April 2, 2021

Mr. Benjamin Friedman
Deputy Under Secretary for Operations
National Oceanic and Atmospheric Administration

RE: Climate Recommendations for Fisheries and Protected Resources

Dear Mr. Friedman:

On behalf of the American Saltwater Guides Association (ASGA), we are writing to express our views concerning Section 216(c) of President Biden's *Executive Order on Tackling the Climate Crisis at Home and Abroad* (EO 14008) issued on January 27, 2021.

ASGA is a coalition of recreational fishing guides, small businesses, and conservation-minded anglers who find greater value in long-term stock abundance rather than simply maximizing harvest. As fishermen with eyes on the water, we are acutely aware of the numerous impacts that climate change is having on our fisheries and marine ecosystems. Our oceans are changing, and unless we adapt to these changes our marine resources and coastal communities will suffer.

The effects of climate change are felt all around the world but have been most profound in our oceans, which are warming and fundamentally changing rapidly. The U.S. east coast is particularly vulnerable to such impacts[1] —for example, the Gulf of Maine is warming an estimated three times faster than the global average, [2] and half of exploited, forage, and protected marine species on the east coast will be negatively affected by changing conditions over the next several decades.[3] Fish stocks are shifting hundreds of miles northward, often outside of their management jurisdictions, creating complex management and ecological challenges. Members of our coalition have observed tarpon and Florida pompano in upper Chesapeake Bay, red drum and cobia off New Jersey, and black sea bass in the Gulf of Maine. Changing ocean conditions are not only impacting where fish are found along the coast but also aspects of their biology, such as growth rates, prey species, and reproductive success.

It is imperative that we improve our research and management frameworks to more efficiently and equitably address the dynamic impacts that climate change is exerting on fisheries and coastal communities. To accomplish this, we recommend: allocating greater funding for NOAA to better understand how changing oceanic conditions affect species distribution, stock productivity, and essential fish habitat; promoting ecosystem-based management and consideration of climate change in management decisions at the regional fishery management councils; and supporting management approaches that are precautionary to the resource and ensure long-term stock health, which in turn maximize resilience.

Increased Funding to Support Climate Change Research at NOAA Fisheries

Broadly, we are supportive of NOAA Fisheries' efforts to manage our marine resources. However, we believe that its abilities can be vastly improved by increasing its financial resources, especially with regard to climate-related fisheries research and monitoring. If NOAA Fisheries had a more robust budget for understanding how climate change is impacting specific fisheries, ecosystems, and regions, stakeholders and managers could more effectively prevent or prepare for such impacts. NOAA Fisheries regularly produces high-quality scientific research; we want to make sure that the agency has all the tools and resources it needs to better focus on the pressing issues at hand. In expanding its climate-and-fisheries science capacity, we also encourage NOAA Fisheries to leverage collaborations with the commercial and recreational fishing sectors whenever possible. We view these partnerships as critical not only for conducting the most comprehensive and well-informed research and monitoring efforts possible, but also for improving buy-in and consideration by the stakeholder and management communities.

Encourage Broader Climate Change Consideration at Regional Fishery Management Councils

We understand that some councils have already began to strongly consider climate change in their management decisions. Without a comprehensive framework for ensuring that our fisheries stay healthy as ocean conditions continue to change, however, the ability of regional councils to adapt is limited. Further, as stocks continue to shift across management jurisdictions established nearly half a century ago, the current council membership makeup and boundaries will be further challenged, leading to contentious disputes among states and stakeholders and blind spots for managers.

We must make every effort to thoroughly and explicitly integrate climate change considerations into routine federal fisheries management activities—for example, the development of fishery management plans, the setting of catch limits, the designation of essential fish habitat, and the setting of research priorities. At the same time, as species continue to move and straddle the jurisdictions of multiple fishery management councils, we need to ensure that the councils effectively coordinate with one another to prevent any loopholes that could undermine effective management.

In addition, continued and expanded use of ecosystem-based fisheries management (EBFM) will further aid fishery management councils' ability to incorporate climate change into management; the holistic approach that EBFM brings is well suited to understand these dynamic impacts and make informed management decisions for maintaining sustainable fisheries.

Promote a Precautionary Management Approach

The best insurance policy to ensure fisheries resilience in the face of climate change is adoption of resource-first, risk-adverse, science-based management strategies that promote healthy fisheries. We believe that the core conservation tenets of the Magnuson-Stevens Act (MSA) provide a great foundation to build towards climate-ready fisheries, and applaud NOAA Fisheries for successfully rebuilding nearly 50 previously overfished stocks since 2000.[4] We are

actively involved in discussions to further ensure long-term fishery health—and thereby maximize the likelihood of climate-resilient fisheries—through a potential reauthorization of MSA during the 117th Congress. In the meantime, we ask that NOAA Fisheries continue to responsibly manage marine resources with the significant ongoing impacts of climate change on our oceans in mind.

Lastly, we would like to request that as broader climate change policy progresses, the recreational fishing community—and the fishing industry in general—be included in the policy discussions. One such example is the administration's support for offshore wind development to reduce greenhouse gas emissions in the electric power sector; we are not opposed to offshore wind, as we understand the benefits it could provide for our coastal communities, but want to ensure that recreational fishing perspectives are heard and that our marine ecosystems are conserved. We take pride in the productive working relationship that we have developed with the NOAA Fisheries National Saltwater Recreational Fisheries Program, and look forward to continued partnership as we tackle the ongoing challenge of changing ocean conditions.

We thank the Biden administration for the opportunity to share our thoughts and commend it for its commitment to increasing the resilience of our nation's fisheries to climate change impacts.

Sincerely,

Tony Friedrich
Vice President and Policy Director
[redacted]

Willy Goldsmith, Ph.D.
Executive Director
[redacted]

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[1] U.S. Global Change Research Program. 2018. *Fourth National Climate Assessment, Volume II: Impacts, Risks, and Adaptation in the United States.* doi:10.7930/NCA4.2018.
[2] Michael Carlowicz. 2018. Watery heatwave cooks the Gulf of Maine. https://climate.nasa.gov/news/2798/watery-heatwave-cooks-the-gulf-of-maine/
[3] Hare, J.H., et al. 2016. A Vulnerability Assessment of Fish and Invertebrates to Climate Change on the Northeast U.S. Continental Shelf. PLoS ONE 11(2): e0146756. doi:10.1371/journal.pone.0146756.
[4] NOAA Fisheries. 2020. Status of Stocks 2019: Annual Report to Congress on the Status of U.S. Fisheries. https://www.fisheries noaa.gov/webdam/download/108764023.

OCEANA Protecting the World's Oceans

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OCEANA.ORG

Submitted via e-mail to: OceanResources.Climate@noaa.gov

April 2, 2021

Mr. Benjamin Friedman
Deputy Under Secretary for Operations
National Oceanic and Atmospheric Administration

RE: Recommendations for More Resilient Fisheries and Protected Resources Due to Climate Change

Dear Mr. Friedman:

Oceana appreciates the opportunity to provide information and recommendations on how to make fisheries and protected marine life more resilient to climate change, as described in section 216(c) of Executive Order 14008, *Tackling the Climate Crisis at Home and Abroad*. Since Oceana was first established in 2001, we have dedicated significant time and resources at the national and regional level to advance conservation and management measures that end overfishing, minimize bycatch, protect fish habitats, and advance innovative and precautionary ecosystem-based approaches to fishery management. However, more must be done to effectively manage U.S. fisheries and protect the health and diversity of our oceans in the face of climate change.

Climate change is an existential threat to our oceans and the people and communities who depend on them. Human-caused emissions of carbon dioxide and other greenhouse gases are causing ocean warming, acidification, oxygen loss, and decreased fish production.[1] The warming ocean, with increasingly frequent and intense marine heatwaves like those recently experienced in the Northeast Pacific[2] and in the Gulf of Maine,[3] will continue to affect marine life with impacts to fisheries, food, and human communities. Climate change models project significant changes throughout the ocean over the coming century with predicted declines in productivity, species range shifts, and habitat loss. For example, climate change and warming oceans will be detrimental to kelp forests, eel grass, shallow-coral reefs, and cold-water coral ecosystems that are essential habitats for managed fish populations.[4]

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[1] IPCC, 2019: IPCC Special Report on the Ocean and Cryosphere in a Changing Climate [H.-O. Pörtner, D.C. Roberts, V. Masson-Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, A. Alegría, M. Nicolai, A. Okem, J. Petzold, B. Rama, N.M. Weyer (eds.)] Available, https://www.ipcc.ch/srocc/
[2] NMFS 2020. String of Marine Heatwaves Dominate Northeast Pacific. Available here.
[3] Why Is the Gulf of Maine Warming Faster Than 99% of the Ocean? Eos, November 12, 2018, available: https://eos.org/features/why-is-the-gulf-of-maine-warming-faster-than-99-of-the-ocean
[4] IPCC 2019, *supra note* 1.

Oceana welcomes the Biden-Harris administration's dedication to tackling the climate crisis. The U.S. must aggressively implement existing mandates as well as new conservation and management approaches to make fisheries and protected marine life more resilient to change. To that end, we offer the following recommendations for improving fishery management, science and monitoring, habitat conservation and transparency.

I. Improve resilience of exploited fish species by limiting catch to buffer against climate impacts and prohibit new fisheries from developing without adequate analysis of the ecosystem impacts.

Oceana recommends the National Marine Fisheries Service develop policy guidance to implement measures to improve the resilience of managed fish species. First, implement precautionary catch rule policies that not only avoid overfishing, but also maintain diverse age and size-structure. Second, all rebuilding plans now and in the future should aim to quickly rebuild populations to levels of higher abundance (> B_{MSY}) to reduce the likelihood of future collapse as managers ease fishing restrictions due to increases in population size. Third, analyze climate change effects in stock assessments and in the determination of optimum yield to ensure annual catch limits for all fish species caught in the fishery include a buffer for climate change resilience.

It is expected climate change will have a major effect on the distribution and abundance of fish and invertebrate species.[5] As the ranges of species shift, either in latitude or depth, fisheries may follow to new areas which may lead to increased bycatch and interactions with protected species. Excessive fishing pressure on top of increased climate variability and extreme events like marine heat waves will make fish populations more vulnerable to collapse. Long-term climate change impacts may make managed fish populations more vulnerable by reducing recruitment, the age and size structure of fish populations, as well as the overall ability of fish populations to recover to levels seen in the past.

As fisheries shift and change, the Fisheries Service would be wise to implement a precautionary and thoughtful approach to allowing new directed fisheries. Specifically, the agency should adopt a policy that prohibits new fisheries until fishery managers have an adequate opportunity to both assess the scientific information relating to any proposed directed fishery and consider potential impacts to existing fisheries, fishing communities, and the greater marine ecosystem. This will ensure that species are not overexploited and there are not unintended consequences to the marine ecosystem as species move into new areas.

Such an approach is particularly important with respect to forage species (e.g. herring, sardine, anchovy, squid) and their cascading effects on marine predators. Forage fish are particularly vulnerable to changing oceanographic conditions and populations can crash quickly. Excessive fishing pressure can

[5] Rijnsdorp, AD. et al. 2009. Resolving the effect of climate change on fish populations. I*CES Journal of Marine Science*, Volume 66, Issue 7, August 2009, Pages 1570–1583, https://doi.org/10.1093/icesjms/fsp056

increase the rate and magnitude of forage fish collapse.[6] Similar to actions already taken in some regions,[7,8,9] Oceana recommends new forage fish fisheries be expressly prohibited. For forage species subject to directed fisheries and whose populations are predominately climate driven, we recommend harvest control rules with minimum biomass limits of no less than one-half the mean biomass[10] and annual catch limits based on survey results and climate informed stock assessments.

II. Increase resilience of protected species such as sea turtles and marine mammals to climate change by implementing best fishery management practices and incorporating climate factors into mortality assessments.

Human-induced climate change is a major threat to marine mammals, seabirds and sea turtles. Experts expect significant direct and indirect effects from increased ocean temperatures, sea level rise and acidification like habitat loss, reduced prey availability, changes in migration patterns and increased susceptibility to disease. While climate effects will vary by species and ecosystem, actions to reduce harm and stress now will give protected marine life a better chance of survival in the face of climate threats, and for threatened and endangered populations, a better chance at recovery.

For sea turtles, Oceana requests NMFS require all fisheries to use the best management practices to minimize turtle bycatch including Turtle Excluder Devices (TEDs) in all trawls that may catch sea turtles and are not yet required to use TEDs. When used properly, TEDs are 97% effective at allowing captured turtles to escape.[11] This would be a simple solution to prevent sea turtles from drowning in trawl nets and increase population resilience.

In addition, we recommend NMFS designate or revise critical habitat for all marine species listed under the Endangered Species Act and protect those areas where populations have moved or are projected to move in response to climate change, including breeding and feeding areas. We also recommend that NMFS identify areas with high rates of listed species bycatch and prohibit use of the implicated gear in those areas at the times when bycatch occurs.

In accordance with the Marine Mammal Protection Act, NMFS uses a potential biological removal (PBR) approach to determine the level of human-caused mortality marine mammal populations can sustain while still allowing those populations to recover. In addition to current human-caused mortalities from

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[6] Essington et al. 2015. Fishing Amplifies Forage Fish Collapses. PNAS May 26, 2015 112 (21) 6648-6652; first published April 6, 2015; https://doi.org/10.1073/pnas.1422020112
[7] 81 Fed Reg. 19,054 (April 4, 2016).
[8] 63 Fed. Reg. 13,009 (March 17, 1998).
[9] 82 Fed. Reg. 40,721 (August 28, 2017)
[10] Essington et al. 2015, supra note 5 and Pikitch, E., Boersma, P.D., Boyd, I.L., Conover, D.O., Cury, P., Essington, T., Heppell, S.S., Houde, E.D., Mangel, M., Pauly, D., Plagányi, É., Sainsbury, K., and Steneck, R.S. 2012. Little Fish, Big Impact: Managing a Crucial Link in Ocean Food Webs. Lenfest Ocean Program. Washington, DC. 108 pp.
[11] NOAA. History of Turtle Excluder Devices. Available: https://www.fisheries.noaa.gov/southeast/bycatch/history-turtle-excluder-devices

fishery bycatch, ship strikes, shootings, and other interactions, the current PBR approach cannot guarantee that the conservation and management goals of the MMPA will be achieved with increasing emission scenarios and associated increasing climate change effects.[12] Many marine mammal populations, for example, the critically endangered North Atlantic right whale and in the Pacific, gray whales, are increasingly experiencing unusual mortality events (UMEs) of greater magnitude and frequency.[13] These events, often tied to toxic algal blooms, disease outbreaks, or sudden declines of food, are associated with warming ocean waters.

Oceana recommends using a PBR approach that accounts for stochastic (random) events and climate change-induced mortality in the recovery factor when calculating PBR. In other words, the calculation of PBR must account for any marine mammal population's future unexpected, large mortality event that might suddenly decrease the population as well as systematic changes in the ocean ecosystem resulting from climate change. Similarly, we recommend NMFS explicitly incorporate climate change stochastic events and climate change into its Biological Opinions and associated Incidental Take Statements for ESA-listed species.

III. Increase resilience to climate change by improving assessment and monitoring.

Adapting to climate change will require enhanced ecosystem assessments, stock assessments, and comprehensive monitoring of fisheries and the environment. It will also require baseline information about each fishery in order to properly assess the impacts of climate change. Improved assessment and monitoring programs will be a critical component of effective fishery management and planning in the face of climate change.

Toward improved monitoring, Oceana recommends NMFS strengthen the 2017 Standardized Bycatch Reporting Methodology guidance with clear standards for accuracy and precision to better ascertain bycatch information and ensure that the impacts of fishing are appropriately monitored, analyzed and reported to stakeholders and managers. In the 2017 final rule, NMFS separated the collection, recording, and reporting of bycatch data in a fishery from the methods used to assess bycatch and the development of measures to minimize bycatch or bycatch mortality.[14] These activities are directly connected, and the agency should require a holistic approach to monitoring and reporting across all fisheries to ensure that statistically-accurate and precise bycatch data is collected using objective tools such as fisheries observers and electronic monitoring technologies.

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[12] Punt, A.E., Siple, M., Francis, T.B. et al. 2020. Robustness of potential biological removal to monitoring, environmental, and management uncertainties. ICES Journal of Marine Science. https://doi.org/10.1093/icesjms/fsaa096
[13] NOAA Active and Closed Unusual Mortality Events, at: https://www.fisheries.noaa.gov/national/marine-life-distress/active-and-closed-unusual-mortality-events
[14] 82 Fed. Reg. 6317, January 19, 2017

Further, in the 2017 rule, NMFS required bycatch reporting to be standardized only within a fishery and not across a region or nationally.[15] This framework will not standardize bycatch data or management and is more likely to create a wide range of approaches across the 46 federal fishery management plans with little to no standardization. To recognize and respond to climate effects, managers, scientists, and stakeholders need useful, usable information collected, analyzed, and reported in a common way to ensure bycatch and the effects of bycatch do not threaten the resilience of our fisheries and protected species. NMFS can and should make sure that this is part of our plan to adapt to climate change. Additionally, NMFS must require more stringent reporting of species-specific landings and bycatch for all U.S. shark stocks and stock complexes, which are essential components of a healthy and resilient ocean ecosystem and must be carefully monitored.

Oceana recommends that nation-wide, NMFS establishes adequate catch monitoring for all protected species including sea turtles and marine mammals to better understand and analyze species status and inform management, including incidental take limits. Impacts should be assessed and managed across the full range of the species, across management boundaries and jurisdictions. Incidental Take Statements ("ITSs") under the ESA should then be enforced through monitoring and annual hard caps to make sure that undue impacts to do not occur while formal consultation is reinitiated.

For improved assessments, it is important to note that nationally, the overfished status of 30% of federally managed fish stocks is unknown and the overfishing status is unknown for 47% of managed fish stocks.[16] These numbers are even worse for federally managed shark populations and stock complexes.[17] To better inform future management and response to climate change NMFS should enhance and fully fund its strategic stock assessment strategy to ensure that assessments are completed for species that are not yet fully assessed, prioritizing species known to be or suspected to be depleted, and improving data collection as necessary.

IV. Conserve, protect and restore habitat to increase resilience to a changing climate.

Oceana supports the "goal of conserving at least 30 percent of our lands and waters by 2030" as described in EO 14008. We also support protecting additional ocean areas beyond the 30 percent goal with other effective area-based conservation measures. Marine protected areas (MPAs) are well-established tools for conserving marine habitats, species populations, biodiversity, and ecological functions. Scientific studies of more than 150 MPAs around the world that prohibit fishery removals (no-take marine reserves) show dramatic biological changes after implementation. On average, these highly restricted MPAs compared to unprotected areas have higher biomass of marine life (446%),

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[15] *Id.*
[16] NOAA Fisheries 2019 Status of Stocks Report to Congress. Available: https://media.fisheries.noaa.gov/dam-migration/2019_status_of_stocks_rtc_final_7-15-20.pdf
[17] NOAA Report to Congress: Status of United States Shark Fisheries. 2020. Available at: https://www.washingtonpost.com/context/nmfs-shark-stock-assessment/d633b625-4961-4ee2-a50d-83f7f16a3908/

greater density of plants and animals (166%), higher animal body size (28%), and even greater species diversity (21%).[18]

Unfortunately, to date, NMFS has not made a strong enough effort to demonstrate the benefits of MPAs to fishermen and seafood companies, some of their most influential stakeholders. We believe this is due to the view of the Fisheries Service in their interpretation of the Magnuson Stevens Act (MSA), that maximizing catch rather than providing for biodiversity conservation and future fisheries stability, diversity, quality, or size of fish, maximizes benefits to the Nation. We urge NOAA and NMFS to work with stakeholders to fully integrate the use of marine protected areas for fishery management and habitat protection, and explicitly consider protected areas in the pursuit of both Optimum Yield and in the conservation of marine ecosystems.

While marine protected areas will be affected by climate change like their surrounding ocean waters, MPAs can provide habitat areas that are less stressed and more resilient to climate change impacts.[19] Networks of MPAs with sufficient size and spacing are viewed to be critical for improving the ability of marine life to adapt to climate change, rebuild ecological resilience, and thus help human communities who depend on healthy oceans also be more resilient.[20]

MPA networks can strengthen marine ecosystem resilience by protecting natural habitats, vulnerable and rare habitats, at-risk species, and feeding, breeding and nursery grounds for marine mammals, seabirds, and fish. MPAs can support the ability of species to be more resilient to, or adapt to, climate change by providing biodiversity refugia that can help species repopulate after extreme events.

A comprehensive and systematic network of MPAs including reserves and other appropriate designations (e.g. marine parks, climate resilience areas, no disturbance areas, etc.) should be developed in a way that protects the biodiversity, productivity, resilience, function, and structure of marine ecosystems while maintaining a healthy environment for all people, coastal communities; and providing opportunities for sustainable fishing. All 11 large marine ecosystems of the U.S. must be represented in a national MPA system.[21] It is not sufficient to say U.S. MPA targets are met by disproportionately protecting one remote region of the U.S. but not others. A successful MPA program would protect a range of habitat types, species, bioregions and depth zones within each large marine ecosystem with emphases on habitats that provide important ecological functions, rare habitats/features, and habitats that are especially vulnerable to human impacts, including climate change. MPAs must also be of

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[18] Lester et al. 2009. Biological effects within no-take marine reserves: a global synthesis. Marine Ecology Progress Series. 384: 33-46. doi: 10.3354/meps08029
[19] Roberts et al. 2017. Marine reserves can mitigate and promote adaptation to climate change. https://www.pnas.org/content/114/24/6167
[20] McLeod et al. 2009. Designing marine protected area networks to address the impacts of climate change. Frontiers in Ecology and Management. Available: here
[21] Beaufort Sea, Northern Bering Sea- Chukchi Seas, Eastern Bering Sea, Aleutian Islands, Gulf of Alaska, California Current, Insular Pacific-Hawaiian, Gulf of Mexico, SE U.S. Continental Shelf, NE U.S. Continental Shelf and the Caribbean.

sufficient size to protect priority habitat features and species (including pelagic habitats and highly migratory species), and networks of protected areas should be established to ensure connectivity between protected areas. Sufficient replication should be established to foster resilience to climate change and other threats.

Oceana recommends an Important Ecological Area approach to any national or regional process for MPA designation, including identification, protection and monitoring:

1) Identification:
    a. Define the spatial extent of area under consideration.
    b. Identify ecological features based on criteria such as ecological significance, biological diversity, rarity, and sensitivity based upon the best available science.
    c. Synthesize available information including local knowledge on ecological features, economic and social uses, and map all spatial data.
    d. Identify important ecological areas based on ecological features that result in the area contributing disproportionately to the health of the marine ecosystem.
    e. Identify current and expected threats to these areas and the ecosystem.
2) Protective Measures:
    a. Develop management objectives for each area by constructing a matrix of ecological features and threats and by considering overarching ecosystem protection goals.
    b. Work with stakeholders to propose and implement a network of MPAs including reserves and other appropriate designations with varying levels of protection to achieve conservation objectives.
3) Monitoring, Evaluation, Research and Adaptive Management:
    a. Ensure development of a monitoring and evaluation plan that would include local observations and input and use the results for adaptive management.
    b. Encourage research including assessments of current and historical biodiversity across management regimes to improve our understanding of the marine ecosystem and inform adaptive management.
    c. Make information on the management, monitoring and research of protected areas and the broader ecosystem condition widely available to the public.

Other effective area-based conservation measures can also be a practical and effective tool for protecting marine habitats and enhancing resilience and should be considered as a broader application in areas surrounding MPAs. Oceana recommends NOAA continue to protect living seafloor habitats like deep-sea corals, sponges, and other structure-forming invertebrates from bottom trawling. An effective and practical approach, like that implemented off the U.S. West Coast,[22] is to freeze the footprint of bottom trawling and identify and protect Important Ecological Areas within the trawl footprint based on

[22] Shester GG, Enticknap B, Mecum B, Blacow-Draeger A, Brock T and Murray S. 2021. A Win-Win for Deep-Sea Corals and Fishing: Increasing Seafloor Protections While Restoring Fishing Opportunities Off the United States West Coast. *Front. Mar. Sci.* 7:525619. doi: 10.3389/fmars.2020.525619

priority habitat features such as rocky reefs, cold-water corals, sponges, or submarine canyons.[23] This precautionary approach has been used across the country and should be expanded by NOAA policy to be required in other U.S. regions where it is not already implemented.

The oceans play a vital role in climate regulation and mitigate the effects of climate change by serving as a sink for carbon. Trawling releases carbon that would otherwise remain sequestered on the seafloor.[24] A recent study suggests that increasing ocean protection in MPAs and trawl closures would not only benefit biodiversity and fishery production, but also secure marine carbon that is at risk of being released by bottom trawling and other activities that disturb the seafloor.[25] Reviews of Essential Fish Habitat and habitat conservation measures should require an assessment of the effects of seafloor carbon sequestration and disturbance from fisheries as well as a consideration of alternatives to minimize carbon emissions.

Last, while there is significant interest and opportunity with renewable ocean energy production like offshore wind, it is imperative that NOAA consult with NMFS under the Magnuson-Stevens Act to ensure these development activities do not adversely affect Essential Fish Habitats and are sited to avoid Important Ecological Areas and ESA-listed species.

V. Improving resiliency through transparency

Increasing transparency in fisheries and fisheries management is key to NOAA's ability to manage for resilience. Enhancing transparency in domestic fisheries will also better enable fishing industry partners, conservation groups, and other stakeholders to support and promote fishery resilience.

With support from NOAA, the Biden-Harris administration can strengthen transparency in domestic fisheries management by:

- aggregating and making public as much fishery data as possible, in as timely a way as possible, including VMS data and bycatch statistics, preferably through easily publicly accessible websites;
- supporting the expansion of Automated Information System (AIS) requirements to all commercial fishing vessels greater than 49 feet continuously broadcasting AIS at all times, data from which has the added benefit of already being publicly available;
- vigorously employing the National Environmental Policy Act process to develop and analyze information, including how an action may impact resilience to climate change, and inform decisions prior to when decisions are made;

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[23] National Oceanic and Atmospheric Administration, Coral Reef Conservation Program. 2010. NOAA Strategic Plan for Deep-Sea Coral and Sponge Ecosystems: Research, Management, and International Cooperation. Silver Spring, MD: NOAA Coral Reef Conservation Program. NOAA Technical Memorandum CRCP 11. 67 pp.
[24] Sala et al. 2021. Protecting the global ocean for biodiversity, food and climate. Nature. https://doi.org/10.1038/s41586-021-03371-z
[25] Id.

- developing and implementing policies to share information related to environmental impacts and resilience without requiring members of the public to make formal Freedom of Information Act requests;
- swiftly and fully responding to formal Freedom of Information Act requests when made; and
- avoiding relying on privileges, such as the deliberative process privilege, in the context of information requests and litigation, unless there is strong evidence that releasing a specific record would cause identifiable harm to the public's interest in sound government decision making and rescind all guidance to the contrary.

In addition to better equipping NMFS to manage fisheries for resilience, enhancing transparency in domestic fisheries as described above will also better enable fishing industry partners, conservation groups, and other stakeholders to support and promote fishery resilience.

On the international front, global illegal, unreported and unregulated (IUU) fishing poses a worldwide threat to sustainable fisheries management and undermines legal fishermen. NOAA and its federal partners should build upon the foundation developed by President Obama's Task Force on Combating IUU Fishing and Seafood Fraud to support resilience of global fisheries by continuing to be a leader in the fight against IUU. Specifically, NOAA should take immediate action to expand the Seafood Import Monitoring Program to all species and support extending traceability requirements throughout the supply chain, which will help ensure that all seafood sold in the U.S. is safe, legally caught, responsibly sourced and honestly labeled.

VI. Improving resilience by stopping subsidies

Harmful government fisheries subsidies that increase fishing capacity beyond market constraints and support IUU fishing are perhaps the greatest threat to the resiliency of marine wildlife, incentivizing overfishing around the globe. Estimates show that in 2018 governments administered $22.2 billion in harmful capacity-enhancing subsidies, with $7.8 billion in fossil fuel subsidies, the highest overall subsidy type. Fuel subsidies are especially harmful as they not only incentivize overfishing but also incentivize increased fossil fuel production and consumption and increasing emissions associated with the fishing industry. NOAA should support efforts of the U.S. Trade Representative and other agencies in negotiating an ambitious fisheries subsidies agreement at the World Trade Organization, including ambitious fisheries subsidies provisions in future free trade agreements, and vigorously enforcing the fisheries subsidies provisions in the United States-Mexico-Canada Agreement. NOAA should make it a priority to prohibit harmful fossil fuel subsidies. The top nations for harmful capacity-enhancing subsidies, such as China, account for a significant portion of global harmful fisheries subsidies. NOAA, with the USTR, should prioritize addressing the subsidies from these nations.

VII. Conclusion

Significant decreases in greenhouse gas emissions are ultimately required to avoid projected catastrophic impacts to our ocean ecosystems. However, even under reduced emission scenarios, we can expect to see significant changes including loss of Arctic sea ice, ocean warming, marine heatwaves, and ocean acidification. We commend the Biden-Harris administration for committing to address climate change and urge NOAA to take additional steps to enhance the resilience of our ocean ecosystems, protect ocean wildlife, safeguard ocean habitats, and responsibly manage for sustainable and resilient ocean fisheries.

Thank you for your attention to this vitally important issue.

Sincerely,

Jacqueline Savitz
Chief Policy Officer
Oceana

Alaska Marine Conservation Council

April 2, 2021

Ms. Gina Raimondo
Secretary of Commerce

Mr. Benjamin Friedman
Acting NOAA Administrator

Submitted electronically to oceanresources.climate@noaa.gov

Thank you for the opportunity to comment on Sec. 216(c) of EO 14008, Tackling the Climate Crisis at Home and Abroad. We support proactive measures to make fisheries more resilient to climate change, particularly through improvements in science, monitoring and cooperative research. It is imperative that a science-based process continues to lead the charge to support management and conservation measures to maintain healthy fisheries and the fishing communities dependent on the health of the ocean resource.

Founded in 1994, the Alaska Marine Conservation Council (AMCC) is an Alaska-based nonprofit dedicated to protecting the long-term health of Alaska's oceans and sustaining the working waterfronts of our coastal communities. Our members include fishermen, subsistence harvesters, marine scientists, small business owners and families, many of whom rely on healthy fisheries. AMCC advances conservation solutions that address the interdependence between healthy marine ecosystems, strong local economies and coastal traditions. Our community-based approach includes outreach, grassroots advocacy, public policy, research and education. The base of our membership includes hundreds of small-boat, community-based, conservation-minded fishermen that depend on the health of the marine resource to remain in their fishing communities. In many of Alaska's coastal communities, fishing is the economic engine that drives the community.

The Alaska Marine Conservation Council appreciates the demonstrated commitment of the Biden administration to make fisheries and protected resources more resilient to climate change. We support advancements to promote the long-term health of the nation's fisheries and fishing communities with a climate-ready fishery focus and meaningful actions to mitigate greenhouse gas emissions. We believe that by strengthening the well-being of coastal communities and responsible resource management, we can ensure that our oceans and the people that rely on them can thrive for generations to come.

Alaskans are living on the front lines of climate change: we see shifts reshaping both our oceans and our fishery-dependent coastal communities. Alaska has 33,904 miles of coastline and hundreds of small communities that rely on the sustenance of the ocean resource for their very existence. Alaska's massive coastline is dotted by remote, low lying communities that face ongoing threats from storm surge, sea level rise and shoreline erosion. Fishery-dependent coastal economies and Indigenous communities and cultures are particularly vulnerable. Climate change affects all aspects of fisheries, from catch rates to shifting fisheries to increased bycatch interactions, all of which impact the ecosystem and fishing communities.
It is imperative that fishery management systems incorporate climate considerations throughout the management process. Climate change is having an impact on fisheries and managers must have the resources and tools to be responsive to the changes. In addition to providing the tools to support resilient fish stocks, factoring climate change in fisheries management will provide stability to fishing communities. NOAA must play a leadership role and recommit to science-based principles as required in the MSA and proactively develop new and revised approaches for managing fisheries that factor in climate change. With leadership from NOAA, our nation's fisheries will have the necessary resources to adapt to the changes.

With the threats that climate change pose, Councils need additional guidance on methods to integrate climate information into management decisions. It is important for NOAA to play a leadership role in guiding sustainable fisheries management under a changing climate and to secure the necessary funding to support needed scientific information. The Science Centers are quite often under budgetary constraints which hamper their ability to maintain robust and ongoing climate monitoring. With increased overhead and annual cost of living considerations for staff, climate research may be cut in order to balance the budget. Moving forward, NOAA must request adequate funding through budgetary channels in the president's budget and use discretionary funds to develop and maintain the scientific data needed to support climate ready fisheries. Climate change research must be identified as a priority on par with all critical information to maintain sustainable fisheries.

In addition, when early warning signs signal a climate-related change, it is critical that there is funding available to conduct stock assessments out of cycle. For example, in 2018 in the Gulf of Alaska, there was an 80% decrease from 2017 in the catch limit for Pacific cod. Scientific information revealed that the decline of the stock was a result of an unusually warm water mass in the Gulf of Alaska, commonly referred to as 'the blob'. The blob persisted from 2014-2016 and warming temperatures were prevalent throughout the water column, leaving nowhere to

escape the abnormally warm temperatures. Pacific cod did not fare well during this period and multiple factors contributed to their demise. The warm waters increased the metabolism of cod, so the fish were hungry. At the same time, available food was low, and the combination resulted in port overall condition of the cod and higher mortality. The warm water also impacted egg production and larval production which greatly impacted recruitment of the next generation of cod. The combination of climate related impacts to the Pacific cod stock and the projection of lower numbers of adult and juvenile cod lead to this dramatic cut to protect the spawning biomass with hopes that the fishery would recover.

At the time the persistent warming conditions in the Gulf of Alaska were understood, the impacts to the Pacific cod stocks were not. This information can inform the need to conduct out of cycle stock assessments when climate-related changes indicate a change in the ecosystem warranting additional data. Stock assessment surveys for Pacific cod are conducted every other odd year. If there had been a survey conducted in 2016 when it was understood that the warming conditions continued, fishery managers would have had a better understanding of mitigation measures to protect the Pacific cod stocks prior to a collapse. Stock assessment schedules and prioritization should include climate variability and rate of change.

With increased understanding of how different species respond under climate scenarios, such as the new understanding scientists have for Pacific cod under warming waters, disasters such as the 2018 cod collapse may be mitigated through additional scientific stock assessment surveys. Ongoing and as-needed assessments to understand vulnerability and risk, tools to understand the tradeoffs of different management strategies and greater use of climate information and indicators will be critical to the health of species and fishery dependent communities. The SSC should consider climate vulnerability when making fishing level recommendations. As the agency conducts scenario planning for the future, increased tools will be invaluable to predict and forecast change.

In the North Pacific, the Alaska Climate Integrated Modeling Project (ACLIM) model is an important source of climate information, with comprehensive effort to both describe and project responses in the Bering Sea ecosystem, in both the physical environment and in human communities. In addition, the Bering Sea Fishery Ecosystem Plan Climate Change Task Force (CCTF) is developing mechanisms to ensure climate information informs fishery management. The goal of this climate project is to evaluate the vulnerability of key species and fisheries to climate change, and to strengthen resilience in regional fisheries management. Efforts such as

these must continue to be supported, and we need to ensure that science translates to management action.

It is also critical that all knowledge systems are included in efforts to understand climate change. Indigenous Alaskans hold what is commonly described as "traditional" knowledge, a unique living body of knowledge acquired and utilized by indigenous communities since time immemorial. A task force was initiated through the Bering Sea Fishery Ecosystem Plan with the charge to develop protocol for using traditional knowledge and local knowledge in management decisions. This is called the Local Knowledge, Traditional Knowledge and Subsistence (LKTKS) task force. In the context of climate change, all sources of information must be utilized and traditional knowledge in particular may hold invaluable information to inform NOAA fisheries. As the engagement process to address climate unfolds, it will be important to develop a process to integrate local knowledge and traditional knowledge into the information sources. All sources of information can help our nation to understand and act on measures to address climate change.

NOAA's Integrated Ocean Observing System and the partnerships that exist within the various regions provide a unique information source to inform real time and retrospective data. As with all the 13 regional systems, the Alaska Ocean Observing System (AOOS) provides valuable data to improve maritime safety, enhance the economy and protect the environment. As NOAA works to fill information gaps, the agency may consider an enhanced role with the oceans observing systems in place. It will be critical to maintain ongoing data sources and monitoring buoys and to consider expansion, particularly in remote regions like the North Pacific.

Alaskans are acutely aware of climate change, and fishery management systems must incorporate climate considerations throughout the management process. Climate change is having an impact on fisheries and managers must have the resources and tools to be responsive to the changes. In addition to providing the tools to support resilient fish stocks, factoring climate change in fisheries management will provide stability to fishing communities. As a longtime resident of an Alaska fishing community, Kodiak, I believe it is critical that annual catch limits and bycatch limits are informed by the latest climate information to ensure we are leaving appropriate levels of both target and nontarget species in the water to keep populations in the water. At times this will be less harvest available for fishermen but at the end of the day the long-term sustainability of our oceans resources is paramount. Fishing communities are well aware of the need to keep stocks healthy to maintain resilient fishing communities and responsible resource management must factor in the impacts of climate change.

In the North Pacific, we are seeing increased interactions with bycatch in large scale trawl fisheries and it is critical to increase our understanding of the role of climate change and impacts to the bycaught species. For example, there are significant recruitment events occurring in the Sablefish species which appear to be a result of the changing climate. Subsequently, there are an increased number of small sablefish that are being caught while the Bering Sea trawl sector targets pollock, and the trend is disturbing: in 2017, the BSAI pollock fleet was 110% over its sablefish allocation; in 2018, 145% over; in 2019, 357% over; and in 2020, the trawl fleet was 519% over its allocation. In addition, in 2020 the Bering Sea trawl sector encountered abnormally high levels of herring bycatch while targeting pollock. The impacts to these bycaught species must be understood and addressed through management action to mitigate the impact to these critical ecosystem species. Councils must factor in bycatch of non-target species when setting ACL's for target species in a changing climate. The SSC should consider climate vulnerability when making fishing level recommendations.

AMCC appreciates the approach outlined in 216(c) which is structured to collect input from fishermen, regional fishery management councils, scientists and ocean stakeholders to help chart the course moving forward. Addressing climate change will necessitate an inclusive, transparent approach which will in turn make use of our collective responsibility to manage fisheries to the best of our abilities in a changing climate.

Ideally, this is the beginning of an engagement process and an ongoing commitment to establish climate-ready fisheries. I welcome and appreciate further opportunities for engagement.

Sincerely,

Theresa Peterson
Fisheries Policy Director
Alaska Marine Conservation Council

April 2, 2021

The Honorable Gina Raimondo
Secretary of Commerce
Department of Commerce
1401 Constitution Ave NW
Washington, DC 20230

Mr. Benjamin Friedman
Acting Administrator
National Oceanic and Atmospheric Administration
1401 Constitution Avenue NW, [redacted]
Washington, DC 20230

Re: Executive Order 14008 section 216(c)
Submitted electronically to oceanresources.climate@noaa.gov

Dear Secretary Raimondo and Administrator Friedman,

Thank you for the opportunity to submit comments on Executive Order 14008, Tackling the Climate Crisis at Home and Abroad, and specifically section 216(c) which considers how to make fisheries and protected resources more resilient to climate change. Wild Oceans was founded more than 45 years ago by conservation-minded fishermen. While we initially focused on conserving large, highly migratory species, our circle of concern expanded to include their prey species. Looking at ocean ecosystem health from the perspective of both predator and prey led us to advocate for holistic, ecosystem-based solutions to manage fisheries. This is the foundation of a resilient future for fishing, based on sound science and acting with precaution.

As our climate changes and extreme weather events become more common, they are causing ocean changes, shifting stocks and disrupting the supply of sustainable seafood. We must build durable responses that protect ocean ecosystems while encouraging fishing communities to adapt. Then we can ensure ocean resources and opportunities thrive to their fullest extent for future generations. The Magnuson-Stevens Fishery Conservation and Management Act provides

us with a solid foundation for preparing for climate change. In order to build more resilient stocks and communities, we need to invest in the fisheries and ecosystem science that supports ecosystem-based fishery management and gives the managers what they need to act with precaution in the face of uncertainty.

Ecosystem-based Fisheries Management (EBFM) provides us with the tools to build healthy fish stocks and fishing communities that can withstand a changing ocean. EBFM is widely accepted as the most appropriate framework for achieving sustainability in fisheries, both in terms of ecological and human wellbeing. Building resiliency by discovering solutions to climate effects requires an understanding of ecosystem structure and function and how human actions might impact the changing ecosystem. We must ensure that fishing activity will not undermine ecosystem health**.** Only then we can ask, "Are our fisheries flexible and adaptable enough to operate in the new climate paradigm?"

For example, as fish stocks shift northward, new fishing opportunities will arise for forage species such as squid, sardine, mackerels or anchovy. We must first understand the impact of these stock shifts on predators that depend on this prey. Only then can we evaluate harvest strategies to preserve biodiversity and ecological relationships. Our regional fishery management councils need more technical guidance to incorporate ecosystem and environmental factors into single-species management actions and stock assessments, which we rely on now and for the foreseeable future.

Our present approach – the fishery targets and limits we currently use under the single-species framework – does not account for impacts on other species and trade-offs within the broader food web. There are enormous ecological uncertainties and inevitable risks inherent in this approach. In order to move towards EBFM, we need to commit to using ecosystem science to inform management decisions. To operationalize EBFM, we must not demand a level of scientific precision and rigor to the application of well-known ecosystem principles that we do not demand of our current biological reference points.

NOAA Fisheries should invest in scientific research that advances EBFM and helps us understand how our oceans are changing, what's at risk and how we can respond to these changes. Below are our recommendations for how NOAA should direct its resources to advance EBFM and better prepare for climate change impacts.

- **The Integrated Ecosystem Assessment (IEA) program should be prioritized to make EBFM actionable.** By integrating all components of an ecosystem, including humans, into the decision-making process, managers can balance trade-offs to achieve their desired ecosystem-level goals. Through regional Fishery Ecosystem Plans (FEPs), councils have begun to define ecosystem-level goals and objectives. To be functional, broad conceptual ecosystem goals and objectives must be supported with a framework of indicators associated with "healthy" states to be maintained and unhealthy states to be avoided. NOAA Fisheries should support and continue to prioritize the work of the IEA

programs and encourage close collaboration between IEA scientists and the councils to link indicators to FEP goals and objectives. This will help managers better assess ecosystem health, analyze tradeoffs among management decisions, and take steps towards achieving climate-ready fisheries.

- **Climate Vulnerability Assessments should be used to inform management and prioritize research.** NOAA Fisheries science centers have been conducting climate vulnerability assessments in each region to identify which species may be most vulnerable based on their exposure to projected changes in the ocean and their sensitivity or adaptability to handle those changes based on their life history characteristics. Vulnerability assessments can help identify areas where additional research is needed to understand, track and assess the risk and provide a basis for considering different courses of action. We support completing this research, but stress that to be useful, NOAA Fisheries needs to incorporate these results into stock assessments, develop a link to management and consider the results in the scenario planning process.

- **NOAA Fisheries Climate Strategy and Regional Action Plans should be updated to guide implementation of the climate science strategy in the next five years.** These regional plans were developed to identify and address top priority information needs as determined by councils, scientists, advisors and stakeholders. Climate science and application should not be about creating more work or undertaking research for science's sake – it's about providing information to managers and the public about what to expect and how to best prepare. The original plans were intended to build on existing data and science to help the councils adapt and prepare for climate variability and future ocean changes. Developing and implementing updated plans should be a collaborative effort between the Council, NOAA Fisheries and stakeholders who bring essential on-the-water knowledge, values and information into the process.

- **NOAA Fisheries should take a leadership role in Climate Scenario Planning to help identify new regional and national solutions for responding to stock distribution shifts across jurisdictional boundaries, maintaining healthy ecosystems with resilient fisheries.** Fishery managers have begun preparing for climate change by using climate scenario planning workshops to identify potential challenges, worst case scenarios and potential solutions for responding to the effects of climate change. We recommend NOAA Fisheries take a leadership role in facilitating climate scenario planning initiatives, including allocating financial resources to support these initiatives, to ensure all regions have access to this tool and are better equipped to implement proactive measures to address climate change impacts.

  Experts agree we need to change our paradigm; we must think about worst case scenarios to reduce our vulnerability. Climate scenario planning provides regional stakeholders and managers an opportunity to ask, "What if?" What if stocks shift? What if prey availability becomes highly variable? What if stock recruitment becomes unpredictable?

Once we identify the questions we need to answer, we can examine our fishery science and management toolbox and consider what science and tools we have and what we need to add in order to maintain healthy fisheries for the future. By considering scenarios in workshops outside of the current frame of management meetings, managers and stakeholders are unburdened from their traditional roles, allowing for more creative thinking and a more open discussion of opportunities.

In addition to strengthening EBFM science and processes for incorporating that science into management, NOAA Fisheries should support precautionary management approaches that build resiliency of fish stocks and the ecosystem.

- **NOAA Fisheries should support expanding opportunities to protect habitat and prey.** In 1996, the Magnuson Stevens Act was amended to recognize the importance of healthy habitat for commercial and recreational fisheries. Protecting and restoring Essential Fish Habitat (EFH) has helped to maintain productive fish stocks, but has focused on physical structures and static boundaries in the ocean. Importantly, EFH includes prey, and EFH designations must consider the impact of coastal pelagic catch on dependent predators.

  NOAA Fisheries should strengthen conservation of forage species to ensure their availability to fish stocks and protected species, taking into account that climate drivers are causing changes to the forage base, in some cases driving prey away from dependent predators.[1] Conserving fish at the ecosystem level requires a change in some of our most basic fishery management concepts. In order to prevent ecosystem overfishing – that is, fishing to a degree that jeopardizes the integrity of marine communities – NOAA Fisheries must move away from the goal of maximizing yields to fisheries toward ecologically sustainable yields. To do that, we need to be more forthright about how we are impacting the food web, and then explicitly consider these impacts within our conservation and management strategies.

  Maximum sustainable yield (MSY) considers only the stability and sustainability of target species and the fishery. But considered in the broader environment, where the quantity and quality of relationships among species define the health of marine communities, fishing at or near MSY is not ecologically sustainable. It is not possible to shrink a fish stock to half or less its carrying capacity, and keep it at that level, without significant ecological consequences. NOAA Fisheries should adopt standards consistent with growing scientific consensus that target populations of forage species should be set no lower than 75% of un-fished biomass while the overfished threshold should be set

[1] Suca, Justin J., et al. "Sensitivity of sand lance to shifting prey and hydrography indicates forthcoming change to the northeast US shelf forage fish complex." ICES Journal of Marine Science (2021)., https://doi.org/10.1093/icesjms/fsaa251

correspondingly higher than traditional levels and no lower than the biomass level associated with MSY.[2]

- **NOAA Fisheries should expand area-based protections for spawning grounds and feeding grounds of all marine species.** NOAA Fisheries has a history of restricting gear in areas critical to the life history of marine fish and protected species. The Spring Gulf of Mexico Gear Restricted Area is a fixed longline restriction that protects Atlantic bluefin tuna during the peak of spawning season by restricting longline activity in an area with a relatively high bluefin interaction rate from April 1 through May 31. The Pacific Loggerhead Conservation Area (PLCA) is more dynamic. The PLCA closure is triggered by an environmental variable consistent with Loggerhead abundance. Specifically, drift gillnet fishing is prohibited in the PLCA from June 1 to August 31 when El Nino conditions are occurring or forecast to occur off Southern California. Building resiliency requires us to maintain these protections and put the resource ahead of profits.

  Importantly, NOAA Fisheries now has the ability to use ocean modeling to identify, designate and protect critical habitat based on oceanographic features. Using features such as temperature, currents or forage availability to designate habitat will allow us to protect pelagic habitat as it shifts in space with climate change. Dynamic area-based management protection has the potential added benefit of reducing the size or length of a closure when compared with a static closure, thereby allowing sustainable fishing opportunities. NOAA Fisheries should prioritize research to develop both static and dynamic area-based management with a focus on protecting spawning grounds, feeding sites and areas of high bycatch of non-target, unmarketable or protected species.

- **NOAA Fisheries should champion innovative gear development to help fishermen adapt to climate shifts.** Fishermen may need to adapt their methods, gear, vessels and markets to meet the shifting landscape. Adaptability relies on innovation, and innovation can provide the opportunity to more efficiently catch target stocks or shifting species while reducing bycatch. For example, in Southern California, deep-set buoy gear was developed that not only targets swordfish with more than 80% efficiency, it steers clear of non-target and endangered species. Selective gear becomes more important in the face of climate change where the ability to engage in a fishery may hinge on avoiding non-target species. For this reason, we ask NOAA Fisheries to support more research into innovative gear development, specifically gear that reduces the needless waste of ocean resources synonymous with indiscriminate gear that catches unmanaged, non-target, or bycatch species. Species-specific gear makes management easier and less costly and allows fishermen to take advantage of fishing resources with less impact on ocean structure and function, thus maintaining ecosystem resiliency.

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[2] Hinman, K. "Resource sharing: the Berkeley criterion." Wild Oceans (2015)., https://wildoceans.org/wp-content/uploads/2016/01/RESOURCE-SHARING.pdf

- **NOAA Fisheries should clarify the use of the Ecosystem Component (EC) designation, including how measures intended to protect the ecosystem roles of such species may be implemented across jurisdictions and fishery management plans.** Ecosystem Component species designation was introduced into the Magnuson Stevens Act in 2009 in order to encourage ecosystem approaches to management decisions. However, the councils have applied this designation very differently, resulting sometimes in a lack of accountability. For example, the Mid-Atlantic Fishery Management Council decided to safeguard the forage base by classifying non-target forage species as ecosystem component species and setting a total limit on retention. In 2019, the Western Pacific Fishery Management Council reclassified 193 species in the Hawaii Fishery Ecosystem Plan from management unit species to ecosystem component species and would no longer establish annual catch limits or associated accountability measures.

  Also, regional councils have differing interpretations regarding possible management measures for species which do not "require conservation and management." NOAA Fisheries should clarify the use of ecosystem component designation, how discretionary management measures can be used to protect the ecosystem role of prey species without such measures implying that the stocks "require conservation and management" and how EC designation can be used to protect the ecosystem role of a stock across jurisdictions and fishery management plans.

Building resilient fisheries in the face of climate change depends on understanding the ocean ecosystem and our impact and role in modifying its structure and function. It depends on setting aspirational goals and objectives for the ecosystem and then taking steps to ensure the health of the resource first. NOAA Fisheries has already developed many tools to move Ecosystem-based Fisheries Management from concept to commonplace. It's time to help managers operationalize EBFM to tackle the challenges of building resilient fisheries in a changing climate.

Sincerely,

Theresa Labriola

April 2, 2021

Benjamin Friedman
Deputy Under Secretary for Operations,
Performing the Duties of Under Secretary of Commerce
for Oceans and Atmosphere and NOAA Administrator
National Oceanic and Atmospheric Administration
1401 Constitution Avenue NW, Room 5128
Washington, DC 20230

Submitted via email to: OceanResources.Climate@noaa.gov.

Dear Mr. Friedman,

On behalf of the Hawaii-based longline fleet, the Hawaii Longline Association (HLA) appreciates the opportunity to comment on how to make fisheries and protected resources more resilient to climate change.

The Hawaii longline fishery is a major fishery of the United States and is the largest food producer in the State of Hawaii (32 million pounds landed in 2019). The fishery started in Hawaii in 1917 and is comprised of 150 active vessels. The annual dockside landed value of the fishery is around $100 million, consistently ranking Honolulu Harbor in the Nation's top ten ports in terms of fisheries economic value (6th in 2018). The Hawaii longline fishery produces over 90% of the Nation's fresh bigeye tuna landings and over 50% of the Nation's swordfish and yellowfin tuna landings. Hawaii's commercial fishing and seafood industry has been estimated by the US Department of Commerce to annually generate around $867 million in sales impacts, $269 million in income impacts, $392 million in value-added impacts, and 9,900 full-and part-time jobs.[1]

Across the Nation, no fleet has seen more closures of US waters to fishing than the Hawaii longline fleet. This has left the Hawaii fleet less resilient to climate change and potentially shifting stocks because our fishing grounds are significantly restricted. Over 65 percent of the US EEZ around Hawaii is permanently closed to our fleet and the 200 nm US EEZ around Johnston Island if fully closed. The bulk of these closures were established under the Antiquities Act with a stroke of the pen, without meaningful public engagement processes, and not based on the best scientific information available. Our fleet is bearing a disproportionate burden of large scale MPAs that were created more for Presidential legacies rather than addressing management needs. Indeed, the waters overlayed by Marine National Monuments were already subject to federal agency management under the MSA and other statutes. The effect of these closures has forced Hawaii longline vessels, which are highly monitored and comprehensively managed, to fish predominately on the high seas at higher costs and among significant foreign competition.

HLA appreciates that President Biden and his administration are concerned with fisheries management issues in the context of climate change and offers the following comments:

[1] National Marine Fisheries Service. 2018. Fisheries Economics of the United States, 2016. U.S. Dept. of Commerce, NOAA Tech. Memo. NMFS-F/SPO-187a, 243 p.

1. **MSA and Regional Fishery Management Councils**

The United States is a global leader in fisheries management due to the MSA and council process. The MSA, among other things, prevents overfishing, promotes ecosystem-based fisheries management, requires that decisions are made using the best available science, and involves substantial opportunities for public and stakeholder engagement. Climate change impacts to fisheries is another area of focus that can be tackled under the MSA; however, the regional councils require the funding to do the work. If the administration and congress are serious about addressing climate issues and fisheries, then they have to provide more funding and support to the councils.

