



Building a Climate Ready Nation: The Need for a Climate-Ready Fisheries Policy

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INTRODUCTION

Climate change poses challenges to the effective implementation of virtually every aspect of NOAA's mission regarding living marine resources. It poses significant and unprecedented challenges to the agency's ability to deliver accurate, timely, and complete science; carry out the legislative mandates of the Magnuson-Stevens Fishery Conservation and Management Act, Endangered Species Act, and Marine Mammal Protection Act; and implement priorities and strategies such as the recently published National Seafood Strategy, the Equity and Environmental Justice Strategy, and the Saltwater Recreational Fisheries Policy. Science and management systems that were put in place decades ago, when the environment was assumed to be relatively static, now are maladapted to the current, rapidly changing environment, necessitating the agency reexamine its approaches to managing trust resources. Further, fishing communities are experiencing climate impacts, and in some cases communities have already been reshaped by these impacts. The future of sustainable fishing in the US, including the provisioning of a sustainable food supply that provides the greatest overall benefit to the nation, depends on accelerating our intentional efforts to clearly define and set in motion a major shift to climate-ready science and management and to provide for the advancement of climate-ready fishing communities and businesses.

Given that the fisheries science and management system that has been in place for the last half century is not sufficient to meet the needs of fish, fisheries, and fishing communities under a rapidly changing climate, **the Marine Fisheries Advisory Committee¹ (MAFAC) recommends that NOAA Fisheries develop a formal Climate-Ready Fisheries Policy.**

Our recommendations include descriptions of fundamental concepts necessary to create a shared understanding and sense of purpose for fishery managers, scientists, and participants as to what a climate-ready fishery future could look like. Broadly, the concept of climate-ready fisheries encompasses the need to maintain long-term sustainability in the face of climate impacts; use the best available science and information; create a more adaptive system that includes consideration of vulnerability and risk, and manages for resilience; and prioritizes equity and thoughtful consideration of impacts to communities.

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We support these broad principles with a closer examination of the properties of a climate-ready fishery management system, and considerations for supporting fishing-dependent communities as climate change disrupts fisheries.

THE NEED FOR A CLIMATE-READY FISHERIES POLICY

The Climate and Ecosystems Subcommittee of MAFAC has, in discussion with NOAA Fisheries, identified two key challenges to implementing climate-readiness in fisheries:

1) The lack of clear definitions for key concepts such as a) climate-ready fisheries b) climate-ready fisheries management, and c) climate-ready fishing communities, creates ambiguity for scientists, managers and stakeholders, which stymies their ability to work collaboratively to adapt our fisheries system to climate change impacts.

2) The fisheries management system has struggled to make full use of existing information on climate impacts to fisheries, and to clearly communicate what science-informed products might be more useful in decision making. This “science-to-management gap” must be addressed to accelerate how management can respond, adapt, and ideally minimize the negative downstream impacts of climate change on fishery ecosystems and dependent human communities. This raises key questions, including: What are the right near- and long-term objectives for fisheries management in a changing climate? How should managers weigh risk and vulnerability against other fisheries management objectives? How and when should managers act when data are limited and/or uncertain?

In service to the first challenge above, the Subcommittee recommends the development of a formal Climate-Ready Fisheries Policy to address challenges in building a shared understanding of climate-ready fisheries. That recommendation is contained in this document. Future work by the Subcommittee will focus on addressing the second challenge listed above.

[NOAA Fisheries has identified](#) that establishing policies that provide direction on the management of and research on living marine resources is one of its key leadership functions. These [policy directives](#) are intended to be:

“...statements of and instructions for implementing important, high-level internal direction and positions that guide organization decisions and actions. Establishing written policy directives promotes accountability and consistency in management and science practices, informs constituents of agency positions, and demonstrates NOAA Fisheries' commitment to implementing identified priorities.”

The agency further explains that NOAA Fisheries policies provide directions and objectives that can be paired with procedures, which provide guidance for the application of the policy objectives. NOAA Fisheries maintains a comprehensive set of policy and procedural directives on a range of topics within its core mission areas, from fishery management to protected resources and law enforcement.

Given the central importance of climate change and its impacts on fisheries science and management, there is a clear need for a Climate-Ready Fisheries Policy. Such a policy should clearly lay out the objectives, goals, authorities, and principles that will guide the agency in the conservation and management of our nation's fisheries for the long-term benefit of the nation, even as the climate changes.

