancement of an EBFM approach would include exploring options for greater co-management and co-stewardship. This should include goals and action items to align the Road Map with other ongoing efforts.

Equity and Environmental Justice Strategy

The Road Map lacks specifics and clarity on how to integrate NOAA Fisheries’ Equity and Environmental Justice Strategy into EBFM. [MAFAC previously provided recommendations](#) to NOAA Fisheries on the draft Equity and Environmental Justice Strategy and several elements of those recommendations are relevant to the Road Map. MAFAC recommended utilizing an equity framework to contextualize barriers to equity that will impact the implementation of EBFM. This would include attention to recognitional, procedural, and distributional equity. Recognitional equity (whose voice matters) is the acknowledgment and incorporation of the rights, tenure, cultural identities, practices, values, visions, knowledge systems, and livelihoods of different stakeholders and actors in conservation governance, planning, and management. Within the Road Map this should be considered in strategic planning, data collected, science conducted, and ecoregional priorities that need to be established. Procedural equity (who is involved in decision-making) is defined as the inclusion and effective participation of all relevant actors and groups in rule and decision-making, transparency, and accountability for conservation policies and programs. Under the Road Map this would include underserved communities being included in the discussions on how to prioritize vulnerabilities and risks to social ecological systems under Guideline 3. Distributional equity (who wins or loses) is the level of fairness in the distribution of benefits, rights, costs, responsibilities, and risks between different groups, including current and future generations. The legitimacy and sustainability of fisheries governance depend on how well principles of equity are implemented in decision-making processes. The elements of an equity framework are critical to incorporate into NOAA Fisheries’ preferred management approach to fisheries and trust resources.

Climate and Ecosystem Fisheries Initiative

MAFAC appreciates the inclusion of CEFI throughout the Road Map, but notes that the interactions between the Road Map and CEFI tend to be more focused on the science aspects of that initiative. CEFI contains regional decision support teams that will be producing management-relevant climate-informed products to advise managers on the current and anticipated impacts of climate change; we encourage the agency to look for ways to represent where those efforts align with Road Map Guidelines 3-6 and the associated goals and actions.

The Road Map should clearly convey guidance on how to implement regional planning for managing climate impacts within the EBFM framework

As NOAA Fisheries highlighted in the Road Map's definition of "climate-ready trust resource management decision making," there is a need to manage "for the effects on, mitigation of, and adaptation to the many ways in which climate change can affect targeted and other trust resource populations, fisheries, and the communities associated with them." In MAFAC's view, this is best supported by creating a vision of management goals for NOAA Fisheries and its partners, while also taking the necessary actions now to maintain sustainable and resilient fisheries. The Road Map can support identification of approaches for creating regionally specific visions that support fisheries and fishing communities in a changing climate, as well as identifying the impacts and priorities within a system that can be addressed by fisheries management. The existing Guidelines laid out in the Road Map offer an overarching process for how to implement EBFM. However, that process and the underlying goals and actions lack clarity in how they feed into a systematic approach to implementing EBFM. MAFAC agrees with the update to the guidelines reflecting a circular or iterative process to the implementation of EBFM, a change from the previous Road Map that we wholeheartedly support. MAFAC believes that a flexible process for implementing EBFM should identify how to integrate the Equity and Environmental Justice Strategy (and the implementation plans), explicitly acknowledge decisions are being made within a social-ecological system, and incorporate insight on how to manage towards climate readiness. What follows is our take on how the Guidelines, and the underlying goals and actions, can better support regional planning efforts:

- Strategic planning should begin by analyzing the biological environment and the social, economic, political systems within the ecoregion along with a threats and opportunities assessment of foreseen negative and positive impacts in the system. Knowing conditions as they are now and understanding that these systems likely have already been dramatically impacted and suffer from shifting baselines, and identifying the biggest threats and opportunities at the beginning of a strategic planning process would focus

management efforts on how to implement EBFM in an ecoregion. The strategic planning should synthesize stakeholder and rights holders' views and input to integrate EBFM and the EEJ Strategy.