2. **Adaptive Management and Streamlined Processes**

Addressing climate change impacts to fisheries and protected species requires adaptive management frameworks. There is a large body of literature that illustrates the importance management systems that can respond to dynamic and rapid changes. The MSA-Council process can be adaptive, but NMFS administrative processes often do not move quick enough to address pressing fisheries management issues. NMFS should continue to look at ways to streamline environmental review processes and statutorily required determinations. For example, an ESA biological opinion on the Hawaii deep-set fishery is now in its 3rd year of development, when ESA requires BiOps to be completed within 135-days.

Another aspect of adaptive management is with regards to MPAs. The "set it and forget it" models are ineffective, especially for high migratory species management. Dynamic spatial management is the future, but also requires significant scientific investment and engagement with fishery participants.

3. **Protected Species Resiliency and the Power of the US Market**

The single most effective action the United States can implement to ensure protected species resiliency is to use the power of the US seafood market. The United States should require that imported seafood is subject to the same level of management measures (e.g., gear requirements and monitoring) for protected species as US fisheries. It is appalling that highly monitored US fisheries could be subject to closure due to protected species interactions while poorly monitored foreign fleets that have higher impacts on the same populations and are able to supply the US market with impunity.

4. **Fisheries Sector Engagement**

Addressing climate change impacts requires engagement with fishers. On the water experience and understanding of changing systems are critical to validate scientific models. Overreliance on complex modeling and worse case scenarios often do not align with on the water observations. Fishing vessels are incredible research platforms and involving fishermen in cooperative research often provides buy-in for management measures. More funding for regional cooperative research programs should be a priority.

Thank you for considering HLA's comments on these important issues.

Sincerely,

Eric Kingma, PhD
Executive Director

CALIFORNIA STATE LANDS COMMISSION
[redacted]

Established in 1938

JENNIFER LUCCHESI, *Executive Officer*
[redacted]

Contact Phone: [redacted]

April 2, 2021

National Oceanic and Atmospheric Administration
1401 Constitution Avenue NW, Room 5128
Washington, DC 20230
OceanResources.Climate@noaa.gov

RE: Climate: Recommendations for Fisheries and Protected Resources

Dear Staff of the National Oceanic and Atmospheric Administration:

This letter is submitted in response to the Request for Information (RFI) for Section 216(c) of the *Executive Order on Tackling the Climate Crisis at Home and Abroad* (EO 14008). Section 216(c) directs the National Oceanic and Atmospheric Administration (NOAA) to collect recommendations on how to make fisheries and protected resources more resilient to climate change, including changes in management and conservation measures, and improvements in science, monitoring, and cooperative research. The California State Lands Commission (Commission) is grateful for the role NOAA plays in conserving and managing coastal and marine ecosystems and resources, and in sharing knowledge of the oceans and coasts with the public. Commission staff appreciates the opportunity to provide feedback on EO 14008 to help NOAA develop adaptation strategies for coastal and marine resources.

California State Lands Commission Jurisdiction and the Public Trust

As background, the Commission manages California's sovereign tidelands and submerged lands, in addition to the natural beds of California's navigable rivers, lakes, and streams pursuant to the common law Public Trust Doctrine. The Commission's jurisdiction extends along the State's entire coastline and offshore

islands from the ordinary high-water mark to three nautical miles offshore. The Commission also has broad oversight authority over sovereign Public Trust lands granted by the Legislature to approximately 80 local jurisdictions (Pub. Resources Code, §§ 6009, subd. (c); 6009.1; 6301; 6306). It is the Commission's responsibility to protect and manage these Public Trust lands and their resources in the best interest of the State, ensuring the public may access them for sustainable uses, including water-dependent commerce, navigation, fishing, recreation, and conservation.

Climate change impacts are threatening the State's sovereign land, resources, and assets, and the Commission is committed to working with its lessees and trustees—as well as other local, state, Tribal, and federal partners—to address these changes head on, using the best available science to inform adaptation and resiliency planning. In addition to actively participating in inter-agency climate change working groups and action teams, the Commission has implemented internal measures to build our institutional knowledge of the science of climate change and its associated impacts on sovereign land. It is the Commission's goal to apply the best available science to facilitate adaptation planning for all our lessees and trustees.

The Commission's new 2021-2025 Strategic Plan identifies climate change and sea-level rise as emerging challenges and outlines the Commission's commitment to action. The Commission applies the best-available science and state policy guidance in its decision-making processes. Staff prepare sea-level rise analyses for all lease applications within tidally influenced areas, both to aid the Commissioner's evaluations and to inform lessees and the public about vulnerabilities and adaptation options. Many of the Commission's granted lands partners are also actively engaged in sea-level rise planning. Granted lands jurisdictions that generate Public Trust revenues over $250,000 annually were required, pursuant to AB 691 (Muratsuchi, 2013), to submit sea-level rise assessments to the Commission by July 2019. These assessments included a description of the impacts and vulnerabilities to the granted lands, an evaluation of those risks given different sea-level rise scenarios, information on the financial costs of impacts, and outline an approach to adaptation for protection of the public's interests in the affected area.

Additionally, the Commission administers the California Marine Invasive Species Program (MISP), which is mandated to prevent the discharge of nonindigenous species into the waters of the state from commercial vessels arriving at California ports. The MISP works to prevent new species introductions by implementing vessel ballast water and biofouling management requirements that are authorized by the Marine Invasive Species Act.

Commission staff has provided feedback below, organized into two sections: (1) *Climate Change Impacts on Fisheries and Protected Resources,* which outlines the different impacts that we have identified as having a current or potential effect on fisheries, aquaculture, and other protected resources; and (2) *Important Considerations and Recommendations for Building Resilient Fisheries,* which lays out our recommendations and potential solutions for promoting the resilience of fisheries and protected resources.

<u>Climate Change Impacts on Fisheries and Protected Resources</u>

- **Ocean warming, marine heat waves, and droughts**
    - <u>Shifts in species distributions</u>
        - In general, warming ocean temperatures are expected to shift geographic ranges of species poleward and into deeper waters, thus impacting total catches and successful rearing in certain fisheries and aquaculture facilities.
    - <u>Shifts in life-stage migration and reproduction</u>
        - Changing ocean temperatures could result in shifts in migration patterns of species that rely partially on temperature as a migration indicator, such as diadromous fishes. Increased frequency and intensity of drought conditions could also impact migration patterns, for anadromous fishes (e.g., Salmons, Smelts, and Sturgeons) and catadromous fishes (e.g., freshwater eels), affecting spawning cycles or food availability. Increased frequency and intensity of drought conditions could also impact outmigration success of diadromous fishes. These factors could all intersect with the Commission's work by impacting restoration projects within its jurisdiction.

- Invasive species
  - Changing ocean temperatures can alter the geographic range of invasive species, potentially pushing out native species that are less equipped to adapt. Additionally, because invasive species are often unintentionally introduced through shipping traffic, which is projected to increase as globalization continues, there may be a spike in invasive species introductions.

- **Ocean acidification**
  - Reduction in calcification
    - Ocean acidification, which results from excess carbon dioxide in the oceans, reduces the ability for calcifying organisms to develop their calcareous shells or skeletons. While this phenomenon affects a variety of organisms--from corals, to calcareous plankton, to shellfish--the effects on shellfish would have a profound impact on shellfish aquaculture and fisheries.

- **Eutrophication**
  - Harmful algal blooms
    - Increases in nutrient concentrations—in concert with other climate change factors such as warming ocean temperatures and hypoxia—have resulted in an increase in the frequency of harmful algal blooms (HABs). HABs have a variety of impacts on pelagic and benthic species of fish, invertebrates, corals, and aquatic vegetation. Not only do they reduce water clarity for species that rely on sight to capture prey or hide from predators, HABs can also release toxins that especially impact bottom-dwelling filter feeders. Additionally, they further deplete the water of oxygen and create "dead zones" that lack sufficient oxygen to support most species.

- **Hypoxia**
  - Anoxic "dead zones"
    - Hypoxia, or the lack of oxygen in water, along with eutrophication, leads to anoxic "dead zones", rendering areas of the water column inhabitable.

- **Sea-level rise and retreating shorelines**
  - Loss of nursery habitat in estuaries
    - The sheltered nature of estuaries provides ideal conditions for fish nursery habitat. As sea levels rise and these areas become inundated, habitats are likely to shift, and nursery habitat may be lost. For example, salt marsh habitats may transition to mudflats as they become increasingly inundated. Often, coastal development constrains the ability of habitats to migrate and adapt to changes in sea levels.
  - Loss of rocky intertidal habitat along the open coast
    - Rocky intertidal areas are vulnerable to sea-level rise. These areas provide essential habitat for many shellfish and benthic species. As sea levels continue to rise and communities deploy hard armoring structures, these habitats will continue to get pushed out.

Important Considerations and Recommendations for Building Resilient Fisheries

- **Monitoring and early detection**
  - Support programs and funding to expand monitoring and early detection of changing ocean conditions, species migration, and invasive species. This would support actions such as rapid response to newly detected invasive species.
- **Create a framework of climate change impacts that affect fisheries, aquaculture, and protected resources**
  - In order to be proactive and to enact meaningful action, it is important to comprehensively understand the range of impacts on fisheries and how they may overlap to create cumulative impacts. Creating a publicly available list of potential climate change impacts on fisheries and other protected resources would allow for

a more efficient and organized approach to address those impacts.
    - Create a prioritization of responses and actions based on this framework.
- **Sustainable and effective equipment**
    - Support funding initiatives to research more sustainable and effective fishing and aquaculture equipment, including gear and other supplies such as feed.
    - Provide funding support to help fishing enterprises transition their equipment to more sustainable alternatives.
- **Adaptable and diversified fisheries and communities**
    - Ensure fisheries and aquaculture facilities have the capacity to adapt to unexpected and varying conditions. This could include shifting to an earlier harvest, harvesting a diverse suite of species suited for different ambient conditions, or deploying physical barriers surrounding aquaculture facilities.
    - As sea levels rise, an emerging adaptation strategy is to create floodable areas with permeable land, such as a park, playground, or open space, which is available for water to move to, stay on, and percolate through. Areas such as these could help reduce flood impacts on surrounding built environments.
    - As climate change progresses, fisheries and aquaculture will continue to face incredible challenges, including potential fishery collapse or closures. Consider working with fishing and aquaculture partners to explore opportunities to provide career and job training in an effort to support those who might be financially impacted by fishery decline or shifts.
- **Shifting Marine Protected Areas**
    - Conduct additional research that would inform further consideration of whether a transition from static to dynamic Marine Protected Areas (MPAs) would be a prudent management action. Recent studies and examples have shown that Incremental shifts in the location and area of MPAs could provide benefits, including

accommodating shifts in species distributions and allowing the ecosystem to adapt over time[1,2].

- **Update technology**
  - Ensure early-warning systems are based on the best available science to quickly warn communities of immediate hazards and effectively lead community members to safety.
  - Establish widespread monitoring systems for marine heat waves, harmful algal blooms, and other climate change-related impacts, and make them publicly available on an interactive platform so community members can participate and provide data.
  - Improve and expand access to advanced GPS, VMS, and AIS technology for fishermen, so that they always know their location. This would allow them to better adhere to fishing boundaries established for marine conservation. Additionally, this would allow for more accurate data on where fishing is occurring, in turn providing valuable information for responding to changing conditions.
- **Conservation and restoration**
  - Support conservation and restoration of estuarine habitats, as these areas provide critical nursery habitat to commercially important fishes.
  - Support efforts that seek to improve habitat resiliency to sea-level rise and other climate change impacts by adaptively managing coastal and estuarine habitats.
  - Support efforts to protect and restore rocky intertidal habitats, which are critical to shellfish aquaculture and fisheries.
- **Community and Tribal engagement**
  - Engage with local fishing communities and establish community-based science initiatives that help support early monitoring and detection.

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[1] Cashion T, Nguyen T, ten Brink T, Mook A, Palacios-Abrantes J, et al. (2020) Shifting seas, shifting boundaries: Dynamic marine protected area designs for a changing climate. PLOS ONE 15(11): e0241771. https://doi.org/10.1371/journal.pone.0241771

[2] Maxwell, S. M., Gjerde, K. M.m Conners, M. G., Crowder, L. B. (2020). Mobile protected areas for biodiversity on the high seas. Science 367(6475): 252-254. https://doi.org/10.1126/science.aaz9327

- Identify opportunities to support and invest in the development of community-led fisheries and aquaculture initiatives.
- Solicit continuous input from communities to better understand local and regional impacts and to promote inclusive decision-making.
- Engage with Tribal governments and communities and explore ways to implement co-management programs that respect, uplift, and integrate Traditional Ecological Knowledges (TEKs). Seek opportunities to learn and collaborate with tribal partners in incorporating traditional practices into adaptation planning and decision-making.

Thank you for the opportunity to provide input to NOAA on tackling the climate change crisis at home and abroad. Please let us know if you have any questions about our comments.

Sincerely,

Nicole Dobroski
Chief, Division of Environmental Planning
and Management
[redacted]

Cc: Keelin Kuipers, Deputy Director
NOAA Office for Coastal Management
[redacted]

THE BEAVER COALITION

April 1, 2021

RE: Section 216(c) of the Executive Order on Tackling the Climate Crisis at Home and Abroad

To Whom It May Concern:

The streams, rivers, and floodplains of North America are critical for the health of our country, our people, our economy, and our natural resources. Water security, wildfire resilience, and fish habitat are just a few of the important services provided by vibrant, intact riverscapes. Climate change threatens the integrity and health of riverscapes through warming temperatures and shifting patterns of precipitation. Deep and durable climate mitigation and adaptation actions in the freshwater environment are possible and easily implemented. We ask that you consider restoring the health of degraded stream systems and building climate resilient riverscapes through a partnership with nature's premier ecosystem engineer, the North American Beaver.

The North American Beaver was once abundant and wide-spread across the continent, but it is now struggling. It is struggling to recover from trapping to near extinction for its fur, from continued lethal removal for its perceived threat to the built environment, and from pervasive habitat degradation of the streams and rivers it calls home. Does the population status of the North American Beaver warrant federal protection? No, not in the sense of it being a threatened species. There are robust populations scattered across the continent and its historic range is almost fully occupied. However, we can act to amplify the natural landscape engineering that beaver do through regulation and practices that support persistent populations. We can magnify and protect our investment in stream restoration actions by entering into partnerships with beaver. We need to take these actions for the health and resilience of our aquatic resources.

For millions of years, the North American Beaver has actively shaped the form and function of aquatic ecosystems in North America. More than glaciers or plate tectonics, beaver have shaped our landscape. Through their predictable construction of dams, ponds, burrows, and channels, beaver have slowed water and sediment down, pushing it up and out, building the valley floors that are the floodplains we and a myriad other species call home. Beaver have provided a stable habitat niche within which the rest of our aquatic ecosystems have evolved. It shouldn't be surprising then, that as we have removed beaver from the system they built and maintained, the structure of our streams, rivers, wetlands, and floodplains has started to crumble.

Beaver are the quintessential "keystone species" for our landscape. Beaver have formed the riverscapes that our fish and wildlife resources depend on, and these riverscapes naturally clean and cool streams, recharge aquifers, and buffer forests and grasslands into a fire resilient landscape. Beaver will actively maintain all of these functions in a robust and dynamic fashion, but quite obviously, only if they are present. Only when beaver are living and working in all of the streams and rivers and floodplains of North America will these riverscapes deliver the ecosystem services we have come to depend upon.

When beaver are removed from streams and rivers, or prevented from becoming re-established in watersheds, the maintenance contract is broken and the system falls into disrepair. Down-cut, incised streams, disconnected from their floodplain, simplify into single-threaded channels. Sediment and carbon are exported from long-term storage, water warms and becomes eutrophic, the landscape dries out, and fires run for miles across a uniform expanse of fuel. Little is left in in terms of healthy habitat for fish and wildlife. Beaver-managed floodplains are salmon, trout, and lamprey habitat. Beaver ponds and wetlands are sinks for carbon and processing domains for nitrogen and phosphorus. Beaver floodplains are water-cooling, water-storing, and flood-dissipating places we must foster.

At a minimum, we must:

- **Keep beaver where they are**; through supporting the implementation of voluntary coexistence solutions at sites where beaver activity conflicts with infrastructure.
- **Build more beaver habitat**; through supporting the implementation of beaver-based restoration techniques, such as low-tech process-based restoration.

How does NOAA help achieve these important climate changes:

- **Protect and enhance current investments in stream restoration;** NOAA invests millions of dollars each year in salmon habitat restoration. These actions should focus on the stream and river processes that facilitate forming and maintaining beaver dominated floodplains.
- **Partner with beaver in stream restoration;** NOAA's stream habitat restoration actions are often undercut by beaver population management actions. By partnering with other Federal agencies, such as Federal land management entities, restoration actions in watersheds can be managed differently for beaver presence.

Our fish, water, and forests depend on our willingness to act. We don't need to study the situation, the science is already robust, comprehensive, and clear. Instead, we must apply our knowledge of the physical and biological processes of functioning beaver riverscapes, and drive rapid, comprehensive, and durable actions. Actions that will assertively address the pervasive degraded streams, rivers, and floodplains of North America that threaten fisheries, water security, flood and wildfire resilience, and extinction of sensitive species. Actions that rebuild the natural functioning dynamics of riverscapes, such that they are capable of resilient, durable responses to disturbance. Actions that should, in fact, form our national climate action plan. Beaver are the national climate action plan – for fish, water, and wildfire.

Thank you for the opportunity to submit comments in response to section 216(c) of the Executive Order on Tackling the Climate Crisis at Home and Abroad.

Sincerely,

Jakob Shockey
Executive Director, The Beaver Coalition
[redacted]

April 2, 2021

Benjamin Friedman
Deputy Under Secretary for Operations, Performing the Duties of Under Secretary of Commerce for Oceans and Atmosphere and NOAA Administrator
National Oceanic and Atmospheric Administration
1401 Constitution Avenue NW, Room 5128
Washington, DC 20230

Docket Number: RTID 0648-XA812

To Acting Administrator Friedman and NOAA leadership colleagues:

On behalf of the Consortium for Ocean Leadership (COL), which represents our nation's leading ocean science, research, and technology organizations from academia, industry, and the larger nonprofit sector (to include philanthropy, associations, and aquariums), I much appreciate the opportunity to provide input on Section 216(c) of the *Executive Order on Tackling the Climate Crisis at Home and Abroad.*

I applaud the order for recognizing that as climate change continues, the diversity, abundance, and distribution of both economically important and protected marine species will surely change along with it. Therein lies the challenge, however, to implementing this order: Right now, despite dedicated efforts by ocean shareholders around the nation, we do not understand our vast ocean or its resources well enough to predict or even mitigate the impacts of these changes as they occur. More than 80 percent of our ocean is unexplored, unmapped, or unobserved; therefore, in order to make fisheries and protected resources more resistant to climate change, we must continue to explore and fully characterize the ocean. The *Implementation Plan for the National Ocean Mapping, Exploration, and Characterizing (NOMEC) of the United States Exclusive Economic Zone* seeks to map deep waters (more than 40 meters) of our nation's EEZ by 2030 and coastal waters (less than 40 meters) by 2040[1]. **The NOMEC initiatives, which will dramatically improve our understanding of the ocean, should be integrated with efforts under this executive order to address our ocean's resilience to climate change.** Analyzing and sharing the information collected as part of the *Implementation Plan* would help ensure the best information possible for successful decision-making and management of fisheries and protected resources.

Additionally, efforts to address this executive order should **include a management emphasis on continuous convening and partnership-building among diverse ocean "shareholders" from all public and private sectors** to ensure the most efficient and effective use of fiscal resources to advance the laudable goals and objectives of this executive order. The recently reauthorized National Oceanographic Partnership Program (NOPP), which gave birth to many important ocean initiatives over the years (including IOOS) provides an excellent vehicle for such convening and partnership building to this end.

[1] National Ocean Mapping, Exploration, and Characterization Council of the Ocean Science and Technology Subcommittee and Ocean Policy Committee (2020). *Implementation Plan for the National Strategy for Ocean Mapping, Exploring, and Characterizing the United States Exclusive Economic Zone.* https://iocm.noaa.gov/about/documents/strategic-plans/210107-FINALNOMECImplementationPlan-Clean.pdf .

We critically need more robust and wide-ranging scientific data that are collected and managed according to agreed-upon standards to make informed, science-based decisions around resilient fisheries, protected resources, and more. To this end, our consortium has several science- and policy-based suggestions to help implement this order as it relates to both fisheries and protected resources, which will also grow our knowledge of the ocean.

Realizing fisheries and conservation goals, particularly in light of climate-related changes, will require more robust observation and monitoring of our ocean. Ocean observations underpin almost all ocean scientific research and are critical to providing early warning of climate-related changes or the presence of other stressors within an ecosystem. Expanding the ocean observing systems that already support ecological forecasting initiatives, such as NOAA's harmful algal bloom (HAB) forecasts[2], will enable better resource management and, ultimately, stronger resource resilience. NOAA currently collects data on the biological, geological, oceanographic, chemical, and atmospheric conditions occurring in or affecting our ocean, but gathering more observations and strengthening data integration capabilities will paint a clearer picture of how these systems function, as well as provide a baseline from which we can monitor changes and, eventually, predict and halt threats. Expanding ocean observing infrastructure to leverage the potential of uncrewed systems, environmental DNA (eDNA), cloud computing, and other growing fields will also advance these goals. Maintaining operations of our existing observing infrastructure and significantly expanding our ability to observe and monitor the ocean are key to having enough information to enable science-based decision-making.

Adopting a scheme of more dynamic ocean management, defined by Maxwell et al. (2015)[3] as "management that changes rapidly in space and time in response to the shifting nature of the ocean and its users based on the integration of new biological, oceanographic, social and/or economic data in near real-time," will help meet conservation goals while also supporting multiple uses of precious ocean resources (including fisheries). As climate change disrupts seasonal migration patterns or pushes species into new territories in search of more hospitable waters — as we are already seeing with lobsters in the Gulf of Maine[4] — marine conservation plans must be enabled to adapt with the species they protect. Carefully managing the coexistence of protected species with dramatically increasing numbers of offshore wind turbines is another excellent example of an area where dynamic ocean management is critically needed. We cannot respond to this "shifting nature of the ocean" if we are not aware of the changes taking place, which in turn will enable proactive, rather than reactive, management.

Efforts to improve observing infrastructure must also include measures to increase our understanding of marine biodiversity — not just what lives in the water but the behaviors of living marine resources themselves — and species diversity, abundance, and distribution. The Marine Biological Observation Network (MBON) and Animal Telemetry Network (ATN) are two ongoing efforts to characterize the movement, habits, and interactions of marine species and ecosystems. Climate change has complex

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[2] NOAA NOS Center for Operational Oceanographic Products and Services. *Harmful Algal Bloom Forecasts.* https://tidesandcurrents.noaa.gov/hab_info.html

[3] Maxwell, S.M., Hazen, E.L., Lewison, R.L., Dunn, D.C., Bailey, H., Bograd, S.J., Briscoe, D.K., Fossette, S., Hobday, A.J., Bennett, M., Benson, S., Caldwell, M.R., Costa, D.P., Dewar, H., Eguchi, T., Hazen, L., Kohin, S., Sippel, T., & Crowder, L.D. (2015). Dynamic ocean management: Defining and conceptualizing real-time management of the ocean. *Marine Policy, 58*, 42-50. https://doi.org/10.1016/j.marpol.2015.03.014

[4] O'Brien, M. (2019, September 18) What rising temperatures in the Gulf of Maine mean for the state's lobster industry. *PBS NewsHour.* https://www.pbs.org/newshour/show/how-rising-water-temperatures-could-end-maines-lobster-boom

effects on fisheries and other marine species; MBON and ATN are critical to understanding these changes and should be supported and expanded moving forward. However, adequately informing sound policy decisions on our quickly changing planet will require a large-scale, coordinated effort to study marine life. To achieve this, we need to renew a sustained, collaborative, and systematic biodiversity research and observation program in the model of the wildly successful Census of Marine Life (CoML). The flagship program ran from 2000 to 2010 and largely provided the global baseline for knowledge on marine biodiversity. A CoML "2.0" program could leverage recent technological advances and provide critical information for managing resources as we prepare to face major ecological challenges.

We know that ensuring the health and sustainability of our ocean is crucial to the security and economic prosperity of our nation, as well as the health of its citizens and all other life. Whether we are managing fisheries, protecting resources, enabling offshore wind, or allowing recreational access, we must ensure that decisions are made based off the best-available science. We can't make those decisions without a clearer picture of what is occurring in our ocean. Growing our ability to observe, explore, and characterize our ocean will then allow the best-possible management decisions to be made, which is increasingly important and challenging in light of the changing climate.

I am happy to answer any questions or provide further information on any of the above points.

Respectfully,

Jonathan W. White, RADM (Ret.), USN
President and CEO
Consortium for Ocean Leadership

Consortium for Ocean Leadership Member Institutions

Alaska Ocean Observing System • Alaska SeaLife Center • Aquarium of the Pacific • ARCUS • ASV Global, LLC • Bermuda Institute of Ocean Sciences • Bigelow Laboratory for Ocean Sciences • Chevron USA • College of William & Mary • Consumer Energy Alliance • Cooperative Institute for Research in Environmental Sciences • Dauphin Island Sea Lab • Duke University • Earth2Ocean • East Carolina University • Esri • Estuary & Ocean Science Center, San Francisco State University • Exocetus • FAU Harbor Branch Oceanographic Institute • Florida Institute of Oceanography • Harte Research Institute • Hubbs-SeaWorld Research Institute • IEEE Oceanic Engineering Society • Institute for Global Environmental Strategies • JASCO • Johns Hopkins University APL • L-3 MariPro, Inc. • Lamont-Doherty Earth Observatory • Liquid Robotics, Inc. • Louisiana State University • Louisiana Universities Marine Consortium • MARACOOS • Marine Technology Society • Massachusetts Institute of Technology • MBARI • Monmouth University Urban Coast Institute • Moore Foundation • Moss Landing Marine Laboratories • Mystic Aquarium • NERACOOS • New England Aquarium • NOIA • North Carolina State University • North Pacific Research Board • Nova Southeastern University • Old Dominion University • Oregon State University • Pennsylvania State University • Rutgers University • Saildrone • Savannah State University • Schmidt Ocean Institute • Sea-Bird Scientific • Severn Marine Technologies, LLC • Shell • Skidaway Institute of Oceanography of UGA • Sonardyne, Inc. • South Carolina Sea Grant Consortium • Stanford University • Stony Brook University • SURA • Teledyne CARIS • Texas A&M University • ThayerMahan •

The IOOS Association • U.S. Arctic Research Commission • U.S. Naval Postgraduate School • UCSD Scripps Institution of Oceanography • University of Alaska Fairbanks • University of California, Davis • University of California, Santa Barbara • University of California, Santa Cruz • University of Delaware • University of Florida • University of Hawaii • University of Maine • University of Maryland Center for Environmental Science • University of Massachusetts, Dartmouth • University of Miami • University of New Hampshire • University of North Carolina, Chapel Hill • University of North Carolina, Wilmington • University of Rhode Island • University of South Carolina • University of South Florida • University of Southern California • University of Southern Mississippi • University of Texas at Austin • University of Washington • University of Wisconsin, Milwaukee • Vulcan, Inc. • Woods Hole Oceanographic Institution

April 2, 2021

Benjamin Friedman
Deputy Under Secretary for Operations, Performing the Duties of Under Secretary of Commerce for Oceans and Atmosphere and NOAA Administrator
National Oceanic and Atmospheric Administration
1401 Constitution Avenue NW, Room 5128
Washington, DC 20230

RE: Climate: Recommendations for Fisheries and Protected Resources

Dear Mr. Friedman:

The Good Food Institute (GFI) appreciates the opportunity to provide input on "how to make fisheries and protected resources more resilient to climate change." GFI is an international 501(c)(3) nonprofit organization that is developing the roadmap for a sustainable, secure, and just protein supply. GFI's team of scientists, entrepreneurs, and policy experts supports research and innovation in alternative proteins to meet consumer demand and feed a growing world. We urge you to prioritize open-access research on alternative seafood as a central component of NOAA's climate change agenda.

Demand for seafood globally is increasing. The Food and Agriculture Organization of the United Nations estimates that global seafood demand will reach 21.5 kilograms per capita by 2030, a nearly 5 percent increase from 2020 levels.[1] In the U.S., per capita seafood consumption has remained relatively constant over the past several decades but population growth has driven expanding total demand. The increase in seafood sales during the Covid-19 pandemic, along with the consistent recommendations under the Dietary Guidelines for Americans to consume more seafood, could further increase domestic seafood demand in the coming years. Ensuring the resilience of our seafood supply is essential to the long-term sustainability of seafood in the U.S.

Alternative seafood production is more resilient to climate change. Current mainstream seafood production models—capture fishing and aquaculture—rely on marine and freshwater environments to produce seafood. However, as climate change intensifies, our marine resources are becoming stressed. Over 90 percent of excess heat from climate change has been absorbed by our oceans since 1970, the rate of ocean warming has doubled since 1993, and the frequency of marine heat waves has doubled since 1982.[2] Just maintaining current production levels from fisheries and aquaculture is challenging in a changing climate, let alone increasing the supply of seafood as demand grows.

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[1] FAO. 2020. The State of World Fisheries and Aquaculture 2020. Sustainability in action. Rome. https://doi.org/10.4060/ca9229en

[2] IPCC, 2019: Summary for Policymakers. In: IPCC Special Report on the Ocean and Cryosphere in a Changing Climate [H.-O. Pörtner, D.C. Roberts, V. Masson-Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, A. Alegría, M. Nicolai, A. Okem, J. Petzold, B. Rama, N.M. Weyer (eds.)]. In press.

Plant-based and cultivated seafood, known together as alternative seafood, are two promising production methods for meeting that growing demand. Plant-based seafood is produced by biomimicking conventional fish and shellfish products using plant ingredients and advanced food science technology. The goal of plant-based seafood is to give consumers the taste, texture, and full seafood experience, but without the adverse external health and environmental costs. Cultivated seafood is produced from a small sample of fish or shellfish cells grown in a tank called a cultivator, which provides warmth and the water, proteins, carbohydrates, fats, vitamins and minerals needed to grow muscle. The result is seafood that looks, tastes, and cooks the same as the traditional version. Because alternative seafood does not rely on ocean resources, the production models are resilient to the rapid changes occurring in aquatic environments.

Alternative seafood production is not directly disrupted by warming and acidifying marine environments. While seafood production systems that rely on the use of live fish and shellfish are affected by climate-driven population migration[3] and heat stress mortalities,[4] plant-based and cultivated seafood production is not disrupted by ocean temperature changes. The alternative seafood industry can also support coastal resilience strategies such as mangrove restoration by moving the supply of commonly farmed species such as shrimp away from fragile marine ecosystems.

In addition to resiliency, we need to incorporate climate change mitigation strategies into U.S. seafood production. Alternative seafood can boost climate change mitigation efforts. Conventional fishing is associated with increasing greenhouse gas emissions as depleted coastal fisheries force vessels to travel farther to catch the same number of fish.[5] Bottom trawling damages ocean floors and releases stored seabed carbon.[6] Diversifying our seafood production methods to include plant-based and cultivated seafood should be a core strategy to reducing emissions from the industry.

Marine-sourced plant ingredients can be included in alternative seafood and may boost climate change mitigation efforts. For example, several species of macroalgae exhibit promising sensory and functional benefits when used as ingredients in plant-based seafood. Cultivating and harvesting these ingredients can be done in concert with aquatic carbon sequestration methods and without the land use change associated with terrestrial agriculture.

Public research funding is the most effective way to accelerate the alternative seafood industry. Although private investment in alternative proteins is growing, open-access public research is crucial to accelerate growth. Public research will have a significantly broader impact on innovation and the economy by creating jobs and generating new opportunities to feed Americans and the world, rather than primarily benefiting specific companies. Despite promising growth, plant-based seafood products only represent a small portion of the total plant-based meat market, are not available for the full range of proteins, and are typically not price competitive with their conventional counterparts. NOAA has a critical role to play in funding research to accelerate the development of resilient and sustainable seafood that is affordable and accessible to all Americans.

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[3] Free, Christopher M., et al. "Impacts of historical warming on marine fisheries production." Science 363.6430, 979-983 (2019). doi: 10.1126/science.aau1758

[4] Reid GK, Gurney-Smith HJ, Marcogliese DJ, Knowler D and others (2019) Climate change and aquaculture: considering biological response and resources. Aquacult Environ Interact 11:569-602. https://doi.org/10.3354/aei00332

[5] Parker, R.W.R., Blanchard, J.L., Gardner, C. et al. Fuel use and greenhouse gas emissions of world fisheries. Nature Clim Change 8, 333–337 (2018) doi:10.1038/s41558-018-0117-x

[6] Sala, E., Mayorga, J., Bradley, D. et al. Protecting the global ocean for biodiversity, food and climate. Nature (2021). https://doi.org/10.1038/s41586-021-03371-z

Public investment in alternative seafood offers a competitive advantage to the United States in this growing industry. The US is home to the several of the top alternative seafood companies in the world, but we will fall behind if the U.S. government does not support these game-changing industries with funding for open-access research and development. Other countries are actively supporting the development of plant-based and cultivated meat and seafood. For example, the European Union includes alternative proteins as a key research area in Horizon Europe's $12 billion research and innovation program, and Singapore is investing $144 million into a variety of next-generation technologies intended to bolster their bioeconomies, including cultivated meat.[7] Canada, the Netherlands, India, Israel, and Japan are making similar investments.

We would be happy to discuss the promise of alternative seafood further. Please do not hesitate to reach out with any questions.

Sincerely,

Jennifer Lamy
Senior Sustainable Seafood Initiative Manager
The Good Food Institute
[redacted]

[7] Yoolim Lee & Joyce Koh, Singapore Backs Lab-Grown Meat, Robots in $535 Million Push, Bloomberg (Mar. 27, 2019), https://bloom.bg/2FI4PKu.

April, 2 2021

By Jim Merkel

[redacted]

To: NOAA Listening Session

Thank you for the opportunity to provide input regarding how to make fisheries including aquaculture more resilient to climate change. A summary of suggestions for NOAA's consideration regarding climate change would be as follows:

Land-based Finfish and Climate Change

Summary

1. NOAA should not support land-based aquaculture systems that are not carbon neutral. Detailed lifecycle analysis of Recirculating Aquaculture Systems (RAS) finds them to be the most carbon intensive method of obtaining nutrition from the sea. For example, the Nordic Aquafarms proposal in Maine has a carbon footprint equivalent to adding 150,000 cars to Maine's roads and represents 4.6 – 6.4 percent of Maine's entire 2030 GHG target. (Please see the attached detailed documents.) There are multiple land-based industrial scale aquaculture facilities proposed in Maine and California which require massive fresh, clean water, electricity, sacrifice areas for dumping sludge and use the shallow sensitive estuaries as a dumping ground for sewage. Combined their carbon footprints would make meeting Maine's climate protocols impossible. NOAA should outright ban these carbon intensive and extractive systems.
2. NOAA should not support any monoculture aquaculture finfish operations as they pose dire risks to the recovering wild fish populations. RAS systems, such as Nordic's proposal, with 7.7 million gallons of daily effluent, rich in nitrogen and phosphorus, and many unknown residues from feeds and vaccinations, and viruses and diseases are risks not worth taking.
3. Any aquaculture systems must demonstrate carbon neutrality utilizing wind and solar power.
4. Any aquaculture system should not cut existing forest areas and instead utilize a brownfield site that has stable soils to avoid releasing carbon stored in the forest and soil, and to maintain the sequestration from existing ecosystems including forests and wetlands.

5. Any siting must not rely on dilution, and must be fully enclosed with no effluent entering rivers, streams, estuaries or bays.
6. Aquaculture operations should not be permitted where dam removals, fish ladders installations and other restorations have not yet taken place as the wild fishery must be the priority.

1. INTRODUCTION

NOAA should vigorously support an environmentally sound working waterfront that includes restoration of damaged fisheries and where appropriate, small scale sustainable polyculture aquaculture, including research that seeks to advance its efficiency and global sustainability. However, NOAA should oppose large-scale land-based finfish aquaculture projects as they poses numerous environmental risks, including spread of virus and disease that threaten potential recovery of nearby wild and endangered fish populations and impacts on wild forage fish populations near and distant. NOAA should not support monoculture systems where creatures are crowded or denied a decent life, as these are breeding grounds for resistant viruses and diseases. Other issues include, massive use of fresh water, effluent including nitrogen and phosphorous pollution, impacts to lobster and other fisheries, and massive carbon footprints. Larger Recirculating Aquaculture Systems (RAS) are CAFO's (Concentrated Animal Feeding Operations) or in this case, CAAF's (Concentrated Aquatic Animal Production) that use unprecedented quantities of fresh water and electricity and output large quantities of sewage in the form of sludge and wastewater into nearby sensitive waters. NOAA should support lower-risk alternatives such as completely closed recirculating polyculture aquaculture systems. NOAA should continue and expand support for investments in restoring wild fisheries through dam removal, fish ladders, eliminating overfishing, toxic industries and promoting a sustainable level of wild catch. The fecundity of properly managed wild fisheries is astonishing and where-ever given the chance, the comeback has been impressive.

2. Climate Emissions Case Study

The following is a summary of selected data from a report I coauthored: "Carbon Emissions of Proposed Nordic Aquafarms Facility: 2/10/2020"

Prepared by: James Merkel and George Aguiar

Full background information and sources are in written DEP submission "Carbon Paper"

Link: Carbon Paper

Findings:

- Nordic would add between 550,000 and 759,000 metric tons of carbon dioxide equivalents (CO2e) to the atmosphere each year.
- Nordic represents 4.6 – 6.4 percent of Maine's 2030 GHG target.
- And between 12.8 and 17.6 percent of Maine's 2050 target.

- Equivalent to adding 120,000 to 165,000 cars to the roads.
- Equivalent to an adding 14,000 to 18,000 households.
- Would increases Belfast's carbon footprint 5 to 7 times.

Note: US per-capita carbon footprint: 16.14 tCO2e (2018)

Maine Statutes have specific targets: (Chapter 3A of Title 38, statute §576-A.)

- 45% below 1990 levels by 2030.
- 80% below 1990 levels by 2050.

Maine's Climate Targets without Nordic: (in Mega Metric Ton CO2e or MMTCO2e)

- 1990 levels: 21.65
- 2012 levels: 18.21
- 2015 levels: 19.21
- 2020 target: 19.5
- 2030 target: 11.91
- 2050 target (Title 38): 4.3
- 2050 Mills Exec. Order: 0

Meeting Maine's Future Climate Targets Tougher than previously anticipated:

- Historic reductions were from switching to natural gas, increasing hydro-electric, biomass, wind energy and small amounts of solar.
- Maine failed to include significant CO2 and methane emissions from hydroelectric (273 kg CO_{2e}/MWh)
- Maine failed to include CO2 from biomass (on par with coal for carbon intensity).
- Further reductions will be more difficult.

Nordics Impacts to Belfast Greenbelt:

- The liquidation of 34 acres including:
    - Mature pine and hardwood trees that sequester carbon,
    - The removal of between 15 and 48 feet of soil totaling an estimated 215,000 cubic yards (about half of stored carbon is in soils)
    - 10 wetlands (store double the carbon of soils).

- Site stores 13,465 metric tons of carbon above and below ground.
- Left intact, this forest's sequesters 42.9 metric tons of carbon/year.

Our Analysis Included Embodied and Operational CO2e:

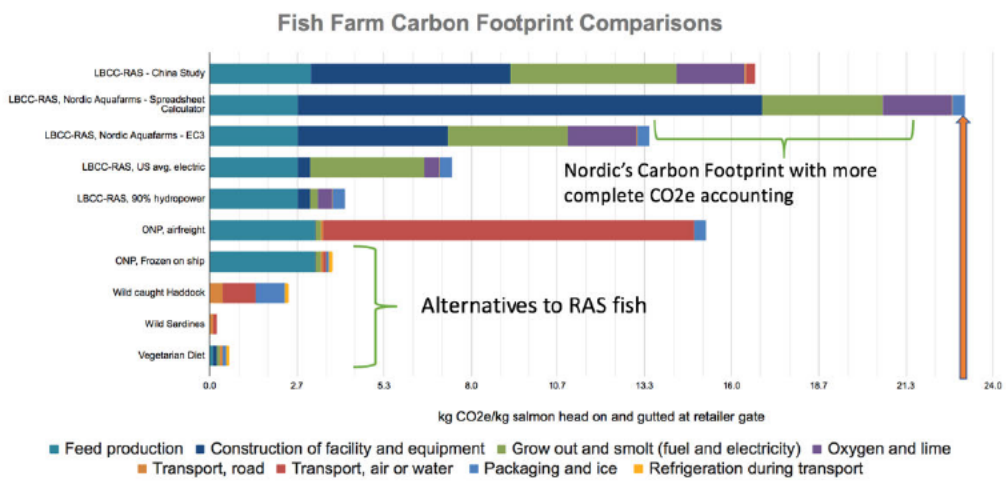
Embodied CO2e:

- Site preparation including soil removal, import of aggregate, road building
- Pipeline construction
- Loss of forest sequestration and storage
- Buildings, tanks, piping, motors, filters, backup generators

Operational CO2e:

- Electricity, diesel, glycerine, water
- Fish food

Results:



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- Sardines: 0.2 kg CO2e/kg vs. 23 kg CO2e/kg (115 times lower)

2. ENVIRONMENTAL IMPACTS

NOAA should assess the impacts on marine ecosystems, sensitive ocean and coastal habitats, and other plant and animal species, specifically:

A. Siting of the onshore aquaculture facilities and operations must avoid adverse impacts, and to minimize any unavoidable impacts on user groups, public trust values, and the marine environment, including effects on commercial and recreational fishing, community beaches and other important ocean uses. The operation must be scaled to not dominate the working waterfront or disproportionately utilize the commons (seawater, fresh water, electricity grid and air).
B. Impacts on marine ecosystems, sensitive ocean and coastal habitats, and other plant and animal species, including but not limited to:
    1. The impacts of escaped fish on wild fish populations; and
    2. The impacts on traditional fisheries including the lobster industry; and
    3. The impacts of interactions with marine mammals, marine wildlife, and birds; and
    4. The impacts of the use of chemical and biological products, pollutants, and nutrient wastes on the marine environment; and
    5. The impacts of effluent into bays, estuaries, rivers and any waters currently closed for shellfish harvesting due to toxic algae blooms; and
    6. The impacts of viruses that might “jump” wild to human, monocultured fish to wild or human, from multiple vectors including feeds from slaughterhouse wastes, fish wastes, distant unmonitored localities, daily effluents, sludge disposal, fish processing, the workers and the sold fish; and
    7. Effects of removal of forage fish for feed, fishmeal, and fish oil on marine ecosystems; and
    8. The cumulative effects of a number of on-shore aquaculture facilities on the ability of the marine environment to maintain preexisting flora and fauna; and
    9. The impacts on surface water, ground water, wells and aquafers; and
    10. The impacts associated with pipelines that might stir up mercury-laden sediments.
C. Design of the aquaculture facilities and operations to avoid adverse environmental impacts, and to minimize any unavoidable impacts, and
D. The specific mitigation and monitoring plans and protocols that will be used to minimize impacts below levels deemed “significant,” while avoiding deferment of such details to a future date.

3. PROJECT DESIGN AND SITING

The project:

A. Will not restrict the use of surface waters or the ocean bottom by the public or other parties, or protrude above the surface of the water so as to mar scenic vistas or interfere with lobster migration.
B. Effluent pipes or tanks will not be located in or near marine reserves, replenishment areas or areas of natural beauty such as parks, greenbelts, wildlife connecting corridors, mature forests, coral reefs or in sensitive habitat, including any marine protected area, marine

reserve, bays, rivers, estuaries, Habitat Area of Particular Concern, Special Management Zone, National Marine Sanctuary, or other marine protected area.

C. Will be operated with a density of fish populations within the project sufficiently low so as to prevent nutrient overloading and the fostering of disease.
D. Will be respectful of, and does not threaten the sustainability of subsistence fishing practiced by Native Hawaiians or Native Americans.
E. Separates multiple aquaculture facilities from each other by a site-based determined distance to prevent cumulative impacts from the separate projects.
F. Will be limited to the use of species and brood stock native to the aquaculture site. Genetically modified stock is not supported. The site must purposefully be distant from commercial fisheries such as lobster, shellfish and wild finfish and from recovering or endangered populations of species such as Atlantic Salmon.
G. Brownfield sites or previously cleared areas with low habitat value must be chosen. Clearing of intact forests, wetlands, vernal pools or wildlife connecting corridors between the sea and upland forests is not supported.
H. Soils must be stable and not require massive earth work to achieve a stable base for the extremely heavy tanks.
I. The design must demonstrate a fully closed system.
J. The design must demonstrate carbon neutrality including embodied energy for construction and operational throughputs of feeds and energy. Offsets of wind and solar must be sufficient to offset construction carbon footprint. Offsets of biomass, hydroelectricity or natural gas will not be considered.
K. The site must be distant from residential dwellings and wells and noise from ventilation systems and diesel generators must be mitigated to not present a nuisance. Construction and operation traffic and pollutions from back-up generators must not alter the character of the community or effect inhabitant's health. Generators for peak-shaving and regular usage are not supported.
L. Fish escapes do occur in RAS systems and the design must prove a robust defense.
M. Should tanks rupture, earthen berms must prevent potentially diseased waters from entering nearly creeks and seawater. A contingency plan for dealing with natural disasters such as hurricanes or tsunamis must be in place. During extended power outages, the generators must not affect air quality of residents and the emergency disposal of waste waters is prohibited.
N. Should a mass die-off occur, chemical cleaners, diseased fish and tank waters must not be released into the surrounding ecosystem. Treated water after a mass die-off must not be pumped into the sea.
O. Any effluent must not contain residue form vaccinations, medications or byproducts, chemical feed residues and wastes from GMO feeds.
P. Sludge must not enter municipal sewage systems or be spread upon sacrifice lands or be placed in open ponds exposed to heavy rains or hurricanes.
Q. Will be assessed for it's community acceptance, and the potential cultural and economic impacts of a failed project.

4. DISEASE AND PATHOGEN PREVENTION

A. The project will be designed, located, and operated to prevent the incubation and spread of disease and pathogens and ecosystem impacts from disease and pathogen introduction.
B. The use, including the prophylactic use, of antibiotics, pesticides, prescription and nonprescription drugs, or other chemical treatments will be prohibited; except that such use may be allowed as necessary to treat a diagnosed disease in accordance with the following requirements:
    1. After consultation with the Commissioner, or a Commissioner's appointee, of the Food and Drug Administration, and
    2. Such use is strictly monitored; and is minimized to the maximum extent feasible.
C. The use of vaccines may be allowed if the system is sufficiently closed to keep residues from the surrounding ecosystem.

5. FISH FEED

Use of wild fish as a feed ingredient, especially fish meal and fish oil derived from forage fisheries, must be avoided and alternatives to fishmeal and fish oil, including use of fish byproducts, should be used to the maximum extent practicable. GMO corn and soy must not be used. Slaughterhouse wastes must be disclosed and monitored as a potential virus or disease vector. Changes in feed composition can dramatically effect phosphorous and other effluent levels and must be regulated.

Selected Data: Carbon Emissions of Proposed Nordic Aquafarms Facility: 2/10/2020
Prepared by: James Merkel and George Aguiar
Full background information and sources are in written DEP submission "Carbon Paper"
Link: Carbon Paper

Findings:

- Nordic would add between 550,000 and 759,000 metric tons of carbon dioxide equivalents (CO2e) to the atmosphere each year.
- Nordic represents 4.6 – 6.4 percent of Maine's 2030 GHG target.
- And between 12.8 and 17.6 percent of Maine's 2050 target.
- Equivalent to adding 120,000 to 165,000 cars to the roads.
- Equivalent to an adding 14,000 to 18,000 households.
- Would increases Belfast's carbon footprint 5 to 7 times.

Note: US per-capita carbon footprint: 16.14 tCO2e (2018)

Maine Statutes have specific targets: (Chapter 3A of Title 38, statute §576-A.)

- 45% below 1990 levels by 2030.
- 80% below 1990 levels by 2050.

Maine's Climate Targets without Nordic: (in Mega Metric Ton CO2e or MMTCO2e)

- 1990 levels: 21.65
- 2012 levels: 18.21
- 2015 levels: 19.21
- 2020 target: 19.5
- 2030 target: 11.91
- 2050 target (Title 38): 4.3
- 2050 Mills Exec. Order: 0

Meeting Maine's Future Climate Targets Tougher than previously anticipated:

- Historic reductions were from switching to natural gas, increasing hydro-electric, biomass, wind energy and small amounts of solar.
- Maine failed to include significant CO2 and methane emissions from hydroelectric (273 kg CO_{2e}/MWh)
- Maine failed to include CO2 from biomass (on par with coal for carbon intensity).
- Further reductions will be more difficult.

Nordics Impacts to Belfast Greenbelt:

- The liquidation of 34 acres including:
    - Mature pine and hardwood trees that sequester carbon,
    - The removal of between 15 and 48 feet of soil totaling an estimated 215,000 cubic yards (about half of stored carbon is in soils)
    - 10 wetlands (store double the carbon of soils).
- Site stores 13,465 metric tons of carbon above and below ground.

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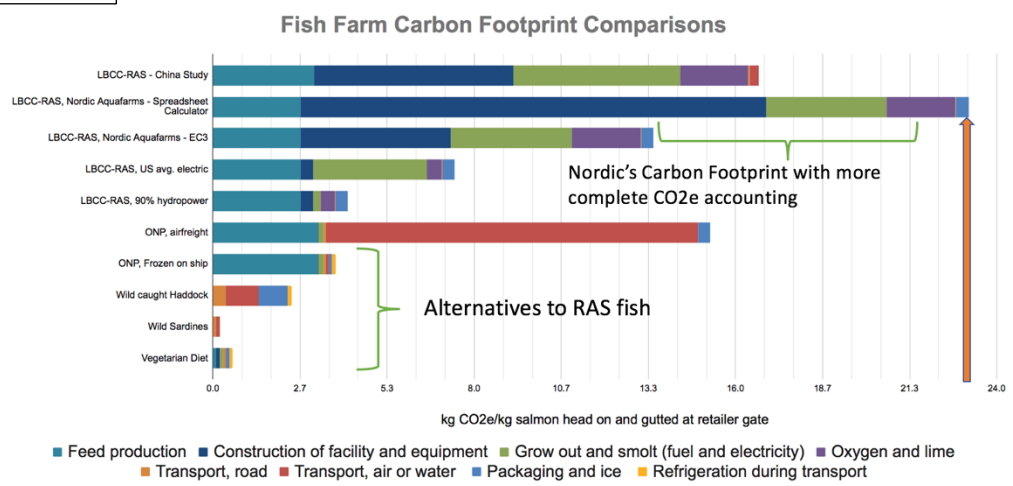

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Recommendations:

- **Applicant be required to demonstrate carbon neutrality using solar and wind for both embedded and operational CO2e.**
- **Applicant be required to find a brownfield site with stable soils and utilize a completely closed system or have outflow into deep ocean currents, not in sensitive and recovering bays.**

Authors:
James Merkel
George Aguiar

Summary

The findings of this study include:

1. That the proposed facility is greenhouse gas (GHG) intensive, and that lower carbon solutions to feeding humanity are readily available. Our calculations have revealed that the applicant's annual GHG emissions represent approximately 5 to 6 percent of the 2030 total State GHG target.
2. If this facility were built and operated an unfair burden would be placed on existing businesses and residents to meet Maine's climate targets and the governor's executive orders.
3. The applicant should be required to amend their plan to:

a.) Demonstrate carbon neutrality utilizing wind and solar power.
b.) Find a brownfield site that has stable soils to avoid releasing carbon stored in the forest and soil, and to maintain the sequestration of a mature 35 acres of forests and wetlands.
c.) Find a location with access to deep ocean currents, or utilize a completely closed system.