A new Climate-Ready Fisheries policy could complement similar policies, such as the Ecosystem-based Fishery Management Policy, and the new policy would serve as the framework for subsequent procedural guidance on implementation. We note that the recent [Procedure for Addressing Climate Change in NMFS Essential Fish Habitat Consultations](#) is a useful example for how the agency could provide focused advice on how to address climate change in key aspects of their mission and provide guidance to councils and other partners. We appreciate that the agency is currently working on a procedural directive to address fishery management jurisdictional and governance issues caused by climate change and hope to see additional directives related to other management areas. We are also appreciative of the ongoing work by the agency and the Councils to incorporate climate change into fisheries management, and envision a Climate Ready Fisheries Policy as a way of supporting and advancing that ongoing work in a way that provides regional flexibility.

Note that in this document, we use the word "fishery" to mean both stocks of fish and the fishing of those stocks, as defined in the Magnuson-Stevens Fishery Conservation and Management Act.

BACKGROUND

Climate change is altering ocean ecosystems, which directly impacts fish stocks and fisheries, and also exacerbates other stressors on ecosystems and communities. Fishermen have been experiencing and adapting to the effects of climate variability and change for decades, but this is becoming increasingly more difficult as the pace of change increases. Climate change is complicating all parts of the fishery management system: data collection and research, assessing stock health, the effectiveness and risk levels of management approaches, and fishing practices. Further, fishing dependent communities that are reliant on healthy fish populations are at risk, as changes in fishery productivity and range, as well as declines or crashes in the resource, can have serious economic consequences for the communities, such as impacting municipal tax bases resulting in the decline or elimination of public services. Place-based, indigenous cultures within the U.S. and its possessions are, in many cases, at even greater risk from changing fishery resources due to climate change. Native, coastal people's dependence on fish and shellfish resources are deeply rooted in their long histories of "place." Their wellbeing, livelihoods, identities, spirituality, and culture are linked to access to traditional seafood. Further, indigenous cultures developed complex, ecosystem-based management that maintained natural resources for millennia; post-contact, colonial management practices have substantially reduced natural abundance and resulted in management that targets a shifted baseline that is less resilient. On top of this, climate change is an ongoing, existential threat to the security and survival of coastal native people in the U.S. and its possessions as they lose access to fish and shellfish that have supported them since time immemorial. The health and abundance of our nation's marine

resources directly impact the health and resilience of our nation's fishing dependent communities. It impacts the number of jobs that can be supported throughout the supply chain and in fishing-related and tourism businesses, increases dependence on imported seafood from countries with less sustainable management systems and treatment of seafood workers, reduces opportunity for sustainable access to abundant fish populations for recreational fishers, and impacts the food security of our nation.

The extensive changes expected and already occurring because of climate change demand an equally extensive change in our approaches to managing fisheries. The regional fishery management councils have had disparate planning responses to incorporating climate change into the management process; for instance, a [recent study](#) by the Government Accountability Office found that only 12 of 46 fishery management plans and amendments considered climate change information. The agency is undertaking a significant amount of work in its science centers and through the Climate Ecosystem, and Fisheries Initiative, and we note the substantial progress that has been made to increase the climate-related science available to managers. **However, from our interactions with stakeholders, managers, scientists and agency staff, we find that participants in the fishery management system do not have a shared understanding of what the needed changes look like, and how to achieve them.** This lack of clarity is having ripple effects throughout the fisheries management enterprise and impeding the progress we need to make to truly have sustainable and climate resilient fisheries and fishing communities. To put it plainly, until participants and decision-makers throughout the fishery management system have a clear and shared understanding of climate-ready fisheries, both our ability to make those changes and their ultimate success are uncertain.

RECOMMENDATIONS FOR DEFINING CLIMATE READINESS

A key component of a successful Climate-Ready Fisheries Policy will be developing and providing a clear description of climate-ready fisheries, similar to the models we see in other policies. These definitions and descriptions often include principles and goals that the agency intends to achieve while pursuing such a policy. MAFAC believes that such clarity is critically needed to establish the agency's leadership on climate-ready fisheries, and that a policy will help unify participants in the fishery management system towards common objectives.

To that end, in this recommendation, MAFAC provides a set of principles that should underpin achievement of climate-ready fisheries, including for climate-ready management and fishing communities. We also offer our thoughts on what a vision for attaining climate-readiness could be for these concepts. We hope these will be valuable as the agency works to clarify direction, leadership, and outcomes for climate-ready fisheries.

MAFAC's future work will include a closer examination of other tools and approaches to achieving climate-readiness, and we may expand our scope outside of wild fisheries management.