- Next, ecosystem-level planning should identify specific management goals that encompass both the human and ecological elements of the system.
- Once goals have been identified, data gaps can be identified and filled through ecosystem status reports, CEFI data initiatives, stock assessments, socio-economic data, and other types of information sources like place-based knowledge or cultural knowledge.
- Vulnerabilities, barriers to adaptation, and priorities within an ecoregion also need to be clearly identified through collaborative processes and should be evaluated to balance tradeoffs in decision making.
- Support should be provided to each region to map out the fisheries management process from data collection to rule making to identify where information can be incorporated that would better support decision making in the face of climate uncertainties. This would clarify who is accountable for what actions that need to be taken to implement EBFM, bridge the climate science to management gap, and identify how place based and cultural knowledge can be woven into the process .
- Finally, clear mechanisms for responding to the EBFM metrics that are tracked will be needed to adaptively manage and respond to climate change. Specifically, Guideline 6 should be better integrated into the rest of the guidelines to operationalize adaptive management.

Communication and coordination with partners and fishery participants

The Road Map emphasizes the need to develop and implement ecosystem-level planning in cooperation with management partners and stakeholders, and rightly states that NOAA Fisheries cannot implement EBFM without significant engagement of these parties. In this section, we offer recommendations for 1) how to expand and enhance communication with partners and fishery participants, and 2) how to improve coordination with fishery participants.

Expanding and enhancing communication

Communication between fisheries managers and stakeholders is sometimes hampered by mistrust, technocratic jargon, and a shortage of opportunities for stakeholders to influence the management system in ways not prescribed by a narrowly structured management process. Climate change has a strong potential to exacerbate mistrust and communications barriers by increasing the complexity and urgency of decision-making while reducing the certainty and availability of scientific information. Therefore, MAFAC

concludes that climatic and other anthropogenic stressors necessitate the development of new and robust two-way pipelines of information, ideas, and feedback between stakeholder communities and the federal fisheries management system. NOAA Fisheries should prioritize the development of innovative inbound and outbound communications channels that enable all those who rely on healthy fishery ecosystems to understand and play a role in informing their management.

While the agency has made progress on the science side of EBFM, progress outside of NOAA is lagging. Most fisheries management remains focused on individual species, fisheries councils have been slow to incorporate ecosystem information into management, and most fishing community members have a variety of perspectives, from not understanding what EBFM is or what it offers, to frustration with the fact that it isn't in place already. New efforts like CEFI and other game-changing opportunities supported by the Bipartisan Infrastructure Law and Inflation Reduction Act funds demand increased coordination not only across the agency but with its partners, further highlighting the need for deliberate, effective, and continual communications from NOAA Fisheries on what steps must be taken outside of the agency.

The revised Road Map expands the agency's commitment to coordinating with partners, including the Regional Fishery Management Councils, fisheries commissions, states, Tribal partners, and many others. To succeed, the planning, communication, and coordination efforts described throughout the plan will need to be successfully executed to ensure the actions identified in the plan are consistently implemented within NOAA Fisheries and by partners.

Improve coordination with fishery participants

Fishery participants can be wellsprings of knowledge gleaned from lived experience as well as valuable sources of ideas for locally tailored management, but they also represent people who are directly affected by the consequences of fishery management decisions, climate change, and other anthropogenic stressors. Recognizing that people who fish for business, pleasure, or subsistence have both valuable knowledge and a heightened exposure to ecosystem change, MAFAC urges NOAA Fisheries and its partners to view implementation of EBFM as an opportunity to focus more attention on integrating people-centered information, needs, and ecosystem knowledge into fisheries management.

Managing vulnerability and enabling bottom-up adaptation through improved social and economic data

Fisheries management decisions can be improved by taking actions to minimize negative impacts on fishing communities and fisheries participants when implementing the actions necessary for the conservation of stocks. EBFM can serve as a framework for greater inclusion of social and economic information in fisheries management, something long-desired by fisheries managers and community members. MAFAC recommends better coordination with fisheries participants to improve the social and economic data collected in order to make decisions to allow for more transparent consideration of tradeoffs, greater inclusion of indicators and other types of information, and identification of management strategies robust to many future scenarios. Particularly in the context of climate change, managers need to find ways to sustainably and quickly allow fishing on those stocks that may be doing well in changing conditions. Similarly, managers must ratchet back fishing pressure on stocks that are struggling, while finding ways to allow fishing businesses to adapt to these changes. To do this well, a single-species approach simply won't work. Leveraging EBFM frameworks is critical to improving the adaptive capacity of the management system and improving outcomes for fishing communities.