Our findings demonstrate that the construction (embodied CO2) and operations (CO2) of Nordic Aquaculture farms (collectively, "the Project") as proposed by the Applicant's Site Location and Development Permit Application (SLODA) to the Department of Environmental Protection (DEP) on 5/16/2019 (the "Application") adds significantly to statewide GHG emissions. Our calculation estimates have revealed that the applicant's GHG contribution of between 0.55 and 0.76 MMTCO2e represents 4.6 – 6.4 percent of the 2030 total state GHG target, and between 12.8 and 17.6 percent of the 2050 target. To approve these new large sources of carbon emissions, while making commitments to reduce GHG, violates the intent of PL 237, §576-A. This large-scale aquaculture facility

proposed by Nordic Aquafarms (NAF) in Belfast, Maine would also make it difficult to "achieve carbon neutrality by 2045" as mandated by the Executive Order No. 10FY 19/20, signed by Governor Mills on September 23, 2019.[1]

By conducting three separate life-cycle assessments of Nordic's proposal, along with surveying similar assessments of other recirculating aquaculture systems (RAS), an estimate of both embedded and operational CO2e (Life-cycle CO2e = Embodied CO2 + Operational CO2) was established. The results support what the literature has determined: land-based aquaculture requires significant energy and feedstock, and produces large amounts of greenhouse gases (GHG).[2][3]

Introduction

There is no shortage of warnings, reports and political statements concerning GHG emissions, and the irreversible consequences of climate change. The United Nations *Emissions Gap Report Summary* that was issued on November 26, 2019 states the situation clearly: "[The] findings are bleak. Countries collectively failed to stop the growth in global GHG emissions, meaning that deeper and faster cuts are now required."[4] Business-as-usual has accelerated the crisis which

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[1] Governor Mills Executive Order, https://www.maine.gov/governor/mills/sites/maine.gov.governor.mills/files/inline-files/Executive%20Order%209-23-2019_0.pdf

[2] Monterey Bay Aquarium Seafood Watch https://www.seafoodwatch.org/-/m/sfw/pdf/standard%20revision%20reference/2015%20standard%20revision/public%20consultation%202/mba_seafoodwatch_criteria%20for%20greenhouse%20gas_msg_final.pdf?la=en

[3] M.Badiolaa O. C.Basurkoa R. Piedrahitab P. Hundleyc D. Mendiolaa in *Aquacultural Engineering* Review: Energy use in Recirculating Aquaculture Systems (RAS), Volume 81, May 2018, Pages 57-70

[4] UN Environment Programme, Emissions Gap Report 2019 https://www.unenvironment.org/resources/emissions-gap-report-2019

> "is more severe than anticipated, threatening natural ecosystems and the fate of humanity (IPCC 2019). Especially worrisome are potential irreversible climate tipping points and nature's reinforcing feedbacks (atmospheric, marine, and terrestrial) that could lead to a catastrophic "hothouse Earth," well beyond the control of humans (Steffen et al. 2018). These climate chain reactions could cause significant disruptions to ecosystems, society, and economies, potentially making large areas of Earth uninhabitable." [5]

We are, as 11,000 scientists declared on November 5th in BioScience **in a climate emergency**.[6]

Maine

In 2003 Maine enacted PL 237. This law required that the DEP develop and submit a Climate Action Plan (CAP or Plan) for Maine, and mandates the reduction of GHG emissions. Specifically, under §576-A of PL 237 the State's goals for the reduction of emissions for 2020 are 10% below 1990 levels (21.65 MMTCO2e) by January 1, 2020, (19.46 MMTCO2e) which Maine is, according to the 2019 Maine Interagency Climate Adaptation work group (MICA) Update Report, on target to meet. However, §576-A mandates that "by January 2030 the State shall reduce gross annual greenhouse gas emissions to at least 45% below 1990 gross annual greenhouse gas emissions level" putting the 2030 target at 11.91 (MMTCO2e). Furthermore, the law mandates that "by January 1, 2050, the State shall reduce gross annual greenhouse gas emissions to at least 80% below the 1990 GHG emissions level," or to 4.3 (MMTCO2e). By comparison, the applicant's greenhouse gas contribution of between 0.55 and 0.76 MMTCO2e represents

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[5] Ripple, William J, Wolf, Christopher, Newsome Thomas M., Barnard, Phoebe, and Moomaw, William R. World Scientists' Warning of a Climate Emergency, *BioScience*, biz088, p. 3 https://doi.org/10.1093/biosci/biz088

[6] Ripple, William J, Wolf, Christopher, Newsome Thomas M., Barnard, Phoebe, and Moomaw, William R., World Scientists' Warning of a Climate Emergency, *BioScience*, biz088, https://doi.org/10.1093/biosci/biz088

4.6 – 6.4 percent of the 2030 total state GHG target, and between 12.8 and 17.6 percent of the 2045 target.

Belfast

As stated in the Belfast's Energy Committee's mission statement, "[t]he committee's objective is to recommend steps to the City Council and city residents that will reduce both greenhouse and air pollution emissions throughout the city." This facility will significantly increase local GHG emissions, while eliminating vital sequestration resources. The facility will also undermine the Belfast Climate Crisis committee's commitment to supporting and enhancing "Ecosystem-based Resilience." Their report states that "solutions [include] conserving and restoring smaller-scale natural ecosystems within the watershed (wetlands, river mouths, beaches, dunes, intertidal and subtidal habitats); designing containment areas; establishing appropriate vegetative cover along shorelines; and mandating low-impact development practices." The Nordic Aquaculture facility is not a "low-impact development practice."

Lifecycle Assessment (LCA) for CO2e

The intention of this research is to establish an estimate of the total carbon (TC) additions to Maine's annual CO2 emissions that can be expected, should the proposed Nordic Aquafarms facility be built in Belfast. Three separate Life-Cycle Assessment (LCA) tools/methodologies were used to establish a framework for accounting for many of the impacts typically ignored when only considering operational flows of resources. Figure 1. illustrates a simplified diagram for a rather complicated analysis. The desired scope for our purposes is to focus on CO2 equivalent emissions related to the entire facility from turning a complex, mature forested site into an industrial facility (concrete, steel, pumps

and motors) and then summarizing the larger categories of operational inputs such as feeds, electricity, diesel fuel, and chemicals.

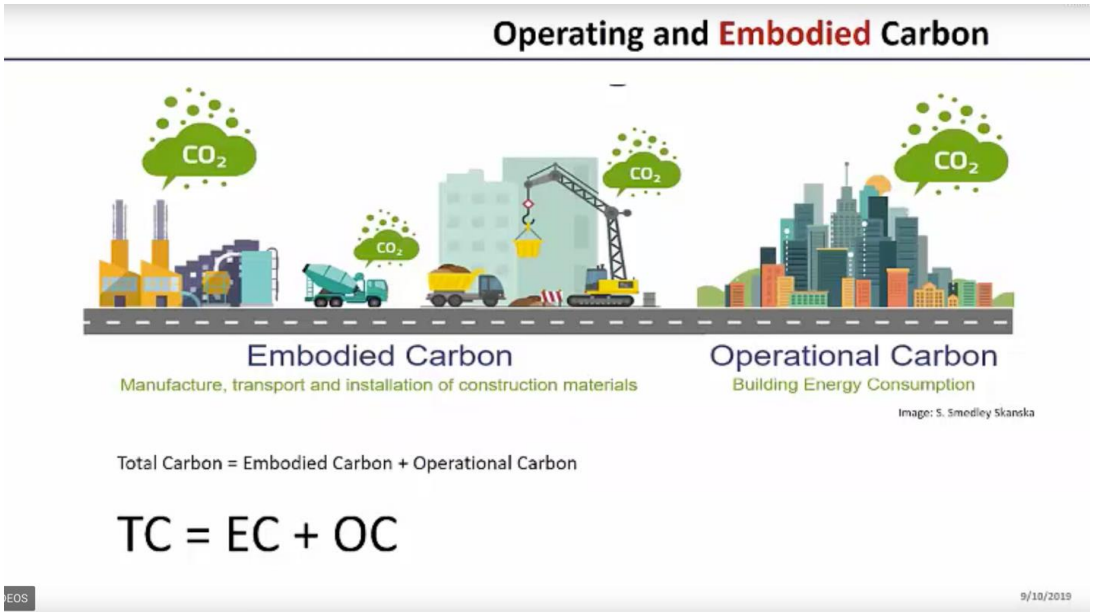

Figure 1

The analysis is an underestimate as many real impacts are difficult to quantify at the design stage, yet it provides a useful estimate for decision-making purposes. In the case of Nordic's proposal, extensive specialized buildings, fuel and chemical tanks, pipelines into the bay, comprise unique and carbon intensive structures, with a broad range of possible scenarios and risks should the project fail prematurely. LCA tools help plan for worst-case outcomes. Maine industries have historically left behind "wicked problems" such as mercury sediments covering miles of the Penobscot River[7], and dioxin pollution in several Maine Rivers.[8] This analysis does not include decommissioning at the end of the useful life of the facility, however, deconstruction at some point, will be carbon intensive.

[7] https://www.maine.gov/dep/spills/holtrachem/index.html

[8] https://www.nrcm.org/programs/waters/cleaning-up-the-androscoggin-river/maines-dioxin-problem/

Few LCA studies have been conducted on land-based aquaculture. In 2015 Seafood Watch published research on energy use in a variety of aquaculture environments. Their analysis determined land-based recirculating aquaculture systems (LB-RAS) to be the most energy intensive of the studied methods.[9]

Figure 2: Energy use associated with aquaculture feeds (red bars) and farm level activities (blue bars) for a variety of species and production methods in units of megajoules/tonne of seafood, drawn from LCA studies and other information sources. Literature review carried out by Keegan McGrath. These data will be transformed into GHG Intensity per unit of edible protein (KgCO2 equivalent/Kg edible protein) when applied to this criterion.

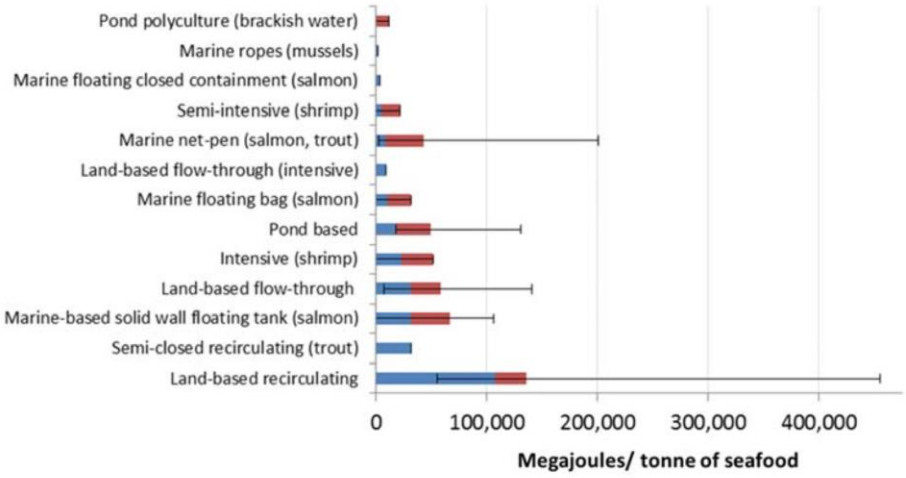

Figure 2: Energy and feed requirements of various aquaculture technologies.

In 2016, a study compared producing Atlantic salmon in open pens in seawater to a hypothetical land-based closed containment recirculating aquaculture system (LBCC-RAS) based upon the Conservation Fund's Freshwater Institute grow out trials of Atlantic salmon.[10] This is the study that the applicant sites to argue that salmon grown in a LBCC-

[9] Monterey Bay Aquarium Seafood Watch https://www.seafoodwatch.org/-/m/sfw/pdf/standard%20revision%20reference/2015%20standard%20revision/public%20consultation%202/mba_seafoodwatch_criteria%20for%20greenhouse%20gas_msg_final.pdf?la=en

RAS system has a lower carbon footprint than shipping open net pen (ONP) salmon by airfreight to Seattle, Washington: 7.4kg CO2e/kg (RAS) vs. 15.2 kg CO2e/kg (airfreight from Norway to Seattle). Electricity to produce 1 tonne of salmon in RAS is cited as 5,460 kWh. However, shipping frozen salmon by container ship from Norway to the US was the lowest footprint option in this study at 3.75kg CO2e/kg.

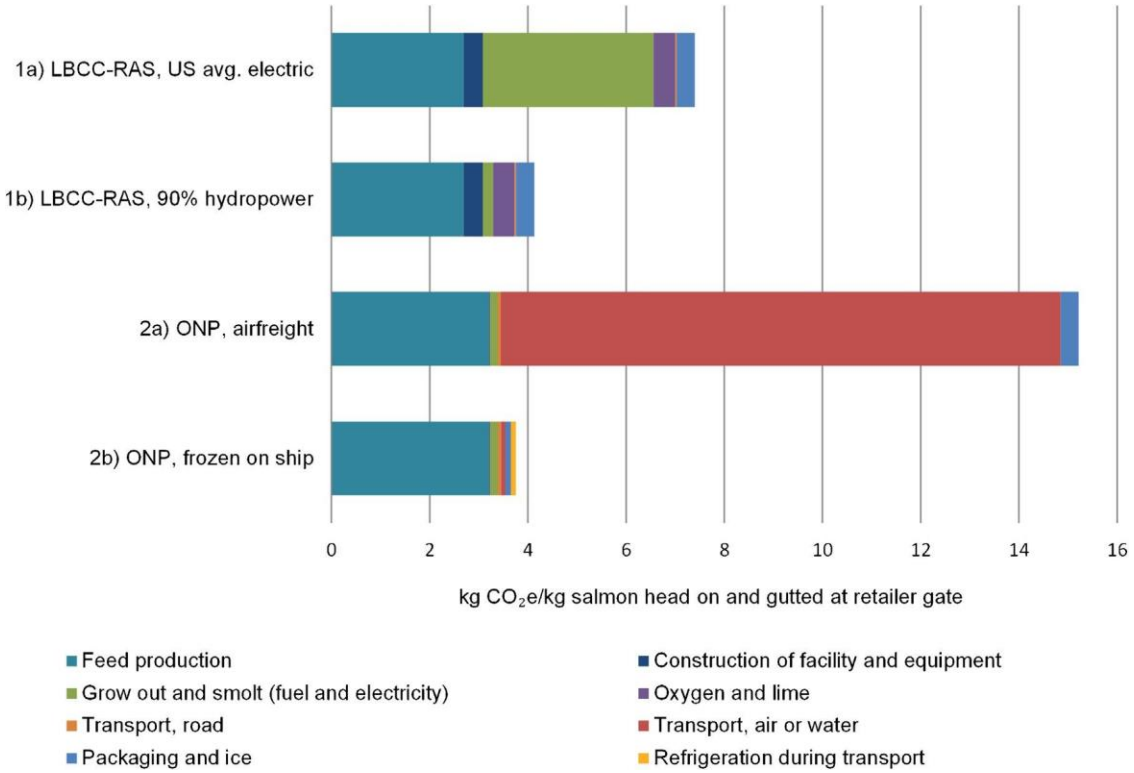

Figure 3: Fish Farm Carbon Footprint Comparisons from 2016 study

This 2016 study had a limited scope, and did not evaluate the carbon footprint of wild caught Maine seafood, or production of plant proteins which have lower carbon

[10] Yajie Liua, Trond W. Rostena, Kristian Henriksena, Erik Skontorp Hognesa,Steve Summerfeltb, Brian Vincib, Comparative economic performance and carbon footprint of two farming models for producing Atlantic salmon (Salmo salar):Land-based closed containment system in freshwater and open net pen in seawater, in Aquacultural Engineering 71, (2016) 1-12. https://doi.org/10.1016/j.aquaeng.2016.01.001

footprints than the options this study evaluated. For example, wild caught Demersal fish (eg. Haddock) species have a life-cycle CO2e intensity of *2.4 kg CO2e/kg*. Small Pelagic fish (eg. Sardines) have a lifecycle CO2e of 0.2 kg CO2e/kg.[11] Vegetarian diets including legumes have CO2e in the range of 0.6 kg CO2e.[12]

A more recent LCA paper was published in 2019 which is the first analysis based upon actual data from growing out 29,000 salmon in northern China from 100 g smolts to 4 KG fish.[13] The results of this study were that to grow one tonne of live-weight salmon required 7,509 KWh of electricity and generated 16.7 tonnes of Co2e, 106 kg of SO2 e, 2.4 kg of P e and 108kg of N e (cradle to farm gate). The study cited electricity and feed as the larger components of the overall impact. This more recent study from an actual operation reported roughly double the tonnes of CO2e/tonne of fish compared to the 2016 FreshWater Institute Study (7.4 vs. 16.7).[14] The power per tonne of fish produced was 5,460 kWh in the 2016 study while the more recent China study was 7,509 kWh. Many factors can account for the differences such as power grid composition, fish food sources and makeup, different inventories and assumptions, however, the data are close enough to offer some confidence in their similar methodologies and findings.

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[11]Parker, Robert W.R., Blanchard, Julia, Gardener, Caleb et al., Fuel use and greenhouse gas emissions of world fisheries in Nature Climate Change, VOL 8, APRIL 2018 p. 333–337 http://www.ecomarres.com/downloads/GlobalFuel.pdf

[12]Clune, S. J., Crossin, E., & Verghese, K., Systematic review of greenhouse gas emissions for different fresh food categories. *Journal of Cleaner Production*, *140*(Part 2), 766-783. http://www.research.lancs.ac.uk/portal/en/publications/systematic-review-of-greenhouse-gas-emissions-for-different-fresh-food-categories(153c618e-1b41-4cf4-b23e-7bc635cd2541).html

[13] Song, Xingqiang, Liu, Ying, Brandão, Miguel et al. Life cycle assessment of recirculating aquaculture systems: A case of Atlantic salmon farming in China in *Journal of Industrial Ecology*, Vol 23, Issue 5, Oct 2019, pp. 1077-1086 https://doi.org/10.1111/jiec.12845

[14] Yajie Liua, Trond W. Rostena, Kristian Henriksena, Erik Skontorp Hognesa,Steve Summerfeltb, Brian Vincib, Comparative economic performance and carbon footprint of two farming models for producing Atlantic salmon (Salmo salar):Land-based closed containment system in freshwater and open net pen in seawater, in Aquacultural Engineering 71, (2016) 1-12. https://doi.org/10.1016/j.aquaeng.2016.01.001

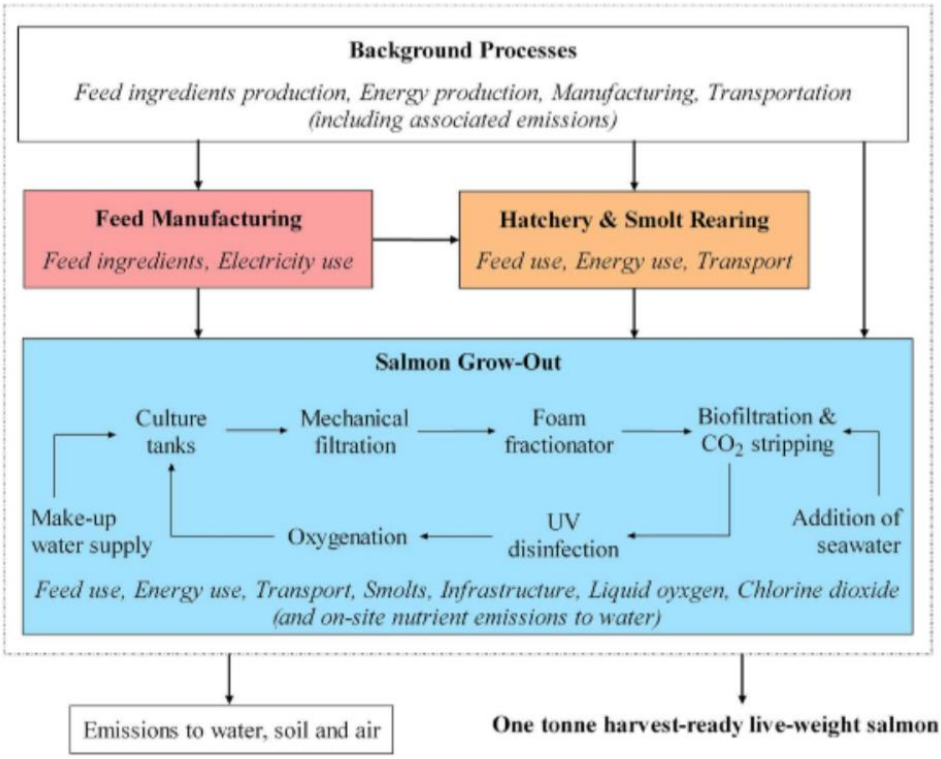

Figure 4: The boundary conditions for the 2019 China example

Figure 4 shows the system boundary and scope for the China example. Life-cycle inventories used SimaPro 8.3 software to capture many of the cradle-to-farm-gate inputs.

To obtain a first order of magnitude estimation for the applicant's proposed Belfast operation, we used the resulting LCA CO2e per metric tonne of fish data from the 2019 China study. At buildout, the proposed Belfast facility anticipates producing 33,000 t/year output. The CO2e from NAF is calculated (16.7 tC/t X 33,000 t/year) to emit 551,100 tCO2e per year from both embodied and operational components. For comparison, an average American car emits 4.6 t/yr, hence the NAF facility can be estimated to be equivalent to adding 119,800 cars to the roads.

Generating specific LCA for the Belfast facility is difficult as the designs change regularly as would be expected for a complex project. We have attempted to be as up to date as possible while focusing on the larger footprint items. For example, earlier plans were for an approximate 18 football fields of roof top solar panels. The panels have been eliminated from the design and 8 diesel generators have been added. The generators use has changed from not just supplying back up power during ice storms, but to shave energy use on a daily basis to reduce the electricity billing rate. Additional changes include, the outflow pipelines being shortened from a mile and a half into Belfast Bay to ⅔'s of a mile. Earlier, 1.5 million gallons/yr. of Methanol was listed and recently was changed to 1 million gallons/yr. of a glycerin product MicroC 2000. Our calculations have kept pace with most reported changes, but are not exhaustive, rather an attempt to capture the larger construction details and design revisions.

In our second LCA analysis we used industry standard spreadsheet calculators looking at as much of the project as possible aiming to include the embodied carbon (EC) specific to this project. Traditionally, only steel and cement are calculated as they are commonly the biggest contributors to a construction projects' EC. Due to the nature of Land-Based RAS (LB-RAS) we attempted to include as many of the significant embodied carbon sources such as the Penobscot Bay pipeline (the design has changed from a trench to buried to above the seabed), the site preparation, backup electrical generation, etc.

Figure 3 is the table from the Conservation Fund's Freshwater Institute grow out trials of Atlantic salmon.[15] To this table, we have added the 2019 China analysis and the first analysis we performed using industry standard spreadsheet (SS1) calculations, an amended estimate of Nordic's annual CO2e emissions based upon amortizing the

[15]Conservation Fund's Freshwater Institute https://doi.org/10.1016/j.aquaeng.2016.01.001

construction over a 15 year time frame. We've included the forest and soil carbon release, along with our own lifecycle assessment of the actual site plan released to the public.

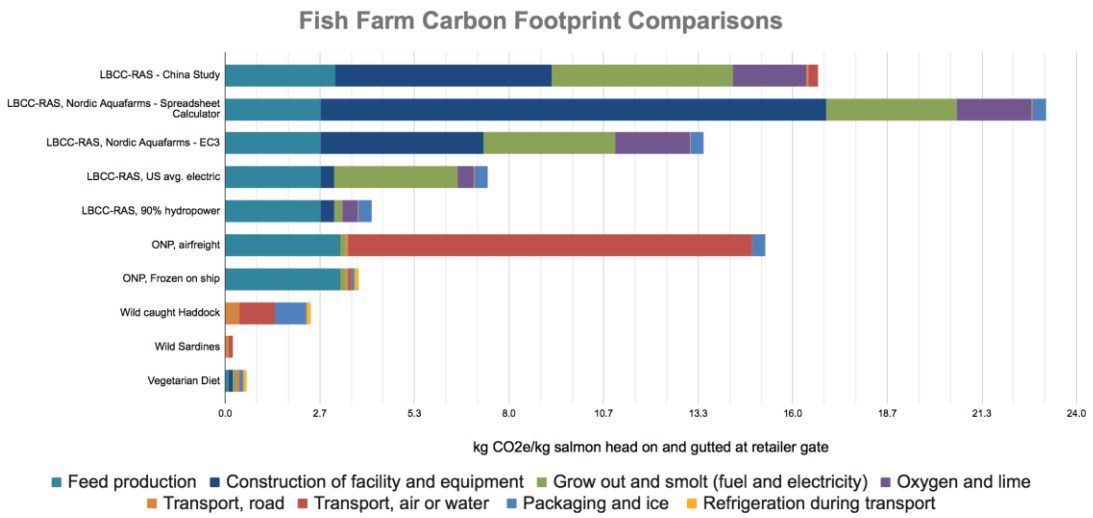

Figure 5: Fish Farm Carbon Footprint Comparisons including our 3 Analyses

In our 3rd analysis, we used the recently released Embodied Carbon for Construction Calculator (EC3). According to the Carbon Leadership Forum, this tool "is a free and easy to use tool that allows benchmarking, assessment and reductions in embodied carbon, focused on the upfront supply chain emissions of construction materials."[16]

This tool is currently in Beta 3 and the database of construction materials is limited to concrete and steel so we only looked at foundations and building envelopes. Unlike our more detailed and time-consuming calculator (SS1), which included tanks, motors, generators, etc, we were limited in Beta 3 to construction materials. By using several LCA tools, we were able to increase the confidence in our results.

[16] Carbon Leadership Forum http://carbonleadershipforum.org/projects/ec3/

Our results from the spreadsheet calculator, listed in Figure 5 as "BBCC-RAS Nordic Aquafarms - Spreadsheet Calculator" reported carbon intensity of approximately 23 kg CO2e/kg salmon. At buildout, the proposed Belfast facility, producing 33,000 t/year output would emit an estimated 759,000 tCO2e (23 tC/t X 33,000 t/year) from both embodied and operational components. This is equivalent to 165,000 cars to the roads.

Results & Discussion

Life-cycle Assessment – embodied carbon discussion

The life-cycle assessment results of the applicant's proposal support what the literature has determined: land-based aquaculture requires significant energy and feedstock, and produces large amounts of greenhouse gases (GHG).[17] Most significant inputs include: electricity for pumping water and operations; construction embodied energy for buildings, pipes, tanks, wells, pumps, motors, filters, generators; fish foods; forest and wetland elimination, and soil disturbances, are also important contributors.

The embodied carbon results are sensitive to the assumed lifespan of the infrastructure of the project. The China study used 15 years, and conducted a sensitivity analysis to include a 10 and 20-year option. For simplicity, our calculations used 15 years. The lifespan of a new technology is very difficult to predict. Should the facility close in half its expected life (due to falling salmon prices, disease outbreaks, technical issues, or saltwater intrusion on wells) the embodied carbon footprint would double.

It is important to point out that there are many impacts that can and can't be measured using LCA, however, this paper focused upon CO2e emissions from construction and

[17] Monterey Bay Aquarium Seafood Watch https://www.seafoodwatch.org/-/m/sfw/pdf/standard%20revision%20reference/2015%20standard%20revision/public%20consultation%202/mba_seafoodwatch_criteria%20for%20greenhouse%20gas_msg_final.pdf?la=en

operation. RAS facilities of the scale proposed are lacking a history of performance and operating data, which would make for a more accurate LCA. However, the China LCA, which has some actual operational data and a solid methodology, along with a team of researchers, is a useful benchmark.

LCA methods can assist in identifying some of the potential unanticipated impacts of an applicant's project. In this case, a large-scale monoculture discharging into shallow and recovering marine environments create risks that might require regular maintenance, and replacements of filters, pumps and controllers and possibly additional heating and cooling of discharge and intake water that could increase or decrease the estimates in our analysis. Practical difficulties were not included in our analysis, such as construction disputes or design flaws that could drive up embodied and operational emissions. The real-world complexity of both ecosystems and human systems, dictate that these estimates are likely conservative.

It is worth noting that only one of our analysis methods attempted to estimate the total carbon of the eight 2MW generators and diesel engines, the smolt tanks, pumps, and other equipment and machinery, the roadways, parking lots and walkways and the pipeline into the bay. In this analysis, we made the best estimates working from the drawings supplied to Belfast City Planning Office.

Life-cycle Assessment – operational carbon discussion

With electricity and feed among the primary operational footprint drivers of RAS carbon footprint, several limitations in our analysis are noted below:

1) To complete a more accurate LCA would require specific fish feed composition, including the breakdown of amounts of small fish in the feed, chicken and pig slaughterhouse wastes, grains and pulses etc. Feed components derived from fish are regularly shipped from South America. The applicant has not yet decided

exactly what they will feed their fish. It is also imperative to note that current fish meal is impacting some of the poorest people on the planet, destroying wild food sources for wild fish, and intensifying the impacts of the climate crisis.[18] Many of the small fish used as feed are eaten in other parts of the world and threatened by largescale harvests as feedstocks.

2) The applicant has not been forthcoming with data such as design estimates of annual electricity consumption, so our results have had to make estimates based upon generator sizing checked against the data from other LCA assessments.
3) Maine's electricity grid power source mix might seem favorable given the considerable potentially "renewable" sources utilized. Some sources for CO2 emissions data make assumptions that biomass and hydroelectric are "carbon neutral" and "renewable," however, these terms are inaccurate in accounting for the life-cycle impacts of these energy sources.[19]

Maine's 2017 power-grid used biomass (26%) and hydro-electric (30%). Wood biomass has a higher CO2 per BTU than coal.[20] Hydroelectric dams, while considered to be carbon neutral, are proving to release large amounts of Ch4 and CO2.[21,22]

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[18] Green, Matthew "Plundering Africa: Voracious Fishmeal Factories Intensify the Pressure of Climate Change",*Reuters*October 13, 2018 https://www.google.com/search?client=safari&rls=en&q=2018+https://www.reuters.com/investigates/special-report/ocean-shock-sardinella/&ie=UTF-8&oe=UTF-8

[19] Harvey, Chelsea, Heikkinen, Niina, Congress Says "Biomass Is Carbon-Neutral, but Scientists Disagree: Using wood as fuel source could actually increase CO2 emissions", in *Scientific America*E&E News, March 23, 2018 https://www.scientificamerican.com/article/congress-says-biomass-is-carbon-neutral-but-scientists-disagree/

[20] *Carbon Emissions from Burning Biomass for Energy* in Partnerships for Policy Integrity https://www.pfpi.net/wp-content/uploads/2011/04/PFPI-biomass-carbon-accounting-overview_April.pdf

[21] Deemer, Bridget R. Harrison, John A. Li, Siyue et al. *Greenhouse Gas Emissions from Reservoir Water Surfaces: A New Global Synthesis*, in BioScience, Volume 66, Issue 11, 1 November 2016, Pages 949–964, https://doi.org/10.1093/biosci/biw117

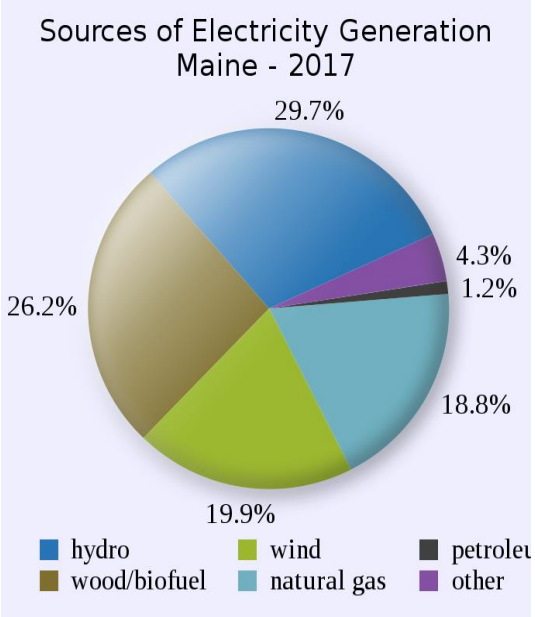

Figure 6

The combustion of wood results in 213 lb CO2/mmbtu (bone dry) while Bituminous coal comes in slightly lower at 205.3 lb CO2/mmbtu.[23] Forests are very effective in sequestering and storing carbon. It is argued that "trees grow back," true, however the lag time for the young forest to sequester carbon at rates that mature forests can is decades long, while the release of carbon from biomass generators is instantaneous. It is the old "slow in, fast out problem."[24] Biomass is only renewable if cut rates and forest practices don't diminish the ecosystem services while harvesting the biomass, (easy to state, difficult to achieve). And while the cutting is taking place, the habitat is under stress,

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[22] Graham-Rowe, Duncan**,** *Hydroelectric Power's Dirty Secret Revealed in New Scientist,* 24 February 2005
https://www.newscientist.com/article/dn7046-hydroelectric-powers-dirty-secret-revealed/#ixzz67klj5iSG

[23] Carbon emissions from burning biomass for energy
https://www.pfpi.net/wp-content/uploads/2011/04/PFPI-biomass-carbon-accounting-overview_April.pdf

[24] Moomaw, William R., Masino, Susan A., Faison, Edward K., *Intact Forests in the United States: Proforestation Mitigates Climate Change and Serves the Greatest Good* in Frontiers in Forests and Global Change, June 2019, Vol 2, pp 1-27. https://www.frontiersin.org/articles/10.3389/ffgc.2019.00027/full

soils and biodiversity are disturbed or eliminated, and forest resilience and long-term health are diminished. All of which can result in additional C02 emissions.

Hydro-electric dams result in methane and CO2 release, and the elimination of large tracks of forest lands that sequester and store carbon above and below the surface, and provide critical habitat for biodiversity. A 2016 paper, found that GHG emissions from reservoir water surfaces account for 0.8 (0.5–1.2) Pg CO_2 equivalents per year, with the majority of this forcing due to CH_4[25]. It can be viewed as ironic that the very dams that have prevented untold millions of salmon from reproducing are now used to claim low carbon footprints for contained salmon that never see the light of day. The point being raised is that technologies such as large-scale hydroelectric plants solve one problem (cheap electricity) while creating other problems (eg. Ch4 and CO2 release, habitat destruction, loss of fishery).

The applicant plans to install 9 diesel generators, using 900,000 gallons of fuel resulting in 9142 metric tons of CO2e annually. This is equal to adding an additional 1,988 cars to Belfast's roadways. In addition to CO2 emissions, the air quality impacts and noise need to be considered, especially during periods of poor air quality and climate inversions.

Forest, wetlands, and soil removal

The facility requires the elimination of 34 acres of secondary growth mature pine and hardwood trees, and the removal of between 15 and 48 feet of soil totaling an estimated 215,000 cubic yards. It also requires the complete elimination of ten wetlands, nine of which are wetlands of special significance (WOSS). three significant streams will also be

[25] Deemer, Bridget R. Harrison, John A. Li, Siyue et al. *Greenhouse Gas Emissions from Reservoir Water Surfaces: A New Global Synthesis*, in BioScience, Volume 66, Issue 11, 1 November 2016, Pages 949–964, https://doi.org/10.1093/biosci/biw117

eliminated.[26] It is estimated that the forest, and the 17 wetlands of varying sizes, currently store approximately 13,465 metric tons of carbon above and below ground. Left intact, this forest's current sequestration rate is approximately 42.9 metric tons of carbon each year. Current research is showing that trees increase their carbon sequestration significantly as they age[27,28]. In addition, forests and wetlands have a high value providing multiple ecosystem services, and William R Moomaw's recent work establishes that proforestation, meaning enhancing older forests, is actually the most viable way to achieve CO2 Targets[29].

A large quantity of carbon is stored in forest soils, and is released upon deforestation and disturbance.[30] According to the application "[e]xcavation required to construct the foundations and lower levels of the grow modules will be approximately 15 to 20 feet below the existing grades. The water treatment building includes 2 stories below grade, requiring a cut up to approximately 48 feet below the existing grades to accommodate

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[26] While the GHG impact of this is not included in these findings, it is recommended that they be calculated and understood. As stated in the application: https://www.maine.gov/dep/ftp/projects/nordic/applications/NRPA/Attachment%2009%20-%20Site%20Condition/NRPA_A9_SiteConditions_text.pdf

"There will be a total of 1,325 linear feet (LF) of impacts to streams within the project area (**Table 9-5**). Streams S3, S5, S6, and S9 will be indirectly impacted by the project. Impacts to stream S9 will be limited to a permanent crossing located between wetlands W8 and W9, along with a temporary crossing during the installation of the force main sewer line. The permanent crossing will be constructed in such a manner to not impair flow during storm events. The upper reaches of streams S3, S5, and S6 will be filled as a result of this project. These filled streams will result in the loss of 1,180 LF of stream bed. Impacts to these streams will typically result in the loss of Groundwater Recharge/Discharge, Floodflow Alteration, and Wildlife Habitats in these locations."

[27] Anderson, Mark G., *Wild Carbon: A Synthesis of Recent Findings* in Wild Works, Volume 1 Northeast Wilderness Trust http://www.newildernesstrust.org/wp-content/uploads/2019/08/WildWorks_V1_WildCarbon-2.pdf

[28] Moomaw, William R., Masino, Susan A., Faison, Edward K., *Intact Forests in the United States: Proforestation Mitigates Climate Change and Serves the Greatest Good* in Frontiers in Forests and Global Change, June 2019, Vol 2, pp 1-27. https://www.frontiersin.org/articles/10.3389/ffgc.2019.00027/full

[29] Moomaw, William R., Masino, Susan A. et al. *Intact Forests in the United States*, in Frontiers https://www.frontiersin.org/articles/10.3389/ffgc.2019.00027/full

[30] Dartmouth College. "Clear-cutting destabilizes carbon in forest soils, study finds." ScienceDaily, 15 April 2016. www.sciencedaily.com/releases/2016/04/160415125925.htm

construction of the lower level and a seawater intake pipeline."[31] Because the soils will have to be removed due to the fact that, "the native silt and clay soils that will be excavated are not suitable for reuse as structural fill at the site"[32] a large portion of all the carbon stored in the soils will be emitted into the atmosphere.

Recommendations:

1. **The applicant be required to demonstrate carbon neutrality and not place increased burden for CO2 reductions on Maine's population. Solar and wind generation have become economically viable for the applicant to utilize.**
2. **The applicant should not be permitted to clear a mature forest that currently sequesters carbon or remove soils and wetlands that are currently storing carbon. Rather, they should be required to find a Brownfield site that has stable soils.**
3. **Our LCA studies show that other lower carbon footprint foods are available in Maine.**
4. **The applicant should be required to find a location with access to deep ocean currents, or utilize a completely closed system.**

Conclusion

Our study concludes that proposed facility is CO2e intensive and that lower carbon solutions to feeding humanity are readily available. Our calculations have revealed that the applicant's GHG emissions are between 0.55 and 0.76 MMTCO2e. This represents 4.6 – 6.4 percent of the 2030 total state GHG target, and between 12.8 and 17.6 percent

[31] Ransom Project 171.05027.005 Executive Summary Page 1 of 2 Belfast Geotechnical Report\02-03 Report\February 2019 Report\Text Rev.2_final February 27, 2019

[32]Nordic Aquaculture SLODA Application https://www.maine.gov/dep/ftp/projects/nordic/applications/SLODA/Section%2011%20-%20Soils/Appendix%2011-B.%20Geotechnical%20Engineering%20Report.pdf

of the 2045 target. To approve these new large sources of carbon emissions, while making commitments to reduce GHG, violates the intent of PL 237, §576-A.

A final consideration must include the unfair burden of further reductions that existing businesses and residents will have to make to meet Maine's targets and the governor's executive orders if this facility is approved. As stated in the Climate Action Plan for Maine, (CAP) getting to Carbon Neutral by 2045 will not occur under "business-as-usual" scenarios, rather it will require that any future large developments demonstrate carbon neutrality, and preferably be carbon positive.[33] There is a need for the DEP, and the State of Maine, to avoid placing additional burdens on existing enterprises, and to require that new businesses use strategies to achieve carbon neutrality with their proposals.

This facility would use Maine's "commons" including the clean aquatic sea water to dilute effluent, clean ground water, and clean air to receive diesel emissions and capacity on the power grid. The public suffers the loss, while the industry makes profits. Extractive industries should not put the burden of proof on its citizens. With several other RAS facilities proposing to come to Maine (Bucksport, Jonesport, Millinocket…) the CO2 implications are significant.

Maine has made progress towards meeting its climate goals, however, the next set of reductions will be more difficult, as Maine's shifting to fracked natural gas, biomass and hydroelectric each have serious impacts. More solar and wind energy will be helpful. As society grapples with sustainability and climate change, the challenge of new technologies is to solve past problems without creating new problems. The DEP should

[33] Maine Climate Action Plan, https://www.maine.gov/dep/sustainability/climate/MaineClimateActionPlan2004.pdf

therefore not approve the NAF project as submitted, for the long list of problems and risks it creates as an untested, new technology. The DEP could require NAF to submit a carbon neutral design utilizing solar and wind power on a brownfield site that connects to deep ocean currents, or is a closed system. Finally, much better options are available for feeding humanity through local organic vegetable protein, and lower trophic level wild local fish eaten sparingly, a movement known as "Slow Fish"[34] while wild fisheries are restored.

34 Slow Food https://www.slowfood.com/slowfish/pagine/eng/pagina--id_pg=44.lasso.html

Barbara Brease
[redacted]

To President Joe Biden
OceanResources.Climate@noaa.gov

April 2, 2021

Comments on the Executive Order on Climate Crisis, Section 216 (c) directing NOAA to consider how to make federal fisheries more climate resilient

Thank you for the opportunity to provide comments on the Executive Order on the Climate Crisis, section 216(c), directing NOAA to consider how to make federal fisheries more climate resilient. As an Alaskan, I am grateful for President Biden's commitment to protect 30 % of US lands and waters by 2030.

Half of our nation's shoreline and three quarters of the continental shelf are in Alaska and these waters contain the most vital and productive marine ecosystems in the world. The pace of change can be rapid. According to the Fourth National Climate Assessment, Alaska has been warming twice as quickly as the global average since the middle of the 20th century. Alaska is warming faster than any U.S. state. Alaska's commercial fishing industry is the most productive such industry in the United States, producing more harvest volume than all other states combined.

However, change is happening and Alaska's waters are being impacted due to accelerated warming and industrial impacts. Despite their high value to our global climate, ecology, food production, and tourism, Alaskan waters receive no permanent protection. Instead of protecting the very ecosystems that provide climate resilience, Alaskan waters are being hammered by off/shore oil drilling, bottom trawl fishing, poorly regulated shipping and noise.

Rick Steiner, a marine conservation biologist[1] who has consulted for the United Nations, governments, International Union for Conservation of Nature and organizations around the world has proposed a plan to create climate resilience in Alaska's marine ecosystem. I support this plan and am optimistic by the significant support it is receiving.

His recent piece in the Anchorage Daily News is linked here: https://www.adn.com/opinions/2021/02/05/president-biden-must-protect-and-restore-alaskas-troubled-oceans/
His plan includes the following actions be taken:

> To make Alaska's marine ecosystems as resilient as possible the administration should establish several large scale Marine National Monuments in Alaska's federal waters (3-200 miles offshore), that provide maximum protection to all components of the marine ecosystem, including marine mammals, seabirds, fish, while protecting subsistence, small-scale coastal fisheries
>
> These Alaska Marine National Monuments should be established in the Aleutian/Pribilof Islands, Bering Strait, Arctic Ocean, Northwestern Gulf of Alaska, and Eastern Gulf of Alaska. They should permanently prohibit all offshore

[1]

oil and gas drilling, trawl fishing, zone other high-impact fisheries, expand protected areas around sea lion rookeries, protect forage fish habitat for seabirds and mammals, better manage shipping, reduce marine debris, and other measures as developed by the Monument stakeholder advisory council together with the federal agencies.

These Marine National Monuments can be established unilaterally by Executive Order under the Antiquities Act, with no need to with both the State of Alaska, North Pacific Fisheries Management Council, oil industry, etc.

Each Alaska Marine National Monument should establish its own Stakeholder Advisory Council, to collaborate with the federal agency (NOAA + USFWS) to develop a strong conservation plan for the marine regions in the Monument.

These Marine National Monuments can be established unilaterally by Executive Order under the Antiquities Act, with no need to both with the State of Alaska, North Pacific Fisheries Management Council, and oil industry."

One of the many points also included in Steiner's plan is the fact that the Alaska National Interest Lands Conservation Act (ANILCA) did not include Alaskan waters. The significance of creating a similar act for Alaskan waters would be powerful.

Many Alaskans will support a permanent prohibition of offshore oil exploration and drilling having seen the devastation of the Exxon Valdez spill. That was/is devastating and did not even happen under ice. An oil spill in the Arctic, under the ice, would be extremely difficult to stop — in some scenarios, it is unlikely that a spill could be capped before the winter freeze-up, meaning that it would spew continually for eight months beneath the ice. Some of the oil would be transported long distances by currents and gyres, some would be absorbed by ice and melt later. The damage to sensitive Arctic ecosystems, species and people could be devastating and irreversible - and widespread.

It is also necessary underscore the importance of prohibiting bottom trawling to protect climate resilience. This destructive fishing method scrapes the seafloor and is therefor indiscrimate in what it catches. The results are a huge bycatch, which includes juvenile species, invertebrates and many non-targeted species.

A study published in Nature[1] reports that bottom trawling accounts for as much carbon emissions as global aviation. Since the ocean floor is a sink for anthropogenic carbon, it is scraped up with the catch. Its release from the sea floor leads to more acidified water, threatening marine life, and reduces the ocean's capacity to absorb atmospheric carbon dioxide.

Other important actions to protect climate resilience in Alaska's waters are to better regulate shipping. Establish speed limits in critical marine habitats. Manage routing so tugs and spill response is available should a vessel become impaired.

Reducing ocean noise is also essential for protecting Alaska's sensitive marine ecosystems. Oil and gas exploration uses seismic air guns that are 6-7 orders of

magnitude louder than the loudest ship sounds.[2] the sounds they emit are at frequencies similar to cetaceans' communication signals, causing confusion among marine mammals and raising the potential for harm. In the Arctic, sound travels longer distances and closer to the surface compared with temperate oceans.[3] Restrict Seismic surveys, loud ship engines and military sonar in areas used by marine mammals since it disrupts feeding, breeding, nursing, communication, navigation and other behaviors essential to their survival.

Finally, it is important for the US to reach out and renew our engagement with the Arctic council in order to facilitate cooperative scientific research and projects to protect the climate resilience of our Arctic ocean. This could lead the way for an Arctic International Treaty, which will provide peace and protection for our Arctic marine ecosystem.

Again, thank you for your commitment to protecting our lands and waters. I hope you will be bold in addressing the threats to Alaska's waters.

Barbara Brease

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1 https://www.oasis-earth.com

[2]Sala, E., Mayorga, J., Bradley, D. *et al.* Protecting the global ocean for biodiversity, food and climate. *Nature* (2021). https://doi.org/10.1038/s41586-021-03371-z

[3] How Ocean Noise Pollution Wreaks Havoc on Marine Life https://e360.yale.edu/features/how_ocean_noise_pollutionwreaks_havoc_on_marine_life

Subject: Sec. 216 (c) RFI Response...

Ted Crookston [redacted]
to OceanResources.Climate, heather.sagar

Fri, Apr 2, 11:26 PM (12 hours ago)

Hello Heather,

On behalf of the Board of Directors for Kenai Peninsula Fishermen's Association of Cook Inlet Alaska, I am submitting the attached response letter regarding the RFI on the Executive Order on Tackling the Climate Crisis, Sec. 216 (c).

In this document you will find a link to a recorded hearing held before the AK Senate Resources Committee on March 8th, 2021. It is one hour and 7 minutes long and is an excellent overview presentation, (especially considering it was delivered via virtual technology,) of the most remarkable and promising program for addressing and mitigating the monumental ocean problems that we have ever encountered — by far!

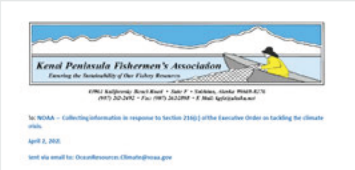
Our association is avidly supportive and hopeful regarding this company. Furthermore, we have current discussions with tribal representatives in the Kodiak area. It is my expectation that they will shortly become engaged as staunch supporters as well. I will see that contact is made with you at the appropriate time as I understand you to be the tribal liaison for NOAA and perhaps it would helpful for you to be aware of any involvement and relationship there.

We wanted to have this response in by the appointed target date of April 2nd. Hopefully, though late in the day, we have succeeded in that regard.

Please see the attached for details.

Thank you,

Ted Crookston
KPFA Director
[redacted]



KPFA - NOAA Su...

Kenai Peninsula Fishermen's Association

Ensuring the Sustainability of Our Fishery Resources

[redacted]

To: NOAA — Collecting information in response to Section 216(c) of the Executive Order on tackling the climate crisis.

April 2, 2021

Sent via email to: OceanResources.Climate@noaa.gov

This letter is in response to the presidential Executive Order on January 27, 2021 on "Tackling the Climate Crisis at Home and Abroad" Section 216 (c), specifically requesting input from "…fishermen…, scientists, and other stakeholders on how to make fisheries and protected resources more resilient to climate change, including changes in management and conservation measures, and improvements in science, monitoring, and cooperative research."

The following specific, simple and actionable recommendations are of material consequence and are submitted in good faith that they will receive serious consideration and be communicated to the highest office which issued this Executive Order and be viewed in the spirit outlined in this request for input and recommendations.

Kenai Peninsula Fishermen's Association, Cook Inlet Alaska.

We are the board of directors of the Kenai Peninsula Fishermen's Association (KPFA), a non-profit 501(c) (6) commercial fisheries advocacy trade group representing Cook Inlet, AK fishing families since 1954. KPFA's mission is "Ensuring the Sustainability of Our Fishery Resources". Our goal is to continue to strengthen our fishing community and to promote the economic stability of the Cook Inlet Setnet Fishery. As such, we represent front line experienced, seasoned fishermen; and with our families, crews, and long-standing industry and community infrastructure we represent a major class of stakeholders.

Input

1. The State of Alaska provides over 50% of the US fish harvest annually. However, the State's fishing industry is in decline in many areas as the numbers and size of fish populations have diminished despite current management and enhancement measures. Clearly, different solutions are needed.

2. We understand that climate change plays a significant role in ocean ecosystems. We are writing to address these concerns and provide information related to an identified possible solution. One technology that has been brought to our attention, known as ocean pasture restoration, is expected to directly enhance fish

resources and ocean ecosystems while simultaneously removing vast amounts of anthropogenic CO_2 from the atmosphere and oceans. The KPFA board received a presentation from OPR Alaska, Inc. regarding its proposed pilot R&D program to implement its nature-based processes to stimulate the growth of phytoplankton in targeted offshore areas that are nutrient-depleted. This resonates with us in positive ways and on many fronts.

3. We appreciate and respect OPR Alaska's transparency as they implement their plans. We are advised they are submitting information directly to NOAA in response to this RFI. Furthermore, we are aware that over the last 6 months, leaders in the AK State Senate Resources Committee and OPR Alaska, Inc. have been engaging in discussions regarding OPR Alaska's proposed ocean pasture restoration work in the Gulf of Alaska. OPR Alaska seeks to begin this work by implementing a 3-year pilot R&D project in prescribed offshore areas in order to demonstrate the work's safety, sustainability, and effectiveness. The company's founder and President recently presented details of the proposal to the Committee on March 8, 2021. The full recording is available for viewing on the Alaska State Legislature (akleg.gov) website.

4. It was represented to us this work has been researched and tested for many years by various groups and has demonstrated substantial results in the projects that have been undertaken to date, including one large-scale project in the Gulf of Alaska in 2012. However, the work has not yet been fully utilized as a means of managing our ever-diminishing wild fish populations. We are intrigued by the potential of this work to help revive the State's vital fishing resources and also to provide a method to dramatically combat the planet's ever-growing CO_2 levels.

5. We find it encouraging that this company has the technology, experience and knowledge to take immediate action in productive and practical processes that hold the potential for significant benefit based on over 20 years of experience and extensive scientific research conducted by a variety of credible sources, as well as their own research and testing.

Recommendations

1. We, as concerned fishermen, are supportive of this private company's proposed 3-year R&D project in the Gulf of Alaska, and we encourage NOAA officials to explore enabling dialog and communication and potential support to achieve that end.
2. Secondarily, we encourage NOAA officials to engage with this private company, just as specified in this order, to make "changes in management and conservation measures" by promoting ocean pasture restoration and ongoing good shepherding of ocean pastures, and to explore the "improvements in science, monitoring and cooperative research" as put forth by the proposals of the private company OPR Alaska, Inc., Kodiak, Alaska.

KPFA has no affiliation with this company, but we feel that the proposals they have put forth and the actionable business plan they are presenting and are ready and willing to implement hold great promise and reason for optimism. We hope you will seek them out and engage in a collaborative alliance regarding the impressive work they have already done and are committed to advancing.

Sincerely,
The KPFA Board of Directors:

Andy Hall, Ken Coleman, Lisa Gabriel, Sarah Frostad-Hudkins, Travis Every, Joel Doner, Paul Shadura, Ted Crookston, Eric Nyce

Recommendations for More Resilient Fisheries and Protected Resources Due to Climate Change
NOAA Request for Information (FR Doc. 2021-040137)
April 2, 2021

Please accept The Nature Conservancy's (the Conservancy) comments on NOAA's Request for Information on Recommendations for More Resilient Fisheries and Protected Resources Due to Climate Change. The Conservancy is a non-profit organization whose mission is to conserve the lands and waters on which all life depends. We are known for our science-based, collaborative approach to developing creative solutions to conservation challenges. Our on-the-ground and in-the-water conservation work is carried out across all the states and territories of the United States and in 79 countries around the world. This work is supported by more than one million individual members.

The Conservancy shares many goals with NOAA. Our organizations have partnered on many science and management initiatives through cooperative agreements and service on various agency advisory bodies. The cooperative efforts have quantified the ecosystem benefits of various habitats, designed and implemented new technologies to enhance fisheries management, and helped communities across the country understand the problems associated with habitat loss and flood risk and develop projects that use nature to address these challenges. A lot has been achieved but the Conservancy recognizes that there is more to do because of continued loss of biodiversity and a changing climate.

Overview

There is now ample evidence detailing climate change impacts to ocean ecosystems, fisheries, and protected resources—hundreds of academic studies and peer reviewed papers have been published documenting heightened risks for overharvest, bycatch, and habitat damage as well as allocation conflicts and livelihood impacts. Climate change is rearranging the distribution of ocean life and threatening the productivity of fisheries that people around the world depend on for life, income, and well-being. With nature on the move, we must consider how that impacts the present and future challenges associated with assessments and actions aimed at conserving fisheries and protected resources, including anadromous, marine, and coastal species and habitats.

Climate change adds additional layers of complexity and heightens the urgency of improving monitoring and management systems to address the classic natural resources management problem of signal to response lags. Natural resource management tends to look backward to determine current and future actions and NOAA needs to continue to adapt its approach, policies, research plans, and actions to look forward. Well-intentioned management actions to address changes in condition are often taken too late to be effective, and status quo management systems are based on increasingly faulty assumptions of steady state environmental conditions without long term trends. There is an urgent need to improve management systems to enable rapid responses needed for effective adaptation to dynamic ocean, coastal, and riverine ecosystem conditions.

The Conservancy urges NOAA to strengthen its efforts to understand the impacts of climate change on communities and natural resources and to use natural and nature-based solutions to address them. This requires better utilization of existing information, addressing gaps in current data, better incorporating social science research and insights into their decision making, and modernizing NOAA's approach to data management to improve integration, interoperability, and accessibility. This requires an integrated approach that cuts across NOAA's programs and authorities and its work with other federal, state, territorial, and tribal agencies on resource issues that cross jurisdictional boundaries.