Climate Ready Fisheries

Fisheries are complex social-ecological systems with the human and natural resource environment closely linked, and climate change is acutely felt throughout the system. Fish populations are also already stressed; traditional indigenous management practices supported much more abundant ecosystems, whereas colonial fisheries commodification and management practices are optimized to maximize harvest and thereby increase stress on ecosystems. Climate change is disrupting ecosystem functioning (e.g., a shift away from stationarity), and is degrading some habitats while creating new ones in some cases. Warming waters and habitat changes are impacting the distribution, timing, and productivity of fisheries. Additionally, non-climate-adapted science and management structures often constrain resource users' ability to adapt to these changes. All this can create challenges for fishermen from all sectors through changes in access to quota and permits, changes in fishing opportunity, market changes, processing capacity, and food security. Changes in how a fishery is conducted also increase uncertainty in the costs of fishing and potentially safety at sea challenges.

Given the rapidly changing conditions, MAFAC encourages the agency to clearly articulate what the outcomes and benefits of climate-ready fisheries look like to the nation. In our view, this would include abundant fish populations managed for resilience. In this instance, MAFAC considers resilience to be the ability to withstand and recover from disruptions, maintain ecosystem function, and increase adaptive capacity of the system; it does not necessarily require the return to the previous state (which may not be possible given a loss of stationarity in the system). A resilient fishery would provide sustained and sustainable access to fish resources, support for fisheries and seafood supply chains during transitions and changes, include meaningful retention of ecosystem function, and be supported by key fish habitats. Resilient fisheries should consider intentional reduction of anthropogenic stressors, such as pollution or development, and restoration of degraded habitats to help buffer managed resources from climate shocks and stress.

MAFAC recommends the following principles for consideration:

- Climate-ready fisheries prioritize the ability of stocks to provide and to support businesses, recreation, and cultures that depend upon them for the long-term, taking into account the protection of marine ecosystems, based on the conservation and management principles and requirements outlined in the Magnuson-Stevens Act. Climate-ready fisheries should meet the fundamental needs of dependent populations and cultures by supporting sustainable fishing. We emphasize that as climate change disrupts fisheries, managing for the long-term (as opposed to maximizing near term benefits) will remain a priority and may require substantially different approaches than the status quo. Climate-ready fisheries ideally consist of abundant populations managed for resilience, in ecosystems and habitats that maintain their function, and that support sustained and sustainable access to fishing.
- Climate-ready fisheries will need to be supported through the strategic application of existing agency scientific capabilities and by extensive new investment of resources in order to build a robust climate-ready science enterprise. The science produced by the agency should describe historic, current and possible future states of fisheries so that

managers can act appropriately to meet the other priorities identified in this section. Climate-ready fisheries are supported by the use of best available science and the inclusion of other ways of knowing, such as Indigenous Knowledge and Local Ecological Knowledge as called for in the [Office of Science and Technology Policy/Council on Environmental Quality Memorandum to Federal Agencies](#) (November 30, 2022). MAFAC appreciates progress being made under the Climate Science Strategy and the initiation of the Climate, Ecosystems, and Fisheries Initiative. Science is key to making fisheries climate-ready, including but not limited to: monitoring and analysis of ecosystem indicators; forecasts of ecosystem changes at regional/local scales that are meaningful to communities; risk assessments and evaluations of how management strategies will perform under likely future conditions; information that tracks and predicts fish population contractions, expansions, and shifts; and what the impacts are and will be to habitats.

- Climate-ready fisheries are ones where the impacts, vulnerabilities and risks posed to fish stocks, ecosystem function, and fishing communities are considered, minimized, and mitigated. This includes using adaptive approaches for management, prioritizing resilience, and supporting the adaptation and planning of fishing participants (tribes, subsistence fishers, commercial fishing and seafood businesses, recreational fishing opportunities, and more) to a climate-altered future.
- Climate-ready fisheries should equitably distribute the benefits and costs of sustainably-managed fisheries and reflect the priorities of the NOAA Fisheries Equity and Environmental Justice Strategy. An equity lens and the honoring of traditional rights should be applied both when making decisions on how the burdens of climate-induced losses in species abundance or geographic distribution will be borne and when making decisions on how the benefits of climate-induced increases in abundance or distribution will be shared.

Achievement of climate-ready fisheries will require efforts to rethink fishery management approaches and enhance focus on fishing communities. We offer some specific thoughts on those priorities below.