Better Integration of Local Ecological Knowledge

People who interact with fisheries ecosystems on a regular basis often possess fine-scale place-based knowledge about changing ecosystem conditions. As the pace of ecosystem change accelerates, it is vital to find new ways to enable the real-time integration of this empirical knowledge into the many science and management arenas where its contribution can fill important gaps. Currently, NOAA Fisheries lacks any specific guidance on the collection and integration of Fishermen's Ecological Knowledge (FEK). FEK, which is not the same as Indigenous Knowledge (see above), is "local knowledge concerning interannual, seasonal, lunar, diet and food-related variations in the behavior and movements of marine fishes and mammals [...]. Such knowledge is passed from generation to generation of fishers and influences the nature, timing, and location of their fishing"¹. The pathways for including FEK and similar forms of local ecological knowledge into fisheries science and management could be improved, and the Road Map could serve as a mechanism for that.

¹ Johannes , Robert E, et al. "Ignore Fishers' Knowledge and Miss the Boat." *Fish and Fisheries*, vol. 1, 2000, pp. 257–71.

MAFAC applauds NOAA Fisheries for its use of Inflation Reduction Act funding to launch an inaugural citizen science grant program to better incorporate laypeople's observations into stock assessments and its evolving understanding of climate impacts to fisheries. We hope to see the agency and its partners continue to create new pathways for the integration of diverse knowledge sources to complete our collective understanding of the changing world beneath the waves.

We also reiterate here our call for further recognition of, and appropriate and consensual use of, Indigenous Knowledge and indigenous practices in the context of EBFM through harmonization of the Road Map with the White House's and NOAA's existing commitments to engaging and including Indigenous Knowledge in decision making.

Tracking and sharing of EBFM metrics

We are encouraged by the frequency with which the Road Map discusses the need to establish milestones and metrics to track progress on implementation. MAFAC is committed to supporting the agency in implementing EBFM and would value regular (ideally, annual) updates from the agency on the implementation of EBFM. This also serves as a public opportunity for the agency to highlight successes and identify opportunities for improvement. All Councils and their Scientific and Statistical Committees may benefit from regular updates on the implementation of EBFM as well. Communicating with these groups could provide significant insight into how to operationalize much of the Road Map.

We also encourage the agency to develop multiple types of metrics and to track them in a regular and transparent way, with intentional communication to fishery managers, the public, and MAFAC. For instance, process-focused metrics (e.g., number of workshops held, number of ecosystem status reports created, number of FEPs with ecosystem-level goals and objectives) are helpful in tracking the steady implementation of the Road Map, and can help the agency identify gaps or regions where additional attention is needed. Outcome-focused metrics can help demonstrate progress on implementation of climate and ecosystem information into management. For instance, the GAO [identified](#) that only 12 of 46 fishery management plans considered climate information, which demonstrates that our management actions that affect on-the-water outcomes are slow to uptake and act on climate information. The Ocean Climate Action Plan highlighted the need to increase council action on climate information, and substantial funds from the Inflation Reduction Act are being spent on projects meant to change management by the councils. Tracking this progress will demonstrate that scientists and managers are working together effectively to adapt fisheries to changing conditions. As any one metric would likely be too prescriptive (e.g., the FMP metric suggested above may not capture progress on implementing climate indicators into a stock assessment, or increasing the adaptive

capacity of the fishing industry), a suite of indicators should be developed that capture management changes.

We also note that, in order to more fully achieve the agency's intent that the [EBFM Policy](#) is "the preferred way for the agency to meet its mandates to sustainably manage the nation's trust living marine resources," and in order to ensure that the intent of the updated policy to "clarify links between EBFM and other NOAA Fisheries policies, guidance documents, efforts, programs, and initiatives including efforts to address the need for climate-ready fisheries," the agency should take systematic steps to integrate relevant ecosystem information into the execution of and reporting on its programs. For instance, we note that climate change is contributing to the stalling or reversal of success in rebuilding U.S. fisheries. The findings of the annual Status of Stocks report and the Fish Stock Sustainability Index will likely continue to worsen. We know of no current reporting to Congress that routinely describes the state of marine ecosystems, the vulnerability of marine species to climate change, and the risks faced by fishing communities. Thus, we recommend the agency consider providing ecosystem, vulnerability, and/or indicator information (including social and economic indicators) to Congress as part of this annual reporting. Therefore MAFAC recommends that the Road Map should require reporting additional context and factors using ecosystem-based information to Congress to demonstrate to the decision makers the state of our ecosystems and the impacts of climate change. This would leverage the strengths of the EBFM efforts across the agency, including the Integrated Ecosystem Assessment Teams, improving communication to key decision makers and the public. While we choose here to focus on the Status of Stocks report, we recommend the agency consider what other regular reporting could be enhanced by inclusion of ecosystem information. Essentially, the agency should consider how to contextualize more of its communication to the public and decision makers with ecosystem information. This could be added as an action item under Goal 6.c, "Include appropriate ecosystem information in NOAA Fisheries reports and initiatives."