We appreciate that NOAA is conducting this broad public engagement to on how to make fisheries and protected resources more resilient to climate change. We hope that this will lead to more expansive dialogue with stakeholders to further examine the issues raised on how to improve the management and conservation measures, science, monitoring, cooperative research, and program execution of these efforts. We present here our initial thoughts of the overarching challenges and opportunities that NOAA faces. We look forward to future engagement opportunities that allow for inclusive and robust dialogue that brings out a diversity of community, regional, and national perspectives.

Resources and Capacity

Perhaps the greatest challenge NOAA faces in making fisheries and protected species more resilient to climate change is insufficient resources and capacity to address this across science and conservation programs. Surveys, assessments, permitting, consultations all are routinely cited in agency meetings and in congressional hearings as not meeting current needs.

All the recommended actions outlined in the rest of these comments have an associated cost. In some cases, such costs may be covered by shifts in what NOAA does with available resources. However, many of these represent shortfalls that cannot be covered within current budget levels. Data gaps lead to delays in management actions with costs not only to the fishery stocks and protected resources, but also to regulated communities. Current investments are simply inadequate. To make fisheries and protected resources more resilient in a changing climate requires additional investments in NOAA's science, management, and monitoring activities.

Enhance Science and Data Collection

The science NOAA conducts internally and funds externally is instrumental in advancing understanding of the complexity of ocean, coastal, riverine, and Great Lakes ecosystems and integrating that knowledge into natural resource management. NOAA has an opportunity to strengthen the agency's internal and external collaborative efforts to achieve sustainable fisheries, healthy coastal and marine ecosystems, and enhanced resilience in a changing climate.

Fisheries and protected resources share a need for long range planning that is an iterative process. In the face of changing environmental conditions, assessments and management or recovery plans must also adapt. For example, the long-term datasets generated by NOAA's fishery surveys can provide a robust picture of the past, but we need survey approaches that detect shifts happening now and help us anticipate the future. This may mean expanding or supplementing the traditional survey to assess additional areas or species. The use of cooperative research to accomplish some of this supplemental research could provide a pathway to incorporate more community knowledge of observed changes into assessment planning. Ocean uses are also evolving and the anticipated increase in offshore renewable energy installations may require new survey approaches. Continuing to incorporate technology into survey design and implementation can help move beyond the limits of NOAA's lean fisheries survey

vessel fleet. It can also help our science enterprise be more resilient to disruptions such as NOAA saw this past year when the pandemic prompted the canceling of many planned surveys.

NOAA has made some important initial steps to understand climate impacts on fisheries and protected resources. The 2015 *NOAA Fisheries Climate Science Strategy* set out some clear objectives and immediate and near-term actions that cut across the objectives. As assessment of progress could help NOAA understand next steps and implementation limitations. For example, the strategy called for climate vulnerability analyses in each region for all living marine resources to better understand what is at risk and why. To date, only the Northeast regional vulnerability assessment has been completed, with the West Coast assessment nearly done. The collaborative approach to the assessment included science and management entities and covered managed and unmanaged but harvested fisheries species, protected species, and other ecologically important species such as forage fish. This produced a comprehensive assessment that can assist multiple NOAA programs meet a variety of statutory requirements and build better understanding of the intersections across them.

Climate change unevenly impacts the communities that rely on these ocean, coastal, riverine, and Great Lakes species and habitats. They have cultural importance and provide the foundation of many communities' economies and way of life. NOAA should prioritize filling key data gaps that hamper management including the use of technology and partnership and enhance the use of social science research to inform decision making.

Enhancing and expanding development and use of decision support tools can help NOAA and the communities the agencies serve adapt management and science planning to better meet the changes ahead. For example, NOAA and the fishery management councils have begun to use scenario planning to assess future potential management requirements. Such approaches have been used by partner federal agencies such as the US Fish and Wildlife Service and National Park Service to explore environmental changes and address uncertainty. This has helped them identify paths to incorporate such thinking into management decisions and may assist NOAA in doing the same.

Data Management Modernization

Enhancing the ability of scientists, managers, and stakeholders to access and use NOAA's data in a timely manner is critical for fisheries and protected resources. NOAA's outdated data systems are slow, expensive, siloed, and prone to errors and gaps. NOAA has embarked on an agency-wide data management modernization effort that must continue at an accelerated pace. These efforts should be considered foundational for advancing science and meeting management challenges in a changing climate.

To address fisheries and protected species data management needs, NMFS has begun a Fisheries Information Management Modernization (FIMM) effort. An initial report by NMFS was released in 2020 to address concerns and opportunities raised by stakeholders. However, this report did not include a full picture of the anticipated activities or a schedule and budget for implementation that would help secure the resources necessary to implement. NOAA should develop an implementation plan that includes a schedule and budget for full implementation and plan for stakeholder engagement for development of user-centric systems, processes, and policies. The plan shall also detail how the FIMM initiative will align with other NOAA data management efforts to provide efficiency and the interoperability across NOAA programs to better meet the challenges of resource management in a changing climate. The agency is encouraged to seek assistance from technology experts inside and outside government throughout this effort.

Improved data management and systems would enhance NOAA's ability to continue to move away from outdated and expensive fishery data collection methods. Fishery participants can be equipped and empowered to collect much of the data that's needed for the sustainable management of fisheries. It has been demonstrated that electronic monitoring and reporting can help fishermen fill information gaps and provide accountability through at-sea monitoring. This would move NOAA beyond outdated logbook systems that create costly processes and long data lags. Just as we saw with the need to suspend surveys over the past year because of the pandemic, NOAA similarly had to suspend the use of human observers that conduct at-sea monitoring. Electronic monitoring systems remained operational demonstrating resilience to broad disruptive events. NOAA has the opportunity to provide clarity in operational and retention standards that would allow for the cost-effective implementation of more electronic monitoring and reporting systems that enhance accountability.

Solutions Oriented Habitat Conservation and Restoration

NOAA uses a variety of authorities to conserve and restore ocean, coastal, riverine, and Great Lakes habitats. These efforts are critical for enhancing fisheries productivity and recovery of protected species. As climate causes changes in environmental conditions, these habitats need to be able to shift and adapt as well or it will threaten the ability for biodiversity to persist. NOAA needs to have the science and capacity to incorporate this information into protected resources and essential fish habitat consultations to best avoid, minimize, and provide for the mitigation from damages.

In some cases, the habitats themselves are protected through designations including as Essential Fish Habitat/Habitat Areas of Particular Concern, National Marine Sanctuaries, or National Estuarine Research Reserves. Insufficient habitat mapping and assessment and quantification of ecosystem services have limited NOAA's ability to conserve areas through such management measures. Some of these areas were developed with inclusive public engagement and have clear conservation and management goals but others do not, eroding public confidence and limiting stewardship opportunities. This should be remedied by improving science and assessment efforts and developing management and monitoring plans with public engagement. NOAA should also assess whether current review timeframes and processes are allowing them to happen on timeframes needed to adapt management in dynamic climate conditions.

NOAA's restoration work is often limited by selecting projects on a piecemeal basis based on available funding and not an assessment of need. Completing the vulnerability assessments mentioned above would provide a basis to identify need and plan for durable restoration efforts that can persist in the face of changing conditions. Conducting seascape scale restoration plans that are multi-species in nature and provide for connectivity between areas can enhance resilience. These should be developed through inclusive public processes to better incorporate traditional knowledge and community objectives. NOAA has multiple programs that facilitate and fund restoration with specific goals. While NOAA has made strides to identify some common goals and objectives through the NOAA Habitat Policy and shared execution of some science and project work, greater cross-cutting would allow for greater achievement of multiple ecosystem and economic benefits including fisheries productivity and coastal resilience. It would also help take projects to scale and leverage multiple public and private funding sources.

Similarly, NOAA and the Department of the Interior have shared interests and program intersections related to diadromous species, including forage fish and protected species such as salmon and sturgeon. Enhancing coordination in science, planning, and program execution would facilitate greater work in river restoration and monitoring. Diadromous fish are essential to maintaining ecosystem connectivity.

Essential fish habitat for diadromous fishes extends beyond the marine habitat into freshwater systems and having accessible habitat throughout their lifecycle is critical to climate resilient fisheries.

Management Practices

Shifts in managed species and habitats will inevitably lead to the need to adapt current management measures. Climate change and loss of biodiversity will increase the pressure on management systems. NOAA has multiple management partners for fisheries and protected species. This includes state, territorial, tribal, and local governments as well as regional fishery management councils and commissions and international bodies. With these management partners, NOAA should review and adapt governance structures, agreements, and processes to better address the dynamic nature of climate impacts.

These are not simple or quick updates and, in some cases, may require significant rethinking about how information is used to form the basis of decisions to better incorporate risk and uncertainty. NOAA has conducted some risk assessment work that can provide a better framework for incorporating climate interactions into management. This needs to include socio-cultural as well as ecological data and information to account for community impacts. Some of this occurs through recovery planning and the risk policies of the fishery management councils but moving more of these approaches into actual management practices will enhance resilience of fisheries and protected resources.

This will also require significant consideration of how socioeconomics are addressed in management structures and systems. NOAA's authorities center management decisions on the fisheries species and protected resources (e.g., optimum yield, recovery targets). These decisions are made with consideration of socioeconomics in accordance with various statutory constructs. Climate change is likely to present situations where the natural resource consideration may be neutral but conditions have changed in a way that require a management change. For example, if a stock shifts the catch limit may be able to remain the same but that stock may have shifted to a different management boundary – could impact state-federal management responsibility, fishery management council assignment, or even require new international management agreements. We are already seeing the stress of not having policies and procedures in place to deal with how this impacts management responsibility, allocation, or the ability to diversify or shift when limited access programs are in place.

Given the potentially large and varied community impacts of climate change, NOAA should seek to expand and enhance cooperative management efforts. This should include collaborations with regulated participants as well as broader community members that are involved in shoreside support infrastructure. NOAA assessed cooperative management opportunities and outlined recommendations for improvement in the Cooperative Research and Cooperative Management Working Group Report (NOAA Technical Memorandum NMFS-F/SPO-156). NOAA should assess progress and prioritize these activities.

April 2, 2021

Mr. Benjamin Friedman
Deputy Under Secretary for Operations
National Oceanic and Atmospheric Administration
Silver Spring, MD 20910

Dear Mr. Friedman,

On behalf of the Gulf of Mexico Reef Fish Shareholders' Alliance (Shareholders' Alliance), please accept our comments on Section 216(c) of the White House Executive Order (EO) on Tackling the Climate Crisis at Home and Abroad.

The Shareholders' Alliance is the largest organization of commercial snapper and grouper fishermen in the Gulf of Mexico (Gulf). We work hard to ensure that our fisheries are sustainably managed so our fishing businesses can thrive, and our fishing communities can exist for future generations. We are the harvesters that provide much of the American public with a reliable source of domestically-caught wild Gulf seafood, and we do this through a philosophy that sustainable seafood and profitable fishing businesses depend on healthy fish populations.

We greatly appreciate the opportunity to provide input on how to make fisheries more resilient to climate change. Climate change is fundamentally altering the landscape in which fishery managers craft policies and in which commercial fishermen like ours operate their businesses. It is one of the most complex and controversial natural resource challenges that exists and has many symptoms. National Oceanic and Atmospheric Administration (NOAA) Fisheries has identified warming waters, sea level rise, and ocean acidification as key climate concerns for the Gulf, which tracks similarly with other regions. But the Gulf is different than other U.S. coasts given our unique hydrography, geography and land-sea interfaces as compared to other coastal parts of the country. The Gulf is ground-zero for a growing number of more intense hurricanes, it is highly susceptible to influxes of freshwater due to upstream rain events, and its nearly-contained basis is suffering from increasing hypoxic zones and algal and bacterial outbreaks.

Commercial fishermen – the proverbial "canaries in the coalmine" – are on the front lines of climate change and are often the first to observe and document these and other environmental changes and how fish populations are responding. As such, we strongly recommend that policymakers ensure that commercial fishermen are considered partners in this process and provided frequent opportunities for meaningful input.

We offer the following recommendations on priority areas for consideration on climate-resilient fisheries and fishing businesses

I. There is no resiliency without sound science and strong accountability.

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) is the backbone of our nation's world-class science-based fishery management system. In the Gulf, it has helped deliver successful stakeholder-driven fishery solutions like the red snapper and grouper/tilefish individual fishing quota (IFQ) programs and a near-tripling of the red snapper quota in the last decade. These, and other achievements, could not have been accomplished without strong measures of commercial reporting and monitoring, comprehensive stock assessments, and a commitment by commercial fishermen to stay within their science-based quotas. For instance, Gulf commercial IFQ fishermen are bound by limited access permit requirements, vessel monitoring systems, multiple layers of reporting, federal fisheries observers, and strong state and federal enforcement mechanisms; as a result, we know exactly how many commercial fishermen there are and precisely how many red snapper were landed. Yet fishery managers still rely on voluntary, incompatible survey programs for the open-access and effectively unlimited private angler sector that regularly exceeds its science-based quotas. While we strive to achieve greater goals of broad ecosystem-based management and real time data comprehensive management systems, there are critical things we can do – starting today – to improve the information we use to manage our fisheries.

To that end, we encourage NOAA to prioritize:

- Mandatory, compatible private angler catch reporting and permitting systems in the Gulf and nation-wide that have a high degree of accuracy and precision.
- Development of a pathway to annual federal fishery stock assessments, or stock assessment updates, that include comprehensive climate and ecosystem data.
- Increased opportunities and funding for cooperative research and citizen science, and clarification on how the resulting data can improve federal fishery stock assessments.
- Preventing reallocation efforts that reward historical quota overages and noncompliance with catch limits.
- Implementation of electronic reporting and monitoring in the Gulf.

II. Fishery ecosystems are more complex than we give them credit for.

The Gulf's commercial fisheries are affected by - and themselves affect - sectors, industries, regions, and communities both upstream and downstream. The Gulf's "marine ecosystem" is really an interconnected network of land and sea, human and animal, ecological and economic, and ocean and terrestrial components. Take, for instance, the commercial red grouper fishery in the Gulf of Mexico. The red grouper population recently declined in part due to catastrophic red tide events off the west coast of Florida, which were exacerbated by increased nutrient runoff and correlated to unsustainable agriculture practices on land. Commercial red grouper fishermen were forced to adjust their businesses to shift and target red snapper and other species while large seafood importers capitalized on this opportunity to import cheap red grouper from other countries, many of which operate their fisheries with much lower conservation standards than the U.S. does. These red tide events also caused harmful human health effects and widespread coastal community environmental (and economic) damage.

To that end, we encourage the NOAA to prioritize:

- Cooperative research and scientific opportunities to better understand the connectivity between land and sea and evaluate watershed impacts on coastal communities and adjacent fisheries.
- Opportunities to build resilient and adaptable commercial fishing business plans.
- Increased funding for and access to the NOAA Fisheries Finance Program (FFP).
- A comprehensive economic assessment of the seafood supply chain to thoroughly quantify economic impacts of sustainable seafood harvest in the U.S.
- Exploration of opportunities to expand regulatory authorities of fishery management bodies to regulate all human use components that impact commercial fisheries.

III. Seafood is the solution to many of our climate-related challenges.

American seafood, like the iconic red snapper and red grouper sustainably caught from the Gulf of Mexico, is a heart-healthy, readily-accessible protein source harvested by small business men and women from Brownsville, TX to the Florida Keys. Our industry has a low carbon footprint – much lower than many land-based protein industries – so we are helping to feed the nation in a way that ensures our planet can sustain this natural and effectively organic food source for generations to come. By promoting collaborative approaches to conservation, the Gulf's commercial fishermen support policies that help sequester carbon and increase the resiliency of our fragile coastlines. Doing so also strengthens our nation's food security systems – a critical need spotlighted by the COVID-19 global health pandemic – and small business workforce that must evolve and adapt their business plans to the changing environment that their businesses depend on.

To that end, we encourage NOAA to prioritize:

- Opportunities to support nations commercial fishing workforce, including expanded vocational training programs and support for the next generation of commercial fishermen.
- Marketing and promotion of domestic wild-harvest seafood consumption, including improving relationships and opportunities with the U.S. Departments of Agriculture and Health to utilize their existing expertise and resources
- Improvement and enforcement of wild-harvest seafood traceability guidelines, and monitoring of seafood imports.

The Gulf of Mexico has a demonstrable track record for success when it comes to sustainable seafood, and we ask that NOAA build upon these achievements in order to improve climate-resilience of the region's (and nation's) commercial fisheries. We look forward to working with NOAA Fisheries and associated partners to put American seafood and commercial fishermen first.

Sincerely,

Eric Brazer, Deputy Director
Gulf of Mexico Reef Fish Shareholders' Alliance

MAINE
Lobstermen's Association, Inc.
[redacted] www.mainelobstermen.org

April 2, 2021

Via Email (OceanResources.Climate@noaa.gov)

Benjamin Friedman
Deputy Under Secretary for Operations
National Oceanic and Atmospheric Administration

RE: Climate: Recommendations for Fisheries and Protected Resources

Dear Mr. Friedman:

The Maine Lobstermen's Association ("MLA") provides these written comments in response to the National Oceanic and Atmospheric Administration's ("NOAA") invitation for "recommendations on how to make fisheries and protected resources more resilient to climate change, including changes in management and conservation measures, and improvements in science, monitoring, and cooperative research." 86 Fed. Reg. 12,410 (Mar. 3, 2021). The MLA appreciates NOAA's consideration of the comments set forth below.

The MLA was founded in 1954 and is the oldest and largest fishing industry association on the east coast. The MLA advocates for a sustainable lobster resource and the fishermen and communities that depend on it. The MLA engages in advocacy, education, stewardship and sustainable resource management, collaborative research, and cultural exchange. For more than 65 years, the MLA has ably represented the interests of the Maine lobster industry and educated the public, regulators, and elected officials about the importance of this industry. The Maine lobster fishery generates more than $1.5 billion annually in sales and distribution supply chain revenue to the region's economy,[1] and is made up of a diverse collection of small businesses that are located in small, rural communities. As described further below, the Maine lobster fishery has been sustainably managed for decades and implements a suite of longstanding protective measures that have demonstrably minimized effects the fishery may have on protected resources.

[1] Michael Donihue, *Lobsters to Dollars: The Economic Impact of the Lobster Distribution Supply Chain in Maine,* at 1, 3, 12 (June 2018), www.colby.edu/economics/lobsters/Lobsters2DollarsFinalReport.pdf.

1. The Maine lobster fishery is extraordinarily sustainable and climate resilient.

The American Lobster fishery is managed cooperatively by several Atlantic states, including Maine, and the National Marine Fisheries Service ("NMFS") under the Atlantic States Marine Fisheries Commission ("Commission") framework through the Atlantic Coastal Fisheries Cooperative Management Act. Under that framework, the Interstate Fishery Management Plan for American Lobster ("FMP") is developed through ASMFC's Lobster Board and implemented by individual states and NMFS within each corresponding jurisdiction. States may adopt additional measures for the lobster fishery if they are more restrictive than the requirements of the FMP. License holders are bound by the most restrictive measures of the jurisdictions they are permitted to fish.

Under this regulatory framework, the Maine lobster fishery has been managed in an extraordinarily sustainable fashion. The conservation measures implemented in the fishery include minimum and maximum size limits, special protection of breeding females through "v-notching," the prohibition of mobile gear to protect lobsters and habitat, the requirement for escape vents in traps to let undersized lobsters escape, size limits on lobster traps, and a state-wide limit of 800 traps per vessel.[2] The fishery is divided into seven management zones, each of which may prescribe trap limits that are more restrictive than the already-restrictive state limit. There is currently one lobster zone and two island conservation areas with more restrictive trap limits. Each zone may also limit the legal hours of fishing and limit entry into the zone.[3] Under Maine's lobster zone program, lobstermen are required to fish the majority of gear in their declared "home zone," which limits the spatial footprint of individual harvesters.

In addition, the Maine lobster fishery is unique in requiring future lobstermen to complete a rigorous two-year apprentice program before being eligible for a commercial Maine lobster license. Apprentices must be sponsored by a licensed Captain and log 1,000 hours of fishing and gear work over a minimum of two years. In limited entry zones, apprentices who have completed the program are placed on a waiting list and can only obtain a permit when one is made available based on the established exit/entry ratio. Maine lobstermen are fully invested in this rigorous, locally focused management framework, which is the primary reason why the fishery has been, and will be, sustainable and resilient over generations of lobstermen.

Indeed, the Maine lobster fishery is thriving. Using current stock assessment models, it has never been overfished, subject to overfishing, or subject to an emergency declaration. The Maine lobster stock is at record-high abundance and landings have steadily increased over many decades (*see* Figure 1 below). One study recently examined the resiliency of the Maine lobster fishery through a period of substantial climate-driven changes in the ocean environment (Le Bris *et al*. 2018).[4] The authors applied a "model that links ocean temperature, predator density, and fishing to population dynamics to evaluate the role of warming and harvest strategies" in both

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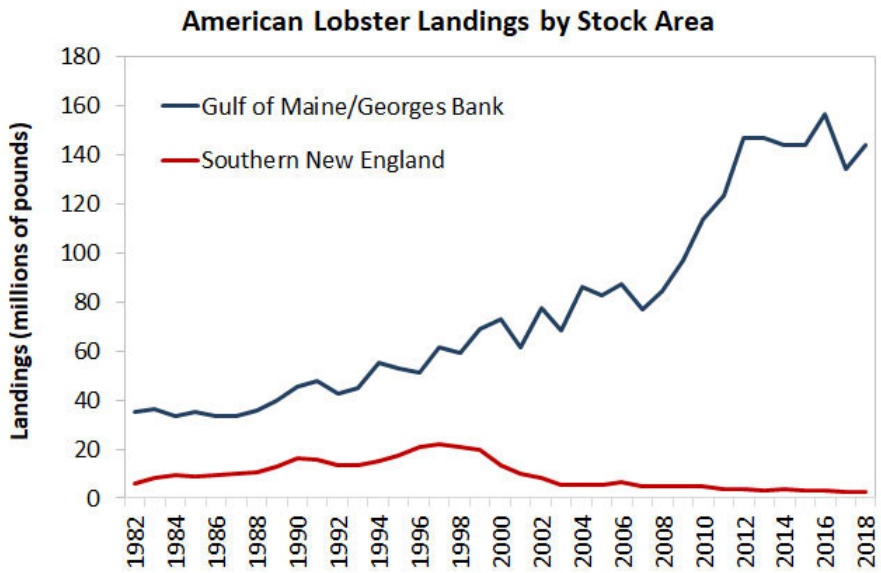
[2] Maine Revised Statutes, Title 12, Chapter 619, Subchapter 1, §6431, §6431-A, §6431-B, §6431-E, §6431-F, §6431-G, §6432, §6432-A, §6433, §6434, §6436, §6438-A, §6440, §6442, §6443.

[3] Maine Revised Statutes, Title 12, Chapter 619, Subchapter 1, §6447 and §6448.

[4] Le Bris et al. Climate vulnerability and resilience in the most valuable North American fishery. *Proc. Natl. Acad. Sci.* 115 (8) 1831-1836 (2018).

the southern New England lobster fishery (which has collapsed) and the Maine lobster fishery (which is thriving). Their results show that the restrictive conservation measures used in Maine "amplified the benefits of warming" in Maine and, had those same measures been applied in southern New England, would have "dampen[ed] the negative effects" of warming on that fishery. *Id*. Their results further demonstrate that "maintaining measures to preserve large reproductive females [as has been and is presently done in the fishery] can mitigate negative impacts of warming on the [Maine] lobster fishery in future decades." *Id*.

Figure 1.[5]



Le Bris *et al*. (2018) concluded that "even though global climate change is severely impacting marine ecosystems, widely adopted, proactive conservation measures can increase the resilience of commercial fisheries to climate change." Moreover, they attributed the success of Maine's proactive measures to the strong, locally-driven management program:

> The development of current harvest strategies in Maine was facilitated by the flexibility of Maine's Lobster Management Zone Law, and by the ability of industry leaders to influence legislation. The informal establishment of territorial use rights promoted a strong conservation ethos in the industry, encouraging the adoption of sustainable harvest strategies to the detriment of immediate economic returns. The case study of the American lobster confirms that a strong sense of resource stewardship and flexible governance facilitate the adoption of effective conservation measures and confer resilience in fisheries.

[5] Obtained from http://www.asmfc.org/species/american-lobster.

Id. This study confirmed what Maine lobstermen have long understood—*i.e.*, that protecting egg-bearing females and oversized lobsters results in a sustainable fishery that is resilient to environmental changes.

In sum, the Maine lobster fishery's sustainable management and its corresponding resiliency to climate change will continue to be accomplished through the *existing management mechanisms* that have worked for decades. Any new federal policies or initiatives that disrupt the existing management framework will undermine the ongoing success of the Maine lobster fishery. Fisheries are most effectively managed—whether to promote target catch sustainability or climate resiliency—at the local or regional level, as has clearly been demonstrated in the Maine lobster fishery.

2. The Maine lobster fishery successfully minimizes impacts on protected species, which has only improved with climate-driven oceanographic changes.

Marine mammal interactions with the Maine lobster fishery are rare. Moreover, the fishery's interactions with the North Atlantic Right Whale ("NARW") have decreased even further over the past 15 years as a result of (i) the implementation of measures under the Atlantic Large Whale Take Reduction Plan ("TRP") and (ii) a shift in NARW distribution out of the Gulf of Maine and into Canadian waters as a result of climate-induced oceanographic changes.

First, regulations developed and imposed at the state and federal level, including those implemented under the TRP, have significantly reduced both the amount of lobster-related rope in the water and the risk of a severe outcome if a NARW encounters such gear. These protective measures include, a "sinking groundline" requirement, vertical line reductions, gear marking, weak links in vertical lines, and other gear requirements to minimize the risk and severity of entanglements. Since implementation of these measures in 2009 (as amended in 2014), the Maine lobster fishery has demonstrated almost 100% compliance and had *zero* observed NARW entanglements or mortality or serious injury ("M/SI") interactions.

Second, since 2010 there has been a well-established shift in NARW habitat preference that has "increased the risk from anthropogenic threats as the whales moved into habitats with fewer protections in Canadian waters (Meyer-Gutbrod et al. 2018)."[6] This shift, which brings NARWs into closer proximity with heavy snow crab fishing gear, has proved deadly in recent years. Indeed, Canada had few, if any, risk reduction measures in place prior to 2017.[7] In contrast to the Maine lobster fishery's record of zero observed M/SI interactions since

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[6] NOAA Fisheries, Office of Protected Resources, North Atlantic Right Whale (*Eubalaena glacialis*) Vessel Speed Rule Assessment, at 1 (June 2020); *see also id*. at 28 ("there appears to have been a considerable change in right whale habitat use patterns in areas where most of the population has been observed in previous years (Hayes et al. 2019)").

[7] *Examining Threats to the North Atlantic Right Whale Before the Subcomm. on Water, Oceans, & Wildlife of the H. Comm. on Natural Resources*, 116th Cong. 6 at 26 (2019), https://www.congress.gov/116/meeting/house/109022/documents/CHRG-116hhrg35462.pdf (Chris Oliver, Assistant Administrator for NOAA Fisheries, noting coordination began in 2017).

monitoring began and zero observed entanglements since 2004, there have been 16 observed entanglements, including 9 M/SI interactions, in Canadian gear since only 2016. Accordingly, as part of the U.S. efforts to improve "climate resiliency," direct engagement with Canada at the highest levels of the U.S. government is essential to secure commitments that Canada will modify its regulatory regime to fully address risks to the NARW. The climate resiliency of protected resources that cross international boundaries cannot be accomplished if other countries are not taking management actions that are equally protective as those applied in the U.S.

3. MPAs are not necessary nor effective in facilitating "climate resiliency."

The recent Executive Order on Tackling the Climate Crisis at Home and Abroad directs federal agencies to "identify[] strategies that will encourage broad participation in the goal of conserving 30 percent of our lands and waters by 2030."[8] Although the Executive Order does not define "conserve" in this context, some groups have advocated for the use of no-take marine protected areas ("MPA") to achieve this goal. However, the best available scientific information demonstrates that widespread implementation of MPAs in U.S. waters would not promote sustainability or climate resiliency.

As a case-in-point, the NARW shift in distribution away from Maine lobster fishing grounds and into more dangerous Canadian fishing waters demonstrates the futility of MPAs as a climate change solution. If MPAs had been established in the Gulf of Maine 20 years ago to protect NARW from entanglements with lobster gear, those MPAs would be irrelevant now, given the shift of NARW out of the Gulf of Maine. Instead, they would be restricting fishing effort, or concentrating effort in a manner that potentially presents greater risk, while at the same time NARWs are being more heavily impacted by Canadian fisheries that now overlap with large aggregations of feeding NARW.

Additionally, no-take MPAs established in U.S. waters will simply redistribute and concentrate fishing effort outside of the MPAs, creating higher entanglement risk to migrating whales.[9] Alternatively, if MPAs have the effect of reducing fishing effort and production in, for example, the Maine lobster fishery, lobster demand will nevertheless continue to be satisfied in greater proportion by lobster fisheries that are not as sustainable or protective as the Maine lobster fishery, resulting in a net negative conservation loss.[10] As a retrospective example, *none*

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[8] Executive Order on Tackling the Climate Crisis at Home and Abroad, Section 216(a)(ii) (Jan. 27, 2021).

[9] *See* Testimony of Dr. Ray Hilborn, House Committee on Natural Resources Hearings on Title II of the Ocean-Based Climate Solutions Act (Nov. 17, 2020) ("[T]he MPA advocates ignore that fact that 30x30 would cause 70% of U.S. oceans to see increased fishing pressure from the vessels that moved out of the 30% closed, and thus potentially be less resilient to climate change. Do we really want to make 70% of our oceans less resilient to climate change?"). Dr. Hilborn's testimony is included as Attachment A to this comment letter. *See also* Bruno, J.F. et al. Climate change, coral loss, and the curious case of the parrotfish paradigm: Why don't marine protected areas improve reef resilience? Annual Review of Marine Science 11, 307-334 (2019).

[10] *See* Chan, H.L. and M. Pan. Spillover Effect of Environmental Regulation for Sea Turtle Protection in the Hawaii Longline Swordfish Fishery, Marine Resource Economics, Volume 31,

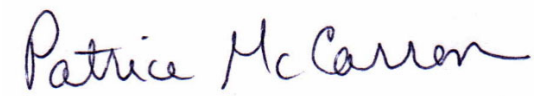
of the Pacific stocks that were overfished at the time of the most recent expansion of the Pacific marine monuments have improved despite the vast area that is now closed to commercial fishing (and despite the fact that foreign fisheries continue to exploit those stocks). The U.S. is *less* resilient to climate change when jobs are lost from sustainable U.S. fisheries while fishing effort increases in countries with weaker environmental protections.

As demonstrated by the Maine lobster fishery, marine ecosystems can be resilient while also remaining working waters that support a strong coastal economy. No-take MPAs eliminate fisheries jobs while failing to effectively conserve resources. If applied to the Maine lobster fishery, MPAs would deplete economic opportunities for families living in Maine's rural coastal communities. Fewer fishing grounds in Maine would result in coastal communities that are *less* resilient to climate change and *less* capable of participating in and contributing to the Administration's climate goals.

For more than a century, the Maine lobster fishery has been a stable presence along New England's waterfronts. It is an icon of the region, and a vital part of the region's culture, traditions, and economy. Maine lobstermen are also world leaders in conservation and stewardship. We take pride in our longstanding sustainable fishing practices and the successful implementation of measures for over two decades to protect the NARW. The future of many of Maine's coastal communities, and economic opportunity for children growing up in these communities, depends on the continued success of the Maine lobster fishery. The existing state and federal management of the fishery is a success and will continue to ensure the climate resiliency of the fishery.

The MLA appreciates NMFS's consideration of the comments and recommendations provided in this letter. If you have any questions or would like additional information, please do not hesitate to contact me at 207.967.4555 or patrice@mainelobstermen.org.

Sincerely,



Patrice McCarron
Executive Director

cc: Dr. Paul Doremus, Acting Assistant Administrator NOAA Fisheries
Sam Rauch, Deputy Assistant Administrator for Regulatory Programs
Michael Pentony, Regional Administrator, Greater Atlantic Regional Office
Donna Wieting, Director, NMFS Office of Protected Resources
Jennifer Anderson, Assistant Regional Administrator for Protected Resources
Senator Susan Collins (via Cameron O'Brien)
Senator Angus King (via Peter Benoit and Chris Rector)

Number 3 (2016); Rausser, G.C. et al. Unintended Consequences: The Spillover Effects of Common Property Regulations." Marine Policy 33(1):24-39 (2009).

Representative Chellie Pingree (via Lisa Pahel and Rhiannon Hampson)
Representative Jared Golden (via Eric Kanter and Morgan Urquhart)
Honorable Janet Mills, Governor of Maine (via Tom Abello)
Patrick Keliher, Commissioner, Maine Dept of Marine Resources
Thomas Nies, Executive Director, New England Fishery Management Council
Robert Beal, Executive Director, Atlantic States Marine Fisheries Commission

Hilborn presentation on Title II of the Ocean-Based Climate Solutions Act

Ray Hilborn Professor School of Aquatic and Fishery Sciences Box 355020 University of Washington Seattle, WA 98195-5020 U.S.A.

For House Committee on Natural Resources hearings on the 17 November 2020

Good morning and I want to thank the members and staff for the opportunity to address this committee. My name is Ray Hilborn, I am a Professor of Fisheries and Aquatic Sciences at the University of Washington. I have been studying fisheries management for 50 years, both in the U.S. and in a number of other countries and international commissions. I currently serve on the SSC of the Western Pacific Council. My research has resulted in 300 peer reviewed journal articles, and several books including "Quantitative fisheries stock assessment and management" which is a standard reference work on fisheries management. My work has been recognized by several awards including the Volvo Environmental Prize, the International Fisheries Science Prize, and the Ecological Society of America's Sustainability Science Prize.

I am not representing any group, although I do receive research funding from a wide range of sponsors including major U.S. foundations such as the Gordon and Betty Moore Foundation, the David and Lucielle Packard Foundation and the Walton Family Foundation; NGOs such as the Environmental Defense Fund, The Nature Conservancy and the Natural Resources Defense Council; agencies including the National Science Foundation and NOAA; and commercial and recreational interest groups,

As someone who has worked in fisheries for over 50 years, and done field work in Alaska for almost 40 years, I know that global warming is real, and climate change is the major challenge to American fisheries. The key question is what are the most appropriate tools to respond?

Attachment A

Before we discuss how to respond to climate change we first need to set the stage. What is the state of U.S. fisheries and Oceans? U.S. fish stocks are healthy and increasing in abundance, and U.S. fisheries management is highly precautionary. Figure 1 shows the median abundance of scientifically assessed stocks in the U.S. relative to the reference point of the abundance that would produce maximum sustainable yield[1]. As you will see the median abundance has always been above the target level and has been increasing since 2000.

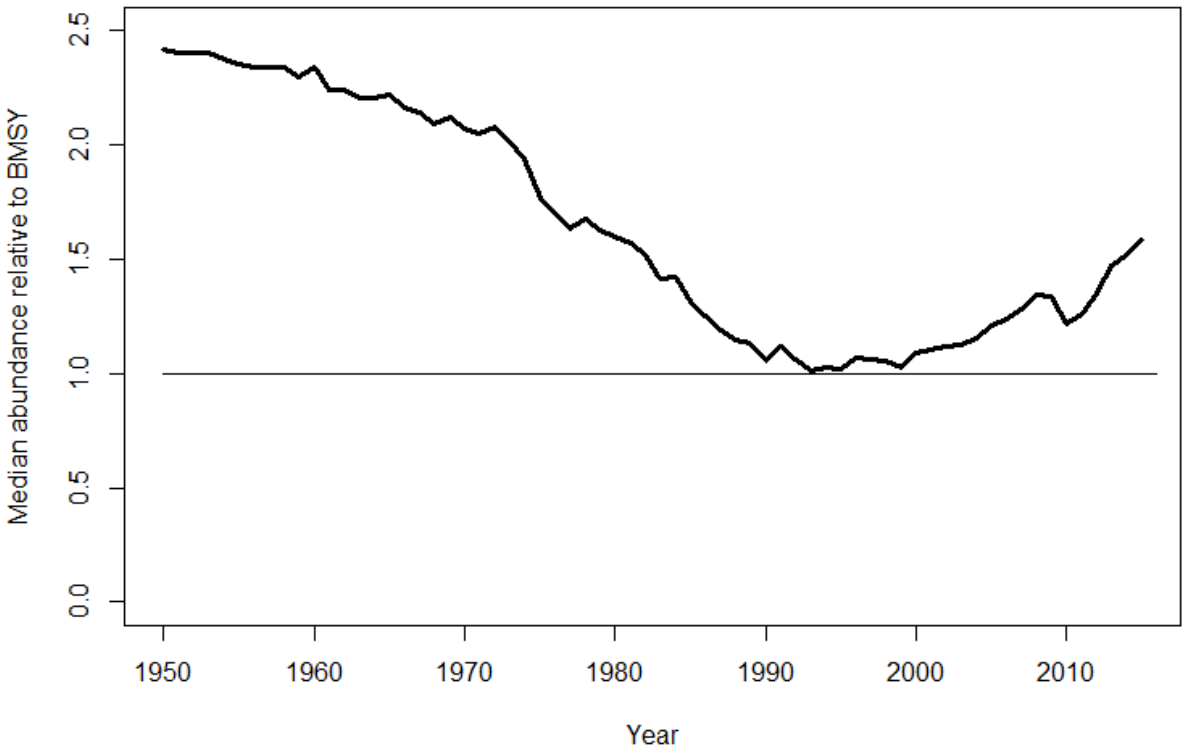


Figure 1. Median stock abundance of U.S. stocks relative to the target biomass that would produce maximum sustainable yield.

[1] Data from NOAA stock assessments and can be found in www.ramlegacy.org

In a recent paper in Proceedings of the National Academy of Sciences (*1*), we showed that overfishing is causing only a 3-5% loss in potential yield from U.S. fisheries, whereas precautionary underfishing is causing far more. Figure 2 shows the loss of U.S. fish production in millions of tons from overfishing, and from underfishing. Underfishing is simply harvesting less than would produce maximum sustainable yield. If we were to fully exploit all of our underfished resources we might increase yield by 40%. Overfishing is simply not a major concern for U.S. fisheries production: science-based management under the Magnuson-Stevens Act is working.

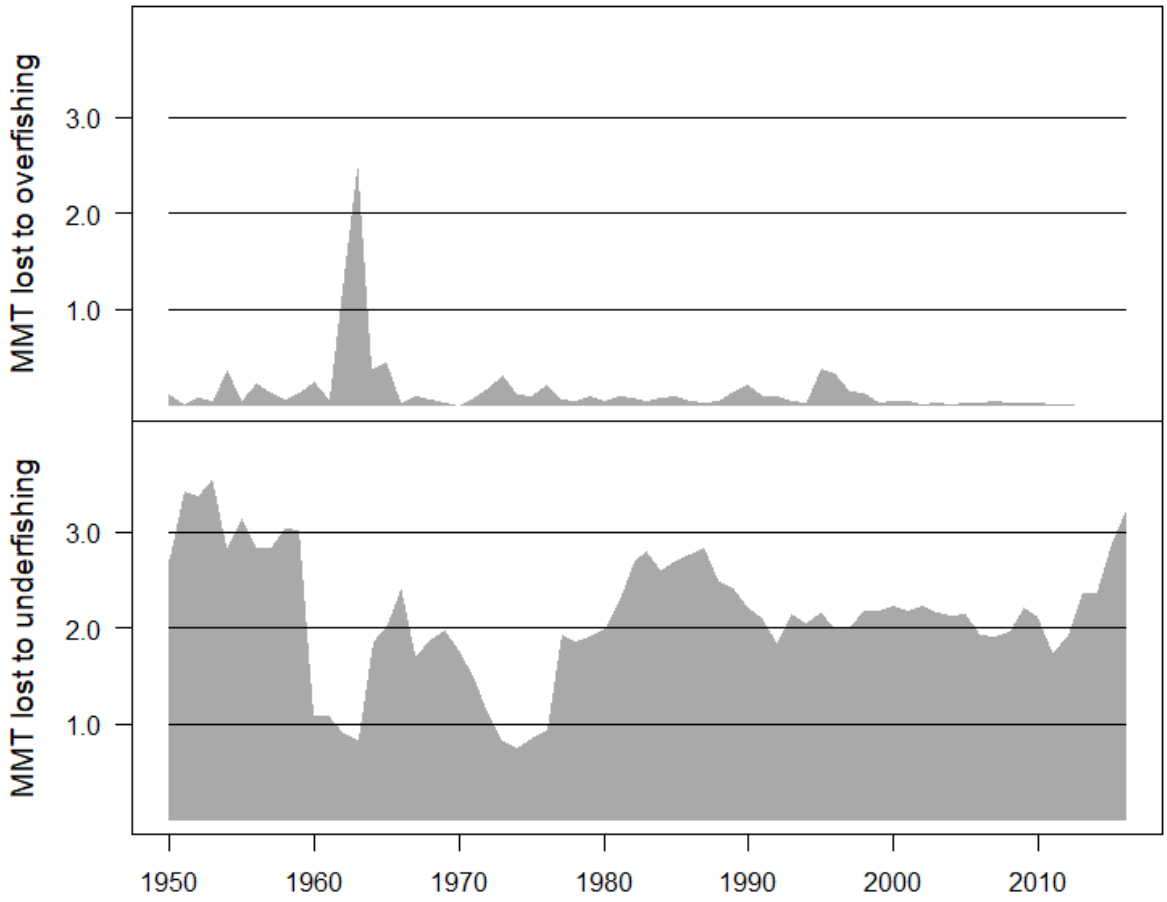


Figure 2. The amount of yield lost to overfishing and underfishing from U.S. fish stocks.

Also to set the stage, the Committee should be aware that in general U.S. fisheries produce food, protein and nutrients at much lower environmental cost than alternative land-based production

Attachment A

methods (*2*). Expanding crops production requires destroying native ecosystems, with most growth in global production coming from conversion of tropical forests. In contrast the well-managed U.S. fisheries maintain largely natural ecosystems that are little altered when compared to the conversion from forest to crops. Anything that reduces U.S. fish production will either cause us to import more fish from places with lower environmental standards, or rely on more land based production.

The impact of fishing on non-target species such as birds, and mammals, and on vulnerable marine ecosystems, is less well known but of more concern than overfishing target species, and to me the major challenge to sustaining our oceans and producing food from the ocean.

Climate change has two major dimensions, warming and increased variability in weather. Warming has been shown to cause species to shift their ranges (*3*), generally but not always towards the poles, and some species will become less productive and others will become more productive. We may also expect more variation from year to year in the abundance of fish stocks.

Recent examples of shifting distributions include the movement of pollock in the Bering Sea northwards, and North Atlantic right whales moving into areas of intense lobster and crab fishing. Responding to these changes in distribution requires dynamic real time management.

So how should we respond to the challenges of climate change? The U.S. has an admirable set of laws and institutions that can do this. The Regional Fisheries Management Councils have the authority, and the Magnuson-Stevens Act, the Endangered Species Act, the Marine Mammal Protection Act and other legislation gives Councils the tools to respond to climate change. We don't need a massive overhaul of existing law to tackle the challenge.

In the years ahead it will be important for fisheries management to be more flexible, allowing for changes in distribution and productivity. Areas and stocks that are high priority for protection now may not be the same in 20 years.

That brings me to Title II of the Ocean-Based Climate Solutions Act, which would require the establishment of marine protected areas that ban all commercial fishing activity in 30 percent of U.S. ocean waters by 2030. Such marine protected areas are simply the wrong tool for adapting to climate change. There are three primary objectives of the 30x30 proposal; (1) to increase target species production, (2) to protect non-target species and (3) to protect sensitive habitats. MPAs will either not help or there are better tools.

Both theory and empirical evidence shows that you cannot increase target species yield with MPAs unless overfishing is wide spread (*4*) (*5*) (*6*). Overfishing is rare in the U.S. and we would not expect MPAs to increase the yield from our fish stocks. Certainly there are typically more fish in the closed areas than outside, but remember that the fishing effort that was previously inside the MPA has been moved outside. The evidence shows that when MPAs are put in place and stocks are well managed, abundance goes up inside the closed area, and goes down outside with no-net gain.

In the highly publicized MPA network set up in California it has been shown that abundance of target species increased inside reserves, but declined outside (*7*) and that the result was no measureable increase in fish abundance (*6*).

It has been clearly demonstrated that bycatch can be best reduced by changes in fishing technology, fishing gear, or changes in incentives to alter fleet behavior. The dramatic reductions in bycatch from turtle excluder devices for trawls, acoustic pingers for gill nets, and a combination of tori lines, change in bait, circle hooks and night setting for longlines has often reduced bycatch by 90%. The

distribution of bycatch problems will change as species distribution changes. Setting aside fixed areas of the oceans is not going to be effective.

Certainly, vulnerable marine ecosystems need protection, but many Fishery Management Councils are doing that – and in a way that is science-based and has creditability with industry and other stakeholders. Moreover, these areas only need protection from mobile bottom contact gear such as trawls and dredges. There is no need to ban midwater trawling, purse seining, longlining or surface gill nets to protect corals, sponges or sea grasses. Moreover the distribution of these species may well change with climate change.

MPA advocates argue that MPAs are more resilient to climate change than fished areas; however a recent review article (*8*) entitled "Climate change, coral loss, and the curious case of the parrotfish paradigm: Why don't marine protected areas improve reef resilience?" has shown no evidence for this. Furthermore, the MPA advocates ignore that fact that 30x30 would cause 70% of U.S. oceans to see increased fishing pressure from the vessels that moved out of the 30% closed, and thus potentially be less resilient to climate change. Do we really want to make 70% of our oceans less resilient to climate change?

For none of these issues are no take MPAs the most appropriate tool, but the proposed legislation would draw staff time, resources and industry engagement away from the really effective tools. The oceans in the U.S. are under many threats beyond climate change, including ocean acidification, exotic species, land based runoff, plastics and illegal fishing. There are solutions to each of these problems, but it is not no-take MPAs – they do nothing to mitigate these problems.

I certainly agree with my colleagues in the environmental movement that we need to protect our oceans, but Title II takes the wrong approach and we can do much better if we apply the same

resources to the tools that will work. Let Councils use the effective tools to protect 100% of U.S. oceans, not apply an ineffective tool to 30%. No take areas are an inflexible, static tool, whereas agency management we already have can respond to climate change in real time.

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Attachment A

Recommendations for More Resilient Fisheries and Protected Resources Due to Climate Change (both issues)

Submitted by:
[redacted]

Climate change is beginning to challenge the health and resilience of ocean ecosystems and fishery resources. The Biden Administration *Executive Order on Tackling the Climate Crisis at Home and Abroad* offers a framework for addressing the emerging threats with systems change approaches that lead to greater health, equity, and multiple benefits.

Specifically, the January 27th Executive Order mandates these overarching strategies and goals:

- Integrated problem statements – it is not just about climate

For example, goals are to include not just resilience to the impacts of climate change, but also, reduction of climate pollution, protection of public health, conservation of lands, waters, and biodiversity, attention to environmental justice, and promotion of economic growth, through innovation, commercialization, and deployment of new technologies and infrastructure.

- A regenerative approach to natural systems – forests, farms, coasts, ocean

For example, "Coastal communities have an essential role to play in mitigating climate change and strengthening resilience by protecting and restoring coastal ecosystems, such as wetlands, seagrasses, coral and oyster reefs, and mangrove and kelp forests, to protect vulnerable coastlines, sequester carbon, and support biodiversity and fisheries."

- Environmental Justice Communities

For example, "Agencies shall make achieving environmental justice part of their missions by developing programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related and other cumulative impacts on disadvantaged communities, as well as the accompanying economic challenges of such impacts".

- Support for economic growth and innovative technologies and practices

For example, "The heads of agencies shall identify opportunities for Federal funding to spur innovation, commercialization, and deployment of clean energy technologies and infrastructure."

Perspectives from Massachusetts

The Massachusetts and Gulf of Maine fisheries and protected resources would benefit from taking these "systems" approaches. See: Building the Massachusetts Seafood System:

https://www.mass.gov/files/documents/2018/05/09/Final%20Report%20Building%20the%20Massachusetts%20Seafood%20System.pdf

The Massachusetts fishing industry, from harvesting in the ocean through processing and distribution to consumers, is drastically under-performing. It has been estimated that only about a third of fish that could be sustainably caught are actually landed. Fishermen are often paid only pennies per pound for the fish they offload. Boats are decades old and fuel-inefficient and the average age of fishermen is approaching the mid-sixties. Consumers are eating frozen imports of a few species like cod, while the diversity of local species is not available. Over 95% of oyster reefs have been destroyed, climate change is shifting many traditional species northward, and plastics and other toxins are entering the food chain. Animosity and lack of trust between fisheries managers and the fishing community has probably never been higher.

Current fisheries policies have either exacerbated or failed to address these core dysfunctions and signs of distress in the industry. Single-species quota caps in a multi-species stock have inhibited fishermen from adapting and diversifying their catch, while a focus on trade promotion and efficiency gains have led to globalized commodity markets and a crippling of local ports and fishing communities. Heavy reliance on government research vessels and intricate models have severed relationships with fishermen and the public, who otherwise could be contributing their practical knowledge and their understanding of local economies, traditions, and innovation. There is a concept that long-term stock recoveries following sharp short-term quota cuts will eventually achieve some economic development goals as well, but as the economist John Maynard Keyes famously said, "in the long-run we will all be dead."

These are all classic symptoms of "systems" failure, of the inattention and lack of understanding of the interrelationships and internal dynamics of the sector; and of a focus of public policies on narrow agendas and single-purpose goals, with minimal attention to ripple and side effects or externalities created.

This misalignment of narrow policy measures that fail to address the more fundamental problems in a complex economic and natural resource sector is not unique to the fishing industry, but other sectors have been making aggressive efforts to articulate and tackle these structural dynamics from an integrated perspective, while fishing industry policymakers and professionals have not.

A multi-stakeholder conversation would be advised to better understand and describe the fishing industry as a complex, interrelated and interdependent system of relationships among habitat, harvesting, processing, and consumption; how this

system would function if it were in healthy condition, including factors that make for resilience and adaptability; and the multiple benefits it should be delivering in terms of ecosystem recovery, jobs, food, cultural traditions, healthy diets, and others. The role that current policies play in fisheries will be identified, along with policy shifts that would lead to more optimal outcomes.

For example, policies could incentivize oyster bed restoration or polyculture with the joint production of food, water quality improvements, fish habitat restoration, and storm surge protection over industrial-scale monoculture. A shift from high-volume, low-value fisheries to low-volume, high-value fisheries can be supported through investments in value-added and waste recovery products that would expand local port economies, deliver societally-useful products, and diversify catches. Efforts to restore elements of flexibility in fisheries management would increase the resilience of the system over time. Significantly greater collaboration in stock assessments and other pilot projects would improve the science, while helping to restore trust in the policy framework. Research and investments in fuel-efficient boats could lower the carbon footprint of the industry. Numerous other examples of cross-cutting and integrated solutions would emerge if the system were looked at holistically and if the full range of societal and ecological values were articulated as goals for the system.

Proposed National Research Council or other Study

A request to the National Research Council for a multi-stakeholder "systems" study, or alternatively a GARFO-sponsored study involving multiple stakeholders in the region, would be valuable and consistent with the January 27th Executive Order,

The objective of a project would be to delineate the fishing industry as a larger system that incorporates ocean ecosystems, harvesters, processors, and consumers as interrelated parts of a whole and that explores policies that will maximize the health, productivity, and resilience of the system. Typically, a systems understanding is developed by assembling experts and practitioners in the separate parts of the system and asking them to contribute their thoughts on the larger framework, the types of imbalances, dysfunctions, or missed opportunities that they see, and the more robust values they believe should be brought to the table, including those that have been under-emphasized, such as resilience of coastal fishing communities, incorporation of indigenous knowledge, and others.

PACIFIC WHALE FOUNDATION

Protecting the ocean through science and advocacy and inspiring environmental stewardship

April 2nd, 2021

Submitted via email to OceanResources.Climate@noaa.gov

National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Permits and Conservation Division
1315 East-West Highway, Room 13116
Silver Spring, MD 20910

RE: Executive Order *Tackling the Climate Crisis at Home and Abroad* Section 216(c)

To whom it may concern,

On behalf of Pacific Whale Foundation (PWF), we are submitting comment in response to President Biden's Executive Order 216(c) which directs NOAA to collect recommendations on how to make fisheries and protected resources more resilient to climate change. PWF is a marine conservation organization whose mission is to protect the ocean through science and advocacy, and to inspire environmental stewardship. We advocate for science-based solutions to major stressors on whales and dolphins. Using data from our Research Program, our team creates public policy agendas and mobilizes community members to support ocean protection efforts. Our priority issues include conducting research on and raising awareness about climate change impacts to cetaceans and ocean ecosystems at large.

We commend the Administration for taking swift action to ensure the health and longevity of the ocean and its invaluable resources within. We will outline four main actions that could be taken in order to accomplish the goal of increasing resiliency of fisheries and protected resources in the face of a changing climate. These efforts would likely require an increase in federal funding opportunities to help encourage multi-stakeholder involvement in this work.

The first recommendation is the immediate expansion of collaborative research. The need to understand the impacts of climate change on a variety of ocean habitats, from nearshore waters out to the high seas, is crucial to highlight the most vulnerable ecosystems. This research should be conducted in conjunction with an increase in fishery data collection and guided by the key drivers of climate change. Some of the relevant areas of study would include alterations in precipitation patterns and subsequent delivery of freshwater, nutrients, and sediment; increased ocean temperature; alterations in circulation patterns; and increased levels of atmospheric CO_2. Ocean warming is expected to cause poleward shifts in the ranges of many organisms, including commercial species, which could have secondary

effects on their predators and prey[1]. This type of research would aid in the creation of a priority list for protections rooted in science.