Climate Ready Fisheries Management

Climate change is challenging the entire management system because we are now operating in a less-predictable and disrupted environment. Adhering to fisheries management practices developed in decades past will dramatically fall short in achieving climate resilience in the fisheries of today and tomorrow. Instead, climate-ready management means that management objectives are attuned to the reality of non-stationarity. Management should prioritize resilience to change and explicitly consider vulnerability and risks of fishing communities, stocks and fishing businesses to climate change, as well as the increased uncertainty in science and management. At the same time, fisheries management should enable adaptation by fishing communities, as well as recreational and seafood businesses equitably while achieving conservation in a changing world. Fishery management plans and fishery ecosystem plans should establish, in advance, proactive measures to increase responsiveness to changes, minimize disruptions to fishing businesses, and explicitly consider tradeoffs. A key to developing effective, focused, proactive measures will be integration of social and economic science into these NOAA Fisheries and

Council processes. As difficult as these issues will be, climate change may necessitate reallocation or redistribution of fishing privileges in order to achieve conservation, management, economic, and equity goals, and managers should establish clear mechanisms for when and how such actions may be considered. The complexity of these needs will require participatory processes to ensure that affected stakeholders have ample opportunity to help inform objectives and actions. Further investment in surveys, stock assessments and ecosystem monitoring are necessary, and these approaches will need to be adapted to meet new challenges. Cooperative approaches to research and data collection to increase communication and enhance trust are an important way to increase buy-in and meet growing science needs.

To achieve climate ready fisheries management, stakeholders would also benefit from clearly identified principles that the agency will uphold. MAFAC recommends the following principles for consideration:

- Management processes should be inclusive, accessible, participatory, and transparent to build trust and manage conflict, and should result in outcomes that are fair and equitable. Place-based management could be an approach to address this desire.
- Management should be proactive and adaptive, using both new approaches and existing tools to meet the challenges of climate change including community and regional socio-economic impact assessments. Managers should be regularly assessing the outcomes of management actions to determine if adjustments are needed to achieve management goals. Pre-establishing management approaches and frameworks to determine how managers will respond to change can increase responsiveness, minimize disruptions, and allow for measured consideration of tradeoffs. Management should also seek to avoid unduly constraining the adaptive capacity of fishing and seafood businesses to pursue and execute sustainable fishing.
- Management should include both short-term and long-term management approaches to incorporate or address climate change, likely at a regional level, to ensure necessary management actions are taken to maintain sustainability and respond to risk while long-term initiatives are being built out.
- Fisheries should be managed sustainably for long-term health of ecosystems, marine fisheries, and community livelihoods. This means that precaution will be a necessary response to uncertainty and risk, but also that new sustainable fishing opportunities should be made available when appropriate.
- Management should seek to restore and maintain fishery resilience, which will necessitate direct consideration of the biological, ecological, social, and economic factors that confer resilience. This will be necessary for fisheries to endure or recover from climate impacts.
- Management should take an ecosystem-based approach. Implementation of the [Ecosystem Based Fisheries Management Policy](#) and associated [roadmap](#) will be critical.

In some cases, place-based management may also provide benefits for managers and communities.

- Management should explicitly consider risk, vulnerability, and uncertainty, and account for them in management. Where possible, management should seek to constrain negative impacts of these factors on fisheries management.
- Management should be based on the best scientific information and knowledge available, including Indigenous Knowledge, Local Ecological Knowledge, and fisheries dependent data.
- As in current practice, managers will need to act using the best available information, even as there may be increased uncertainty. Scientists will also need to consider intentionally adapting survey and assessment approaches, expanding efforts to detect and monitor ecosystem changes, and developing new modeling and forecasting techniques to meet new challenges.

Climate Ready Fishing-Dependent Communities

The resilience of fishing-dependent communities is strained not only by climate change, but by a host of other issues, including reduced access to working waterfronts and fishing grounds, inequitable distribution of benefits and access among populations (which is particularly acute for tribal, native and indigenous populations), increased costs of fishing, changes in market demand and fish prices, and graying of the fleet. They are also facing increased pressure from changing ocean uses (like the build out of wind, mining, and aquaculture), gentrification, and impacts from onshore development that affect water quality, quantity, and behaviors. Now, climate change is layered on top of these changes, with sea level rise threatening fishing infrastructure and access to fishing, increased storms limiting fishing opportunities and safety at sea, extreme events causing drastic ecosystem and community effects, and shifting stocks challenging the ability of some communities to target species that have left traditional fishing grounds. These impacts can be especially hard on remote, rural and underserved fishing communities and in particular indigenous and tribal communities who continue to be impacted by historical policies that separated them from sustenance lifeways practices ([Thibeault and Bell, 2022](#)). We note that MAFAC has previously provided [recommendations](#) on supporting fishing communities in the context of climate change.