Bridging the science-to-management gap for climate change

Councils have demonstrated an ongoing interest in EBFM and climate-ready management approaches. However, they need additional guidance and clarity of how to address climate through management objectives, how to use the scientific products and information currently available, and what tools and approaches can be implemented to ensure fisheries and fishing communities are resilient and sustainable. This will be particularly salient for the next few years, as the Councils implement projects under Inflation Reduction Act funding with the potential to contribute to the goals in the Road Map.

We support the Road Map's inclusion of stronger connections to the Councils and council process and its focus on the development of management approaches. This connection is critical to

improve the understanding and use of ecosystem and climate information. However, we encourage the agency to take this further by initiating a process with key partners, including the Councils and interested public, to develop a collaborative Climate-Ready Fisheries Management agreement. This Agreement would focus on developing the objectives, initial steps, approaches, and mechanisms for the rapid implementation of climate-ready fisheries management.

One model for such a collaborative policy is the [Fisheries Allocation Review Policy](#). NOAA Fisheries wrote a procedural directive that accompanied the policy, providing recommended practices and guidance on allocation factors for regional fishery management councils to consider when making allocation decisions. As a companion to that policy and directive, the Council Coordination Committee used a working group process to draft a second directive that established triggers for the review process of the Councils. The public commented on these documents, and the documents themselves highlight how the public can engage in developing procedures. This demonstrates that the agency can use its policy and procedures system to develop guidance collaboratively with the Councils to address pressing concerns.

Whether this is the exact model followed or not, MAFAC believes it is fundamental to the success of incorporating climate data into fishery management to build co-developed procedures to describe *how the agency and Councils will act together on climate information*. The agency continues to develop a robust science system to deliver management-relevant climate information to Councils. To complement this and to ensure that information is effectively incorporated, Councils need to be an active part in developing a more adaptive management system. While every region and fishery will experience climate change somewhat differently, Councils and NMFS can share a common purpose (for instance, articulating the desired state of fisheries that are climate-ready to assist in decision-making around tradeoffs), a shared conceptual framework on management on-ramps (e.g., through tools like climate-informed stock assessments, risk tables, precautionary buffers), a joint understanding of strategies for increasing adaptive capacity of fishing businesses and communities (e.g. by empowering advisory bodies to consider adaptive options, by exploring concepts of risk pooling or cooperatives), and more.

MAFAC hopes to develop this idea further with the Councils and NMFS in the near future. Such an agreement would substantially complement the intent and efforts of the EBFM Policy and Road Map and fill some of the missing gap towards management action on climate.

Additional anthropogenic stressors

Although our letter has focused significant attention on climate change as an overarching anthropogenic driver affecting fisheries, MAFAC also wishes to highlight the increasing salience

of anthropogenic habitat impacts other than climate change and fishing activities. The full suite of anthropogenic stressors to fish and fish habitat includes: “conventional” anthropogenic stressors to fish habitat such as coastal development, deforestation, and nonpoint-source pollution from agriculture, lawns, and pavement; newly emerging concerns about per- and polyfluoroalkyl substances (PFAS) and a variety of chemicals now understood to be endocrine disruptors; as well as the impacts of new ocean uses such as offshore wind as well as potential future uses such as marine carbon dioxide removal, large-scale aquaculture, and ocean mining.

As highlighted in our [previous letter on climate-ready fisheries](#), resilient fisheries should consider intentional reduction of anthropogenic stressors such as pollution and development, as well as restoration of degraded habitats. EBFM provides a framework through which to consider and call attention to these impacts. NOAA Fisheries has made use of Integrated Ecosystem Assessments to evaluate impacts and tradeoffs of some of these above-mentioned anthropogenic stressors, which can help inform how the agency approaches consultation processes with partner agencies. However, NOAA Fisheries needs to prioritize interagency coordination and education to other parts of NOAA and other agencies on the need to evaluate the downstream effects of decision making on fisheries, fishing communities, and marine ecosystems. This is critical to the success of NOAA Fisheries succeeding in the management of their own trust resources. For instance, the Department of Agriculture might not regularly think about how to regulate farming practices in the central United States to minimize negative impacts on fisheries and marine ecosystems.

Thank you for consideration of our recommendations and we look forward to supporting the agency as it revises the Road Map.