Next, we recommend the implementation of an ecosystem-based management (EBM) approach as necessary to support an increase in fishery resilience. Utilizing a broad management approach recognizes how food web linkages and human interventions may affect sustainability in aquatic ecosystems. EBM maintains natural structure of ecosystems while factoring in human use, integrating the cumulative impacts on marine environments, and aiding in the management of species, habitats, economic activities, conflicting uses, and the sustainability of resources[2]. A successful EBM will recognize economic, social, and cultural interests, addressing the need for a multi-stakeholder approach to the implementation of any management practices.

Our third recommended action is to place an emphasis on increasing biodiversity. A growing body of evidence points to the importance of biodiversity for ecosystem stability and optimal functionality, thus creating the need for conservation measures to safeguard biodiversity needs and human society needs[3]. Due to conflict between biological conservation and social and economic demands, particularly as it relates to the commercial fishing industry, further research on areas that provide crucial ecosystem services, or those that are under the biggest threat for collapse, is greatly needed. These studies are needed to illuminate high priority areas and shed light on the most vulnerable species to help maintain (or increase) biodiversity and create "no-take" lists, size-limits, seasonal closures, or other such regulations as needed.

Finally, in order to make fisheries and protected resources more resilient to climate change, we ask you to consider cetacean health. In addition to increasing the biodiversity of an ecosystem, large whales, dolphins, and porpoises have a clearly proven support of ocean productivity and ultimately fishery abundance and health. Large migratory whales are crucial for nutrient transport across large swaths of ocean, and all cetaceans provide balance to ocean food webs, leading to healthier ocean ecosystems. In addition to the socio-ecological interactions, particularly in coastal communities, whales provide multiple benefits to human well-being such as primary production, nutrient cycling, recreation (ecotourism), education, and carbon sequestration[4].

Whales as carbon sinks alone is enough to prioritize health and abundance of cetaceans, however, greater consideration is also needed for increased observer coverage in fishing operations to reduce marine mammal bycatch. For example, here in the Hawaiian Islands, observer coverage for the Hawaii Longline Fishery is only 20% on deep-set tuna fishing trips, and nonexistent in nearshore fisheries[5,6]. The Hawaiian insular false killer whale is threatened by extensive unobserved troll, handlines, and other hook-and-line fisheries that operate at near record levels in

their core habitat area[6]. Therefore, integrating health monitoring of cetacean species and increasing observer coverage aboard fishing operations would help support fisheries resilience by integrating cetacean health and abundance in management practices.

Thank you for the opportunity to submit comment. Again, we commend the Administration for taking the necessary steps toward creating a more resilient ocean and look forward to the positive changes ahead.

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LUMMI INDIAN BUSINESS COUNCIL
2665 KWINA ROAD BELLINGHAM, WASHINGTON 98226 (360) 312-2000

Benjamin Friedman
Deputy Under Secretary for Operations,
Performing the Duties of Under Secretary of
Commerce for Oceans and Atmosphere and
NOAA Administrator
1401 Constitution Avenue NW, Room 5128
Washington, DC 20230

April 2, 2021

Mr. Benjamin Friedman,

The Lummi Nation is known as the salmon people. Its livelihood, well-being and culture are unquestionably bound with the health of salmon stocks in the Nooksack River watershed and nearshore. Prior to European settlement, the river and nearby tidelands produced plentiful natural resources that allowed the Lummi people to develop a rich material, cultural and spiritual heritage. The right to harvest this bounty was explicitly preserved in the Treaty of Point Elliot of 1855. The 1974 Boldt decision (US *vs.* Washington) re-affirmed this right.

The Lummi Nation's ability to exercise its treaty rights is seriously threatened by the lack of harvestable fish and shellfish. This can be directly linked to the degradation and loss of high quality aquatic habitat, including poor water quality. Habitat degradation is considered the leading cause for the decline of WRIA 1 salmonid populations (WRIA 1 2005). Current habitat conditions are substantially less productive than historical conditions. Estimated current adult capacity for each Nooksack early Chinook population is less than 10% of historic capacity; similarly, estimated current adult productivity and life history diversity are less than 15% and 45% of historic levels, respectively (Mobrand, Inc. 2003). This decline of salmonid stocks has had cultural, social, and economic impacts on tribal members.

Poor water quality has resulted in the closure of tidelands to shellfish harvests, which have supported an important tribal industry for hundreds, if not thousands of years. The tribe operates a shellfish hatchery in Lummi Bay that grows and sells seed to growers worldwide. The hatchery also seeds a few areas of

the Lummi Bay tide flats, where the Lummi people traditionally harvest shellfish. Poor water quality has directly impacted this harvest in the past.

Predicted climate change impacts in the Pacific Northwest will affect habitat and salmon in various ways. Littel et al (2009) provides a summary of some key climate change impacts affecting salmon; these include: 1) Increases in annual temperature of, on average, 2.2 °F by the 2020s, 3.5 °F by the 2040s, and 5.9 °F by the 2080s (compared to 1970 to 1992), averaged across all climate models; 2) April 1 snowpack is projected to decrease by 28 percent across the state by the 2020s, 40 percent by the 2040s, and 59 percent by the 2080s compared with the 1916 - 2006 historical average; and 3) Rising stream temperatures will likely reduce the quality and extent of freshwater salmon habitat. A recent study by Crozier et al (2021) found that while Chinook salmon migration shifted earlier in response to warmer freshwater conditions, this didn't prevent large-scale population declines under two climate change scenarios. They also found that climate impacts to Chinook were most dramatic in the marine survival stage, reducing survival by 83-90%.

To mitigate climate change impacts to fisheries, Lummi Natural Resources has been undertaking several projects as well as related monitoring. This includes the following:

1) Habitat restoration projects that restore wood using engineered logjams to rivers. This creates cool pools for holding during warmer summer water temperatures, engages floodplains to prevent flooding downstream, allow the land to store unwanted sediment provide refugia for juveniles during high flows and reduce scouring, and restores channel processes.
2) Restore riparian areas along the river and in the estuary.
3) Restore and protect wetlands in both the Nooksack estuary and in the watershed.
4) Monitor water temperatures/water quality both in the estuary and in the river.
5) Growing oyster and geoduck seed to supplement Lummi tidelands for harvest by Lummi tribal members.
6) Conduct salmon redd and carcass surveys for escapement estimates, and to determine effectiveness of habitat restoration projects.
7) Salmon broodstock program to rebuild stocks.
8) Radio and pit tags to track salmon movement in the river
9) Conducting zooplankton surveys for use in the Salish Sea Marine Survival Project.
10) Monitoring of invasive aquatic species, including the European Green Crab and Spartina spp.
11) Conducting research and assessments on a variety of species including Dungeness crab, sea cucumber, native bi-valves.

The Lummi Nation is conducting this work with various partners including the Nooksack Indian Tribe, NOAA, Long Live the Kings, State of Washington Department of Fish and Wildlife, Northwest Indian Fisheries Commission, Western Washington University, Northwest Indian College, and the University of Washington. We are striving to integrate all of the work within our own Natural Resources Department to meet the challenges we face due to climate change.

To make fisheries more resilient, we recommend the following:

1. There should be a more coordinated approach among federal agencies. Each agency has their own mandates, and they directly impact fisheries, such as water quality and water resources (EPA). In addition, while each federal agency may provide some funding to address climate change impacts, we find that we need to not only search for funding, but piecemeal funding from both the state and the federal agencies, since most federal agencies won't allow match funds obtained from another federal agency.
2. In order to determine effectiveness of projects to mitigate the impacts of climate change, we need access to long-term monitoring funds. Most grants fund at best, one year of monitoring. Think of this as a lessons learned project- is the project meeting its goals, and why? In conjunction with monitoring funds, we are lacking capacity to analyze existing data and determine effectiveness.
3. Financial support is not keeping pace with the change in management complexity. Science makes us more aware of current status and future impacts, but we can't do anything about it because we don't have funds to monitor, research, educate and train new scientists, etc. This is particularly harmful to groups, such as tribes, that are already struggling in many of these areas.
4. There is a lot of good research being completed by NOAA on the impact of climate change on fish stocks. This information would be useful for our own research. Please ensure that this information is readily available, perhaps directly distributing reports to tribes.

Thank you for the opportunity to provide comments with regards to making fisheries more resilient. This letter documents issues we face, how the Lummi Nation is responding, and a few areas on how we can improve our fisheries in light of climate change. We will be sending out additional comments in a few weeks.

Sincerely,

Merle Jefferson, Sr
Director, Lummi Natural Resources

MAKAH TRIBAL COUNCIL

The Makah Tribe is an equal opportunity employer.

The Honorable Deborah Haaland
Secretary of the Department of the Interior
1849 C Street NW
Washington, DC 20240

The Honorable Gina Raimondo
Secretary of the Department of Commerce
1401 Constitution Ave NW
Washington, DC 20230

April 2, 2021

Re: Makah Tribal Council Comments and Consultation Request on Sec. 216 of Executive Order 14008 on Tackling the Climate Crisis at Home and Abroad

Dear Secretaries Haaland and Raimondo:

The Makah Tribal Council is writing to provide comments to and request consultation on the implementation of Sec. 216 of Executive Order 14008, Tackling the Climate Crisis at Home and Abroad. The Makah Tribe is indigenous to the Cape Flattery area and has been sustained by our natural resources, especially from the ocean, for thousands of years. Thriving and resilient fisheries and protected resources are the foundation of the Makah Tribe's economy, food security, cultural wellbeing, and resilience to climate change. The Makah Tribal Council understands the federal trust responsibility to extend to addressing the impacts of climate change on our resources and rights as reserved under the 1855 Treaty of Neah Bay.

This letter summarizes our dependence on these resources and the place-based nature of our harvest rights in support of our unique perspective on climate research gaps, management approaches, and mechanisms to build resilience. We conclude with comments on the 30x30 policy as the implementation of this policy could have significant impacts on the Makah Tribe. Due to the foundational link between climate resilient fisheries and the overall resilience of the Makah people, the Makah Tribal Council opposes the implementation of marine protected areas or other types of closures that exclude treaty harvest. These policies in our region would directly undermine the resilience of our people and the exercise of our treaty-reserved rights. **We are therefore requesting joint consultation with Interior and NOAA on the implementation of Sec. 216 of E.O. 14008.** We urge you to look to the Magnuson-Stevens Act for an established and functional definition of "conserve," invest in much-needed climate change research, and consider flexibility and creative solutions in addressing the needs of natural resource-dependent

and climate vulnerable communities like the Makah Tribe. We look forward to working with you on this important topic.

Please note that while this letter focuses primarily on topics affecting marine and anadromous resources, we intend to submit a corresponding letter to the U.S. Department of Agriculture outlining our perspective for terrestrial and freshwater resources.

The Makah Tribe:
The ancestral homeland of the Makah Tribe, the "People of the Cape," is located at the Northwest point of the Olympic Peninsula in Washington State. The current reservation is 30,067 acres and our treaty protected area includes Usual and Accustomed Hunting and Fishing Stations (U&A) in waters of the United States that extend off the outer coastline north from 48° 02'15" N latitude and east of 125° 44'00" W longitude, and in the western end of the Strait of Juan de Fuca east to 123° 41'56" W (see map). However, Makah traditional use of the oceans extends north to the Bearing Sea and south to the Columbia River. Many of the resources the Tribe currently depends on migrate along the West Coast, and our area of interest extends to the full extent of these ecosystems.

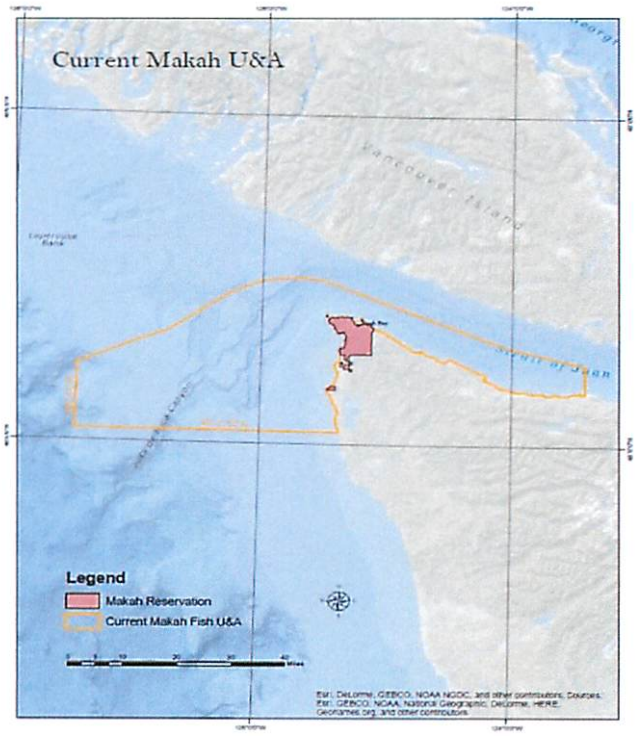

Figure 1: Map of present-day Makah Usual and Accustomed Fishing Area (U&A)

The existence and well-being of the Makah people has always been closely tied to our relationship with the environment, especially the ocean. The Makah hold a spiritual reverence and have inexorable ties to the ocean and its bountiful natural resources. This relationship to the ocean continues today, in part through our robust and valuable treaty commercial fisheries, which support our local economy and food security. Our treaty commercial fisheries account for 50% of our economy on an annual basis, with most households including someone who fishes. Makah culture and traditions, in conjunction with the remoteness of the reservation, make the

Tribe especially reliant on fisheries and subsistence resources. Community surveys indicate that 99% of the Makah community rely on fishing, shellfish, or hunting for a portion of their diet. Due to our remote location, local employment opportunities are limited and natural resources-based jobs (fishing, timber, etc.) are primary employers. We cannot understate the importance of our treaty fisheries. Climate resilient fisheries are a critical component of our community's overall resilience to climate change.

On January 31, 1855 the Makah Tribe entered into a formal and legally binding agreement with the United States of America, known as the 1855 Treaty of Neah Bay. Article 6 of the U.S. Constitution defines treaties between the U.S. Government and sovereign nations as the "supreme law of the land." The Treaty of Neah Bay is the legal agreement between the Makah Tribe and the United States that recognizes the Makah Tribe's status as a sovereign nation. It reserves inherent sovereign rights to natural resources, cultural practices, and other services and benefits in exchange for the cession of 469 square miles of territory to the U.S. Government. Explicitly, the Treaty reserves the Makah Tribe's rights to hunt, fish, whale, seal, and gather within our U&A. These rights were later confirmed and interpreted through the 1974 federal court decision known as the Boldt Decision[1] and subsequent rulings.[2]

The 1855 Treaty of Neah Bay also created the special legal relationship between the federal government and the Makah Tribe called "Trust Responsibility." Federal Indian Trust Responsibility is a legal and fiduciary obligation under which the United States meets its moral obligations to uphold the highest responsibility and trust toward American Indian tribes. The federal Indian Trust Responsibility holds the U.S. legally responsible for the protection of tribal lands, assets, resources, and treaty rights for the benefit of the Tribe. The U.S. Supreme Court has reaffirmed in numerous decisions and policies that the Federal Indian Trust Responsibility entails legal duties, moral obligations, and the fulfillment of understandings and expectations that have arisen over the entire course of dealings between the U.S. and the tribes.

Climate Resilient Fisheries and Protected Resources (Sec. 216(c)):
Thriving and resilient fisheries and protected resources are critical to the continued exercise of Makah treaty fishing, whaling, and sealing rights, as well as the economic and nutritional security and cultural wellbeing of our community. Recently conducted community surveys regarding climate change indicated that impacts to fisheries resources and to the ocean are primary community concerns. Recent research has demonstrated that smaller-scale fisheries are particularly vulnerable to global environmental change, but can also be skilled at adapting to changing conditions.[3] The same study found that access to assets and resources, as well as flexibility from governments and regulatory bodies is crucial to successful climate resilience and

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[1] *United States v. Washington*, 384 F. Supp. 312 (W.D. Wash. 1974), aff'd, 520 F.2d 676, 684-687 (9th Cir. 1975).
[2] *E.g.*, *Washington v. Washington State Commercial Passenger Fishing Vessel Association*, 443 U.S. 658, 685-687 (1979) (salmon); *U.S. v. Washington*, 459 F. Supp. 1020, 1065 (W.D. Wash. 1978) (herring); *U.S. v. Washington*, No. C85-1606R, Subproceeding No. 92-1 (W.D. Wash. Dec. 29, 1993) (halibut); *U.S. v. Washington*, 873 F. Supp. 1422, 1445, n.30 (W.D. Wash. 1994), aff'd in part and rev'd in part, 157 F. 3d 630, 651-652 (9th Cir. 1998) (shellfish); *U.S. v. Washington*, No. 9213, Subproceeding 96-2 (Nov. 4, 1996) (Pacific whiting).
[3] Green, K. M., Selgrath, J. C., Frawley, T. H., Oestreich, W. K., Mansfield, E. J., Urteaga, J., ... & Crowder, L. B. (2021). How adaptive capacity shapes the Adapt, React, Cope response to climate impacts: insights from small-scale fisheries. *Climatic Change*, *164*(1), 1-22.

adaptation in small scale fisheries. We urge NOAA to invest in infrastructure, technology, and research needs identified by fisheries-dependent communities like Makah and continue to work with us to identify regulatory and management flexibilities to support diverse and climate resilient fisheries. Our priorities are summarized below:

Climate Resilient Management Approaches:
The Makah Tribe has a sophisticated fisheries management department which engages actively as a co-manager and resource trustee with state, federal, and international fisheries management regimes. We firmly believe that the existing management structures as established under the Magnuson-Stevens Act (MSA) are effective at managing and – where necessary – recovering our fisheries, particularly in the Pacific Region (for example, canary rockfish – fully rebuilt, yelloweye rockfish – almost rebuilt). Furthermore, Regional Fisheries Management Councils are already integrating climate change scenario planning and climate change adaptation considerations into management. Science-based and context-specific approaches to managing resilient fisheries have been and continue to be successful in our region. We recommend that NOAA continue to invest in existing management structures and support tribal, federal, and state fisheries managers in developing the tools and research necessary to further incorporate climate considerations into active and effective fisheries management that supports Makah treaty harvest in perpetuity. We encourage NOAA to coordinate with other agencies consistent with the "whole of government" approach outlined in E.O. 14008 to consider ecosystem resilience measures that cross departmental authorities and programs (i.e. hypoxic zones related to agricultural runoff).

Restored Fishing Access as Climate Resilience:
Makah treaty fishing rights are geographically limited to the extent of our U&A boundary. As climate change drives range shifts in commercially and culturally important fisheries species, the Tribe may face decreased access to these treaty resources as Makah fishermen are unable to follow the resource outside of the U&A. At treaty times, Makah leaders considered our ocean territories their most important resource, especially the productive fishing grounds northwest of Cape Flattery at Swiftsure and 40 Mile Banks, so much so that Tribal leaders were willing to cede large areas of land under the 1855 Treaty of Neah Bay as long as they could continue to fish at these productive fishing grounds. The Makah Tribe's reserved rights under the Treaty allowed us to retain access to these traditional fishing grounds, including those off the coasts of Washington and Vancouver Island, for 120 years after signing. However, since the late 1970s these fishing grounds have been located in Canada's Exclusive Economic Zone (EEZ) and are not accessible to Makah fishermen. This federal action excluded Makah fishermen from grounds they had fished for thousands of years with no consultation, mitigation or compensation. Requests to consult made by the Tribe at the time did not even receive a response.

Restoring Makah fishing access to these areas can now serve a dual purpose: as restoration of previously violated treaty rights, and as a significant and meaningful climate resilience strategy for Makah fisheries. Restored access to these sites would increase the flexibility that Makah fishermen have to access economically and culturally important species, even if climate change shifts ranges northwards. The Tribe has met regularly with federal leadership to discuss this important topic, most recently with former Assistant Secretary Tara Sweeney (Interior) in September 2019; former Deputy Director William Crozer (Intergovernmental Affairs) in June 2019; and NOAA staff and our legislators in April 2018. We understand that restored access to

these sites will not occur instantaneously and we suggest a future meeting between NOAA, Interior, and the Makah Tribal Council to continue discussions on this important climate resilience strategy and federal trust responsibility. We look forward to working with this Administration to find a way forward.

Infrastructure to Support Resilient Fisheries:
We encourage NOAA to support investments in coastal infrastructure that would increase the value and diversity of our fisheries and fisheries-associated supply chain as a climate resilience strategy. Specifically, we would prioritize investments in our Marina infrastructure, our local fish processing capacity, and our local infrastructure to freeze and preserve fish. These projects would increase the profitability of our fisheries and create additional local jobs – both of which would increase our resilience to increasingly variable fisheries seasons as a result of climate change. While these investments would build climate resilience in the long term, they would also facilitate economic recovery from the impacts of COVID-19 on our fisheries-dependent community in the shorter term.

Climate Resilience Research Needs:
Makah Fisheries Management has always relied on the best available science to effectively and sustainably manage our fisheries. Climate change is introducing new challenges for management and research gaps remain. Research is needed in the following areas:

- *Climate Impacts on Lower Trophic Levels:* Better information is needed on how climate change will affect the quality and quantity of species at the base of the food chain (krill, forage fish, copepods, etc.). This data would improve our ability to forecast impacts to and manage for fisheries and other protected resources such as marine mammals. Similar information, including impacts to benthic levels and impacts to water quality and quantity is needed for terrestrial and anadromous species.
- *Ocean Acidification (OA):* Our OA research agenda includes: expanded real-time monitoring and development of early warning signs, development of biological indicators, improved mapping of OA hot-spot and refugia areas, model validation and improved spatial and temporal modeling, and more research on the vulnerability of commercially valuable fisheries species to OA and behavioral impacts of OA on non-shellfish marine organisms (particularly finfish and other commercially important species). The Makah Tribe also sits on the Steering Committee of the Olympic Coast OA Sentinel Site, which, while not a fisheries management body, facilitates coordination and collaboration on shared OA science, education, and ecosystem management priorities. Investments that would support the Sentinel Site, as well as the participation of tribal governments in its management are critical to ensure that we can continue to catalyze research and information sharing on the impacts of OA on Washington's Outer Coast.
- *Fisheries Species Range & Phenological Shifts:* Our climate impacts assessment highlighted the need for better data on any potential northward shift for halibut and how this shift would impact the Makah U&A. We also need better downscaled information on how climate change will impact migration timing and stream temperature tolerance of specific salmon populations and their food sources.

- *Range Shifts of Predators and Invasive Species:* Research is needed into how climate change may impact the ranges of predators, invasive plant, fish, and invertebrate species and pathogens that could impact our marine and freshwater aquatic fisheries resources.
- *Improved Bathymetry Data:* More detailed mapping of the marine environment at the scale of the Makah U&A would improve our ability to plan, model, and manage our fisheries effectively and in a climate resilient manner. This data would support our understanding of how climate change will impact the presence and seasonal movement of groundfish fishery species, distribution of key ecosystems (kelp forests, etc.), and localized upwelling of lower trophic level species.
- *Social Science and Economic Analyses:* Social science and economic analyses are an essential component of building climate resilience. Research priorities include coupled social-ecological modeling, research on the impacts of OA and climate change on the Makah people, socio-economic risk modeling, and economic analyses of climate impacts on Makah fisheries. Funding to support the ongoing implementation of culturally specific resilience strategies identified through this research is also needed.
- *CO2 Removal by Aquatic Vegetation:* Research is needed to better characterize, inventory, and quantify carbon storage potential in various aquatic vegetation habitats. Funding demonstration projects, as well as kelp forest and eelgrass bed restoration work, in partnership with interested tribal governments would improve understanding and allow for near-term implementation of OA mitigation strategies.
- *Climate-Driven Changes in Rivers Impacting Salmon:* Better downscaled data on the climate change-driven impacts on water quality and quantity in rain-dominant watersheds is needed. Climate research in Washington State has focused on changes in snow-dominated systems in the Cascade Mountains. Better data on projected impacts to water quality and quantity in our watershed would improve our ability to manage our resources. Better characterization of how interactions between streams outside the Makah Reservation and U&A boundary impact Makah resources (esp. salmon) and how climate change will affect this interaction is also needed.

Climate Resilience, The 30x30 Policy (Sec. 216(a)), and Consultation Request

Given that E.O. 14008 also directs NOAA and Interior to develop guidelines around a goal of conserving 30% of America's lands and waters by 2030 ("30x30 Policy"), we must comment on the interaction between targets-based conservation, climate resilient fisheries, and natural resource dependent communities like the Makah Tribe. The Makah Tribal Council does not support the establishment of marine protected areas or other closures that do not recognize Makah Treaty harvest within or adjacent to our U&A and traditional use lands. The exclusion of Makah treaty harvest within our U&A would violate U.S. federal trust obligations under the 1855 Treaty of Neah Bay. Nearby closures could drive increased competition and resource use conflicts from non-tribal fishermen to our U&A, disproportionately impacting our treaty fishermen who cannot exercise Makah treaty fishing rights elsewhere. Due to the magnitude of the potential impacts of this policy on our treaty fisheries and hunting, economy, cultural traditions, and way of life, we are requesting formal government-to-government consultation with NOAA and Interior on the establishment of guidelines for the 30x30 policy and the overall implementation of Sec. 216.

Many of these spaces are also Traditional Cultural Properties eligible for listing in the National Register of Historic Places. Federal actions that would affect access to or management of these areas would also require consultation with the Makah Tribe under Sec. 106 of the National Historic Preservation Act. Adaptive and ecosystem-based management grounded in the best available science has always driven our management of our fisheries and protected resources. Although we recognize the need for bold action on climate change, we urge NOAA and Interior to continue to rely on science-based and context-specific rather than targets-based and politically-defined approaches to resource management.

The Makah Tribal Council further recommends NOAA and Interior rely on the existing definition of "conservation and management" as established under the Magnuson-Stevens Act (MSA) for guidelines under Sec.216(a). Under the MSA definition, 72% of the Nation's ocean waters are currently under conservation.[4] We recommend that Interior to consider a similarly structured definition for terrestrial areas. The creation of protected areas (if considered) should be understood as a targeted and carefully monitored tool in response to a specific driver to achieve a specific outcome – not a goal in and of itself.[5]

Even if the agencies pursue a different set of guidelines, a significant portion of our region is already designated under various federal conservation statuses and should not be considered for further closures. Existing conservation areas within our traditional lands and waters include Olympic Coast National Marine Sanctuary and Olympic National Park. The Olympic Coast National Marine Sanctuary does not exclude treaty harvest, but can constrain the Tribe's self-determination and decision-making over the use of our marine space. Olympic National Park prohibits the exercise of treaty hunting and gathering. The active management of our treaty resources within the Park is further constrained by the Wilderness Act. The legacy of forced displacement of Indigenous peoples through the creation of land-based protected areas in the name of conservation is well documented. Researchers are already highlighting social justice concerns with large targets-based marine protected areas.[6] We urge NOAA and Interior not to expand or resume this outdated and unjust practice in our marine spaces. The implementation of federal trust responsibility to the Makah Tribe, and our role as resource trustees, should already serve to ensure the climate resilience of our treaty resources, rights, and ocean spaces – without the establishment of additional protected areas.

We respect this Administration's commitment to taking bold action and climate change and to improving consultation. The climate change research priorities, management approaches, and policy tools described above represent meaningful investments in climate resilient fisheries, protected resources, and communities. We want to reiterate to our federal trust officers that meaningful consultation is pre-decisional and necessary for federal actions that would impact sovereign tribal governments. We view the implementation of sub-sections a and c of Sec. 216 as a series of fundamentally linked policy choices and decisions that would impact the Makah

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[4] RFMC letter to Secretary Haaland and Secretary Raimondo dated March 12, 2021.

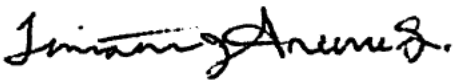
[5] Northwest Indian Fisheries Commission (2003). Tribal Policy Statement on Marine Protected Areas, Marine Reserves, Marine Sanctuaries, and Fishery Conservation Zones.

[6] De Santo, E. M. (2013). Missing marine protected area (MPA) targets: how the push for quantity over quality undermines sustainability and social justice. *Journal of environmental management*, *124*, 137-146

Tribe. We look forward to discussing this further through government-to-government consultation.

To schedule consultation and/or if you have any questions, please contact the Makah Tribal Council Secretary, JoDean Haupt-Richards ([redacted]). Thank you for the opportunity to comment on this important subject.

Sincerely,



Timothy J. Greene, Sr.
Chairman
Makah Tribal Council

Cc:
Heather Sagar, NOAA Fisheries, Senior Policy Analyst
Amilee Wilson, NOAA Fisheries, West Coast Regional Tribal Coordinator
Allison Hall, Department of Interior, Regional Environmental Officer

West Coast Seafood Processors Association
[redacted]

April 2, 2021

Dr. Paul Doremus
Acting Assistant Administrator for Fisheries
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910
Via email to: OceanResources.Climate@noaa.gov

RE: Section 216(c) of Executive Order 14008, Tackling the Climate Crisis at Home and Abroad

Dear Dr. Doremus:

On behalf of the West Coast Seafood Processors Association (WCSPA), I am writing to support current fisheries management and protected resources polices on the West Coast that support a healthy, resilient ocean climate, as described in Section 216(c) of Executive Order 14008, Tackling the Climate Crisis at Home and Abroad. I also include some suggested potential considerations to make fisheries and their associated management polices stronger.

WCSPA represents shoreside processors in Washington, Oregon and California who process the majority of groundfish on the West Coast as well as other species under the purview of State and Federal fisheries management. Our members, and the fishermen who fish for them, are keenly aware of the effects of climate change on the oceans and the natural resources dependent on healthy, resilient oceans.

Already, West Coast fisheries are some of the best examples of successful fishery management practices that produce sustainable harvests of nutritional seafood products and keep fishing families working so our coastal communities thrive. We look to the Pacific Fishery Management Council (PFMC) as a leader in working with us to achieve these successes.

Developing policies to address climate change must be rooted in sound science, the same way fisheries management under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) dictates management must be rooted in the best scientific information available. Existing and proposed scientific surveys and studies must be funded. Creating unreal expectations for expanding the science relating to climate change without funding it will only exacerbate the problem of developing policies with little scientific information.

Additionally, all ocean users must be held to the same accountability standard to which the existing seafood industry is held. Developers introducing more ocean-based work, such as marine renewable energy from wave or wind, must account for impacts to the same threatened or endangered species the fishing industry does. For example, wind turbines that cause incidental bird takes or anchors that introduce or new predator-prey relationships must be accounted for so fisheries are not unduly restricted due to interaction with wildlife or habitats from another industry.

Ocean resliency with regard to fisheries must also include the seafood industry from top-level management down the individual fishermen and the communities on which they depend. Oftentimes current management practices are too slow to respond to rapidly-changing environmental conditions. The Pacific Council and NOAA Fisheries West Coast Region (WCR) depend on biennial harvest specifications for managing groundfish stocks, which may be too inflexible to address changes that happen either on the ocean or on land that affect the fishery. The Pacific Council has used emergency actions three times in the last year to address pandemic-related changes that caused limited opportunities to fishing. Climate changes will likely increase the number of fishing opportunity challenges that will require flexible management.

We fully support the open and transparent public process of the Pacific Council; it is appropriate that any potential climate resilience mandates be filtered through the Council process. Already, the Council and its advisory bodies have addressed holistic ecosystem-based management through development of the Fishery Ecosystem Plan (FEP), creation of advisory bodies dedicated to ecosystem issues, precautionary measures inherent to many management actions and, recently, the development of a Climate and Communities Initiative (CCI). This Initiative included broad stakeholder outreach to consider scenario planning to address potential climate changes in California Current Ecosystem (CCE). The effort is forward-thinking and was designed to help the Council and fishery managers respond quickly to shifts in ocean condition, fisheries, etc.

It is for these reasons we suggest relying on sound science to inform decisions related to climate change and management of our fisheries and fish stocks; fully funding that science so it is the best available; holding non-fishery ocean users to the same standards as the seafood industry; ensuring management actions include flexibility; and relying on the PFMC's open public process for vetting of any policy changes.

Sincerely,

Lori Steele
Executive Director

EARTHJUSTICE

Submitted via email

April 2, 2021

Mr. Benjamin Friedman
Deputy Under Secretary for Operations
National Oceanic and Atmospheric Administration

Heather Sagar
Senior Policy Advisor
NOAA Fisheries
OceanResources.Climate@noaa.gov

RE: Climate: Recommendations for Fisheries and Protected Resources

Dear Mr. Friedman and Ms. Sagar:

Thank you for the opportunity to provide recommendations on ways in which NOAA Fisheries should use its authorities to make fisheries and protected resources more resilient to climate change. As President Biden recognized in the Executive Order on Tackling the Climate Crisis at Home and Abroad, marine ecosystems and the natural and human communities that depend on them face urgent, wide-ranging threats from climate change. However, NMFS also possesses strong, wide-ranging legal authority to address these threats. NMFS must apply these tools now in a proactive, consistent way if we are to have a legitimate chance at halting the degradation of marine fisheries, wildlife, and habitats and boosting their ability to withstand climate change stressors.

The health and resilience of fisheries and protected species is inextricably linked to the health of their habitats and ecosystems. Habitats that are degraded or shrunken cannot support all the flora and fauna that depend on them. They are also less able to persist, much less bounce back from, rising water temperatures, altered circulation patterns, increasing acidity, and other climate-related stressors. Similarly, the depletion of species that play key ecological roles—for example, ecosystem engineers, grazers, forage species, and top predators—throws marine ecosystems out of balance, weakening their function and rendering them more vulnerable to collapse.

Despite the widely accepted, scientifically documented connections between ecosystems and the species that comprise them, NMFS has not applied those concepts widely in carrying out its duties to manage federal fisheries management and conserve protected species. Federal fishery management remains narrowly focused on maximizing extraction of individual species

without meaningful analysis of how that extraction affects other fish and wildlife species, other fisheries, or habitat. Similarly, in the context of ESA consultation, NMFS has often downplayed the impacts of a proposed federal action on listed species by comparing it to severe climate change threats, rather than analyzing the cumulative impact of the action and providing measures to ensure that additional impacts do not tip the species or its habitat towards irreversible decline. Shifting from these dated practices towards approaches that are focused on applying ecological knowledge and precaution and building resilience will require strong, clear directives from NMFS leadership. Fortunately, existing law not only authorizes but often requires the science- and ecosystem-based approaches that will build resilience in fisheries and protected resources.

I. Building Fishery Resilience by Addressing Ecosystem Connectivity

Building climate-resilient fisheries requires shifting away from the traditional management emphasis on maximizing catch of individual species towards an emphasis on maximizing the health of fish populations and the ecosystems to which they belong. A resilience-building, ecosystem-based management approach requires conserving and promoting species abundance and diversity, as well as actively addressing the connection between species and the health of their habitat. Recognizing the wealth of scientific literature that exists on these concepts, we provide a brief explanation and examples below.

A. Promoting Species Abundance to Foster Resilience

While traditional fishery management tends to focus on maintaining a level of abundance that enables continued exploitation of a fish population, resilience-focused management would focus on achieving and maintaining a level of abundance that enables a species to fulfill its role in the ecosystem. For example, many predatory fish populations, including salmon, tuna, and groundfish, depend on abundant forage fish populations for high quality nutrition that promotes growth and productivity. Managing forage fish populations, such as menhaden, herring, sardine, and anchovy to promote abundance levels that fully support these predatory fish, as well as other marine predators such seabirds and marine mammals, should be the express goal of forage fish management. This is particularly crucial now that climate change is likely contributing to more frequent and unpredictable fluctuations in forage fish population levels—fluctuations that are exacerbated by excessive fishing pressure.

Achieving an abundance of top predator populations is also key to supporting overall ecosystem health. For example, studies have linked high shark biomass with increased coral reef health and resilience to bleaching. Fostering the recovery of shark populations through decreased fishing pressure and bycatch would help promote coral reef health. Conversely, managing species only to avoid extremely low population levels may preserve the species' presence in the ecosystem but at insufficient numbers for it to fill its role in mediating the effects of other marine

fish and wildlife species on important habitats. For instance, studies show that sharks play an important role in controlling sea turtle herbivory and thus protecting healthy seagrass beds. These seagrass beds function both as key habitat for numerous species and as blue carbon sinks. Fostering a healthy abundance of sharks helps protect this vital habitat and the species it supports.

In coral reef ecosystems, maintaining abundant populations of herbivores like parrotfish and urchins is essential to make space for coral to grow and reproduce. Climate change poses an especially severe threat to coral reef ecosystems, making sound herbivore conservation urgently necessary.

B. Promoting Species Diversity to Foster Resilience

Ensuring species diversity is critical to ensuring that multiple species are available to fill vital ecosystem functions like forage, grazers, and keystone predators. Ecosystems that lack this kind of functional redundancy are vulnerable to collapse. For example, kelp forests off the northern California coast have collapsed after sea stars that provided the only significant check on urchin populations died off from disease and no other predators were there to fill that role. Coral reefs in the Caribbean have suffered dangerous algal overgrowth due to urchin die-offs and excessive take of remaining herbivores, especially parrotfish. On the West Coast, multiple forage fish species have decreased significantly, with Pacific sardine continuing to decrease to extremely low levels. Those decreases make it all the more crucial to both rebuild those populations and foster continued abundance of species that—for now—are at higher population levels.

C. Addressing Interplay Between Species and Habitat

As the reef, kelp forest, and seagrass examples above illustrate, species affect their habitat as much as habitat affect the species. Fishery management that fosters climate resilience must explicitly address the effects that altering species' numbers has on the habitat they occupy—and sometimes create for other species.

D. Additional Management Approaches Necessary to Boost Resilience

In addition to accounting for species' ecological importance in directed fisheries, climate-resilient management must minimize harm to numerous species and habitats from indiscriminate fishing practices. This requires serious efforts to minimize bycatch by placing hard limits on bycatch, implementing time-area fishing restrictions to protect biodiversity hotspots, and promoting shifts to more selective fishing gear and methods. It also requires preventing physical habitat damage from gear, particularly when that damage harms habitats that function as blue

carbon sinks or—as in the case of bottom trawling carbon-rich sediments—actually release large amounts of stored carbon dioxide.

NMFS and the Regional Fishery Management Councils (collectively, "fishery managers") must also address the likelihood that fish populations will shift their geographic range in response to changing ocean conditions, meaning new species will become vulnerable to fishing in regions where they are not currently targeted or managed. To prevent unregulated and potentially unsustainable exploitation of these shifting stocks, fishery managers should implement precautionary restrictions on fishing for stocks that are currently unmanaged in the relevant jurisdiction unless sound scientific data and analysis demonstrate such fishing is sustainable and all MSA-required management measures are in place for the stock.

II. MSA Mandates for Ecosystem-Based, Resilience-Focused Fishery Management

Fishery managers have broad authority to incorporate ecosystem resilience concerns into fishery management. The MSA specifies numerous responsibilities that fishery managers must fulfill and assigns NMFS the ultimate "responsibility to carry out any FMP or amendment approved or prepared by NMFS," as well as the authority to "promulgate such regulations as are necessary to discharge that responsibility or carry out any other provision of Magnuson." 16 U.S.C. § 1855(d). The MSA requires every fishery management plan to contain a number of specific provisions. 16 U.S.C. § 1853(a). In addition, every conservation and management measure promulgated pursuant to the MSA must be consistent with ten National Standards. 16 U.S.C. § 1851(a). Of these standards, the twin goals of National Standard 1 – preventing overfishing while achieving optimum yield on a continuing basis – have primacy over other considerations. 16 U.S.C. § 1851(a)(1); 50 C.F.R. § 600.310(l). Per National Standard 2, all conservation and management measures must be based on the best available scientific information. 16 U.S.C. § 1851(a)(2).

In addition to imposing a number of explicit statutory obligations, the MSA provides more general directions that grant fishery managers broad discretion to implement additional measures they deem appropriate to manage fishery resources. In combination with the more explicit obligations, these general provisions provide managers ample authority to engage in ecosystem-based management. One broad statutory provision states that fishery managers may include management measures in an FMP "to conserve target and non-target species and habitats, considering the variety of ecological factors affecting fishery populations; and . . . prescribe such other measures, requirements, or conditions and restrictions as are determined to

be necessary and appropriate for the conservation and management of the fishery." 16 U.S.C. § 1853(b)(12)-(14)[*sic*].[1]

As explained below, these provisions are applicable to and helpful for managing fisheries with an eye to building fishery resilience by protecting the overall ecosystem functions of target and non-target species. The combination of the MSA's requirements and discretionary provisions provide ample authority to consider such ecosystem effects as predator-prey interactions and trophic cascade effects on habitat, as well as how climate change might interact with those effects.

A. NMFS Must Manage Fish Stocks in a Manner that Protects the Marine Environment

The MSA requires that fishery management councils and/or NMFS develop management measures for any stock in need of conservation and management. 16 U.S.C. §§ 1852(h)(1), 1853(a)(1). "Conservation and management" refers to all of the rules, regulations, conditions, methods, and other measures

> (A) which are <u>required to rebuild, restore, or maintain, and which are useful in rebuilding, restoring, or maintaining, any fishery resource and the marine environment</u>; and
> (B) which are designed to assure that—
> (i) a supply of food and other products may be taken, and that recreational benefits may be obtained, on a continuing basis;
> (ii) irreversible or long-term adverse effects on fishery resources <u>and the marine environment</u> are avoided; and
> (iii) there will be a multiplicity of options available with respect to future uses of these resources.

16 U.S.C. § 1802(5) (emphasis added).

The statutory definition of conservation and management measures plainly supports EBFM to address ecological needs and fishery resilience in multiple circumstances, including: (1) conservation and management to ensure populations remain or get large enough to rebuild, restore, or maintain the stock at a level that supports continued fishing and direct food supply

[1] The legislative history of the Sustainable Fisheries Act indicates that as early as the mid-1990s legislators were calling on NMFS to shift from its stock-specific management approach to an ecosystem-based management approach. *See* NOAA Guide to the Sustainable Fisheries Act, P.L. 104-297 (Feb. 1997) at 67 ("Senator Snowe believes NMFS takes a 'narrow approach' focusing on individual fish populations. She wants us to consider a more 'holistic' approach in an ecosystem context.")

from the stock; (2) conservation and management to ensure forage fish populations remain or get large enough to rebuild, restore, or maintain fishery resources that depend on these forage species; and (3) conservation and management to build, restore, or maintain a species abundance or diversity in order to maintain or restore the marine environment.

The statute's specific references to "the marine environment" in its definition of "conservation and management" further support EBFM. In addition to supporting management for the purpose of sustaining a fishery, this language supports regulation of species that play a critical ecosystem role for the sake of supporting ecological health—for instance, conserving grazing fish and invertebrates that mediate algal growth (e.g., parrotfish and urchins), filter feeders that maintain or improve local water quality (e.g., menhaden and shellfish), "ecosystem engineers" that create habitat for other species (e.g., tilefish), and top predators that mediate populations of mesopredators. In addition, the Act's emphasis on preserving resources for future uses supports management focused on building the resilience of fish populations and marine ecosystems to current and future climate effects.

Other provisions in the MSA also provide a foundation for EBFM. For example, in order to determine which stocks of fish need to be included as part of a fishery management plan, the MSA requires that each FMP include a description of the fishery, including a description of the species of fish involved in the fishery. 16 U.S.C. § 1853(a)(2); 50 C.F.R. § 600.310(d). A "fishery" is defined to mean one or more stocks of fish that can be treated as a unit for purposes of conservation and management, and a "stock of fish" is defined to include a species, subspecies, geographical grouping, or other category of fish capable of management as a unit. 16 U.S.C. § 1802(13), (42). As discussed below, there are grounds to argue that predator and prey species should be managed in an ecosystem fashion – that is, that prey species should be managed as a unit with the species that depend on them for food.

Including forage and other ecologically significant species as "stocks in the fishery" managed by an FMP triggers several useful EBFM requirements. For example, an FMP must "specify objective and measurable criteria for identifying when the fishery to which the plan applies is overfished . . . and, in the case of a fishery which the Council or the Secretary has determined is approaching an overfished condition or is overfished, contain conservation and management measures to prevent overfishing or end overfishing and rebuild the fishery." 16 U.S.C. § 1853(a)(10). These measures, called "status determination criteria," include the overfishing limit, the maximum fishing mortality threshold, and the minimum stock size threshold. 50 C.F.R. §§ 50 C.F.R. § 600.310(c)(1); 600.310(e)(2)(i). Perhaps more significantly, the MSA requires that each FMP establish a mechanism for specifying annual catch limits for stocks in the fishery and accountability measures to ensure that such limits are not exceeded. 16 U.S.C. § 1853(a)(15). Including ecologically related species, such as predator and prey species,

in FMPs would promote more explicit consideration of how fishing affects the health and resilience of the ocean ecosystem.

B. Managing Ecologically Interrelated Species to Achieve Optimum Yield

The primary goal of the MSA, which all conservation and management measures must satisfy, is National Standard 1. This standard requires that "[c]onservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry." 16 U.S.C. § 1851(a)(1). In order to implement this overarching standard, the MSA requires that any FMP must contain "[c]onservation and management measures necessary and appropriate to prevent overfishing and rebuild overfished stocks, and to protect, restore, and promote the long-term health and stability of the fishery." 16 U.S.C. § 1853(a)(1)(A). Measures to protect food source of a predator species, or integrity of ecosystem interactions, are necessary and appropriate to prevent overfishing (in predator-centric sense), rebuild overfished stocks (either of forage species or prey-limited, overfished predators), and protect and promote the long-term health and stability of both a forage fishery and a predator fishery. Similarly, measures to promote sufficient abundance of habitat engineers and top predators so that they can fulfill their role in supporting habitat health are consistent with—and even necessary—to achieve optimum yield.

In addition, the MSA requires that each FMP "assess and specify the present and probable future condition of, and the maximum sustainable yield and optimum yield from, the fishery, and include a summary of the information utilized in making such specification." 16 U.S.C. § 1853(a)(3). The National Standard 1 guidelines state that as part of this process a fishery management plan must identify ecological, social, and economic factors relevant to managing each particular stock, and evaluate them to determine optimum yield. 50 C.F.R. § 600.310(e)(3)(iii). Including more thorough identification and discussion of the ecological factors used in assessing and specifying MSY and OY, including ecosystem relationships, would improve fishery managers' ability to understand the fishery and identify management needed to improve its resilience.

"Maximum sustainable yield" is not defined in the MSA. NMFS's regulations define maximum sustainable yield as "the largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological, environmental conditions and fishery technological characteristics (e.g. gear selectivity), and the distribution of catch among fleets." 50 C.F.R. § 600.310(e)(1)(i)(A). By specifically singling out "prevailing ecological and environmental conditions," this regulatory language supports consideration of current and future climate conditions, as well as larger ecosystem conditions. For example, the availability of adequate numbers and variety of forage fish and invertebrates is a prevailing ecological condition that should be taken into account when specifying MSY for predator species.

Similarly, natural mortality caused by predation pressure is a prevailing ecological condition that should be taken into account when specifying MSY for forage species. An additional ecological factor to consider in the context of forage species is whether shortages in other forage species populations could cause predators to switch prey and place greater pressure on remaining forage populations.

The MSA defines "optimum yield" as the amount of fish which "will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems," and "is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor." 16 U.S.C. § 1802(33) (emphasis added); *see also* Sustainable Fisheries Act Report of the Committee on Commerce, Science, and Transportation, Sen. Rep. 104-276 (May 23, 1996) at 32-33 (Sustainable Fisheries Act of 1996 changed the definition of "optimum" to clarify that ecological, economic, and social factors could only be used to set catch levels lower than MSY, but not higher). Once more, this statutory language explicitly recognizes the protection of marine ecosystems as a highly important factor.

NMFS's NS1 guidelines reflect that broad mandate, explaining that the benefits of protecting marine ecosystems include benefits resulting from maintaining healthy populations (including those of unexploited species), maintaining adequate forage for all components of the ecosystem, maintaining evolutionary and ecological processes, as well as evolutionary potential of species and ecosystems, and maintaining productive habitat. 50 C.F.R. § 600.310(e)(3)(iii)(A)(*3*). In other words, the optimum yield requirement directs fishery managers to address the benefits derived both from keeping the ecosystem healthy and supporting its ability to adapt to the climate change and other factors.

The guidelines also direct fishery managers to consider a number of ecological factors in determining the appropriate level for optimum yield, including the fishery's "impacts on . . . forage fish stocks, other fisheries, predator-prey or competitive interaction, marine mammals, threatened or endangered species, and birds. . . . Also important are ecological or environmental conditions that stress marine organisms or their habitat." 50 C.F.R. § 600.310(e)(3)(iii)(B)(*3*).

Together, the statutory definition of "optimum yield" and these regulations expressly require that fishery managers set OY at a level that allows enough fish to remain in the ecosystem needs to perform key functions like forage, habitat engineering, and trophic regulation. They also require fishery managers to apply best available science on climate change impacts and set OY at a level that will promote ecosystem resilience in the face of changing ocean conditions. Factoring ecosystem resilience needs into OY is particularly important because the MSA establishes achieving OY as one of the two primary, overarching requirements of all fishery management measures. In other words, all management measures, including annual catch

limits and accountability measures, must achieve OY on a continuing basis – thereby contributing fundamentally to the goals of building healthy, resilient fisheries and ocean ecosystems.

C. Ecosystem-Based Management Fosters More Comprehensive Management of Interrelated Stocks of Fish.

National Standard 3 is a separate MSA provision that plainly supports EBFM: "To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination." 16 U.S.C. § 1851(a)(3) (emphasis added). NMFS regulations define "management unit" in terms of the management objectives of the FMP to which the fishery or portion of a fishery belongs. 50 C.F.R. § 600.320(d). Management units "may be organized around biological, geographic, economic, technical, social, or ecological perspectives." *Id.* § 600.320(d)(1). The ecological perspective offered in the regulations, which "could be based on species that are associated in the ecosystem," would easily encompass ecosystem-based management of predators and prey as interrelated stocks. *Id.* § 600.320(d)(1)(vi). Given that "[t]he purpose of this standard is to induce a comprehensive approach to fishery management," 50 C.F.R. § 600.320(b), NS3 supports a comprehensive approach fishery management that takes into account species relationships such as predator-prey interactions that affect multiple fisheries. In short, both the language of National Standard 3 and related regulations endorse an EBFM approach.

D. Essential Fish Habitat Provisions Support Resilience-Focused EBFM

The MSA's essential fish habitat ("EFH") provisions provide another vehicle to promote resilience in the face of climate change. Importantly, the MSA requires fishery managers to *enhance* the amount and quality of EFH by protecting healthy habitats and restoring previously damaged habitats.

In adding the EFH requirement to the MSA, Congress recognized that "[o]ne of the greatest long-term threats to the viability of commercial and recreational fisheries is the continuing loss of marine, estuarine, and other aquatic habitats. Habitat considerations should receive increased attention for the conservation and management of fishery resources of the United States." 16 U.S.C. § 1801(a)(9); see also id. § 1801(a)(2) (recognizing that direct and indirect damage to habitat diminishes the capacity to support fishing). Congress required that every FMP "describe and identify essential fish habitat" and "minimize to the extent practicable adverse effects on such habitat caused by fishing," while also identifying "other actions to encourage the conservation and enhancement of such habitat." 16 U.S.C. §§ 1801(9), 1853(a)(7). The MSA therefore requires three categories of actions with respect to EFH: (1) designating

EFH; (2) minimizing harmful fishing impacts to EFH; (3) actively protecting and enhancing EFH.

To protect EFH, Councils are required to "prevent, mitigate, or minimize any adverse effects from fishing, to the extent practicable, if there is evidence that a fishing activity adversely affects EFH in a manner that is more than minimal and not temporary in nature." 50 C.F.R. § 600.815(a)(2)(ii). Adverse effects mean "any impact that reduces quality and/or quality of EFH," and may include "direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH." Id. § 600.810(a).

Importantly, Congress recognized that the identification and conservation of EFH would be an ongoing process. As scientific knowledge of fish species, their biological needs, habitat usage, and new information on adverse impacts advances, EFH designations and conservation must be updated to reflect that understanding. 16 U.S.C. § 1855(b)(1)(A) (NMFS to review and update EFH designations "based on new scientific evidence or other relevant information."); 50 C.F.R. § 600.815(a)(10). Like all conservation and management measures promulgated pursuant to the MSA, EFH identifications and revisions must be based on the best available science. 16 U.S.C. §§ 1851(a)(2). NMFS regulations echo this requirement, calling on Councils to obtain EFH information from "best available sources," including peer-reviewed literature and unpublished scientific reports, among others, and to "interpret [EFH] information in a risk-averse fashion to ensure adequate areas are identified as EFH for managed species." 50 C.F.R. § 600.815(a)(1)(iv).

The MSA's EFH provisions are meant to foster a proactive approach to protecting and enhancing fish habitat. *See, e.g.*, H.R. Rep. 104-171 at 30-31 (expressing Congress' intent in the 1996 Sustainable Fisheries Act "to encourage the Councils to take a proactive approach to limiting gear types that may harm fisheries or essential fishery habitat or increase bycatch"). The MSA and implementing regulations also contemplate continued efforts to minimize any adverse effects from fishing on all areas of EFH:

> Councils must act to prevent, mitigate, or minimize any adverse effects from fishing, to the extent practicable, if there is evidence that a fishing activity adversely affects EFH in a manner that is more than minimal and not temporary in nature . . . . In such cases, FMPs should identify a range of potential new actions that could be taken to address adverse effects on EFH, include an analysis of the practicability of potential new actions, and adopt any new measures that are necessary and practicable. Amendments to the FMP or to its implementing

> regulations must ensure that the FMP continues to minimize to the extent practicable adverse effects on EFH caused by fishing.

50 C.F.R. § 600.815(a)(2)(ii) (emphasis added). These regulations should also be read in the context of the Magnuson-Stevens Act's call for actions that not only protect EFH from harm, but enhance the quality of EFH. This aspect of the EFH provision further highlights Congress' intent that EFH identifications and protections be implemented in a conservation-oriented, forward-looking way based on evolving information. In other words, these provisions provide a solid basis to manage EFH with the goal of building ecosystem and fishery resilience.