We also note that climate change is substantially exacerbating issues of food insecurity and the lack of fishing access for tribes, Native Hawaiians, and other native and indigenous communities. The current fishery management system is responsible for the structural exclusion and dispossession of fishing access for these communities that sustainably managed these natural resources for millennia. Further, we acknowledge that existing post-colonial management systems are designed to manage in the context of an ecological baseline substantially shifted from that which was managed and maintained by indigenous practices before Western contact. Loss of access to fishing and fish is more than an economic burden to these communities, but represents a profound loss of culture, tradition and identity. Efforts to address the impact of climate

change on fisheries and fishing communities must not conflate these issues with those facing other commercial or recreational fisheries; direct, intentional and transdisciplinary efforts must address the intersectional and systemic challenges faced by tribes, Native Hawaiians, and other native and indigenous communities.

NOAA Fisheries should clearly identify underserved communities and better understand the prioritization of fishing communities' needs to adapt to climate change. This must include explicit consideration of indigenous communities, tribes, and subsistence users. We envision improved coordination and cooperation with communities as "first observers" in understanding significant shifts in the ecosystem. And ultimately, communities must be able to plan for and mitigate economic and cultural loss as a result of climate change. This means that fishing-dependent communities should continue to have sustainable access to fishery resources and markets, within the constraints of the resource, even if traditional target species shift. NOAA Fisheries should find ways to support increased investment in fishing communities and infrastructure to increase adaptation, and to facilitate planning processes to address new and existing pressures on fishing communities exacerbated by climate driven changes. For federal projects and activities that cross agency and departmental jurisdictions, NOAA Fisheries should work to represent the concerns of fishing communities where possible, and furnish those fishing communities with the information they need to be effective advocates for their interests in public processes. We would like to see the holistic consideration of pressures on fishing communities (economic instability, lack of health care, etc.), which would likely mean NOAA Fisheries needing to coordinate closely with other federal and state agencies, businesses, and non-profit partners to achieve successful support.

To support climate ready fishing-dependent communities, the agency and stakeholders would benefit from clearly identified principles that the agency will uphold when working to support communities. MAFAC recommends the following principles for consideration:

- Adopt a holistic view of community stressors and coinciding support. Fishing communities face stressors beyond the state of fisheries, including cultural change or loss from gentrification or community collapse, impacts from environmental contaminants, or a host of other social, economic, or environmental stressors that impact individuals and communities ability to adapt to climate driven impacts to fisheries.
- Invest substantially in development and accessibility of data, information, and indicators to describe the social and economic characteristics of fishing communities and participants.
- Facilitate information exchange with all fisheries resource stakeholders and other resource agencies.
- Meaningfully address the needs and adaptability of rural, remote, and underserved fishing communities.
- Meaningfully address the needs and adaptability of communities that rely on fisheries for food security needs.
- Work with Native American, Native Hawaiian, Pacific Islander, and Alaska Native communities to collaboratively address subsistence, cultural, non-commercial, and economic resilience for tribes and indigenous communities.

- Support small business owners who face unique challenges and play critical roles in modern fishing dependent communities.
- Assess the vulnerability of recreational and tourism based businesses in management actions, including aligning with the priorities of the Saltwater Recreational Fisheries Policy.
- Support a resilient seafood supply chain and global market that supports climate resilience for the nation, seafood consumers dependent on U.S. fisheries, and fishing dependent communities.
- Implement solutions in multiple arenas and provide support to plan for climate disruptions and new opportunities. This could include continuing to make funding available for adaptation planning at the community level, as [recommended](#) previously by MAFAC to the agency.
- Ensure benefits and costs are equitably distributed.
- Safeguard sustainable fisheries that provide continued, long-term support to the livelihoods of coastal communities and cultures.
- Encourage and increase access to scientists, decision makers, etc. (through workshops, cooperative research, fishery management council and commission processes, etc.) for fishing-dependent communities.

We are fully experiencing the impacts of the climate crisis and we are in an all-hands-on deck moment. NOAA Fisheries knows fisheries, management, and fishing-dependent communities better than any other agency and now is the time to set clear direction to adapt to dramatically changing ocean conditions.

MAFAC appreciates the agency's consideration of our recommendations and looks forward to continuing to work with the agency to determine the best way to implement them. MAFAC's future work will more closely examine the tools and approaches that can help the nation achieve climate-readiness within fisheries. We anticipate sending further recommendations to support the agency's efforts to reduce the barriers to greater inclusion of climate information in management.