The MSA also requires federal agencies to consult with NMFS regarding any action that agencies authorize, fund, or undertake that may adversely affect EFH. 16 U.S.C. § 1855(b)(2); 50 C.F.R. § 600.920(a)(1). Consultation is required both when the action is originally authorized, funded, or undertaken, as well as when the action is renewed, reviewed, or revised if the renewal, review, or revision may adversely affect EFH. *Id.* At the close of consultation, NMFS must provide the federal agency with recommendations regarding EFH conservation for any action that would adversely affect EFH. 16 U.S.C. § 1855(b)(4); 50 C.F.R. § 600.920(a)-(b). The agency must provide a detailed written response to NMFS and the relevant Council describing the measures the agency proposes to take in order to avoid, mitigate, or offset the impacts of the agency's action on EFH or, if the agency chooses to ignore EFH recommendations, explaining its reasons for not following the recommendations. 16 U.S.C. § 1855(b)(4)(B); 50 C.F.R. § 600.920(k)(1).

EFH consultation requirements provide another tool to promote fishery and ecosystem resilience with respect to both fishery management decisions that affect EFH and non-fishing impacts to EFH. For example, reviews of or revisions to FMPs that manage forage species should trigger EFH consultation with respect to any EFH in which the forage species are a designated component of EFH. For example, several species managed under the West Coast Coastal Pelagic Species FMP are considered components of EFH for Pacific groundfish, salmon, and highly migratory species. Therefore, measures altering allowable catch and other forage fish management measures under the West Coast Coastal Pelagic Species FMP should trigger consultation on the effects of those measures on EFH for groundfish, salmon, and highly migratory species. Such consultation would provide another means to ensure that forage species management promotes the resilience of these dependent fisheries.

With respect to non-fishing impacts, such as dredging, offshore oil and gas activities, and other offshore energy projects, EFH consultation provides the opportunity to press for strong protections for habitats like seagrass, coral reefs, rocky areas, and kelp forests that are crucial for fishery health, climate resilience, and even carbon storage. Using consultation authority not only

to protect existing habitat but provide for enhanced or expanded habitat in the future will be an important part of fostering resilience.

E. Minimizing Bycatch Is Essential to Support EBFM and Build Resilience

National Standard 9 of the MSA requires that conservation and management measures minimize bycatch to the extent practicable and, to the extent bycatch cannot be avoided, minimize the mortality of such bycatch. 16 U.S.C. § 1851(a)(9). This requirement is an essential part of EBFM.

The MSA further requires each FMP to "establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery, and include conservation and management measures that, to the extent practicable and in the following priority—(A) minimize bycatch; and (B) minimize the mortality of bycatch which cannot be avoided." 16 U.S.C. § 1853(a)(11) (emphasis added). When Congress added National Standard 9 to the MSA in 1996, the Senate Committee on Commerce, Science, and Transportation expressly stated that it "anticipate[d] that ecological interrelationships of fish species in the ecosystem will be an important consideration in determining the practicability of minimizing bycatch." Sen. Rep. 104-276 at 13.

The MSA's command to minimize bycatch is especially pertinent to ecosystem-based forage management for a number of reasons. First, most forage species tend to swim in large schools and sometimes mix with other species of forage fish (e.g., river herring are caught in large numbers by vessels targeting schools of Atlantic herring). Second, fisheries targeting forage species generally use large purse seines or other nets that surround entire schools of fish that are swimming close to the surface. These factors render forage species vulnerable to bycatch. Excessive bycatch can adversely affect both the health and sustainability of the ocean ecosystem and is therefore a prime concern of fishery managers who are endeavoring to engage in EBFM. Bycatch monitoring and minimization measures provide both the data to initially show that an unmanaged forage species needs to be added to an FMP and the means to limit the incidental capture and mortality of that species.

Top predators, especially sharks, are also subject to high bycatch rates with very little accounting or understanding of the impact of removing so many predators from the food web. This practice is highly detrimental to EBFM. Better observer coverage and standardized bycatch accounting for fisheries that capture sharks is essential to obtain more reliable information on bycatch rates. In the meantime, NMFS must use the data it has to set enforceable, precautionary bycatch caps that not only aim to rebuild them to a supposed MSY abundance level, but to an ecologically functional abundance level.

III. Building Protected Species Resilience Through the Endangered Species Act

In addition to NMFS's authority to implement ecosystem-based, resilience-focused fishery management measures, NMFS has extensive authority and responsibility to promote resilience of species listed under the ESA. The statute expressly requires NMFS to take actions necessary to ensure that protected populations are resilient to multiple stressors, including climate change. It specifically requires the agency to promote resilience by ensuring survival and *recovery* of ESA-listed species.

ESA Section 7 provides a particularly potent tool to regulate a broad range of actions that federal agencies authorize, fund, or carry out, including offshore oil and gas activities, dredging, discharge of pollutants, fishing, and noise pollution from sonar and seismic testing. Avoiding and minimizing threats from all of these activities is crucial to increase protected species' resilience to adverse impacts from climate change.

Section 7 of the ESA imposes a continuing and affirmative duty on federal agencies to "insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of" its critical habitat. 16 U.S.C. § 1536(a)(2). "Action" is broadly defined to include "actions intended to conserve listed species," "the promulgation of regulations," or any other action that may directly or indirectly cause modifications to the land, water, or air. 50 C.F.R. § 402.02.

Section 7 requires an action agency to engage in formal or informal consultation when it determines that its proposed action "may affect" listed species or critical habitat. *Id.* §§ 402.13, 402.14. Effects determinations must be based on the sum of all effects caused by the action. 50 C.F.R. § 402.02 (defining "effects of the action."). Both the action agency and the consulting agency must "use the best scientific and commercial data available" in evaluating the action's effects and completing the consultation process. 16 U.S.C. § 1536(a)(2); 50 C.F.R. § 402.14(d), (g)(8). If an action may affect a listed species or critical habitat, the action agency must either engage in formal consultation or obtain the wildlife agency's written concurrence that the action is not likely to adversely affect listed species or critical habitat. 50 C.F.R. §§ 402.13, 402.14. Formal consultation concludes in the issuance of a biological opinion that determines whether the action is likely to jeopardize the continued existence of the listed species or destroy or adversely modify its critical habitat. 16 U.S.C. § 1536(b)(3)(A); 50 C.F.R. § 402.14(h). Jeopardy or adverse modification exists if an action reasonably would be expected, directly or indirectly, to appreciably reduce the likelihood of the survival and recovery of a listed species in the wild. 50 C.F.R. § 402.02. If the wildlife agency concludes that the proposed action, when added to the environmental baseline and any cumulative effects, is likely to jeopardize the species, it must

specify reasonable and prudent alternatives that would avoid the likelihood of jeopardy. 16 U.S.C. § 1536(b)(3)(A); 50 C.F.R. § 402.14(h)(2).

The duty to consult is ongoing. ESA regulations reflect that obligation by requiring reinitiation of consultation in certain circumstances:

(a) If the amount or extent of taking specified in the incidental take statement is exceeded;
(b) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered;
(c) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or
(d) If a new species is listed or critical habitat designated that may be affected by the identified action.

50 C.F.R. § 402.16.

Another key aspect of the biological opinion is the incidental take statement. "Take" means to "to harass, harm, . . . wound, [or] kill," 16 U.S.C. § 1532(19), and includes harm in the form of "significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering," 50 C.F.R. § 222.102. The ESA requires NMFS to provide an incidental take statement when the agency anticipates that incidental taking of a threatened or endangered species will occur. 16 U.S.C. § 1536(b)(4). This requirement applies even if take of the species is not prohibited by statute or regulation. *Ctr. for Biological Diversity v. Salazar*, 695 F.3d 893, 910–11 (9th Cir. 2012). The statement must specify the permissible level of taking. 16 U.S.C. § 1536(b)(4); 50 C.F.R. § 402.14(i)(1)(i). In addition, the incidental take statement must specify reasonable and prudent measures that NMFS considers necessary or appropriate to minimize the effects of take, as well as reporting requirements and other terms and conditions with which the action agency must comply in order to implement the reasonable and prudent measures. 16 U.S.C. § 1536(b)(4)(B); 50 C.F.R. § 402.14(i)(1).

To fulfill its statutory obligations and promote protected species' resilience, NMFS must use its ESA authorities promote abundance levels that do not simply ensure the continued existence of a species or population, but affirmatively promote healthy abundance levels and habitats. This will require a more precautionary approach than the one NMFS has generally taken, which improperly focuses on allowing as much take or adverse modification as a species or its critical habitat can withstand instead of promoting increased abundance, habitat health and availability, and full recovery to resilient, healthy population levels.

In addition to its authority to regulate federal actions that could impair the resilience of a species or its habitat, NMFS also has the ability to foster increased resilience through its designation of critical habitat under ESA Section 4. 16 U.S.C. § 1533(a)-(b). As climate change causes species to shift their geographic range, it is crucial to protect suitable habitat outside of the species' current range that accommodates its shifting distribution and provides room for a recovering population.

CONCLUSION

As President Biden's Executive Order recognizes, climate change poses enormous threats to ocean ecosystems and the fisheries and species that depend on them. Ensuring that these precious resources are healthy enough to persist—and optimally to thrive—well into the future requires NMFS to use the full extent of its legal authorities in a proactive, precautionary manner. It also requires that NMFS provide strong, clear leadership, directing regional fishery management councils and its fellow federal agencies to ensure that their decisions promote the health of fisheries, protected species, and the habitats they depend on. We look forward to working with NMFS to advance and implement these measures.

Sincerely,

Andrea A. Treece
Attorney, Oceans Program

MADE IN ALASKA

MARICULTURE

Ms. Heather McCarty, Chair, Alaska Mariculture Task Force

[redacted]

RE: Recommendations to make fisheries and aquaculture more resilient to climate change

To Whom It May Concern:

April 2, 2021

In response to NOAA's request for recommendations regarding how to make fisheries and aquaculture more resilient to climate change, the Alaska Mariculture Task Force (Task Force) submits the following recommendations. (*NOTE: In references by the Task Force, mariculture is defined as enhancement, restoration, and farming of shellfish and seaweed. Mariculture does not include fin-fish farming, which is prohibited by state law.*)

Task Force Background

In 2016, the Task Force was established by Administrative Order (AO) #280 and re-authorized in 2018 by AO #297. The AOs describe the benefits provided to Alaskans by a fully developed mariculture industry:

- Economic – providing jobs and commerce in coastal communities:
- Environmental – improving the local ecosystem in various ways, such as providing habitat improvement, carbon removal, or countering ocean acidification;
- Cultural – compatible with traditions, cultures, and skills in rural communities;
- Industrial – complements and expands our existing renewable seafood industry, which is Alaska's largest private sector employer;
- Food Security – increases access to local foods for Alaskans.

The Task Force was directed "*to create a comprehensive plan for the development of a viable and sustainable mariculture industry producing shellfish and aquatic plants for the long-term benefit of Alaska's economy, environment and communities*". The comprehensive plan was completed in 2018 and can be viewed here. Additionally, a brief version of the plan can be viewed here, ***with the goal to grow a $100 million industry in 20 years.***

The planning process included five advisory committees and a phased economic analysis to inform the development of the comprehensive plan. The first phase of the economic analysis involved a set of case studies of other regions with successful mariculture industries and relevance to Alaska in terms of species, regulatory structure, etc., which demonstrated common pre-existing elements leading to success (i.e. pre-existing large-scale seafood industry) and common challenges to overcome. The second phase of the economic analysis provided an economic framework for the development of a $100 million mariculture industry in 20 years. This framework included the following six species currently under some level of research and development in Alaska and annual revenue goals in 20 years: oysters ($30M), geoducks ($10M), seaweeds ($15.7M), mussels ($7.5M), sea cucumbers ($6.5M), and King crab ($5.7M).

Recommendations

First, related to fishery management, it is essential that fishery management continue to prioritize monitoring and stock assessment, in order to see change in stocks (increases or decreases) as quickly as possible. This allows for adaptive management guided by the precautionary approach to take swift and responsible actions to appropriately adjust harvest levels in the face of change.

Second, related to shellfish fisheries, if ocean acidification continues along its projected trajectories, investments should be made NOW in shellfish hatcheries, which can culture shellfish in its early stages and adjust Ph levels in order to increase survival during the vulnerable juvenile stages. These cultured shellfish may be necessary to restore and rehabilitate wild stocks to prevent crashes from which it would likely take decades to recover. It takes several years to get a shellfish hatchery built, operating, staffed and producing up to full capacity. It is absolutely necessary to get ahead of that curve now. This is a critical place for NOAA to invest in facilities, staff, research and training.

Third, related to aquaculture, it is promoted by NOAA that aquaculture will provide resilience to US food production. Additionally, it is widely understood and promoted by NOAA that shellfish and seaweed aquaculture provide numerous ecosystem services which are beneficial to the ocean and wild stocks. Some refer to this as a "restorative industry", one that not only produces a resource, but also helps to restore other resources. Emphasis on the development of restorative industries should be emphasized as one way to adapt to a world in which climate change is the norm.

In Alaska, the Task Force is working on a Five-Year Action Plan to build a foundation for the growth of the mariculture industry. NOAA financial and technical support, particularly in the early stages of this development, is critical to reach a fully developed mariculture industry, which produces significant environmental benefits, including the removal of excess nitrogen and carbon, to our oceans.

Fourth, the commercial fishing/aquaculture fleet of vessels and processing facilities need financial and technical support in upgrading from diesel-burning engines and power supplies, to upgraded technologies which increase energy efficiency and reduce emissions. In Alaska, the commercial fishing fleet operates approximately 9,000 registered vessels and deliver to dozens of processing plants which still operate on diesel generation.

Thank you for your consideration of our comments. If you have questions, feel free to email me.

Sincerely,

Heather D. McCarty

Heather McCarty, Chair, Alaska Mariculture Task Force

[redacted]

Ocean Conservancy

[redacted]

www.oceanconservancy.org

April 2, 2021

Mr. Benjamin Friedman
Deputy Under Secretary for Operations
National Oceanic and Atmospheric Administration

RE: Climate Recommendations for Fisheries and Protected Resources

Dear Mr. Friedman:

Ocean Conservancy[1] thanks NOAA Fisheries for the opportunity to comment on Section 216(c) of the Executive Order on Tackling the Climate Crisis at Home and Abroad (E.O. 14008).[2] The challenge that climate change poses to fisheries and fishery management is grave, and gathering input under the E.O. is an important first step toward climate-ready fishery management. Fundamentally, the successes of the U.S. management system, the sustainability of our fish stocks, and the livelihoods and cultures of Indigenous and fishing-dependent communities are at risk unless action is taken soon to act on the information we have to adapt our fisheries for significant change.

Fishing feeds us, connects our families, and sustains vibrant cultures. Our oceans and fisheries are central to food security and culture for Indigenous people who have been stewards of these resources for millennia. The fishing and seafood sectors generated $244 billion in sales and supported 1.74 million jobs in the U.S. in 2017.[3] Thriving fisheries depend on healthy fish stocks and effective management that keeps fishing within sustainable limits. The strong fishery management system in the U.S. has enabled the rebuilding of 47 fish stocks and greatly reduced overfishing.

However, the ocean and climate are changing rapidly, which is jeopardizing the health of fish stocks and the marine ecosystem, the sustainability of fisheries and the resiliency of coastal communities. Because of climate change, the ocean is becoming warmer, more acidic, and lower in oxygen. Additional changes include sea level rise; increases in extreme events, such as hurricanes and marine heatwaves; and worsening coastal erosion and sea ice loss.[4] These changes, in turn, impact fish populations, marine mammals, seabirds and other marine organisms. While shifts in fish stock distributions toward cooler waters are one of the most visible and well-documented changes, they are far from the only impact observed on fish.[5] Many stocks are also becoming less productive and less resilient to other threats, like

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[1] Ocean Conservancy is working to protect the ocean from today's greatest global challenges. Together with our partners, we create science-based solutions for a healthy ocean and the wildlife communities that depend on it.
[2] NOAA Fisheries, *Recommendations for More Resilient Fisheries and Protected Resources Due to Climate Change*, 86 Fed. Reg. 12410 (March 3, 2021).
[3] NOAA Fisheries. 2020. Fisheries Economics of the United States 2017 Report Infographics. Available at: https://www.fisheries.noaa.gov/national/sustainable-fisheries/fisheries-economics-united-states
[4] IPCC. 2019. Special Report on the Ocean and Cryosphere in a Changing Climate. https://www.ipcc.ch/srocc/
[5] Hollowed, A. B., *et al.* 2013. Projected impacts of climate change on marine fish and fisheries. ICES Journal of Marine Science, 70: 1023–1037.

pollution or habitat degradation. These changes have resounding impacts throughout the ecosystem.

Fisheries are also affected by climate change, and fishery-dependent coastal economies and Indigenous communities and cultures are particularly vulnerable.[6] For fisheries, climate change could result in lower catches, less stability, shifting and emerging fisheries, loss of traditional target species, new bycatch interactions, more extreme events and disasters, and impacts to ports and other fishing infrastructure.[7]

The severity of these impacts, and the fact that they are already occurring creates a pressing need to act now and transition to climate-ready fisheries. Climate-ready fishery management means taking action now to understand, predict, plan and adapt to the impacts of climate change on fisheries and the communities that depend upon them to improve the long-term health and resilience of the ecosystem. There are tools and practices that NOAA Fisheries and its partners can put into place in the near term that will yield positive benefits, but the scale and pace of efforts must be increased. At the same time, the agency should undertake efforts to continue to prepare fisheries science and management to rise to the climate challenge in the longer term.

E.O. 14008 is timely. Delaying action to address the climate impacts on oceans and on fisheries has costs, with delays in implementation increasing risks.[8] Failing to take action is likely to result in less stable management and more fisheries disasters. It is worth noting that while some climate change effects resulting from past emissions are inevitable, the magnitude of effects will be determined by present and future emissions. Fundamentally, we need to reduce greenhouse gas emissions immediately to head off the most severe impacts of climate change on fisheries. The adaptation solutions we discuss here should be part of a larger effort on the part of the Biden Administration that includes reductions of greenhouse gas emissions.

In this letter, Ocean Conservancy offers seven recommendations for NOAA Fisheries to transition to climate-ready fishery management: 1) recommit to sustainable management, 2) build upon the foundation of existing climate-ready fisheries work from the agency and partners, 3) integrate climate considerations into the management process, 4) support the science enterprise needed for climate-ready management, 5) take action to prepare and adapt fisheries in a way that is inclusive and equitable, 6) increase funding and capacity, and 7) use input collected under the E.O. to implement the climate-ready fisheries in a transparent process.

1. **Recommit to sustainable fishery management, which is a necessary component for climate-ready fisheries and the resiliency of fish stocks.**

The U.S. has an effective system of federal fishery management under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) that has resulted in successful rebuilding of stocks and notable reductions in overfishing.[9] However, many stocks experience chronic overfishing, and there has

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[6] Barange, M., *et. al*, 2018. Impacts of climate change on fisheries and aquaculture: Synthesis of current knowledge, adaptation and mitigation options (No. 627), FAO Fisheries and Aquaculture Technical Paper. Rome.
[7] Free, C. M., *et al*. 2019. Impacts of historical warming on marine fisheries production. Science, 363: 979–983; Barange, *et al.* 2018. Impacts of climate change on fisheries and aquaculture: Synthesis of current knowledge, adaptation and mitigation options. FAO Fisheries and Aquaculture Technical Paper, 627. Rome.
[8] Holsman, K. K. *et al.* 2019. Towards climate resiliency in fisheries management. ICES Journal of Marine Science, 76: 1368–1378.
[9] NOAA Fisheries. 2020. Status of Stocks 2019: Annual Report to Congress on the Status of US Fisheries.

been a concerning uptick in the number of stocks declared overfished in the last few years. Achieving sustainable management under the existing system of statutory requirements to keep catch within sustainable limits, rebuild overfished stocks, and end overfishing is critical for preparing fisheries for climate change. The agency must recommit to achieving sustainable management of fish stocks by addressing remaining fundamental conservation and management challenges so that fish stocks are as resilient as possible in facing climate change.

The MSA has enabled effective management for many fisheries. Unfortunately, climate change is already threatening this success. The agency has identified climate change as a driver of declines in some of the newly overfished stocks that now require rebuilding plans.[10] Climate change will make meeting rebuilding targets for some stocks more challenging, and overfished populations are even more vulnerable to climate threats.[11] However, that fact does not change the agency's mandate to rebuild stocks back to healthy levels in as short a time as possible, as well as its mandate to prevent overfishing, which lowers stock resilience. Recommitting to sustainability will require the agency to do more to uphold the core requirements in the MSA, take action when Fishery Management Councils ("councils") fail to do so, and ensure science-based accountable management for all fisheries and sectors.

The agency can also build on efforts to adopt ecosystem-based fisheries management (EBFM). The EBFM framework allows managers to consider environmental and ecological information in decision-making within a sustainable management system. Many of the actions needed to prepare and adapt fisheries for change could be conducted under the existing EBFM umbrella; however, NOAA scientists recently found that implementing EBFM (in the case of the study, exemplified through the overarching annual cap on groundfish catch in the Eastern Bering Sea) alone would not be sufficient under continued change.[12] Fishery Ecosystem Plans (FEPs) have been the key vehicle for EBFM in the U.S., and have also been an important driver of efforts to address climate change impacts.[13] For example, the FEP implemented by the Pacific Fishery Management Council in 2013 is currently serving as a platform to explore options to address climate change along the U.S. West Coast. It has also enabled the council to formalize development of an annual Ecosystem Status Report from NOAA that provides information on ecosystem and climate-related indicators. EBFM and the EBFM Policy should be bolstered at the agency with a focus on elevating climate-ready management linkages. Councils could additionally benefit from increased use of FEPs and greater cross-region communication of best practices and lessons learned.

Fisheries have always operated in an uncertain environment, and the science-based and precautionary approach in the MSA has fostered sustainability and improved stability. Climate change brings greater variability and uncertainty, and thus taking a precautionary approach is essential. While management will need to be responsive, adaptable, and nimble, this does not mean that regulations and management requirements should be loosened. Changes that allow for unsustainable fishing will only erode the resilience of fish stocks, with impacts to fisheries. At the same time, there may be new sustainable fishing opportunities that can support fishing communities through change. However, climate-ready fishery management should not assume that all types of fishing are appropriate in every place and time, particularly in the face of scientific uncertainty about impacts and sustainability.

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[10] *Ibid.*

[11] Bell, R. J., *et al*. 2018. Rebuilding in the face of climate change. Canadian Journal of Fisheries and Aquatic Sciences, 75: 1405–1414.

[12] Holsman, K. K., *et al.* 2020. Ecosystem-based fisheries management forestalls climate-driven collapse. Nature Communications, 11: 457.

[13] Levin, P. S., *et al.* 2018. Building effective fishery ecosystem plans. Marine Policy, 92: 48–57.

Finally, climate change and fishing are not the only pressures that fish populations experience. Habitat degradation, decline of important ecosystem species, and other threats can affect population and ecosystem resilience and interact with the effects of fishing and climate on fish stocks.[14] The agency should prioritize effective management of these other marine threats as part of its stewardship mission, inclusive of efforts to conserve protected resources and habitat.

2. **Build on the strong foundation for climate-ready fisheries created by the agency and its partners.**

Over the last decade, NOAA Fisheries and its partners, including the councils, have built a solid foundation for action on climate-ready fisheries. Now, we are at a critical point where efforts to adapt management for climate change need to be expanded and accelerated. To start, the agency should leverage existing complementary frameworks to kick start a cohesive climate-ready management approach.

In 2015, NOAA Fisheries developed its Climate Science Strategy, which effectively set a new course for how the agency would address climate impacts to fisheries and the management system.[15] As a next step, regions created Regional Action Plans (RAPs) that identified specific actions to implement the strategy.[16] In 2018, NOAA issued a subsequent technical memo and paper focused on management needs resulting from shifting distributions and changing productivity of fish stocks.[17] At the five-year mark for the strategy, the agency should evaluate and report on progress as a near-term step, including for both the overarching strategy and the RAPs. The strategy, along with other fundamental documents like the EBFM Policy and Roadmap and the next generation Stock Assessment Improvement Plan, can be integrated as important components of a comprehensive approach to implementing the E.O.

The Regional Offices and Fisheries Science Centers have taken valuable steps to address specific regional climate challenges, fill knowledge and research gaps, and implement tools tailored to meet the needs of councils. Working with NOAA, the councils have adopted a range of actions to prepare for climate change. The Integrated Ecosystem Assessment (IEA) program at the agency has played a key role connecting scientists and fishery managers. The IEA model is intended as an approach to organize science in order to inform decision-making and conduct the collaborative science needed for ecosystem-based management.[18] It has enabled the development of cutting edge projects and products that are scientifically rigorous, meet management needs, and are informed by and often co-produced with managers and stakeholders. As the name would suggest, the IEA program has also been an integrative force within the agency to bring climate information to the councils in a relevant and accessible format.

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[14] Bell, R. J., *et al*. 2020. Actions to Promote and Achieve Climate-Ready Fisheries: Summary of Current Practice. Marine and Coastal Fisheries, 12: 166–190.

[15] Link, J.S., Griffis, R, and S.Busch (editors). 2015. NOAA Fisheries Climate Science Strategy. U.S. Dept. of Commerce, NOAA Technical Memorandum NMFS-F/SPO-155, 70p.

[16] NOAA Fisheries, Climate Science Strategy Regional Action Plans. Available at: https://www.fisheries.noaa.gov/national/climate/climate-science-strategy-regional-action-plans

[17] Karp, M. A., Peterson, J, Lynch, P.D. and R. Griffis (editors). 2018. Accounting for Shifting Distributions and Changing Productivity in the Fishery Management Process: From Detection to Management Action. U.S. Dept. of Commerce, NOAA. NOAA Technical Memorandum. NMFS-F/SPO-188, 37 p.

[18] Levin, P. S., *et al*. 2009. Integrated Ecosystem Assessments: Developing the Scientific Basis for Ecosystem-Based Management of the Ocean. PLoS Biol, 7: e1000014; Spooner, E., *et al.* 2021. Using Integrated Ecosystem Assessments to Build Resilient Ecosystems, Communities, and Economies. Coastal Management, 49: 26–45.

Moving forward, the agency can empower the IEA by ensuring adequate capacity, strengthening ongoing collaboration with other programs and with managers, and further expanding and refining products to address key management questions.

3. **Integrate climate information into management by applying tools, new approaches and developing guidelines.**

Climate change affects every part of the management process. Surveys and data collection are facing additional demands as fish move to new areas and exhibit different spatiotemporal patterns and behaviors. Understanding of key fish characteristics and their relationships to ecosystem conditions must be reevaluated, and the fundamental assumptions of stock assessments will need to be updated in order to continue to provide high quality scientific advice. Managers need ways to make decisions that acknowledge climate-related risks and clarify a growing number of tradeoffs. They also must be prepared to deal with disasters and unexpected changes that will put greater pressure on the system. Even with access to climate information, there must be clear pathways for managers to use that information and adjust management action accordingly.

We highlight the following opportunities to accelerate the use of climate information in management:

Plug ecosystem and climate information into the management process:
Tools and practices already in place to help ensure sustainable fisheries also support climate-ready fisheries. For example, the IEA program in each region could be empowered with greater capacity and resources in order to produce additional reporting for the councils on ecosystem conditions and develop indicators and thresholds to inform management decisions. These thresholds can provide an early warning for when adjustments are needed. FEPs can be harnessed as a vehicle with which to set goals and objectives and drive initiatives at the council level to address climate impacts in a comprehensive and cross-cutting manner. For example, at the North Pacific Fishery Management Council, the Alaska region Climate Change Action Module builds from the Bering Sea FEP framework to support implementing management measures aimed at ensuring the sustainability of fisheries and coastal communities in the context of climate change.[19] Work associated with the Climate Change Action Module will assess climate risks and vulnerabilities and evaluate management adaptation strategies, such as modified harvest control rules, area-based conservation measures, alternative time-space closures, and bycatch reduction incentives. Collectively, these management adaption recommendations will support the council to develop climate-resilient strategies in the region.

Empower the councils and their science advisors:
The agency can develop the necessary decision support tools for the councils to integrate climate change information into management decisions. Many councils have engaged with the issue of climate change at some level and have taken actions to understand impacts to the fisheries in their jurisdictions. Councils now need more support and guidance on how to use climate information to shape decisions and translate information from tools into adjustments in management. The agency has taken initial steps in this direction for some tools with technical memoranda,[20] but further guidance is needed at a

[19] Steam, D. *et al*. 2020. Supporting climate-resilient fisheries through understanding climate change impacts and adaptation responses: draft Climate Change Task Force workplan of the Bering Sea Fishery Ecosystem Plan. North Pacific Fishery Management Council.
[20] *See* Karp *et al.*, *supra* note 17; Morrison, W.E. & V. Termini. 2016. A Review of Potential Approaches for Managing Marine Fisheries in a Changing Climate. NOAA Technical Memorandum NMFS-OSF-6, 34 p.

finer-scale and applied level in order for councils and regional offices to operationalize climate-ready management. The agency should continue to clarify for councils their existing responsibilities and additional opportunities to include climate and ecosystem information in fishery management plans and management measures as part of the conservation and management of fish stocks, including achieving optimum yield. At an individual level, council members could be further equipped with the tools, terminology and scientific grounding to meet climate challenges in fisheries through ongoing training and regular updates on climate-ready efforts from the agency.

At the councils, the Scientific and Statistical Committees (SSCs) are at the core of science-based management. The SSCs already serve the role of integrating a range of information on fish stocks to provide management and technical advice, and some SSCs already use ecosystem information and have dedicated ecosystem subcommittees (e.g. the Pacific Fishery Management Council). The agency should assess the climate expertise on SSCs and consider whether there are ways to support and develop additional climate expertise, for example through training or expanded membership. The agency could also consider reviewing the SSC Terms of Reference for each council to assess opportunities to include more explicit direction on the inclusion of climate and ecosystem information in SSC duties and objectives and provide guidance.

Leverage tools that assess risk and vulnerability to clarify priorities for action:
Risk assessment is a tool that identifies threats and vulnerabilities on species, communities, fisheries interactions, or other elements of focus. These assessments typically quantify the probability of undesirable events and their consequences in order to prioritize management and assess tradeoffs.[21] While use of risk assessment is not inherently linked to management action, it does allow scientists and managers to determine areas of continued analytical focus given limited time and resources and how to prioritize inclusion of ecological information in the science to management process.[22] The Mid-Atlantic Fishery Management Council has used risk assessment as part of its broader ecosystem approach to fisheries management (EAFM). The goal of the effort was to bring ecosystem considerations into management actions in a stepwise evolution.[23] In coordination with the Northeast IEA program, the council implemented a risk assessment tool using ecosystem indicators. These indicators identified priority ecosystem considerations for further research and policy development, which were intended to be followed by development of a conceptual model and management strategy evaluation (MSE). While the effort was not designed solely to address climate change risks to meeting management objectives, it includes consideration of climate interactions and could be further adapted to support climate-ready tools. The method has the benefits of being a rapid and scalable way to operationalize EAFM in a real-world fishery context.[24] It also features clearly defined roles and interactions for coordination between decision-makers and scientists.

Similarly, NOAA Fisheries has several climate vulnerability assessments (CVAs) completed or in the final stages of preparation for fish stocks and protected resources. Based upon a methodology established by the agency, the fish stock CVAs indicate the exposure and sensitivity of fish stocks to climate change and

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[21] Holsman, K., *et al.* 2017. An ecosystem-based approach to marine risk assessment. Ecosystem Health and Sustainability, 3: e01256.
[22] See Karp *et al*. *supra* note 17.
[23] Muffley, B., *et al*. 2021. There Is no I in EAFM: Adapting Integrated Ecosystem Assessment for Mid-Atlantic Fisheries Management. Coastal Management, 49: 90–106.
[24] Gaichas, S. K., *et al*. 2018. Implementing Ecosystem Approaches to Fishery Management: Risk Assessment in the US Mid-Atlantic. Frontiers in Marine Science, 5.

establish a relative vulnerability of stocks in a region.[25] Now, the councils need explicit instructions on how to translate such information into management action. Managers could use CVA to prioritize stocks for MSEs examining climate readiness or to receive research or management attention. CVAs could also identify vulnerable stocks, where a council and its SSC could consider additional precaution (e.g., buffers) to increase stock resilience. The agency also conducted a CVA for fishing communities along the East Coast and the Gulf of Mexico.[26] This CVA built upon Community Social Vulnerability Indicators (CSVIs) the agency developed, with 14 indices that measure facets of commercial and recreational fishing dependence, social and gentrification pressure vulnerability and climate change vulnerability and resilience to disturbance.[27] These community CVAs will be important for helping managers understand the risk to fishing communities, and the agency should revitalize efforts to conduct these studies.

Risk assessment captures species and fishing community vulnerability to climate change and other threats, making it well-aligned with the objectives of E.O. 14008. NOAA Fisheries should continue to hone and support the tools for use prioritizing assessment and management given climate considerations.

Engage stakeholders in scenario planning:
Scenario planning is a tool to create and explore plausible alternative futures as a way to better understand how to respond to and operate in uncertain future conditions. These futures are not predictive in nature, but instead act as a way to structure thinking, clarify potential solutions, and identify areas for more specific attention.[28] On the West Coast, the Pacific Fishery Management Council adopted a Climate and Communities Initiative in 2017 intended to explore management and fishing community responses to two climate impacts: shifting stocks and changing productivity. As part of this initiative, the council has a scenario planning process underway. Facilitated by an outside expert, the process engages stakeholders to understand and address the perceived threats and related challenges to fisheries and explore potential solutions and associated management actions. The three East Coast councils (New England, Mid-Atlantic, and South Atlantic) are also now engaged in a climate change scenario planning effort that involves stakeholders in envisioning the state of the fishery system under climate change. Scenario planning involves close coordination among stakeholders, managers and scientists, and developing the scenarios themselves is an in-depth and central part of the process. The agency should consider promoting use of scenario planning as a tool that can create buy-in and foster a shared understanding of challenges and opportunities for management action.

Accelerate use of Management Strategy Evaluation:
Management Strategy Evaluation (MSE) uses simulation to compare and evaluate the relative effectiveness of prospective management options over a wide range of possible realities and identifies

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[25] Morrison, W.E., *et al.* 2015. *Methodology for Assessing the Vulnerability of Marine Fish and Shellfish Species to a Changing Climate.* NOAA Technical Memorandum NMFS-OSF-3, 48 p.
[26] Colburn, L. L., *et al*. 2016. Indicators of climate change and social vulnerability in fishing dependent communities along the Eastern and Gulf Coasts of the United States. Marine Policy, 74: 323–333.
[27] Jepson, M. and L.L. Colburn 2013. Development of Social Indicators of Fishing Community Vulnerability and Resilience in the U.S. Southeast and Northeast Regions. U.S. Dept. of Commerce., NOAA Technical Memorandum NMFS-F/SPO-129, 64 p.
[28] Pacific Fishery Management Council. 2018. Agenda Item H.1.a. Ad hoc Climate Scenarios Investigation workgroup report on the Climate and Communities Initiative update. November 2018 meeting. Available at: https://www.pcouncil.org/documents/2018/11/agenda-item-h-1-a-supplemental-csi-report-1.pdf/

management approaches robust to a range of conditions.[29] There is broad agreement that MSEs are an effective tool in fisheries to evaluate potential outcomes of alternative management actions on ecosystem components (natural and human) and identify trade-offs within management objectives. Management approaches identified in MSE can be implemented via updated harvest control rules and Fishery Management Plan amendments, as appropriate. However, the value of MSE as a tool depends on its implementation, which should include close consultation with stakeholders and managers to develop strategies. There are also considerations for MSEs that depend on data availability, appropriate model complexity, and the goals and objectives of the process. There are a broad range of MSE applications, from ecosystem-scale to species-specific. The agency should issue technical guidance to promote effective use of MSE as part of the council decision-making process relevant to climate change.

In the North Pacific, the Alaska Climate Integrated Modeling project (ACLIM) is a comprehensive, multi-year, interdisciplinary effort to characterize and project climate-driven changes to the eastern Bering Sea (EBS) ecosystem.[30] The project includes MSEs on fish and invertebrate species that have been prioritized based on links to climate vulnerability. The project pairs downscaled regional projections of oceanography and biochemistry under differing emissions scenarios with biological and socio-economic models to project fish abundance and distribution in response to fishing and management scenarios. These scenarios were developed in partnership with the NPFMC, and the performance of different strategies in these scenarios was compared to the council's social, ecosystem and economic goals. The ACLIM effort is a "Cadillac" and integrated approach of using MSE that can provide valuable insight into the utility and benefits of the tool for climate-ready management. The agency should provide opportunities to share the process and results of this approach with other councils, but also develop guidance that provides right-sized approaches for less data-rich contexts.

Undertake policy development in key areas:
While NOAA Fisheries currently has many tools for climate-ready fisheries, there are some areas in which new policies and procedures should be developed. Shifting stock distributions, for example, present a host of related jurisdictional, allocation and permitting issues. Managers currently lack a full suite of tools to conduct adaptive management that addresses the conservation and management challenges of shifting stocks and the shifting availabilities of fish stocks in a region. Given the nature of the problem, it necessitates agency-level guidance. Particular consideration should be given to issues around equity and ensuring policies do not result in disproportionate benefits or costs to specific stakeholder groups. Similarly, there should be a clear set of best practices and sustainability safeguards around emerging fisheries.

4. **Strengthen and transform the science and knowledge enterprise to support implementation of climate-ready management.**

Climate change poses serious challenges to the scientific enterprise at NOAA Fisheries and the current ways that data are collected and used. At the same time, climate-ready management requires increasing the production of information for use in decision-making. To successfully navigate these changes, the agency needs to revitalize data collection through more investment, updated systems, and greater coordination and integration of data from other parts of NOAA and from partners. Finally, Traditional

[29] Punt A. E., *et al*. 2014. Management strategy evaluation: best practices. Fish and Fisheries, 10.1111/faf.12104.
[30] Hollowed, A. B., *et al*. 2020. Integrated Modeling to Evaluate Climate Change Impacts on Coupled Social-Ecological Systems in Alaska. Frontiers in Marine Science, 6.

and Indigenous knowledge is a critical source of information that the agency should recognize, support, and use in decision-making.

Expand survey and research capacity:
Fishery-independent surveys used to assess fish abundance and distribution will have to adjust to changes in fish spatial and temporal patterns while retaining the integrity of historical survey data. Without increased resources and adjustments to strategy, NOAA Fisheries will have to make difficult choices about how to meet survey demands. The Administration should invest in NOAA Fisheries' resource survey capacity, expand in-water monitoring, and ensure consistency in surveys across regions. Increasing investments in surveys will maintain the production of high-quality data on fish abundance and drive improvements in survey efficiency and methodology. The agency should also consider new ways to obtain data; enhanced with new technologies and expanded cooperative research programs, NOAA Fisheries can better assess our fishery resources. The integration of data from new survey methods and sources should be done using strong calibration procedures that ensure data are comparable across methods and over time and instill confidence in science projections.

Data collection needs for climate-ready fisheries extend beyond traditional fisheries-independent and -dependent surveys. In order to monitor and detect change, managers will need information on current oceanographic, climate and ecosystem conditions in addition to information on stock characteristics. The agency should consider conducting a review of relevant data collection programs across a wide range of disciplines, including climate, biological, ecological, socioeconomic and other data to assess gaps and needs. To meet data and research needs, cooperative research efforts should also be expanded. For example, cooperative research could refine understanding of how fish respond to localized environmental conditions and their effects on factors like catchability.

With more information available, the agency should increase the capacity to forecast expected changes, support interdisciplinary process-oriented research to understand drivers of changes observed, and continue to develop ecosystem models that resolve cumulative ecosystem impacts and inform reference points. We believe the agency's nascent Climate and Fisheries Initiative is likely to be an important step to meet some forecasting and data needs and increase collaboration across disciplines and branches of NOAA. Regional modeling could provide an array of services for regional stakeholders, including early warning capabilities for extreme events. This initiative should be given adequate capacity and resources, and should be done in the context of providing information for climate-informed management and supporting community resilience.

Support climate-informed stock assessment:
A core limitation for climate-ready fisheries is the need for more frequent stock assessments and better inclusion of ecosystem and climate information in those assessments. While the number is growing, many stock assessments use only limited ecosystem and ecological data, and often use such information as background or in a qualitative manner.[31] While it will not be appropriate or necessary to include ecosystem and climate information in every stock assessment, there should be clear guidance, methods and support for doing so and better inclusion of these considerations in the Terms of Reference for assessments, as suggested in the Climate Science Strategy. Another near-term opportunity is fully

[31] Marshall, K. N., *et al*. 2019. Inclusion of ecosystem information in US fish stock assessments suggests progress toward ecosystem-based fisheries management. ICES Journal of Marine Science, 76: 1–9.

implementing the next-generation Stock Assessment Improvement Plan.[32] The plan will improve the efficiency of stock assessment production while incorporating innovative science- and ecosystem-linked stock assessments, which will make fisheries more responsive to current conditions.

The use of indicators can determine which information can be used in ecosystem considerations. Ecosystem and Socioeconomic Profiles (ESPs) have recently been developed for a number of groundfish and crab stocks in Alaska, including sablefish, Gulf of Alaska (GOA) pollock, Eastern Bering Sea and GOA Pacific cod, Bristol Bay Red King Crab, and St. Matthew Island Blue King Crab.[33] These new profiles are included as an appendix in stock assessment evaluation reports and are intended as a standard framework to assist scientists and managers in incorporating ecosystem and socioeconomic indicators within the stock assessment process.[34] Indicators can be explored and vetted through the ESP process, and if certain climate-based indicators are shown to be effective predictors of fish stock status, they are more likely to be included in future assessments. ESPs have the potential to bridge the gap between ecosystem and socioeconomic research, stock assessment, and eventual management outcomes. ESPs should continue to be developed for all stocks for which there are sufficient data. Where stock-specific data are insufficient to support an ESP, this process will highlight information needs.

Understanding ecosystem linkages and incorporating them into stock assessments gives managers better capability to evaluate effectiveness of current reference points and management approaches under a changing climate, which could shift understanding of stock productivity. For example, scientists at NOAA Fisheries were able to link the recruitment of sablefish to oceanographic processes using available past oceanographic information, but the information can also be updated in near real-time and projected into the future.[35] Understanding this ecosystem link has allowed for re-estimation of historical recruitment to develop climate-ready reference points, now-cast sablefish conditions based on current oceanography in the system, and explore whether the current management approaches will be resilient to changing productivity of sablefish into the future by forecasting the oceanographic-recruitment relationship using IPCC climate scenarios. These approaches demonstrate methods by which climate information could be incorporated into assessments, and the agency should explore efforts to replicate, elevate, and expand them.

Recognize and support the use of knowledge-based decision-making and co-production of knowledge: Fishery management will be improved by utilizing multiple types of knowledge, including Traditional Knowledge (TK) and Local Knowledge (LK). These are important sources of information about what is happening on the water and in communities, which can in turn inform fishery managers as they navigate

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[32] Lynch, P. D., R. D. Methot, and J. S. Link (editors.). 2018. Implementing a Next Generation Stock Assessment Enterprise. An Update to the NOAA Fisheries Stock Assessment Improvement Plan. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-F/ SPO-183, 127 p. Available at: https://spo.nmfs.noaa.gov/content/tech-memo/SAIP2018

[33] Peterson Williams, M. J.,*et al*. 2021. The heat is on: Gulf of Alaska Pacific cod and climate-ready fisheries. ICES Journal of Marine Science. https://doi.org/10.1093/icesjms/fsab032

[34] Shotwell, S.K., Fissel, B., and Hanselman, D. 2019. Ecosystem and socioeconomic profile of the Sablefish stock in Alaska. Appendix 3C *In* Hanselman, D.H., *et al*. 2019. Assessment of the Sablefish stock in Alaska. Stock assessment and fishery evaluation report for the groundfish resources of the Bering Sea Aleutian Islands and Gulf of Alaska. North Pacific Fishery Management Council, Alaska. Pp. 157-202.

[35] Haltuch, M. A., *et al*. 2019. Assessing the effects of climate change on US West Coast sablefish productivity and on the performance of alternative management strategies. ICES Journal of Marine Science, 76: 1524–1542.

a changing marine ecosystem.[36] Including TK in fishery management decisions is supported by the MSA and is aligned with the goal of open and transparent EBFM and several Executive Orders on environmental justice and racial equity.[37]

Increasing and requiring Tribal representation on councils, associated council bodies and within research institutions is critical to creating an equitable management system. TK should be on the same level with Western science, and approaches of knowledge co-production can assist in considering fisheries and communities within larger ecosystem contexts.[38] Tribal representatives, TK holders, and scientific TK experts must have equitable voices throughout the management process and must be at the center of developing methods and processes for including TK in management. To support these relationships, NOAA Fisheries should increase internal capacity to build equitable relationships and research co-production by investing in regional Tribal liaisons for science centers and councils, as well as non-economic social science staff.

5. Ensure climate-ready fisheries management is equitable and inclusive.

We urge the administration to keep equity and inclusivity at the forefront while planning for and implementing climate-ready fisheries. All stakeholders must have meaningful access to the decision-making process and managers must consider and account for diverse stakeholder needs. It is imperative that management decisions are based on equitable impacts to all, including historically under-resourced communities. Councils, as the *de facto* fishery management decision-makers, must have membership from a variety of backgrounds and experiences reflective of those who depend on our oceans and fisheries.

Indigenous communities in particular should be ensured a seat at the management table and have an equitable role in management. Indigenous people have stewarded marine resources for millennia, and health, well-being and culture are inextricably tied to our oceans and fisheries. As detailed above Traditional knowledge must be utilized in decision-making, and co-production of knowledge must be supported and encouraged.

Further, cooperation and collaboration between management bodies, states, Tribes, industry, communities, NGOs and other entities is critical to managing fisheries effectively in a changing ocean. Managers should also recognize the contribution and interests of groups that are less visible within the management process, including processing plant workers and other workers within the supply chain who also depend on the health and sustainability of fishery resources and a productive ecosystem. Open lines of communication and cooperation between all parties is needed.

6. Prioritize climate-ready efforts as a critical funding and capacity need.

Greater investment is needed to ensure our fisheries are prepared for the future. NOAA Fisheries should request significantly increased funding from Congress as a part of the President's Budget proposal to

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[36] Stephenson, R. L., *et al*. 2016. Integrating fishers' knowledge research in science and management. ICES Journal of Marine Science, 73: 1459–1465.
[37] Raymond-Yakoubian, J., Raymond-Yakoubian, B., and Moncrieff, C. 2017. The incorporation of traditional knowledge into Alaska federal fisheries management. Marine Policy, 78: 132–142.
[38] *Ibid.*

provide the resources necessary to transition to climate-ready fisheries management. At the same time, the agency should prioritize existing funding where possible to support these efforts.

There is no silver bullet solution for climate change; instead, changes are needed in every part of the management process, and these will need to be supported by additional capacity and resources. While funding should be directed to new initiatives and areas, supporting existing implementation-ready efforts, like those highlighted in this comment letter, and elevating climate within long-standing program areas is important to ensure a rapid pace of progress.

Implementing climate-ready fisheries will also require more capacity, from building scientific expertise, to ensuring that there is sufficient coordination and communication, and supporting the councils in a more complex management environment. To make climate a priority within the agency, NOAA Fisheries should increase the staff dedicated to the issue. For example, this could include increasing capacity at each Fisheries Science Center with increased staff time dedicated to coordinating with the relevant Regional Office on climate and living marine resource management. We also encourage coordination with other line offices and their programs. NOAA Fisheries will need to work with other parts of the agency in order to detect and anticipate change, understand drivers, and protect ecosystem structure and functioning necessary for resilient fish stocks and healthy fisheries.

7. **Create a transparent and inclusive process for implementing climate-ready fisheries using input collected under E.O. 14008.**

In carrying out this Executive Order, NOAA Fisheries should be transparent with how the process is conducted as well as reporting on progress made using the input collected to inform management. We recommend that the agency collect data on efforts taken related to the E.O. and report to the public annually. Given the set of existing initiatives and frameworks that relate to implementation of climate-ready fisheries, it would also be valuable for the agency to share active initiatives, including their outcomes and a point of contact for more information. Reporting will enable the agency to directly evaluate progress in relation to goals and objectives around climate-ready fisheries. It will also build public trust and buy-in to the process.

We are appreciative of the opportunity for the public—including state and Tribal governments—to provide comments at listening sessions and through the written solicitation. We believe that providing continued opportunities for stakeholder engagement in implementing the E.O. will result in better input and ultimately in stronger and more durable outcomes for resilient fisheries. As one step, we recommend that NOAA Fisheries convene a series of national-level meetings to strengthen stakeholder involvement and share approaches for climate-ready fisheries. These events could be similar in format to the National Saltwater Recreational Fisheries Summit. NOAA Fisheries must also engage directly with Tribes as sovereign governments in consultation and collaboration.

Conclusion

We commend the Biden Administration and NOAA Fisheries for making the commitment to tackle the challenges that climate change presents to fishery management. We support and our recommendations highlight climate-ready fishery management that builds on the proven tenets of sustainable management, integrates climate change information and considerations into management processes, and strengthens the scientific enterprise to prepare it for change. To fully realize the vision of resilient fisheries in E.O. 14008, the agency must take action in a way that is transparent, inclusive and equitable, and increase funding and capacity for these efforts.

Climate-ready fishery management means taking action now to understand and adapt to the impacts of climate change on fisheries and the communities that depend upon them. Implementation management using input collected under section 216(c) will support working waterfronts and sustainable small-scale fisheries, will further implementation of EBFM, and fortify our nation's valuable living marine resources for a changing ocean environment.

Sincerely,

Meredith Moore
Director
Fish Conservation Program

Elizabeth Cerny-Chipman
Senior Policy Analyst
Fish Conservation Program

COMMERCIAL FISHERIES
CENTER OF RHODE ISLAND

Benjamin Friedman
Deputy Under Secretary for Operations
U.S. Dept. of Commerce

April 2, 2021

Dear Administrator,

On behalf of the undersigned members of the Rhode Island commercial fishing industry, thank you for the opportunity to present our recommendations on climate-resilient fisheries. This letter responds to 86 FR 12410 in support of Section 216(c) of President Biden's Executive Order 14008, "Tackling the Climate Crisis at Home and Abroad."

Climate resilience must first and foremost take into account the fact that the marine environment has always been, and will always continue to be, dynamic. Unfortunately, the same cannot be said for fisheries management. Thanks to climate change, we are now beginning to realize this. The task before us now is to design a management system that is as adaptable as our marine ecosystems and the fishermen who depend on these ecosystems. Achieving climate resilience means investing in human systems—science, management, harvesting activities, and the markets—that are capable of flexing in synch with ecological systems while continuing to provide optimal value to the American public.

Members of the Rhode Island commercial fishing industry include captains, crew, owners, owner-operators, netmakers, bait stringers, seafood dealers, seafood processing and delivery staff, engine mechanics, fuel and marine suppliers, nonprofits, and more. We share a deep pride in providing nutritious wild-caught seafood to our communities, our nation, and the globe.

Rhode Island fishermen see ecological change firsthand. We see increases in our catches of Mid-Atlantic target species such as black sea bass, squid, fluke, sea robin, and bluefish. We see greater frequency of bycatch of warm-water species like tarpon, cobia, croaker, drum, kingfish, garfish, and spot in our incidental catches. We see migratory species arriving earlier in the season and sticking around later. We see some species moving further offshore or northeastward into Georges Bank and the Gulf of Maine. Changes are not limited to our target species: we see more seals, more cormorants, and more nuisance seaweeds, as well.

These changes create both new challenges and new opportunities. Achieving resilience in the face of climate change means *both* buffering our fishery system against new challenges *and* enabling the fishery system to take advantage of new opportunities.
Already, Rhode Island fishermen have been adapting to these changes. Some have been traveling further to catch and land their fish. Others have increased the diversity of the species they target and the markets they sell them into. However, adaption is not something that fishermen can do alone. All too often, a static and sluggish management system blocks fishermen from doing the very things they must do to continue providing seafood to the American public in a changing climate. For this reason, building climate-resilient fisheries must start with a focus on management itself. But the work does not stop there.

Below, we highlight eleven action items that NOAA, the regional fisheries management councils, and other branches and agencies of the federal government can take to impart greater resilience into the fisheries system and remove barriers to climate adaptation. These recommendations were contributed by the Commercial Fisheries Center of Rhode Island and the 125 diverse members of the Rhode Island fishing industry who participated in the Resilient Fisheries RI project of 2016-2018. More information about these efforts can be found at www.cfcri.org and www.resilientfisheriesri.org.

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Protect and restore habitat from non-fishing impacts. U.S. fisheries management's near-exclusive focus on fishing as a driver of ecosystem change is deeply problematic, and it obscures the many other anthropogenic factors that shape our marine ecosystems. Climate change is one of these factors. Others include water pollution, coastal development, offshore development, watershed fragmentation, invasive species transport, mining and dredging, and many more. The effects of climate change do not diminish these other factors; in fact, they are likely to magnify effects of other stressors while making it harder to pinpoint and manage the causes of ecosystem change. Ramping up science and management around non-fishing impacts to fish habitat should be a top priority for NOAA, the regional fisheries management councils, Congress, and the states. In Rhode Island, many fishermen share deep concerns about the health of Narragansett Bay (an estuarine ecosystem heavily impacted by wastewater discharges) and the wind farm development on the continental shelf. These concerns are

interwoven with climate change in many ways; thus, they too must be part of the climate resilience conversation.

Increase the pace of science and decision-making. Often, fisheries management decisions are based on stock assessments that are conducted infrequently and based on outdated data. Closing the time gap between data collection and management action is essential to supporting dynamic and adaptive fisheries. However, this must be done without sacrificing the reliability of data or the transparency and participation in public decision-making processes. New models and technologies for data processing, peer review, public participation, and decision making should be explored with the goal of managing the fish that are swimming in the ocean today, not the fish that were swimming there three to five years ago. Examples of real-time collaborative research exist in British Colombia, Norway, and the Falkland Islands. We should look to those cases as models for the future of U.S. fisheries science.

Provide real-time environmental data to fishermen. Utilizing buoy arrays, gliders, satellite photography, bottom temperature sensors, and other technology, NOAA should offer access to real-time data that can help fishermen target our fishing more selectively. For example, an improved understanding of different species' thermal niches, combined with access to real-time temperature data at varying depths across the continental shelf, can enable fishermen to pinpoint the best locations and depths to set their gear, thereby making more efficient use of time and fuel while avoiding catches of bycatch and choke species.

Grant Rhode Island voting representation on the MAFMC. Rhode Island is the number one squid port on the East Coast. Squid, along with many of Rhode Island's top species, including scup, black sea bass, and bluefish, are managed by the Mid-Atlantic Fisheries Management Council. Unfortunately, Rhode Island's lack of voting seats on the MAFMC gives rise to a situation of "regulation without representation." This disconnect is becoming sharper as these species continue to become an ever-more important part of Rhode Island's landings mix. In order to assure that fisheries management decisions are reflective of local realities and expertise, Congress must grant Rhode Island full voting representation on the MAFMC, just as North Carolina has full representation on both the MAFMC and the South Atlantic Fisheries Management Council.

Synch state-by-state catch allocations with current distributions. Some regional management councils allocate fishery resources on a state-by-state basis using historical landings records that are decades old. This practice is increasingly problematic as species' distributions shift. In Rhode Island, increasing volumes of black sea bass, fluke, and bluefish have been present in our catches in recent years, but our ability to land these available catches has been hampered by the fact that state-by-state allocations for these species are based in the 1980s and 1990s. We commend the Mid-Atlantic Council for its current effort to revisit the way that landings for these species are allocated. As the climate continues to change, NOAA and the regional management councils must continue to balance historical economic dependence with current

species distributions so that no fisherman is needlessly discarding valuable food fish that enter his traps, nets, and lines.

Cultivate and mentor the next generation. Climate change is one of many factors that contribute to an environment of uncertainty about the future within the fishing industry. This uncertainty has made it very difficult for young people to enter and build up businesses within the commercial fishing sector. Efforts should be made to reduce this uncertainty by providing supports for young people to acquire the necessary skills, finance, and ecological knowledge to become successful fishermen and ocean stewards. Intergenerational transfer of ecological knowledge from retiring fishermen to new entrants is all the more critical as the climate changes. In consideration of the above, we would like to see funding for programs that support knowledge exchange through mentorship. The Commercial Fisheries Center of Rhode Island is one of the first in the nation to coordinate a crew apprenticeship program for new fishermen; however, this is just a beginning. In the coming years, we must invest in the next generation, or there will not be one.

Flexible and diversified resource access. Permitting systems that lock fishermen into specific fisheries can have a dampening effect on fishermen's ability to adapt. The limited-access, fishery specific nature of most federal permitting schemes makes it expensive if not impossible for fishermen to switch or diversify target species as the resource composition in their area changes. NOAA and the councils should devise measures to address this barrier, such as flexible permit structures, ecosystem-based management approaches, or financing or permit bank programs that facilitate the purchase of additional permits. These approaches have the added benefit of expanding resource access for young fishermen, helping to support intergenerational continuity within the industry.

Consumer education. As the mix of species in local waters changes, so too must the mix of species on local dinner tables. In many locales, customers enjoy experiencing local traditions by eating seafood. However, climate change means that traditional species are being replaced by emerging species in ever-greater measure. Consumer education can play a vital role in helping local seafood supply chains adapt to the new mix of available species. For example, in Rhode Island, this can mean educating lobster lovers about how to enjoy Jonah crab, or educating restaurants about how to utilize scup. NOAA should leverage its Saltonstall-Kennedy program, Fish Watch program, and other market-related activities and investments to embed climate resilience into consumer awareness.

Invest in gear diversification. The ability to shift to new gear types is a hallmark of adaptability, not only to climate change but also to limitations brought about by offshore development of renewable energy. However, it can be costly for fishermen to experiment with new gear types. NOAA can play a vital role in enabling gear type adaptation by providing funding to support gear experimentation on fishing vessels. The Commercial Fisheries Research Foundation's current effort to pilot squid jigging technology in Southern New England is a prime example of this type of work. This effort and other efforts like it should be expanded and funded broadly.

Diversified supply chains. Markets have traditionally been given little thought in fisheries management, but in order to be self-sustaining, fisheries must have a profitable market outlet for our catch. Moreover, markets are not just about profit: they are also a way of distributing healthy protein to eaters far and wide. The Covid-19 pandemic has shown how both fishermen and eaters can suffer when seafood supply chains break down. It has also shown what supply chain resilience looks like, as fishermen and seafood dealers around the U.S. have adapted on the fly. Here in Rhode Island, many fishing businesses have survived the pandemic thanks to an emergency measure allowing them to sell finfish dockside and deliver lobsters and crabs directly to customers and retail markets. Seafood dealers have pivoted to home delivery. A seven-organization partnership of fishing organizations and food relief programs has provided 51,000 pounds of Rhode Island seafood to those in need. As the climate changes, the public and private sectors must double down on creating the conditions for fishing businesses to tap into diverse market channels so that we can weather any storm that may come our way.

CC: Senator Sheldon Whitehouse, Senator Jack Reed, Congressman David Cicilline, Congressman Jim Langevin

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Matthew Palazzo
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F/V Robert C
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Rodman Sykes
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COMMERCIAL FISHERIES
CENTER OF RHODE ISLAND

Benjamin Friedman
Deputy Under Secretary for Operations
U.S. Dept. of Commerce

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Ashley Ann ll, Red Tail Fisheries
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commercial fisherman
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Michael Hall
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Josiah Dodge
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John Kourtesis
F/V Christopher Andrew
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Mr. Benjamin Friedman
Deputy Under Secretary for Operations
U.S. Dept. of Commerce

April 2, 2021

Dear Under Secretary Friedman,

We are a group of social scientists linked by our support for local fishing communities and our interest in fisheries diversification as a resilience strategy for adapting to climate change and other stressors. In this letter, which responds to NOAA's solicitation for input on climate-resilient fisheries Section 216(c) of President Biden's Executive Order 14008, "Tackling the Climate Crisis at Home and Abroad," we summarize the scholarly literature on diversification and make the case for diversification as a cornerstone of climate resilient fishing communities.

As you know, global climate change is causing novel and persistent changes in oceanic conditions, affecting both physical and chemical properties of ocean systems. In turn, these emerging ocean conditions are driving biological changes in marine resources, including range shifts, increases or decreases in abundance, size decreases, and behavior changes (Pinsky et al. 2020). Geographic and temporal shifts in marine resource availability directly impact resource-dependent communities, increasing social inequities and vulnerability (Rogers et al. 2019). The ability of individuals and communities to adapt in response to environmental and socioeconomic changes, commonly referred to as adaptive capacity, is the focus of increasing attention (Folke et al., 2002). Understanding fishermen's responses to climate change requires an understanding of both adaptation approaches, or their ability to predict and respond to environmental changes through targeted actions, and resilience, or the adaptive capacity of the social-ecological system as a whole, with the goal of equipping these systems to be prepared to cope with both predicted and unanticipated changes (Nelson et al. 2007). Both are relevant to understanding the ways that fishermen, fishing communities, and fisheries management systems are adapting or could adapt in response to climate-driven shifts in fish stock distribution.

The range of strategies employed by fishermen to adapt to climate-driven changes include, among other things, chasing fish as their ranges shift (Rogers et al., 2019), migrating to new places (Perry et al., 2011), targeting species that move into their ranges (Badjeck et al., 2010), changing occupations (Stoll et al., 2019), and simply coping with less (Perry et al., 2011). Some of these adaptations, particularly targeting new species moving into their range or changing fishing locations, may require fishermen to acquire new permits or quota, pointing to diversification as an adaptation strategy.

Diversification is not only an adaptation, but also an attribute of fishermen's adaptive capacity, in that it determines fishermen's access to fish stocks. Fisheries access is a category that includes licensing, permitting, and other ways in which fisheries management structures shape the type

and volume of resources that individual fishermen and fishing communities are authorized to harvest from the ecosystem. Access regimes can give rise to varying degrees of specialization or diversification, and how these may condition the ways in which commercial fisheries respond to climate-driven shifts in resource availability.

Mitigating risk by way of livelihood diversification is among the most common individual- and community-level approaches for those involved in fisheries described in the literature, aligning with both ecological and economic theories associated with portfolio management (Edwards et al., 2004; Figge, 2004; Fuller et al., 2017; Kasperski and Holland, 2013). Diversification occurs when fishermen, family members, or communities target multiple unsynchronized species (Stoll et al., 2017) or via occupational pluralism, where actors engage in non-fisheries related activities to supplement their income (Pomeroy et al., 2006). Both approaches can help to buffer against income variability caused by changes in environmental or socioeconomic conditions, and diversification is likely to increase fishermen's adaptive capacity to climate change. That is why Diversification is often touted as an effective strategy for climate change adaptation (Kasperski and Holland 2013, Dee et al. 2016).

However, employing these adaptation and resilience strategies is often difficult in practice. Switching to new species or changing the timing or location of fishing in response to increases or decreases in resource abundance can be hampered by fisheries management regimes that constrain entrance and fishers' mobility (Coulthard, 2008; Holland and Kasperski 2016; Kasperski and Holland 2013). Similarly, attempts to diversify across multiple fisheries as a risk reduction strategy may be impractical in the context of permitting and licensing regimes that promote specialization into one or a few fisheries (Murray et al. 2010; Stoll et al., 2016). Therefore, it is critical to examine the role of fisheries management policies in enabling or constraining the ability of fishermen to switch species as resource distributions change and to diversify their fishery participation across multiple species as resource abundance becomes more variable or uncertain. It is also important to consider these enabling or constraining effects in light of other fisheries management goals and to explore trade-offs and potential solutions to these trade-offs.

In addition to fisheries management, there are several other factors that may enable or constrain fishermen's ability to switch species or diversify across species. These include availability of permits, availability of financing to purchase permits, technical considerations such as whether a vessel can readily be modified to utilize a different type of gear, fishermen's ecological knowledge, and markets. In particular, the role of market diversification in shaping fisheries resilience is an area of inquiry that deserves more attention than it is typically given (Stoll et al. 2015).

We encourage NOAA to consider the range of ways that fisheries management policies can help or hinder the ability of fishermen and fishing communities to adapt to climate change. Further research into and acknowledgment of of fishermen's diversification as an adaptive strategy is an important component of promoting climate resilient fisheries.

Please feel welcome to reach out to any of the individuals listed below to discuss these ideas further.

Attentively yours,

Sarah L. Smith, PhD
Postdoctoral Research Associate
Department of Human Ecology
[redacted]

Joshua Stoll
Assistant Professor of Marine Policy
School of Marine Sciences
[redacted]

Sarah Schumann
Shining Sea Fisheries Consulting LLC
[redacted]

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Subject: Comment on EO 140008

Elma Burnham [redacted]
to OceanResources.Climate

Fri, Apr 2, 6:56 PM (17 hours ago)

Hello,
I am a commercial fisherman in Bristol Bay, Alaska for wild sockeye salmon, and I am extremely concerned about climate change's potential effects on our fishery and the oceans as a whole. Given the huge community-wide engagement on the Pebble Mine issue and cross-cultural coalition building that's taken place in the region, we know fishermen are concerned with the health of the ecosystem and engaged participants in its wellbeing. We need to make sure fishermen are at the tables participating in these conversations. Connecting with the Pebble Mine leaders may be one way; other ways may be sending representatives to the bay pre and post-season (May and then early August).

The data input I would like to see as part of this initiative is water temperature and species sightings. As far as I understand, we do not have historic, regular data on the river water temperature. There are consistent reports of fish die-offs due to warm water and speculation as well as research that smaller fish are due to warming waters. Seeing other species of fish, whales, and birds during the salmon run is rare; what could their presence mean?

Finally, in 2019 I witnessed gray whale (two dead whales) and shorebird die-off during a hot year that I find very concerning. The popular narrative/speculation of the gray whales is that they were starving on their journey north and came farther inland looking for food in an unfamiliar ecosystem as they typically make it farther north before feeding consistently. The sooty shearwater die-off was attributed to a strong storm that blew them off course and away from their food source. I have no doubts in my mind that these events are climate-related and also could be affecting fish stocks.

I believe that the majority of small-boat fishermen are dedicated to stewarding the oceans, following management, and protecting the fish stocks from everything from over fishing to climate change. Thanks for your important work.
Sincerely,
Elma Burnham
Ugashik, Bristol Bay, Alaska

PS: This podcast hosted by Indigenous leaders of the region has some episodes on climate change & fisheries. https://podcasts.apple.com/us/podcast/on-the-land/id1494806427

--

Elma Burnham (she/her)
[redacted]
www.elmaburnham.com
#hersalso

Subject: Climate: Recommendations for Fisheries and Protected Resources

Engler, Lisa (ENV) <[redacted]> Fri, Apr 2, 6:25 PM (20 hours ago)

to OceanResources.Climate@noaa.gov, [redacted]

You are viewing an attached message.

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Mr. Benjamin Friedman, Acting Under Secretary of Commerce for Oceans and Atmosphere:

As the state co-chair of the Northeast Regional Ocean Council (NROC), the Regional Ocean Partnership (ROP) for the New England states, I am respectfully submitting comments in response to the Notice of Request for Information (RFI) from NOAA regarding *Recommendations for More Resilient Fisheries and Protected Resources Due to Climate Change*.

NROC is grateful that the *Executive Order on Tackling the Climate Crisis at Home and Abroad* and this subsequent RFI acknowledge the importance of regional ocean councils in implementing Administration priorities. Regions are often the appropriate scale for application of national goals due to the specific culture, issues, policies, economies, and interjurisdictional coordination that varies around the country. This is exactly why the New England governors established NROC in 2005 - to provide a forum for interjurisdictional coordination and progress on regional coastal and ocean issues that meets the unique culture of the New England states.

My comments will be brief and high level because we are introducing ourselves and NROC's priorities to Administration leadership via separate letterhead and we understand that it is early in the implementation of the Administration's policy priorities. These comments apply to both the fisheries and the protected resource issues in the RFI.

- We recommend that the Biden Administration partner with NROC to advance and pilot Administration priorities that are appropriate for regional scale implementation. NROC is an effective and inclusive messenger that regularly communicates with regional

stakeholders on coastal and ocean policy and planning priorities. We provide over fifteen years of experience convening states, tribes, industry, non-governmental organizations, and the public on regional ocean planning, coastal resilience, and ocean and ecosystem health issues. We also provide extensive data, science and information resources through our Northeast Ocean Data Portal and through our long-term partnership with the Northeast Regional Association of Coastal Ocean Observing Systems (NERACOOS).

- We recommend that the Biden Administration provides NROC with the necessary federal funding and agency support to achieve Administration priorities in the region. Federal funding will ensure that NROC has the appropriate capacity to advance ambitious national policy priorities in the region.

- We suggest that the Biden Administration regularly engages NROC for specific recommendations as implementation of the Administration's priorities become more detailed. NROC can provide specific recommendations on data and mapping requirements, public engagement, and agency and interjurisdictional coordination. For example:
    - The NROC Ocean Planning Committee can provide recommendations for and be utilized to engage states, tribes, industry, environmental groups, and other participants in informing and planning for the renewable energy, biodiversity protection, and conservation goals expressed in sections 207 and 216 of the Executive Order.
    - The NROC Coastal Hazards Resilience Committee can provide recommendations for and be utilized to seek state, local, tribal and other input on climate forecasting capabilities and information products.
    - Each of the NROC committees and the NROC team developing the Northeast Ocean Data Portal can inform the potential development of a federal geographic mapping service for climate related information as expressed in section 211 of the Executive Order.
    - NROC states can provide specific recommendations on fisheries mitigation and the coordination of federal consistency reviews with NEPA review of renewable energy projects, particularly offshore wind projects.

We are prepared to support NOAA and the Administration. Please do not hesitate to engage NROC as you develop plans to achieve the ambitious climate, offshore wind, and biodiversity protection objectives expressed in recent communications from the White House and the federal agencies.

Sincerely, on behalf of the NROC membership,
Lisa Berry Engler
Director, Office of Coastal Zone Management
Commonwealth of Massachusetts

NROC STATE MEMBERS

MAINE
Kathleen Leyden
Maine Coastal Program
[redacted]

Meredith Mendelson
Department of Marine Resources
[redacted]

NEW HAMPSHIRE
Steve Couture*
Department of Environmental Services
[redacted]

Chris Williams (Alternate)
Department of Environmental Services
[redacted]

MASSACHUSETTS
Lisa Engler* (current NROC Co-Chair)
Office of Coastal Zone Management
[redacted]

Kathryn Ford
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RHODE ISLAND
Janet Coit
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Jeff Willis*
Coastal Resources Management Council
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Robert Ballou (Alternate)
Department of Environmental Management
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CONNECTICUT
Brian Thompson
Department of Energy and Environmental Protection
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David Blatt (Alternate)
Department of Energy and Environmental Protection
[redacted]

* Member of NROC Executive Committee

Subject: Comments: Tackling the Climate Crisis at Home and Abroad.

fsharpe alaskawhalefoundation.org [redacted]
to OceanResources.Climate@noaa.gov

Fri, Apr 2, 6:12 PM (21 hours ago)

Hello,

Thanks for this opportunity to weigh in:

Here are my kind thoughts re climate change resilience for Alaskan fishers:

• Enhance communication with fishers residing in southern resource areas (BC, Washington, Oregon, California) who are currently coping with warming and novel species assemblages.

• Support small scale fishers and their families who are adaptive and invested in positive outcomes.

• Support indigenous fishers & communities, especially those employing traditional methods (weirs, reef nets, ponds).

• Support research into bycatch reduction and marine mammal entanglement, so as to minimize impacts associated with fisheries closures.

• Conduct more research into the herring biology and other keystone bait fish species (caplin, sandlance, smelt).

• Increase the number of small, no-take reserves, which can serve as exporter of biomass to exploited areas.

• Support initiatives and legislation re greenhouse gas reduction, both nationally and internationally.

• Continue seeking comment from fishing communities, as in the manner of this executive order!

Thanks for this opportunity to provide feedback!

Sincerely yours,

Fred Sharpe
Principal Investigator
Alaska Whale Foundation
[redacted]

UNITED FISHERMEN OF ALASKA

Mailing Address: [redacted]
Phone: [redacted]
E-mail: [redacted] **Website:** www.ufa-fish.org

April 2, 2021

The Honorable Benjamin Friedman
Acting Administrator
National Oceanic and Atmospheric Administration
Via Email: [redacted] and **OceanResources.Climate@noaa.gov**

Dear Acting Administrator Friedman:

Thank you for seeking public input on Section 216(c) of Executive Order 14008 and allowing us to comment on making fisheries and protected resources more resilient in the face of climate change.

United Fishermen of Alaska (UFA) is Alaska's statewide commercial fishing trade association, representing 37 commercial fishing organizations participating in fisheries throughout the state, and the federal fisheries off Alaska's coast. Alaskan fishermen have a front row seat to the impacts of climate change, and we recognize our livelihoods and coastal communities will be seriously impacted if we do not address the problem.

As Alaskan fishermen, we are extremely proud of our science-based fishery management strategies that prioritize sustainability and marine ecosystem health. Our management system has become a model throughout the nation as well as other countries, as we continue to have one of the most bountiful and healthy seafood supplies in the world. We recognize that that science-based fishery management approach must continue to adapt, anticipate and respond to climate change impacts to ensure a healthy ecosystem is maintained. We thank the Biden administration for making climate change a priority, and it is an effort we are proud to support.

Several of UFA's 37 member groups will weigh in with comments, providing you with detailed observations and suggestions. We support our member group's comments and share their concerns. UFA's approach is a simple ask that science be at the forefront of these efforts and that they are amply funded. Alaska stakeholders believe strong science is essential for management of existing and new emerging fisheries. We recognize that conservation does not mean the absence of utilization of the fishery resources, but can include the management of human use of natural resources for public benefit and sustainable social and economic utilization. Fishery managers must be able to respond to a rapidly changing marine environment and ensuring there is proper funding to support these scientific efforts will be key.

We look forward to being part of this conversation as it continues to develop and once again, thank you for the opportunity to comment.

Regards,

Matt Alward
President

Frances H. Leach
Executive Director

OFFICE OF SPECIES CONSERVATION

Idaho Governor's Office of Species Conservation

[redacted]

Mike Edmondson
Interim Administrator

Idaho DEPARTMENT OF FISH AND GAME

[redacted]

Ed Schriever
Director

April 2, 2021

The Honorable Gina Raimondo
Secretary of Commerce

Re: State of Idaho Reply – Public input on Section 216(c) of Federal Executive Order 14008

Dear Ms. Raimondo:

The Idaho Department of Fish and Game (IDFG) and Office of Species Conservation (OSC) appreciate the opportunity to provide comment in regards to Section 216(c) of the Federal Executive Order 14008 on Tackling the Climate Crisis at Home and Abroad. Idaho Code section §36-106 directs the IDFG to, "…preserve, protect, perpetuate, and manage…" the fisheries resources of the state for the citizens of Idaho and "…. provide fishable populations." We are committed to managing for robust fish populations that will support sustainable harvest and the protection and preservation of native aquatic and terrestrial species. IDFG's fisheries management plan details the management direction of IDFG and is responsive and adaptive to key issues. Managing and adapting to climate change is an important component of IDFG's mission and we appreciate NOAA's engagement with our agencies on this topic.

We offer the following recommendations for development of federal conservation priorities for climate change action. Our recommendations are based upon our agency's mission and management priorities. In recent years, many key grant sources and partners have received reduced or stationary funding support from NOAA. Funding shortfalls affect IDFG's ability to conduct shovel-ready habitat and/or monitoring projects in the field as well as collaborate with other agencies and entities to do the same. Secondly, IDFG and its partners rely on NOAA funding to acquire data and expertise to inform climate change mitigation and adaptation planning and management. Lastly, education, outreach, and database management ensure that agency data is transparent, reliable, and available. We encourage NOAA to tackle the climate and ocean change challenges related to fisheries by providing continued and new funding, coordination and resources for these key initiatives.

Below are our specific recommendations:

Increase funding for fisheries science and habitat restoration efforts through expansion of competitive grants and other federal funding programs.

IDFG performs research, monitoring, and evaluation to understand status and trends of fish populations across the state of Idaho. IDFG, and its regional partners, have also been actively investing in fish habitat restoration efforts. These habitat actions reduce entrainment and improve steam temperatures, habitats, and migratory corridors to ensure that there are sustainable aquatic fish communities. With projected changes in snowpack and freshwater habitat conditions, these habitat actions will be of even greater importance in the future. IDFG also intensively monitors the outcomes of habitat restoration actions in two major watersheds. The majority of this work relies on NOAA (e.g., Mitchell Act, Pacific Coast Salmon Recovery Funding) and other federal funding grants. Continued support for grants and other funding sources allows IDFG and other State agencies to supplement their limited resources to conduct this essential work.

Recommend NOAA continues monitoring the conditions and changes of the California Current Ecosystem in the Pacific Ocean from changing ocean conditions.

Many salmon and steelhead have recently experienced lower ocean survival, but the mechanisms are unclear. For many ocean-going salmon and steelhead species, there is limited data regarding where these fish reside in the ocean, localized ocean conditions, and predation effects. Recently, marine heat waves have received considerable attention due to localized effects on the ocean environment and its food web. Continued NOAA-funded research is necessary to better understand and adaptively manage predator-prey dynamics in the ocean. IDFG supports further research regarding ecological, biological, and environmental relationships of species composition and abundance. We believe that the recent marine heat waves will become more prominent and that it is important to understand the ecological fish responses of salmon and steelhead for this important component of their life cycle.

Recommend that NOAA prioritize funding to implement management actions to address pinniped predation and expand fisheries and marine mammal research to inform State and federal management.

We also support NOAA's research to understand sea lion predation impacts on salmon and steelhead within the Columbia River. As ocean and freshwater food webs and environmental conditions change, we anticipate fish community assemblages will change. For the Columbia River, an increase in abundance and duration of residency of sea lions in the main stem and its tributaries has occurred. In recent years, impacts from both Stellar and California Sea Lions has been magnified as these pinnipeds key into migratory behaviors of fish species. They have been able to find and take advantage of biological pinpoints within the system to predate on lamprey, sturgeon, salmon and steelhead.

IDFG is a co-manager and permittee engaging in sea lion management in the Columbia River. However, IDFG does not receive any outside funding for our work. Some federal funding is annually provided to our partners at ODFW, WDFW and CRITFC; however, the

increasing number and duration of pinnipeds residence in the Columbia River has increased management costs. Currently, NOAA provides some annual funding, but this funding has not increased proportionally with time-sensitive research and management needs. Additionally, NOAA funds a NOAA-led research project on sea lion tagging and predation in the Columbia River. IDFG would like to see that the funding for this research is adequate and stable through the near future. This work is vital to understanding the impacts of pinniped removals at these pinch points.

Partner and support federal land management agencies in monitoring and improving habitat conditions throughout the State of Idaho

The first step to taking meaningful action on climate and ocean change is through strong intergovernmental collaboration and coordination. To maximize limited State resources for climate change, IDFG relies on partnerships with many federal agencies to monitor and improve habitat conditions. The Bureau of Land Management and the Forest Service manage over 32 million acres of federal lands in Idaho including roads that use culverts--pipes or arches made of concrete or metal--to allow water to flow from one side of the road to the other. Many of the streams that pass through these culverts are essential habitat for fish.

IDFG supports continued efforts by the federal agencies to improve habitat conditions that affect aquatic habitat in Idaho. The history of multi-use federal lands in Idaho has led to the accumulation of culverts across the landscape, some of which act as barriers to fish migration. The continued maintenance of culverts and other structures is needed to restore habitat connectivity for fish in Idaho. The United States Geological Survey maintains gauges to track water flows and temperatures. In recent years, the USGS has stopped thermal monitoring at some river locations in Idaho due to funding constraints. Stopping data collection, especially in long term monitoring sites impacts efforts to track the water temperatures and measure progress of efforts to mitigate thermal impacts on fish habitat. IDFG recognizes the value of this work towards monitoring and improving aquatic habitat conditions that will become even more important in the face of climate change.

Encourage NOAA to improve data management and access to NOAA and other federally funded datasets and portals/platforms.

State managers throughout the Columbia Basin region rely on both real-time and historic data to make informed management decisions. Long-term datasets spanning large temporal and geographic areas are key to understanding climate variability and planning responses to maintain sustainable fish populations. Currently, there are existing partners and programs (e.g., Pacific State Marine Fisheries Commission, StreamNet, Pacific Northwest Aquatic Monitoring Partnership, NorWeST) that fill this need. Continued and increased funding is necessary to support these data management programs.

These data are requisites for constructive regional dialogues regarding climate action and the results of management changes and actions. These data platforms would provide additional value with increased efforts at data visualization and interpretation tools as well as transparent and accessible metadata and quality control measures. We also support education

and outreach to the public, policy makers, and colleagues to promote existing findings and as well as foster science-based dialogues.

In summary, IDFG and OSC strive to ensure that Idaho's aquatic resources will be available for present and future generations to enjoy. We welcome NOAA's engagement on this topic and look forward to working with NOAA in the future to increase our understanding and promote science-based dialogues on this regionally important but somewhat controversial topic. We believe that IDFG, OSC, and our partnerships require more science and resources to ensure that we continue to take meaningful action, which requires continued and expanded support from NOAA and other federal programs.

Thank you for your consideration of these comments.

Sincerely,

Mike Edmondson
Interim Administrator
Office of Species Conservation

Ed Schriever
Director
Idaho Department of Fish and Game

April 2, 2021

Mr. Benjamin Friedman
Deputy Under Secretary for Operations
National Oceanic and Atmospheric Administration
Submitted via email at: OceanResources.Climate@noaa.gov

Re: Climate Recommendations for Fisheries and Protected Resources

Dear Mr. Friedman:

Please accept these comments on behalf of the Aleut Community of St. Paul Island Tribal Government, Association of Village Council Presidents, Bering Sea Elders Group, Kawerak, Inc., Ocean Conservancy, and The Pew Charitable Trusts U.S. Arctic Program in response to the request for information regarding Section 216(c) of Executive Order 14008, *Tackling the Climate Crisis at Home and Abroad*. We are concerned about the global climate crisis and applaud NMFS for reaching out to gather the necessary input in addressing these problems.

The Aleut Community of St. Paul Island is the federally designated name used to identify the community of Unangan, also known as Aleuts, residing on St. Paul Island in the Bering Sea. The Association of Village Council Presidents (AVCP) is the regional non-profit Tribal consortium for 56 federally recognized Tribes in the Yukon-Kuskokwim Delta. The Bering Sea Elders Group (BSEG) is an association of Elder Representatives appointed by 38 Tribes in the Yukon-Kuskokwim and Bering Strait regions. Kawerak, Incorporated (Kawerak) is the Alaska Native non-profit Tribal consortium for the 20 federally recognized Tribes of the Bering Strait region. Ocean Conservancy is a national non-profit organization working to protect the ocean from today's greatest global challenges. The Pew Charitable Trusts is an independent non-profit organization that works to improve public policy, inform the public, and invigorate civic life.

These comments focus on climate-driven disruptions in the Bering Sea that have placed the ecosystem in peril, with devastating impacts on both fisheries and protected resources. The Bering Sea is an exceptional ecosystem of tremendous ecological, economic, and cultural importance. It supports one of the largest fisheries in the world and provides critical habitat for marine and terrestrial plants and wildlife. The Bering Sea region is home to numerous communities of Central Yup'ik, Cup'ik, St. Lawrence Island Yupik, Unangan, and Inupiaq people and Tribes that reside between the southern Chukchi Sea and the Aleutian and Pribilof Islands. Indigenous people of the region have an innate connection to the lands and waters that they have been stewards to for millennia and whom also live a low-carbon lifestyle. The people of the region are especially vulnerable to the impacts of climate change, of which they did little to create. Executive Order 13754—reinstated under the same Executive Order to which these comments respond—recognized the extreme ecological and cultural importance of the northern Bering Sea and made it the policy of the United States to "enhance the resilience of the northern Bering Sea region by conserving the region's ecosystem, including those natural resources that provide important cultural and subsistence value and services to the people of the region."

The call for information specifically seeks recommendations on how to make fisheries and protected resources more resilient to climate change. Climate-ready fishery management comes in many forms, and it is critical that the range of management actions to respond to climate change are inclusive, equitable, and include precautionary measures that do not assume that industrial-scale fishing is appropriate everywhere.

The following paragraphs will detail the many overlapping threats facing the Bering Sea ecosystem, and propose a path forward. Climate-ready fishery management in the Bering Sea includes looking at fisheries management in the context of this ecosystem-wide crisis, which extends beyond fishery-specific impacts. Climate-ready fishery management must center the importance of Bering Sea Indigenous Peoples' ways of life in NOAA's approach to research, management, and policy. It must also apply an equitable approach to fishery management. In the North Pacific, the National Marine Fisheries Service (NMFS) and the North Pacific Fisheries Management Council (NPFMC) must make meaningful efforts to collaborate and partner with Indigenous people of the northern Bering Sea, and there must be dedicated Tribal voting seats on the NPFMC. An ecosystem-based and precautionary approach should be applied, and there should be critical examination of expansion of industrial commercial fisheries into the northern Bering Sea. Any such expansion would have irreparable impacts on an ecosystem in flux and collapse and impacts on Indigenous food security, traditional cultural activities, and spiritual practices. NOAA should engage in partnerships and collaborative research to create a shared understanding of the Bering Sea. Meaningful

and ongoing Tribal involvement in research, at all levels and in all aspects, will better contribute to fuller and more actionable understandings of the changes we continue to see and experience first-hand. Traditional Knowledge is highly valuable in understanding climate change and must play a central role in management decisions.

The Importance of the Bering Sea for the Continuance and Sustainability of Indigenous Ways of Life Must be Central to NOAA's Approach to Research, Management, and Policy

Indigenous Peoples have been sustained for millennia by the incredibly productive Bering Sea region, including the countless species of seabirds, marine mammals, fish and invertebrates. Our oceans have critical cultural and subsistence value for coastal communities, and also provide jobs, food, and small scale exports that boost our national economy, making them some of the most valuable ecosystems in the world. However, the Bering Sea, as a distinct and dynamic region containing some of the world's largest and most productive fisheries, is now being threatened by climate change and human-induced impacts.[1]

Due to the amplified impacts of climate change in high latitudes, the Bering Sea is warming at a significantly faster rate than oceans in temperate zones. Indicator species such as zooplankton, seabirds, and marine mammals are showing signs of stress and population declines under warmer, more acidic, and increasingly toxic conditions as a result of harmful algal blooms and increasingly ice-free ocean conditions.

Climate change is an existential threat to the Bering Sea ecosystem. These unprecedented environmental changes are coupled and compounded by human-driven stressors, including increased marine traffic, fishing activities, mining exploration and extraction, marine debris, and seabird and marine mammal unusual mortality events

[1] RB Smith, *Oily Substance Found Near Savoonga Remains A Mystery*, THE NOME NUGGET (July 24, 2020), http://www.nomenugget.net/news/oily-substance-found-near-savoonga-remains-mystery; Catherine Rubano, *Bering Strait Region Sees More Debris from Russian Side, But Source Still Unknown*, KNOM (Oct. 17, 2020), https://www.knom.org/wp/blog/2020/10/17/bering-strait-region-sees-more-debris-from-russian-side-but-source-still-unknown; Atle Staalesen, *LNG tanker loses engine power on Northern Sea Route*, THE BARENTS OBSERVER (Jan. 19, 2021), https://thebarentsobserver.com/en/arctic-lng/2021/01/lng-tanker-loses-engine-power-northern-sea-route.

that occurred in 2011[2] and 2019.[3] Alaska Native marine mammal subsistence hunters have witnessed startling changes to marine mammal health.[4] Salmon are dying due to heat stress not long after they enter river ecosystems, causing shock in communities across the region. These stressors exceed the capacity of current single-species management, and demands systematic management changes in favor of adaptable and dynamic Indigenous-led approaches to preserve long-term ecosystem health in the Bering Sea.[5] Further compounding this stress is the lack of inclusive efforts to achieve comprehensive and integrated monitoring, observation, research, and response in the Bering Sea region, which effectively excludes coastal community members and Tribes from current decision-making process.

These human-ecosystem interactions threaten the entire Bering Sea, but they are especially concerning in biologically diverse areas with uniquely high ecological value relative to the larger ecosystem. For example, the Pribilof Islands marine ecosystem is a biologically rich microcosm of the Bering Sea, and has often been referred to as a bellwether for change, offering abundant evidence of the environmental changes that have already occurred and are currently underway or expanding.

Collective climate stressors are accelerating the decline of the Bering Sea ecosystem. There is an urgent need to adopt precautionary management measures for those development stressors and to conserve biodiversity and subsistence opportunities. Resource managers must address these changes, and leaders must act to stop carbon pollution to prevent ecological collapse.

Apply a Precautionary and Equitable Approach to Fishery Management in the Northern Bering Sea

Commercial fishing, while economically beneficial, can disrupt the region's delicate food webs by removing large volumes of fish (targeted and prohibited species) and damaging fragile benthic habitat. An increase in marine traffic heightens the risk of major events like oil spills and whale strikes and introduces millions of gallons of

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[2] NOAA, Diseased Ice Seals and Unusual Mortality Events, https://www.fisheries.noaa.gov/alaska/marine-life-distress/diseased-ice-seals#2011-2016-unusual-mortality-event.

[3] NOAA, NOAA Fisheries Declares Unusual Mortality Event Due to Elevated Strandings of Ice Seals in the Arctic (Sept. 12, 2019), https://www.fisheries.noaa.gov/feature-story/noaa-fisheries-declares-unusual-mortality-event-due-elevated-strandings-ice-seals.

[4] Lex Treinen, *The mysterious case of the sinking seals*, KTUU (Dec. 30, 2019), https://www.ktuu.com/content/news/The-mysterious-case-of-the-sinking-seals-566571471.html.

[5] Raymond-Yakoubian and Daniel. 2019. An Indigenous approach to ocean planning and policy in the Bering Strait region of Alaska. *Marine Policy 97 (2018) 101–108*.

wastewater, chemicals, trash, and noise pollution.[6] Marine pollution poses significant threats to wildlife and overall ecosystem health, especially in the remote Arctic where enforcement is lacking. It is imperative that NMFS/NOAA use Traditional Knowledge to better understand the shifts in the carrying capacity of the Bering Sea that Indigenous people are witnessing.

Commercially important species like Pacific cod (*Gadus macrocephalus*) and pollock (*G. chalcogrammus*) have historically been confined to the southeastern reaches of the Bering Sea.[3] In recent years, however, these species have moved into the northern Bering Sea. One indication of this northward shift is in the collapse of the Pacific cod fishery in the Gulf of Alaska, which was closed in December 2019 in response to record low numbers. Since 2012, the center of the Bering Sea pollock population has moved northward at a rate of 18 miles per year. Researchers have observed a sharp decrease in the availability of prey for young walleye pollock in the southern Bering Sea during warmer years, which limits the survival of pollock during their first winter and decreases recruitment over consecutive years.[7]

Changes in the abundance, distribution, and energy content of forage fish may affect the survival and growth of apex predators like seabirds and marine mammals. Survival rates are generally highest when ample forage fish are available, while disease and starvation rates increase when prey availability is low. It is critical that resource managers consider the ways that human consumption of marine resources can exacerbate climate impacts and further disrupt the Bering Sea ecosystem.

NMFS and the NPFMC must make commitments to be inclusive of Indigenous people, Tribes, and Traditional Knowledge as part of their processes in real and substantial ways. NMFS and the NPFMC must make meaningful efforts to collaborate with Indigenous people of the northern Bering Sea, and there must be dedicated Tribal voting seats on the NPFMC. In order to protect subsistence ways of life, at risk, endangered or otherwise protected species, and the sustainability of the ecosystem as a whole - no expansion of industrial commercial fisheries in the northern Bering Sea should take place.

Climate Change/Ocean Acidification

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[6] Melissa Parks, Austin Ahmasuk, Barry Compagnoni, Andrew Norris, Roger Rufe, *Quantifying and mitigating three major vessel waste streams in the northern Bering Sea*, MARINE POLICY (Aug. 2019).

[7] Van Pelt, T.I., North Pacific Research Board, The Bering Sea Project: Understanding ecosystem processes in the Bering Sea (Ed., 2015).

As part of the fastest-warming region on Earth, the Bering Sea is in peril and its changes may have ripple effects around the world. Traditional Knowledge, together with national and international research, suggests that the region is undergoing an unprecedented environmental shift, with troubling consequences for the marine ecosystem.[8] Over the past five years, the winter atmospheric conditions that influence the region have been significantly different from the historical norm.[9] Sea surface temperatures in the northern Bering Sea have been as much as 5°C warmer than the historical average.[10] The lack of winter sea ice in most of the Bering Sea defies previous climate forecasts, which predicted that we would not see these conditions until 2050.[11] Meanwhile, observations and data indicate that the distributions, population sizes, and survival of key marine species are changing drastically, with increasing reports of massive die-offs of seabirds and marine mammals.[12]

Like most modern environmental challenges, these disruptions in the Bering Sea are driven by climate change. Left unchecked, our consumption of fossil fuels will have countless negative impacts not just to the Bering Sea ecosystem, but also to the entire country and world. Management agencies should contribute to climate change mitigation by implementing policies that reduce carbon emissions.

Marine Traffic/Shipping

While some decision-makers celebrate the fact that the loss of Arctic sea ice creates new "opportunities" for marine shipping and tourism, military exercises, resource extraction and more, there are significant concerns that these new activities will cause additional harm to the Bering Sea ecosystem.[13] A rise in vessel traffic increases the likelihood of major events like oil spills and whale strikes and entanglements[14] and also

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[8] NOAA, 2020 Arctic Report Card, https://arctic.noaa.gov/Report-Card.

[9] NOAA Fisheries, *Scientific teams set out to track unprecedented changes in the Eastern Bering Sea* (April 18, 2019).

[10] NOAA Alaska Fisheries Science Center, Alaska Marine Ecosystem Status Report: 2018 Eastern Bering Sea Executive Summary (2019), https://access.afsc.noaa.gov/REFM/REEM/EcoWeb/index.php?ID=28.

[11] Hal Bernton, *As Bering Sea ice melts, Alaskans, scientists, and Seattle's fishing fleet witness changes 'on a massive scale*, SEATTLE TIMES (Sept. 15, 2019).

[12] Davis Hovey, *Years of data suggest ecosystem shifts in the Northern Bering Sea*, KNOM (Aug. 5, 2019).

[13] Davis Hovey, *NSEDC Concerned Crab Stock Could Crash, ADF&G Moving Forward with Winter Season*, KNOM (Feb. 11, 2020), https://www.knom.org/wp/blog/2020/02/11/nsedc-concerned-crab-stock-could-crash-adfg-moving-forward-with-winter-season/.

[14] Rosalind M. Rolland, Katherine M. Graham, Raphaela Stimmelmayr, Robert S. Suydam, John C. George, *Chronic stress from fishing gear entanglement is recorded in baleen from a bowhead whale (Balaena mysticetus)*, MARINE MAMMAL SCIENCE (2019).

raises the risk of pollution from the discharge of wastewater, chemicals, trash or debris.[15]

Another concern surrounding increased marine traffic is the impact of vessel-generated noise on marine mammals, which use sound to communicate. Marine mammals exposed to noise from marine traffic can suffer from increased stress levels, hearing loss, changes in behavior, injuries or death.[16] Constant noise could force marine mammals out of their usual or preferred habitats, potentially reducing their ability to find prey.

Although there are still gaps in our understanding of how increased marine traffic will affect the Bering Sea ecosystem, it is clear that these activities pose enough risk to warrant caution.

The Need for Collaborative Research

The Indigenous and Tribal signatories to this letter emphasize that Indigenous Peoples have lived in the Arctic for millennia. As stewards of our lands and waters we have developed inextricable connections that form the foundation of our own understandings of our environments, including marine, freshwater, terrestrial, atmospheric, and ice. Our knowledge has been passed down from generation to generation, and is continually updated, adapted, and reshaped as our individual and collective experiences and observations inform them. Our view of the 'ecosystem' is holistic and recognizes different systems, and the connections between them, such as the physical, biological, chemical, social, and cultural systems.

Alaska Native organizations, Tribes, and communities are extremely concerned about environmental and other changes happening in the Arctic and are eager to contribute to our collective understanding of them. Arctic research must incorporate Indigenous roles that those communities and experts can offer. Our desire is to work to create a collaborative, effective, and widely beneficial understanding of the Arctic and have meaningful involvement and leading roles in research to better understand the changes we continue to see first-hand.

The ability to do this is largely dependent on the relationships between federal agencies, like NMFS, and Tribes and Tribal organizations. We encourage NFMS to continue to work to build equitable relationships that can foster equitable, collaborative, and co-productive research endeavors. This can be done via the development of

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[15] Melissa Parks, Austin Ahmasuk, Barry Compagnoni, Andrew Norris, Roger Rufe, *Quantifying and mitigating three major vessel waste streams in the northern Bering Sea*, MARINE POLICY (Aug. 2019).

[16] Clear Seas, Underwater Noise and Marine Mammals, https://clearseas.org/en/underwater-noise/.

specific partnerships, via increased communication and engagement, and by ensuring that internal agency capacity is available for these efforts. Within the Alaska Region of NMFS, including at the research hub for the Arctic region—the Alaska Fisheries Science Center (AFSC)—we would like to see, in particular, more Tribal Liaisons and a dramatic increase in non-economic social science staff. These changes would improve NFMS's ability to develop relationships and carry out collaborative and meaningful research, as well as benefit agency work at all levels by facilitating better connections with and understandings of Indigenous peoples, communities, concerns, and knowledges.

Marine Debris/Plastics Pollution

Despite its small population and remote location, Alaska's coast is littered with thousands of tons of marine debris, the majority of which is fishing-related gear. Human-generated waste is deliberately or accidentally deposited in oceans and waterways, making its way to the Arctic from lower latitudes. Marine debris is generated by vessels of all types and sizes operating in and outside of the Arctic. Weather events and ocean currents may transport large volumes of debris from afar. Growing populations, increased maritime activity, and consumer preference for plastic-based single-use products have resulted in a rapid accumulations of marine debris, which threatens wildlife and ecosystem health in numerous ways.

Most marine debris contains plastic. Each year millions of tons of plastic leak into the ocean from coastal regions alone—equivalent to dumping the contents of one garbage truck into the ocean every minute.[17] Without significant action, there may be more plastic than fish in the world's oceans, by weight, by 2050. According to the United Nations, marine plastics pollution costs an annual $13 million per year in damage to marine ecosystems, including impacts to marine productivity, fisheries, and tourism. In addition to the direct economic costs, marine plastic pollution has adverse impacts that are more difficult to quantify, including effects on human health, food chains, and other essential economic and societal systems.

Globally, approximately 20% of marine debris is generated at sea.[18] Abandoned, lost, or discarded fishing gear, also known as derelict fishing gear, is one of the most pervasive and harmful types of marine debris, and is the most common type of marine debris

[17] World Economic Forum, The New Plastics Economy: Rethinking the Future of Plastics (2016).

[18] Ocean Health Index, Trash Pollution, http://www.oceanhealthindex.org/methodology/components/trash-pollution.

found in the Bering Sea region.[19] Due to the high level of fishing activity in the region, fishing nets (trawl, seine, and gill nets), lines and ropes, and plastic bands are frequently adrift or washed ashore.[20] These materials can entangle animals and result in death through starvation and strangulation. Although once less common in the Bering Sea ecosystem, marine debris is increasing. We recommend that NOAA and NMFS prioritize addressing working with the Bering Sea region's Tribes and Indigenous organizations in the region in identifying the threats and potential policies needed to mitigate threats to Indigenous food security[21] from marine debris.

Tribal Sovereignty and Building Meaningful Roles for Tribes in Management

The United States must not turn its attention away from meaningful Tribal involvement in coastal and maritime management. Contemporary ecosystem management recognizes the importance of communities' participation in effective management; if sought collaboratively, this participation could address many concerns of national interest. If a program existed for communities—including Tribes—to collaborate with state and federal government in managing the nation's coastal areas and resources, more effective management would result.

The reinstated Northern Bering Sea Climate Resilience Area Executive Order seeks to create a Tribal role in the future of the northern Bering Sea. We wholeheartedly welcome this effort, are eager to be involved, and urge NMFS to ensure inclusion of Indigenous Peoples. Including Bering Sea communities and Tribes, as well as their Traditional Knowledge, in coastal and marine resource management will only strengthen federal processes.

Critical Next Steps

Coastal communities, Tribes, and ocean conservation organizations are in agreement that the Bering Sea is in peril, due in large part to the human-created stressors described in this letter. We are facing an ecological crisis that requires timely actions and changes in management strategies and practices, as well as precautionary measures to strengthen the resilience of the Bering Sea ecosystem. Importantly, this includes the incorporation of community observations, tribal perspectives, and

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[19] Alaska Marine Stewardship Foundation, Analysis of Trawl, Seine and Cargo Net Samples from Marine Debris Cleanups in Alaska (2014).

[20] Alaska Marine Stewardship Foundation, A Review of Marine Debris Surveys, Accumulations and Cleanup Projects in Alaska through 2014 (2014).

[21] Inuit Circumpolar Council, Alaska, Alaskan Inuit Food Security Conceptual Framework: How to Assess the Arctic from an Inuit Perspective—Summary and Recommendations Report (2015) (created as part of 2015 Alaskan Inuit Food Security Conceptual Framework Technical Report).

Traditional Knowledge and integration with Western science to ensure the Bering Sea continues to operate as a highly productive and valuable marine ecosystem.

Thank you for the opportunity to comment and please do not hesitate to contact any of the organizations for further information.

Sincerely,

Melanie Bahnke
President
Kawerak, Inc.

Vivian Korthuis
Chief Executive Officer
Association of Village Council Presidents

Amos Philemonoff, Sr.
President
Aleut Community of St. Paul Island

Mellisa Johnson
Executive Director
Bering Sea Elders Group

Scott Highleyman
Vice President, Conservation Policy
and Programs
Ocean Conservancy

Steve Ganey
Vice President Environment
The Pew Charitable Trusts

CC: Senator Lisa Murkowski
Senator Dan Sullivan
Congressman Don Young
North Pacific Fishery Management Council
Jim Balsiger, Regional Administrator, National Oceanic and Atmospheric Administration

April 2, 2021

Ms. Gina Raimondo
Secretary of Commerce

Mr. Benjamin Friedman
Acting NOAA Administrator

Submitted electronically to oceanresources.climate@noaa.gov

Dear Secretary Raimondo and Administrator Friedman,

On behalf of the Marine Fish Conservation Network (Network), I write to provide input on section 216(c) of Executive Order 14008 on tackling the climate crisis at home and abroad. This section of the executive order calls for input on how to make fisheries more resilient to climate change, including changes in management and conservation measures, and improvements in science, monitoring, and cooperative research. The Network is a coalition of commercial and recreational fishing associations, regional and national conservation groups, aquaria, chefs, sustainable seafood suppliers, and marine science organizations committed to sustaining fish populations, healthy marine ecosystems, and robust fishing communities. Thank you for providing the opportunity to comment on these critically important issues, which are central to the mission of our organization and highly impactful to the members of our Network.

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) defines a fishery as "one or more stocks of fish which can be treated as a unit for purposes of conservation and management and which are identified on the basis of geographical, scientific, technical, recreational, and economic characteristics; and any fishing for such stocks."[1] Thus, the MSA while prioritizing conservation, clearly and inextricably links the biological components of a fish stock with the human activity of fishing together in this fundamental definition; in a fishery, the biological and economic/recreational attributes are interrelated, and one cannot exist without the other. It follows that efforts to increase the resilience of fisheries to climate change must simultaneously increase the resilience of the biological and human systems that comprise them. It is in this spirit of addressing the resilience of coupled human-natural systems to climate change that we offer these comments.

[1] 16 U.S.C. §1802

Nationally, the MSA has helped to curtail overfishing and rebuild fish stocks, and conserve fish habitat areas, although results have varied between regions. Despite our accomplishments, there is still progress to be made to address the impacts of chronic overfishing. Additionally, the nation's fisheries are now under tremendous pressure from the impacts of climate change including warming ocean temperatures and ocean acidification. Increasing climate variability rapidly alters the physical environment and the timing and amount of fishing opportunities, extreme events such as harmful algal blooms, damage ecosystem function and curtail or close fishing seasons; and coastal communities experience declines in the quality of their infrastructure and incursions from sea level rise. Many of these negative forces significantly impact small-scale, community-based fishermen in the commercial, charter/for-hire, and recreational sectors. Recognizing this, the Network believes that we can enhance our governance systems and use them in innovative new ways to increase resilience to climate change, build back from our pandemic-impacted situation, and create additional opportunities for sustainable fisheries stakeholders.

I. Incorporate the best available climate science into fishery management

The Network believes in science-based management of U.S. federal fisheries, including incorporation of the best available science related to climate into stock assessments consistent with National Standard 2. Recognizing this, we recommend that NOAA consult with stakeholders to develop and adopt policies that require federal fishery managers to buffer and account for the impacts of climate change in the development of all fishery management plans (FMPs), as well as include conservation and management measures to mitigate those impacts. The agency should also recognize the growing reality of climate change emergencies resulting from extreme events or sudden shifts, and collaboratively establish new policies and processes for quickly implementing contingency plans to ensure the health and resiliency of fish stocks in the face of these uncontrollable events.

Specifically, we recommend that NOAA establish guidance for councils on how to adapt FMPs to directly incorporate climate impacts into their operations. FMPs should be amended to include an assessment of the impacts of climate change on each managed fishery, and establish conservation and management measures that respond to those impacts in a planned manner consistent with the ten National Standards. Councils are nearly always managing reactively, whereas proactive management can allow our governance process to anticipate challenges and respond flexibly and adaptively, enhancing outcomes for all stakeholders in turn.

The agency should also recognize the growing reality of climate change emergencies resulting from extreme events or increasing shifts in fish distribution and abundance. We recommend that NOAA establish a policy for using its emergency regulatory authority under MSA §305(c) to conserve fish stocks during emergencies that are attributable to climate change. Often the speed at which acute climate-related events impact fisheries is too rapid for FMP amendments to be enacted or regulatory actions taken. The Secretary of Commerce should have the ability to enact emergency regulations or interim measures during a fishing season or fishery management cycle to prevent or reduce overfishing and promote resilience of fish stocks during climate change emergencies. We believe that such a process could be enacted through new regulatory guidance on the existing authorities granted to the Secretary in the MSA. Under such a framework, relevant regional fishery management councils could be consulted prior to setting regulations or interim measures;

any measures taken should not exceed the annual catch limit for the fishery and should maximize fishing community participation in the decision-making process for the good of both fish stocks and coastal communities.

We also recommend the development of new guidance for how to incorporate climate considerations into stock assessments, including known impacts of climate change on the fishery and the stock's vulnerability to these changing conditions. Stock assessments should also offer recommendations for addressing climate change impacts on a fishery and identify any additional research needed to better understand them. We also recommend with significant increases in stock assessment funding in NOAA's budget to overcome the assessment backlog and strengthen the assessment process.

Climate change is impacting marine and anadromous fish habitat, including Essential Fish Habitat and Habitat Areas of Particular Concern, in significant ways. Many of these impacts are exacerbated by human activities such as overfishing of prey species, pollution, water diversion, and the physical impacts of mobile fishing gear, which can combine to reduce habitat resilience. We recommend that NOAA evaluate its current habitat conservation programs in light of the impacts of climate change to determine ways to ensure habitat conservation remains consistent with the goals and requirements of the MSA.

Lastly, we recommend that NOAA establish guidance to adapt management to changes and shifts in fishery abundance and distribution in order to appropriately minimize the harm from subsequent economic, social, and ecological impacts of those shifts. A process should be established that allows the Secretary of Commerce to work with Councils, if appropriate, to determine if a fishery extends beyond the jurisdiction of the council currently managing it and, in coordination with the relevant councils, determine the best council or councils to appropriately modify or prepare a new or joint fishery management plan.

II. Support and strengthen our fishing communities and working waterfronts

Coastal fishing communities and working waterfronts are intricately linked to the marine ecosystems on which they rely, and thus play a critical role in fisheries management. They support a suite of community-based fishing related activities (i.e., commercial, charter/for-hire, recreational, and subsistence) and sustain the intergenerational fishing culture that forms the economic and social fabric of the coastal United States. These fishing activities support industries and infrastructure, chefs, eateries, seafood retailers, tackle shops, educational institutions such as aquaria and research laboratories, as well as generate an economic multiplier effect when revenue stays within a community.[2]

We recommend that National Standard 8 guidance be comprehensively updated to modernize Councils' and the agency's approach to supporting fishing community resilience to climate change. NOAA has not meaningfully updated its guidance for National Standard 8 since the 1990s. Since that time, coastal communities and working waterfronts across the country have significantly deteriorated, reducing their capacity to respond to climate

[2] Kirkley, James. "The NMFS Commercial Fishing & Seafood Industry Input/Output Model (CFSI I/O Model)." *Prepared for the National Marine Fisheries Service (NMFS). Virginia Institute of Marine Science* (2009). *Available from https://www.st.nmfs.noaa.gov/documents/commercial_seafood_impacts_2006.pdf*

change impacts and eroding their sense of place. Additionally, NOAA has added significant socioeconomic staffing capacity at the Science Centers, enabling the agency to approach community-based fishery issues in recreational and commercial sectors with far more sophistication than in the past. National Standard 8 guidance should also be updated to require Councils to establish clear measures to assess and minimize any adverse economic impacts to fishing communities in FMPs while achieving conservation goals, and to adopt FMP amendments and take other regulatory actions that secure sustainable community participation in fisheries.

III. Strengthen bycatch provisions

Bycatch, the incidental catch of a non-target species while targeting another, is a persistent problem in many commercial, charter/for-hire, and recreational fisheries that is often exacerbated by climate change. The Network notes that in some regions bycatch fisheries have been prioritized over traditional directed fisheries in management and decision-making. This has led to a decline in those traditional fisheries and the communities that depend on them, reducing their resilience to climate change as they are less able to prosecute these fisheries in more distant waters. Many of these are Native communities with unique cultures and languages. Many of the community-based directed fisheries that are subject to bycatch, including anadromous and groundfish species, are also being rapidly impacted by climate change.

We believe that a conscious effort needs to be made to stop and reverse these trends and maintain coastal communities that are vital and diverse by reducing bycatch of and depletion of the stocks. One important step would be to amend NOAA's National Standard 9 guidance to require greater reductions of bycatch in fisheries management. This could be achieved in part by clarifying NOAA's interpretation of language in National Standard 9, "reduce bycatch to the extent practicable," in order to remove opportunities for councils to circumvent bycatch provisions in FMPs and other policy directives, and thereby, improve stocks and traditional directed fishing opportunities.

NOAA can also issue guidance and develop programs to reduce bycatch impacts directly. The agency should, as a matter of policy, prioritize and promote traditional directed fisheries over bycatch uses. It should require (and provide institutional support for) consistent improvements to monitoring and reporting systems to better quantify bycatch, and provide guidance to encourage councils to establish full retention requirements for species with high catch mortality rates. NOAA should also work with Councils and the USDA to establish effective, workable seafood traceability requirements that incentivize bycatch reductions.

IV. Establish and support a robust new strategic planning process

Our collective experience during the COVID-19 emergency clearly shows that our fisheries are highly vulnerable to severe disruptions, whether those disruptions are ecologically or economically driven. The pandemic has also taught us that flexibility and innovation are key to the resilience of fishing communities in withstanding powerful stressors and adapting to changing conditions.

Several Network members participated in the Pacific Fishery Management Council's 2020 scenario planning exercise[3], and they all agree that the experience was valuable and worth replicating in other regions. We recommend that NOAA explore ways to support scenario-planning exercises that specifically address future challenges, including climate change impacts, facing each FMP under each of the Councils. A bottom-up planning process that systematically identifies vulnerability and proposes specific actions to adaptively respond could set NOAA and our fisheries on a course to enhanced resilience in a highly meaningful and tangible way.

In conclusion, we would be happy to work with you and your teams to clarify or develop the specific approaches that we suggest here. Thank you for considering these comments as we continue to work together to secure a climate resilient future for our nation's fisheries and ocean ecosystems.

Sincerely,

Robert C. Vandermark
Executive Director

[3] See: https://www.pcouncil.org/actions/climate-and-communities-initiative/

Submitted via email

April 2, 2021

Benjamin Friedman
Deputy Secretary for Operations
Performing the Duties of Under Secretary of Commerce for Oceans and Atmosphere and
National Oceanic and Atmospheric Administration Administrator
OceanResources.Climate@noaa.gov

Re: Section 216(c) of the Executive Order on Tackling the Climate Crisis at Home and Abroad: Climate Recommendations for Fisheries and Protected Resources

Dear Mr. Friedman,

The Center for Biological Diversity, Humane Society Legislative Fund, and the Humane Society of the United States submit the following comments in response to the National Oceanic and Atmospheric Administration's ("NOAA") request for information on how to make fisheries and protected resources more resilient to climate change. 86 Fed. Reg. 12,410 (Apr. 2, 2021).

As stated by President Biden in his January 27, 2021 Executive Order on Tackling the Climate Crisis at Home and Abroad, we are facing a "profound climate crisis" and we have only a little time to pursue bold actions to avoid the most catastrophic impacts of climate change.

First and foremost, our nation needs to swiftly shift away from fossil fuels and transition to clean and renewable energy. Indeed, the best available science on climate change demonstrates that we not only need to end the federal fossil fuel leasing program, but phase-out existing production as well. As recently stated by several scientific experts, "[t]he scale of threats to the biosphere and all its lifeforms—including humanity—is in fact so great that it is difficult to grasp for even well-informed experts" and our planet faces a "ghastly future" unless swift

action is taken to reverse the climate crisis, including "a rapid exit from fossil fuel use."[1] NOAA should therefore use all of its existing powers to help achieve those ends.

In addition, NOAA has the ability, and the obligation, to take action to make our ocean resources—including fisheries, marine mammals, and coastal resources—more resilient to climate change. We request that NOAA use its existing authority to (a) monitor and reduce emissions from agency actions and (b) quickly mitigate emerging climate-change threats to protected resources. We ask that NOAA:

1. **Use existing regulatory processes to limit warming to 1.5 degrees.**
2. **Use the Endangered Species Act's ("ESA") broad authority to monitor and mitigate human-caused threats to protected species from sea-level rise.**
3. **Use the Marine Mammal Protection Act ("MMPA") to monitor and mitigate climate change impacts to marine mammals.**
4. **Mitigate emerging climate-change related threats to marine mammals such as entanglements and vessel strikes.**
5. **Implement a policy of precautionary fisheries management decisions to mitigate climate change and lessen climate change impacts.**
6. **Prioritize the monitoring and mitigation of climate impacts such as ocean acidification.**
7. **Make federal government solutions inclusive and focused on equity.**

We provide more details on each of these below.

1. **<u>Use existing regulatory processes to limit warming to 1.5 degrees.</u>**

To limit warming to 1.5 degrees, NOAA must use its existing regulatory authority to stop fossil fuel exports and construction of new fossil fuel infrastructure projects, such as pipelines, import and export terminals, storage facilities, refineries, and petrochemical plants.[2] Crude oil exports have skyrocketed,[3] driven by the fracking boom and enabled by Congress's reversal of

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[1] Bradshaw, C., et al. 2021. Understanding the Challenges of a Ghastly Future. Front. Conserv. Sci. Vol. 1, Article 615419.

[2] Tong, D. et al., Committed emissions from existing energy infrastructure jeopardize 1.5 °C climate target, 572 Nature 373-377 (2019); Smith, C.J. et al., Current fossil fuel infrastructure does not yet commit us to 1.5 °C warming, 10 Nature Communications 101 (2019).

[3] United States Energy Information Administration, Data: Petroleum & Other Liquids, *available at*: https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&s=mcrexus2&f=m (last visited Sept. 23, 2019); DiChristopher, T., *US crude oil exports hit a record last week at 3.6 million barrels a day*, CONSUMER NEWS

the 40-year-old crude oil export ban in 2015. Approval and construction of new fossil fuel infrastructure projects have ballooned due to the fracking boom. These approvals create a variety of harms and risks, including "carbon lock-in"—incentives to continue to extract and burn fossil fuels even when it is not beneficial from an investment or policy perspective to do so;[4] increased costs to transition to a low carbon economy;[5] and placing investors at risk of being left with stranded assets.[6]

NOAA should deny permits for new fossil fuel infrastructure projects unless denial would be unlawful under applicable statutes.[7] NOAA should also use its authorities to require a transition to 100% zero-emission vessels by a certain date.[8] Federal agencies also must also comply with the National Environmental Policy Act ("NEPA") prior to issuing such permits and approvals. Any proper NEPA analysis would necessarily conclude that the environmental impacts of such projects are significant and cannot be mitigated, providing the agency with an analysis supporting project denial.[9]

2. **Use the Endangered Species Act's ("ESA") broad authority to monitor and mitigate human-caused threats to protected species from sea-level rise.**

NOAA has the ability and duty to substantially improve the outlook for coastal species at risk of sea-level rise (e.g., sea turtles nesting in the southeast U.S.). We urge NOAA to take immediate steps to strengthen the policy guidance for managing sea-level rise and storm surge threats to species and their habitats and fully utilize the tools provided by the Endangered Species Act to reduce sea-level rise threats to listed species. This entails (a) using the best-available science on sea-level rise in decision-making, (b) conducting a comprehensive, science-based analysis of sea-level rise threats in listing determinations for coastally distributed species, (c) designating critical habitat that protects upland areas needed for landward migration as the oceans rise, (d) ensuring that recovery plans include actions to reduce sea-level rise threats,

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AND BUSINESS CHANNEL, Feb. 21, 2019, *available at*: https://www.cnbc.com/2019/02/21/us-crude-oil-exports-hit-a-record-high-last-week.html (last visited Sept. 23, 2019).

[4] Erickson, P. *et al.,* Assessing carbon lock-in, 10 Environmental Research Letters 084023 (2015).

[5] *Ibid.*

[6] De Lorenzo, Luca & Enkvist, Per-Anders, Framing stranded assets in an age of disruption, Stockholm Environmental Institute & Materials Economics (2018).

[7] For example, citing its contribution to climate change, the Obama State Department found that the Keystone pipeline would not serve the national interest and denied the permit. (The White House Office of the Press Secretary, Statement by the President on the Keystone XL Pipeline, https://obamawhitehouse.archives.gov/the-press-office/2015/11/06/statement-president-keystone-xl-pipeline (last visited Dec. 3, 2019).)

[8] *See, e.g.*, World's First Zero-Emission Wind and Hydrogen Power Cargo Ship, Maritime Executive, Mar. 26, 2021, https://www.maritime-executive.com/article/world-s-first-zero-emission-wind-and-hydrogen-power-cargo-ship.

[9] Therefore, NOAA should work with the Council on Environmental Quality to issue new NEPA Guidance summarizing the best available science on climate impacts and policy implications of new fossil fuel infrastructure, explaining the adverse consequences of such approvals. This will provide a valuable science and policy resource upon which federal agencies can rely in their NEPA reviews, avoiding the need to inefficiently replicate the analysis.

acknowledge the necessity of reducing greenhouse gas emissions to levels that allow recovery, conduct needed research and monitoring to better understand threats, and set recovery criteria that address sea-level rise threats, and (e) consultations that include sea-level rise analyses for coastal projects and consultations on major emissions sources to provide mitigation benefits that directly reduce the source of sea-level rise threats.

1. Best-Available Scientific Guidance on Sea-level Rise

When making listing determinations, designating critical habitat, or engaging in recovery planning, NOAA must consistently rely on the best-available science on observed and projected sea-level rise at a regional scale to make the most scientifically informed decisions about the threats that sea-level rise poses to listed species and their habitats. The National Climate Assessment, which is updated every four years, can provide a good scientific basis for sea-level-rise-related decision-making, coupled with new publications and region-specific analyses.[10]

2. Listing Decisions

NOAA can ensure that listing analyses and determinations comprehensively consider the threats from sea-level rise and increasing storm surge. Listing decisions for coastally distributed species are highly variable in the quality of their sea-level rise analyses. Some listing decisions have detailed discussion and analysis while others do not even mention sea-level rise. For example, the U.S. Fish and Wildlife Service's 2013 final listing rule for three coastal Florida plant species-- Cape Sable Thoroughwort, Florida Semaphore Cactus, and Aboriginal Prickly-Apple—included an extensive review of the science on current and projected sea-level rise and detailed analyses of how sea-level rise and increasing storm surge are affecting and will continue to affect these species (78 Fed. Reg. 63796). Based on this comprehensive analysis, sea-level rise was determined to pose a significant threat to these species. In contrast, the 2012 final listing rule for eight freshwater mussels--Alabama Pearlshell, Round Ebonyshell, Southern Kidneyshell, Choctaw Bean, Tapered Pigtoe, Narrow Pigtoe, Southern Sandshell, and Fuzzy Pigtoe--did not mention sea-level rise (77 Fed. Reg. 61664), even though most of these mussels occur in the lower, nontidal sections of coastal streams in Alabama and Florida which are projected to become increasingly saline as sea levels rise, threatening to eliminate mussel populations in those areas. NOAA can help inform Fish and Wildlife Service decisions by providing science-based sea-level rise projections. A thorough sea-level rise analysis is critical not only for recognizing important threats for listing purposes, also because the threats analysis in listing determinations often forms the foundation for recovery plans, critical habitat designations, and consultations.

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[10] *See also*, National Marine Fisheries Service 2016, *Procedural Instruction 02-110-18, Guidance For Treatment Of Climate Change in NMFS Endangered Species Act Decisions* ("NMFS Climate Change Guidance"), which specifies that NMFS should use Representative Concentration Pathway (RCP) 8.5 because in "cases of significant uncertainty, it is appropriate to assume conditions similar to the status quo until new information suggests a change is appropriate."

3. Critical Habitat Designation

The ESA explicitly allows NOAA to designate critical habitat "outside the geographical area occupied by a species at the time it was listed, upon a determination that such areas are essential for the conservation of the species."[11] Because many species are shifting their ranges in response to climate change, designating habitat areas outside of the current range, including areas projected to provide suitable habitat in the future and habitat to facilitate movements to new areas, will become critical to helping species survive and recover under climate change. For many coastal species, habitat is being lost or degraded by increasing inundation, erosion, and saltwater intrusion due to sea-level rise, as well as flooding from stronger hurricanes and increasing storm surge. NOAA can identify and designate sufficient unoccupied inland habitat, protected from inundation by sea-level rise and increasing storm surge, to help species and their habitats move landward and prevent coastal squeeze (i.e., squeezing species between rising waters and coastal development).

NOAA can use its many tools at hand for modeling the impacts of sea-level rise and identifying future suitable habitat. As an example, the Fish and Wildlife Service designated unoccupied upland habitat in the 2012 critical habitat designation for the western snowy plover to mitigate for habitat loss due to sea-level rise which was predicted to partially or fully inundate 36 of 60 critical habitat units (77 Fed. Reg. 36,728). High-resolution LiDAR data informed how to extend unit boundaries to compensate for habitat loss due to sea-level rise; designate critical habitat outside of the snowy plover's occupied range to ensure the conservation of the plover under threats from sea-level rise; and restore habitat to increase the amount of suitable habitat for plovers to offset losses from sea-level rise and other threats. This provides an illustration of the feasibility and importance of a proactive approach.

4. Recovery Plans

Recovery plans provide an important opportunity to conduct a comprehensive analysis of sea-level rise threats on a species-specific basis and to set forth a prioritized action plan to eliminate or reduce those threats so that the species can achieve recovery. We recommend that recovery plans include five components for addressing sea-level rise and other climate-change-related threats: (1) a discussion of how climate change affects or is projected to affect the species and its habitat, (2) actions for research and/or monitoring to better understand those threats, (3) actions to eliminate or reduce the impacts of those threats on listed species (i.e., adaptation), such as identifying essential habitat to which species can migrate or be translocated as the oceans rise, (4) recognition of the necessity of reducing greenhouse gas emissions to levels that will allow the species' recovery (i.e., mitigation), and (5) recovery criteria that require the elimination

[11] 16 U.S.C. § 1532(5); *see also* NMFS Climate Change Guidance, citing recent amendments to the joint regulations governing designation of critical habitat, 81 Fed. Reg. 7,414 (Feb. 11, 2016), and noting that climate change has made it more important to be proactive in designating unoccupied habitat as critical in appropriate cases.

or amelioration of those threats. Recovery plans are highly variable in their treatment of climate change threats and typically do not include many of these components. For example, the Fish and Wildlife Service's 2012 Recovery Plan for Hawaiian Waterbirds identified sea-level rise as a potential threat but recommended no actions to address this threat. In contrast, NOAA's 2009 Recovery Plan for the Northwest Atlantic Population of the Loggerhead Sea Turtle identified sea-level rise as a potential threat and recommended actions for research and emissions mitigation.

5. Consultation

The ESA consultation process provides an important opportunity to minimize climate-related threats to listed species from federal activities. NOAA can conduct sea-level rise analyses in consultations for projects that may affect coastal species. Many projects that may have a federal nexus such as coastal development projects, coastal armoring, and beach renourishment activities are likely to be harmful to coastal species facing habitat loss and degradation due to sea-level rise. NOAA can consider the importance of protecting inland habitat needed for landward migration; protect coastal habitats such as marshes, seagrass beds, kelp forests, coral reefs and oyster reefs which buffer the coast from sea-level rise and provide essential habitat for listed species; and discourage coastal armoring and other hardening of the coastline which increase erosion and can have harmful effects on listed species.[12] Since sea-level rise threats only worsen with rising greenhouse gas emissions, NOAA can also consult on federal projects that will produce large amounts of greenhouse gas emissions that contribute to sea-level rise, with the goal of implementing reasonable and prudent mitigation measures to lower the project's greenhouse emissions and ultimate sea-level rise impacts on coastal species.

3. <u>Use the Marine Mammal Protection Act ("MMPA") to monitor and mitigate climate change impacts to marine mammals.</u>

Protecting marine mammals through NOAA's existing regulatory authority can both reduce greenhouse gas emissions and mitigate the impacts of climate change on marine mammals. NOAA can deny permits for new fossil fuel infrastructure projects, including projects that export methanol to produce plastics, because of the harmful impacts to marine mammals. Plus, healthy marine mammal populations can reduce the impacts of greenhouse gas emissions.

The ecosystem benefits of large whales include nutrient cycling and acting as a carbon sink. Research demonstrates that whales act as ecosystem engineers both through transferring nutrients within the water column and across latitudes supporting plankton blooms on which the

[12] *Id*. at 3 ("It will usually be the case that consideration is not limited to only the duration of the specified activity, but also to its continuing effects for the foreseeable future. For example, where a construction activity is the subject of consultation, we must consider not only the effects caused from the construction itself, but also the effects of the resulting structure once completed.").

marine food web relies as well as sequestering carbon, limiting the effects of climate change.[13] According to Roman and McCarthy (2010), the recovery of whale populations can counter "the decline in nutrients for phytoplankton growth caused by ocean warming."[14] In fact, they estimated that whales and seals in the Gulf of Maine are responsible for the release of approximately 2.3×10^4 metric tons of nitrogen per year into the ecosystem.[15] Research also shows that, by enhancing primary productivity, whales sustain the growth of their own prey.[16]

This research underscores the importance of maintaining marine mammals at their optimum sustainable populations,[17] as required under the MMPA. Annual stock assessment reports provide the scientific information needed to manage marine mammals according to MMPA requirements. NOAA must do a better job providing up-to-date and accurate information in the stock assessment reports to protect oceans from climate change impacts. We are but one of a number of organizations and agencies that have repeatedly criticized the stock assessments for having missing, outdated and/or imprecise information regarding population abundance and trends, for example:

- Potential biological removal levels ("PBRs") are critical for appropriate management of anthropogenic impacts and a lack of a valid PBR hampers the agency's ability to comply with MMPA mandates.

- Incorrect stock definitions result in misleading abundance estimates and inaccurate trend data that could result in populations experiencing a significant decline without detection. One example is the California/Oregon/Washington stock of humpback whales that NOAA has not revised since the 2016 listing of humpback whale DPSs. The small Central America DPS therefore is inadequately protected from anthropogenic threats.

- Outdated survey data (more than eight years old) are not used for stock assessments, which leaves many marine mammals without abundance estimates.[18]

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[13] Nicol, S., Bowie, A., Jarman, S., Lannuzel, D. Meiners, K.M. and Van Der Merwe, P. (2010) Southern Ocean iron fertilization by baleen whales and Antarctic krill. Fish and Fisheries, 11: 203-209; Roman J, McCarthy JJ (2010) The Whale Pump: Marine Mammals Enhance Primary Productivity in a Coastal Basin. PLoS ONE 5(10): e13255. doi:10.1371/journal.pone.0013255.
[14] *Id.*
[15] *Id*.
[16] Lavery TJ, Roudnew B, Seymour J, et al. 2014. Whales sustain fisheries: blue whales stimulate primary production in the Southern Ocean. Mar Mammal Sci; doi:10.1111/mms.12108.
[17] 16 U.S.C. 1362(3)(9) (defining optimum sustainable population as the number of animals which will result in the maximum productivity of the population or the species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element).
[18] U.S. Marine Mammal Commission, 2016. Review of the National Marine Fisheries Service's Marine Mammal Stock Assessment Reports: Range, Abundance, and Potential Biological Removal. 18 pp. June 2016. At: https://www.mmc.gov/wp-content/uploads/SARsReport.pdf

- Habitat descriptions in the stock assessment reports should assess the impacts to prey base from climate change and fisheries in addition to including quantitative data on noise pollution for noise-sensitive marine mammals.

4. **Mitigate emerging climate-change related threats to marine mammals such as entanglements and vessel strikes.**

Changing ocean conditions driven by climate change increases the risk of vessel strikes and entanglements. Warming waters, for example, can shift the distribution of large whales and force whales to look for food in areas that overlap with fishing gear or vessels. The increasing number of reported entanglements off California and other waters coincides with changing ocean conditions driven by climate change. These changes are threatening whales, sea turtles, and other marine animals off all our coasts with entanglements or vessel strikes: humpback whales off Alaska; fin whales, blue whales, and Pacific leatherback sea turtles off the U.S. West Coast; sea turtles in the Gulf of Mexico; and North Atlantic right whales off the U.S. East Coast.

The North Atlantic right whale highlights this problem all too well. The changing climate presents new risks for the critically endangered North Atlantic right whale because management has not kept pace with increasing human-caused injury and death in the changing right whale habitat. Although the North Atlantic right whale has been protected under the ESA since 1973,[19] the species has never recovered to a sustainable population level.[20] As NOAA Fisheries itself has recognized, the North Atlantic right whale is "one of the world's most endangered large whale species" and "has been steadily declining for nearly the past decade."[21] There are currently estimated to be fewer than 95 breeding females left in the population, and calving rates have significantly decreased in recent years.[22] NOAA has failed to protect these whales.

Right whale distribution and habitat use has shifted since 2010 in response to climate change-driven shifts in prey availability.[23] For example, Southern New England has become an important habitat area for all life history stages.[24] The best scientific and commercial data

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[19] Right whales were first listed as "endangered" under the Endangered Species Conservation Act in June 1970, *see* 35 Fed. Reg. 8,491, 8,495 (June 2, 1970), and subsequently, in 1973, under the ESA. *See* 50 C.F.R. § 17.11. Right whales have been listed as a "depleted" species under the MMPA since 1973, 38 Fed. Reg. 20,564, 20,570 (Aug. 1, 1973), and are a "strategic" stock under this statute, *see* 16 U.S.C. § 1362(19).
[20] NMFS, *Recovery Plan for the North Atlantic Right Whale* (*Eubalaena glacialis*) (2004).
[21] *10 Things You Should Know About North Atlantic Right Whales*, NOAA Fisheries (Oct. 17, 2019), https://www.fisheries noaa.gov/feature-story/10-things-you-should-know-about-north-atlantic-right-whales
[22] *North Atlantic Right Whale,* NOAA Species Directory, https://www fisheries.noaa.gov/species/north-atlantic-right-whale
[23] Record, N., Runge, J., Pendleton, D., Balch, W., Davies, K., Pershing, A., Johnson, C., Stamieszkin, K., Ji, R., Feng, Z. and Kraus, S. 2019. Rapid Climate-Driven Circulation Changes Threaten Conservation of Endangered North Atlantic Right Whales. Oceanography. Vol. 32, pp. 162–169.
[24] Leiter, S.M., Stone, K.M., Thompson, J.L., Accardo, C.M., Wikgren, B.C., Zani, M.A., Cole, T.V.N., Kenney, R.D., Mayo, C.A., and Kraus, S.D. 2017. North Atlantic right whale *Eubalaena glacialis* occurrence in offshore wind energy areas near Massachusetts and Rhode Island, USA. Endangered Species Research. Vol. 34, pp. 45–59;

available, including aerial surveys,[25] acoustic detections,[26] stranding data,[27] a series of dynamic management areas declared by NOAA Fisheries pursuant to the ship strike rule,[28] and prey data,[29] all indicate that right whales now heavily rely on Southern New England waters.[30] Large, consistent aggregations of right whales in all four seasons, have led scientists and a NOAA Fisheries Expert Working Group to describe Southern New England as a year-round foraging "hotspot."[31]

This evidence of North Atlantic right whale climate-driven range shifts requires NOAA to improve management of human-caused threats like ship strikes and entanglements for the species. And it highlights why better management measures—such as requiring the use of ropeless (or "on-demand") fishing gear—off all our coasts are required to help ensure the survival and recovery of marine animals.

1. Require the use of ropeless fishing gear to protect marine mammals harmed by Category I and II pot and trap fisheries.

Because of climate change, both whale and sea turtle distribution and fishing locations have shifted in ways to cause unexpected overlap and a high risk of entanglements. We urge

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Quintana, E., "Monthly report No. 3: May 2017," Report prepared for the Massachusetts Clean Energy Center by the New England Aquarium, pp. 26 (May 15, 2017), at 52–54.

[25] Kraus, S.D., Leiter, S., Stone, K., Wikgren, B., Mayo, C., Hughes, P., Kenney, R.D., Clark, C.W., Rice, A.N., Estabrok, B., and Tielens, J. 2016. Northeast large pelagic survey collaborative aerial and acoustic surveys for large whales and sea turtles. Final Report. OCS Study, BOEM 2016-054, pp. 118; Leiter et al. 2017.

[26] Kraus, et al. 2016; Davis, G.E., Baumgartner, M.F., Bonnell, J.M., Bell, J., Berchick, C., Bort Thorton, J., Brault, S., Buchanan, G., Charif, R.A., Cholewiak, D., 2017. Long-term passive acoustic recordings track the changing distribution of North Atlantic right whales (*Eubalaena glacialis*) from 2004 to 2014. Scientific Reports. Vol. 7, p. 13460.

[27] Asaro, M.J., Update on US Right Whale Mortalities in 2017, NMFS, November 30, 2017, available at: https://www.greateratlantic.fisheries noaa.gov/protected/whaletrp/trt/meetings/ 2017%20Nov/asaro_usstrandings_nov2017.pdf.

[28] NMFS Interactive Dynamic Management Area Analyses: https://www.nefsc noaa.gov/rcb/interactive-monthly-dma-analyses/.

[29] Pendleton, D.E., Pershing, A., Brown, M.W., Mayo, C.A., Kanney, R.D., Record, N.R., and Cole, T.V.N. 2009. Regional-scale mean copepod concentration indicates relative abundance of North Atlantic right whales. Marine Ecology Progress Series. Vol. 378, pp. 211–225; NOAA Northeast Fisheries Science Center, "Ecology of the Northeast US Continental Shelf – Zooplankton," available at https://www.nefsc noaa.gov/ecosys/ecosystem-ecology/zooplankton html.

[30] Although there are challenges in the use of opportunistic sightings data (no area systematically surveyed, effort not corrected for, and potential for counting an individual whale more than once), they are a proxy for habitat used by North Atlantic right whales, as validated by NMFS' management actions based on these data, including the implementation of DMAs; *see also* NMFS, Voluntary Vessel Speed Restriction Zone in Effect South of Nantucket to Protect Right Whales (Jan. 28, 2019), https://www fisheries.noaa.gov/feature-story/voluntary-vessel-speed-restriction-zone-effect-south-nantucket-protect-right-whales (In January 2019, an aggregation representing a quarter of the population—100 whales—was seen in this area).

[31] Oleson, E.M., Baker, J., Barlow, J., Moore, J.E., and Wade, P., 2020. North Atlantic Right Whale Monitoring and Surveillance: Report and Recommendations of the National Marine Fisheries Service's Expert Working Group. NOAA Technical Memorandum NMFS-OPR-64, at Fig. 1; Kraus, S.D. 2016; Davis, G.E., et al. 2017; NMFS Interactive DMA Analyses.

NOAA to initiate a rulemaking to require the use of ropeless fishing gear in commercial fisheries, such as trap and pot gear used to target crab and lobster, to prevent whales and sea turtles from becoming tangled in fishing gear and drowning.

Entanglement in fishing gear is a top threat to large whales in the United States. The use of heavy vertical lines—often connected to even heavier traps—can result in multiple wraps around the whale's head, mouth, flippers, or tail, sometimes preventing the animal from resurfacing, resulting in drowning. Additionally, the entangling gear often impedes basic movement, feeding, and reproduction, and can cause deep wounds and chronic infection. Sea turtles entangled in commercial fishing gear can suffer similar fates. Fishery entanglements not only kill and harm individual animals, they are one of the primary threats impeding the recovery of endangered North Atlantic right whales, humpback whales, blue whales, and leatherback sea turtles—species that are all protected under the Endangered Species Act.

NOAA Fisheries has both a duty and authority under the MMPA and the Endangered Species Act to prevent fixed gear fisheries from jeopardizing marine mammals and sea turtles. "Ropeless" fishing gear (also known as on-demand, pop-up, or buoy-less fishing gear) eliminates unattended vertical line in the water column, and thus significantly reduces the risk of entanglements in vertical lines, and the attendant serious injuries, mortalities, and sub-lethal impacts these entanglements cause. This type of gear is already being tested and used by fishermen around the globe, including in waters off the U.S. East and West Coasts, in the Gulf of St. Lawrence in Canada, and in Australia.

Requiring the use of ropeless fishing gear in all Category I and II trap/pot fisheries—i.e., commercial fisheries using trap/pot gear that NOAA Fisheries has determined cause frequent or occasional serious injury and mortality to marine mammals—will help eliminate the suffering of individual animals that get caught in vertical line, and help promote the survival and recovery of the numerous endangered marine mammal species threatened by ongoing entanglements in fishing gear. It will also help reduce incidental mortality and serious injury of marine mammals to insignificant levels approaching a zero mortality and serious injury rate, as required by the MMPA.

2. **Expand or create mandatory vessel speed limits of 10 knots to protect large whales from vessel strikes.**

Vessel strikes are a top source of human-caused mortality for U.S. whales. In fact, vessel strikes are the biggest source of human-caused mortality to large whales on the U.S. West Coast, followed closely by fishing gear entanglements. Large cargo ships, some longer than four city blocks, funnel into shipping lanes to ports near San Francisco and Santa Barbara. Scientists estimate that 80 whales die from ship strikes each year on the U.S. West Coast. We urge NOAA

Fisheries to establish mandatory vessel speed limits of 10 knots in all voluntary speed restriction zones off Southern California and in the San Francisco Bay region.

NOAA Fisheries lists ship strikes and entanglement in commercial fishing gear as the two primary threats impeding right whale recovery.[32] Right whales are particularly vulnerable to vessel strikes because their habitat requirements, and coastal migration necessitate their use of waters heavily traversed by vessels and because their feeding, resting, and socializing behavior bring them to the surface often.[33] In June 2020 a baby right whale was found dead off the coast of New Jersey, with propeller wounds across its head, chest and tail.

On August 6, 2020, conservation groups filed a rulemaking petition seeking additional ship-speed limits along the Atlantic coast to protect critically endangered North Atlantic right whales.[34] The petition asks the National Marine Fisheries Service to expand the areas and times when its existing 10-knot rule applies and to make all vessel-speed restrictions mandatory, rather than voluntary, to avoid collisions that kill and injure right whales. We urge NOAA to grant this rulemaking petition to protect endangered North Atlantic right whales from emerging threats due to climate-related shifts in habitat.

5. **Implement a policy of precautionary fisheries management decisions to mitigate climate change and lessen climate change impacts.**

It is undeniable that the ocean ecosystem is impacted by climate change. Warming oceans, decreased sea ice, ocean acidification, increased toxic algal blooms, and changing prey distributions are becoming more pronounced and disruptive. These pose an escalating threat to U.S. coastal ecosystems and human communities. NOAA must, along with its international, federal, and state partners, tackle these challenges head on and create a fisheries management regime that can protect ecosystem functioning for future generations. This requires community engagement, cross-agency coordination, and the use of science-based solutions.

NOAA can increase the resilience of climate-impacted fish populations by considering the historical abundance when setting harvest goals. Congress passed the Magnuson-Stevens Fisheries Conservation and Management Act with the intent to "prevent overfishing, to rebuild overfished stocks, . . . and to realize the full potential of the Nation's fishery resources."[35] Accordingly, fisheries managers seek to catch as many fish as possible, yet avoid negatively affecting future catches for the long-term. But in many cases, fish stocks were heavily fished

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[32] *See, e.g.*, NMFS Right Whale Tech Memo at 1, 7.
[33] Susan Parks, *Dangerous Dining: Surface Foraging of North Atlantic Right Whales Increases Risk of Vessel Collisions*, 8:1 BIOL. LETT. 57–60 (2012).
[34] Press release, Vessel Speed Limits Sought to Protect Endangered North Atlantic Right Whales, https://biologicaldiversity.org/w/news/press-releases/vessel-speed-limits-sought-protect-endangered-north-atlantic-right-whales-2020-08-06/
[35] 16 U.S.C. § 1801(6).

before stock status was monitored. Political pressure to increase harvests, even on overfished stocks, combined with poor data means that managers underestimate the decline in the stock status or set recovery targets far below what is warranted if biological indicators considered the historic (much higher) abundance. This leaves stocks vulnerable to climate change impacts.

Overfished stocks fail to produce maximum sustainable yield, and more significantly, cause potentially irreversible changes to ecosystems. Humans' overfishing and intensive use of coastal areas has degraded the marine environment to the point of losing biodiversity and diminishing ecosystem functioning.[36] Risks associated with low fish stock sizes include not only reduced fisheries landings, but also a lack of forage fish for predators, like the critically endangered Southern Resident killer whale. These whales prefer to eat Chinook salmon. The salmon's depleted abundance and decreased size means that Southern Resident killer whales are prone to miscarriages, stillborn calves, and young animals failing to thrive and survive.[37] Killer whales' recovery therefore depends on recovery of endangered Chinook salmon stocks.

NOAA researchers can sometimes account for climate change in fisheries management models, but in situations where information is lacking, NOAA must set more precautionary targets that consider higher, historic abundances. Creating oceans that are resilient to climate change requires that harvest goals transparently consider the historic abundance of overfished species, rather than on observations of the past half century or shorter. Shifting baselines, coined by Daniel Pauly in 1995,[38] refers to a collective amnesia of what healthy oceans looks like. We urge NOAA to resist this degradation of the ocean's living resources. We recommend that NOAA set harvest goals using biological indicators that consider the historic abundance to allow a precautionary buffer for climate change impacts.

1. Example: Western Atlantic Bluefin Tuna

Western Atlantic bluefin tuna is a poster child for overexploitation, climate change impacts, and shifting rebuilding targets. In the North Atlantic Ocean, climate change impacts have resulted in warming temperatures, rising sea levels, increasing acidification, and altered circulation and nutrient supplies, all of which are project to intensify this century.[39] Atlantic bluefin tuna are unique among bony fish for their endothermic capacity and cardiovascular

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[36] Worm, Boris, et al. "Impacts of biodiversity loss on ocean ecosystem services." *Science* 314.5800 (2006): 787-790.

[37] Wasser, Samuel K., et al. "Population growth is limited by nutritional impacts on pregnancy success in endangered Southern Resident killer whales (Orcinus orca)." *PLoS ONE* 12(6): e0179824. https://doi.org/10.1371/journal.pone.0179824.

[38] Pauly, D., 1995. Anecdotes and the shifting baseline syndrome of fisheries. *Trends in ecology & evolution*, 10(10), p.430.

[39] Bindoff, N. L., et al. 2007. 2007 Observations: Oceanic Climate Change and Sea Level. in S. Solomon, et al. , editors. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the IPCC. Cambridge University Press; Beaugrand, G. 2009. Decadal changes in climate and ecosystems in the North Atlantic Ocean and adjacent seas. Deep-Sea Research II 56:656-673.

physiology. Given this unique physiology that makes tuna particularly vulnerable to increased ocean warming, any models projecting population status of the Atlantic bluefin tuna should consider climate change.

Western Atlantic bluefin tuna has been at low population levels for decades (see fig. 1 left-hand graph), despite a 20-year rebuilding period that began in 1999. During the rebuilding period, Atlantic bluefin tuna failed to rebuild as expected. After revising its management targets in 2017, NOAA considered the stock status unknown rather than overfished. Most recently, the 2020 stock assessment revised downward the 2017 abundance estimates (fig. 1 left-hand graph). In other words, the stock declined more than predicted since 2017.

Even considering this bad news of a failed rebuilding period and revised stock assessments, the full picture of bluefin tuna decline is not evident. The stock assessments do not adequately depict or portray estimates of abundance prior to 1973. Fishing pressure on Atlantic bluefin tuna began long before 1973, including a relatively recent peak in catch around 1965 (fig. 1, right-hand graph). A healthy population is key to increasing rebuilding potential of bluefin tuna in light of changing environmental conditions.[40] Specifically, old bluefin tuna increase resilience to cyclical or random population changes because fecundity increases with size.[41]

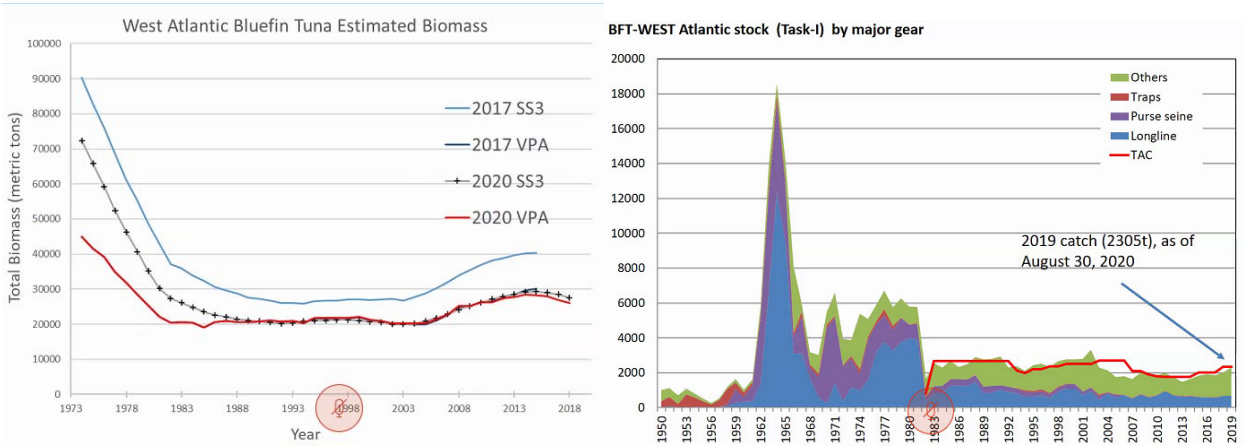

Figure 1. Western Atlantic bluefin tuna abundance (biomass) on left and catch on right. Note the abundance graph time series begins in 1973, approximately a decade after the peak recorded catches. (Source: NOAA Public Hearing, Presentation by Dr. John Walter, ICCAT SCRS Rapporteur, Sept. 3, 2020)

Key uncertainties in assessing the health of the western Atlantic bluefin tuna population include the impact of climate change, and specifically whether Atlantic bluefin tuna are shifting northward to more favorable waters and away from the United States (fig. 2). But this isn't the only impact of climate on western Atlantic bluefin tuna. Western Atlantic bluefin tuna's only

[40] Secor, D. H., Rooker, J. R., Gahagan, B. I., Siskey, M. R., & Wingate, R. W. 2015. Depressed resilience of bluefin tuna in the Western Atlantic and age truncation. Conservation Biology 29(2):400-408.
[41] *Id*.

known spawning grounds are in the Gulf of Mexico, which means that they are particularly sensitive to ocean warming because geography constrains movement north to cooler temperatures. Based on increases in temperatures that will decrease suitable spawning habitat, Muhling et al. (2011) estimated drastic reductions in probabilities of bluefin tuna larval occurrence in current spawning areas in the late spring: 39–61% by 2050 and 93–96% by the end of the 21st century.[42] Declining spawning habitat can contribute to the problem of low recruitment due to a lack of big, old, fat and fertile females in the population and further slow recovery.

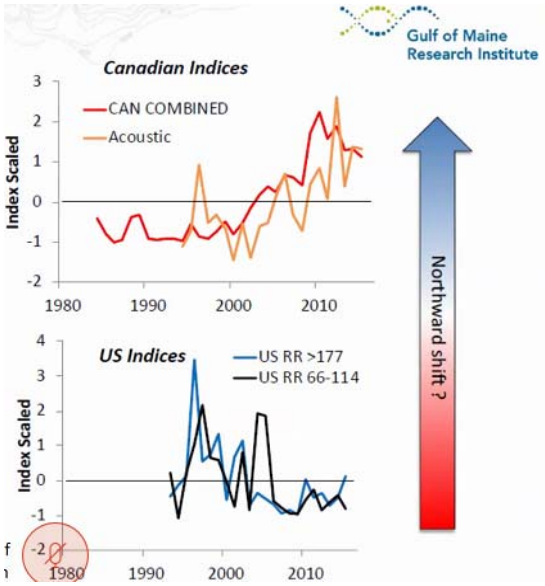

Figure 2. Indices of western Atlantic bluefin tuna abundance in Canada (top) and the United States (bottom). (Source: Walter 2020 Presentation, Data: SCRS-2020-071. Hansel et al. 2020. BTRP Research Project Spatio-temporal associations of western bluefin tuna indices of abundance with ocean climate conditions.)

2. Example: Pacific Bluefin Tuna

Similarly, Pacific bluefin tuna are at a low abundance and vulnerable to ocean warming, both of which may lead to low recruitment and rebuilding potential. Climate change may disrupt Pacific bluefin tuna spawning patterns because bluefin spawning is particularly susceptible to temperature changes, which can affect fish migration and larval survival.[43] Pacific bluefin tuna spawn between Japan and the Philippines, in the Sea of Japan south of Honshu.[44] With spawning

[42] Muhling, B. A., Lee, S. K., Lamkin, J. T., & Liu, Y. (2011). Predicting the effects of climate change on bluefin tuna (*Thunnus thynnus*) spawning habitat in the Gulf of Mexico. ICES Journal of Marine Science: Journal du Conseil, 68(6), 1051-1062.

[43] Kimura, S., Kato, Y., Kitagawa, T., & Yamaoka, N. (2010). Impacts of environmental variability and global warming scenario on Pacific bluefin tuna (*Thunnus orientalis*) spawning grounds and recruitment habitat. *Progress in Oceanography*, 86(1), 39-44.

[44] Chen, K.S., P. Crone, and C.C. Hsu. 2006. Reproductive biology of female Pacific bluefin tuna *Thunnus orientalis* from south-western North Pacific Ocean. *Fisheries Science* 72: 985–994; Tanaka, Y., Mohri, M. and Yamada, H.,

success closely linked to water temperature, Pacific bluefin tuna prefer areas with low variability in inter-annual temperatures. Even small variations in egg and larval survival and growth rates could cause significant impacts to populations.[45] This is a serious concern for the future success of Pacific bluefin tuna because an ocean model simulation under a climate warming scenario predicts a 3º C increase in temperature by 2100 and, when considering a spawning season between April and June, results in a predicted 36% decline in larval survival due to exposure to lethally warm temperatures.[46]

Recent Pacific bluefin tuna recruitment – the entry of juvenile fish into the fishable population – is near historic lows. Recruitment, measured in Pacific bluefin tuna as the number of age 0 fish as of July 1st, in 2014 was at the second lowest level since 1952 and the average recruitment for the last five years was likely below the historical average level.[47] The stock assessment assumes that recruitment is nearly independent of the size of the spawning stock, meaning that even after an 80% decline in the population, recruitment will still be 99.9% of what it was before the decline.[48] This assumption – that the adult biomass can be depleted to a very low level without any impact on the future of the stock – has been strongly criticized in peer reviews of the assessment yet it has not been changed.[49] It is contrary to the evidence of stock-recruit relationships for the majority of fish stocks.[50] It is also inconsistent with the precautionary approach, which is particularly concerning for a decimated stock, such as Pacific bluefin.[51]

2007. Distribution, growth and hatch date of juvenile Pacific bluefin tuna *Thunnus orientalis* in the coastal area of the Sea of Japan. *Fisheries Science*, *73*(3), pp.534-542.

[45] Kimura, S., Kato, Y., Kitagawa, T., & Yamaoka, N. (2010). Impacts of environmental variability and global warming scenario on Pacific bluefin tuna (*Thunnus orientalis*) spawning grounds and recruitment habitat. *Progress in Oceanography*, 86(1), 39-44.

[46] *Id.*

[47] ISC PBFWG. 2016. 2016 Pacific bluefin tuna stock assessment, Draft Executive Summary. http://www.iattc.org/Meetings/Meetings2016/SAC7/PDFfiles/INF/SAC-07-INF-C(a)-ISC-Letter-IATTC-Executive-Summary.pdf.

[48] ISC PBFWG. 2014. Stock assessment of bluefin tuna in the Pacific Ocean in 2014. http://isc.fra.go.jp/pdf/2014_Intercessional/Annex4_Pacific%20Bluefin%20Assmt%20Report%202014-%20June1-Final-Posting.pdf.

[49] Bonhommeau, S. 2013. CIE Independent Peer Review on the Stock Assessment of Pacific Bluefin Tuna. http://swfsc noaa.gov/uploadedFiles/Divisions/DO/2013_06_28%20Bonhommeau%20PBFT%20review%20report.pdf; Carruthers, T. 2013. CIE Independent Peer Review on the Stock Assessment of Pacific Bluefin Tuna. http://swfsc noaa.gov/uploadedFiles/Divisions/DO/2013_06_28%20Carruthers%20PBFT%20review%20report.pdf; Powers, J. 2013. CIE Independent Peer Review on the Stock Assessment of Pacific Bluefin Tuna. http://swfsc noaa.gov/uploadedFiles/Divisions/DO/2013_06_28%20Powers%20PBFT%20review%20report.pdf.

[50] Myers, RA and NJ Barrowman. 1996. Is fish recruitment related to spawner abundance? Fishery Bulletin 94: 707-724.

[51] Mangel, M, J Brodziak, G DiNardo. 2010. Reproductive ecology and scientific inference of steepness: a fundamental metric of population dynamics and strategic fisheries management. Fish and Fisheries 11:89-104.

6. **<u>Prioritize the monitoring and mitigation of climate impacts such as ocean acidification.</u>**

    a. **NOAA should implement policies and management to prevent ocean acidification.**

Carbon dioxide emissions are the primary contributor to ocean acidification, and NOAA must directly address the need for carbon dioxide reductions to conserve marine ecosystems. NOAA can and must go beyond resilience and adaptation to ocean warming and acidification.

Existing laws already have some powerful tools that could be brought to bear on the problem of ocean acidification and NOAA should leverage science-based policies and management under those laws. Some objectives could include:

- Conduct a vulnerability assessment for marine and coastal species and ecosystems. Determining atmospheric CO_2 levels necessary to conserve marine ecosystems from dangerous ocean acidification. Emissions scenarios are important for informing policy approaches to acidification.

- Forecast species' responses to ocean acidification using modeling tools to predict range shifts, demographic and population trends, and physiological responses across taxonomic groups using a range of climate models, emissions scenarios, and management timelines (25, 50, 100 years). Identify wildlife species and ecosystems imperiled by ocean acidification by evaluating range shift models and population viability models run under future ocean acidification levels. Recommend conservation actions, including protected status, for species that are most at risk. Protect species across their range since populations are likely to have different adaptations to local oceanic conditions.

- Develop science-based tools to inform management under changing climate conditions. Develop a mapping tool for coastal areas that integrates predictions on species' range shift and changing ocean conditions to illustrate coastal and marine that will become important for supporting biodiversity in the future under a range of climate models, emissions scenarios, and management timelines (25, 50, 100 years). Identify important future areas including corridors and steppingstone habitat to facilitate acidification- and climate-induced migration.

- Determine the economic values of ecosystems that are at risk from ocean acidification and the costs of reducing CO_2 emissions to preserve those ecosystems.

- Develop an adaptative framework that seeks to conserve all of the components of marine and coastal biodiversity and ecosystem function under a range of ocean acidification scenarios, promotes the resiliency of the natural environment under changing climate

conditions, and increases the sustainability of human communities/human use of the oceans and coasts.

- Manage for resistance and resilience of marine and coastal species and ecosystems to climate change and ocean acidification. Protect and expand the network of marine and coastal protected areas and sound ecosystem management of areas that include a diversity of habitats and biogeographic regions; include topographic features associated with high species diversity such as upwelling zones as well as regions with high habitat heterogeneity; include ecologically significant areas such as nursery grounds, spawning grounds, areas of high species diversity, and transitional zones between habitat types.
- Recommend areas for protection as refugia. Identify and protect areas that show resistance and resilience to ocean acidification and climate change.
- Develop research and strategies to minimize and eliminate stressors on ocean ecosystems such as the prevention of overexploitation, reduction of nutrient pollution, prevent habitat loss, and control invasive species.
- Recognize that adaptation efforts for the ocean and coasts will only be effective/ have long-term success if carried out alongside comprehensive, rapid mitigation/reduction of greenhouse gas emissions to sustainable levels.
- Recognize that we know enough about ocean acidification, and need prompt action, to take policy steps to prevent its worst consequences.
- Utilize existing policy, regulations, and legislation at the local, regional, and national level that promote ocean acidification adaptation and mitigation; and develop new tools and identify needs for new policy guidance, regulation, and legislation to facilitate ocean acidification mitigation and adaptation strategies. Use tools in existing legislation to promote adaptation, which include but are not limited to:
    - Endangered Species Act: Identify and protect species threatened or endangered by ocean acidification. Identify and protect critical habitat for listed species under current and future ocean conditions (i.e. identify and protect habitat that will be important for species' survival and recovery as species' ranges shift and habitat is lost due to changing ocean conditions). Develop and implement recovery plans that analyze the effects of ocean acidification on listed species and outline conservation strategies for persistence and recovery under changing conditions.
    - NEPA: NOAA should include in NEPA review an action's ocean acidification consequences and recommended mitigation measures. NOAA should develop tools to assist lead agencies and project proponents in identifying

potential impacts to coastal and marine environments currently and under future scenarios.

- Recommend updates and clarifications to state and federal regulations pertaining to coastal and ocean management to incorporate consideration of ocean acidification and to facilitate implementation of adaptation strategies. For example, update regulations for the National Marine Sanctuaries Act and the Coastal Zone Management Act.
- Provide action agencies with the best available science on impacts to biodiversity due to ocean acidification so they can be integrated into existing and future management plans and agency decisions, including planning and permit activities. Educate management personnel on climate change and ocean acidification to inform management decisions.
- Identify needs for new policy guidance, regulation, and legislation to facilitate ocean acidification adaptation. Publish guidance on ocean acidification for state, regional, and municipal bodies that oversee coastal and ocean management.
- Develop and fund enforcement approaches to ensure the implementation of adaptation strategies. Make implementation of climate change adaptation strategies binding, with interim goals, clearly delineated, and with clear and enforceable accountability.

b. Science and research should complement water quality monitoring under the Clean Water Act.

NOAA should facilitate the use of ocean acidification research and monitoring for implementation of the Clean Water Act. Under the Act, states are already required to conduct biennial water quality assessments that "evaluate all existing and readily available water quality-related data." 40 C.F.R. § 130.7(b)(5). Indeed, the Environmental Protection Agency ("EPA") has already directed states to solicit existing and readily available information on ocean acidification during their water quality assessments.[52] Ocean acidification data should be made accessible and useful to states and the EPA for its water quality assessments. NOAA should conduct research that will assist EPA and the states to develop appropriate water quality standards and biological criteria that can be used to detect ocean acidification's impacts.

The Clean Water Act has been instrumental in protecting water quality for 40 years. Congress enacted the Clean Water Act, 33 U.S.C. §§ 1251 et seq., with the express purpose of

[52] Environmental Protection Agency, Memo: Integrated reporting and listing decisions related to ocean acidification (2010). (available at http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/oa_memo_nov2010.cfm)

"restor[ing] and maintain[ing] the chemical, physical, and biological integrity of the Nation's waters." 33 U.S.C. § 1251(a) (2008). The goals of the Clean Water Act are to guarantee "water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation" and to promptly eliminate water pollution. 33 U.S.C. § 1251(a).

Toward those goals, the Clean Water Act requires states to establish water quality standards that serve as a basis for regulation of water pollution. 33 U.S.C. § 1313(a)-(c); 40 C.F.R. § 130.3. These standards set out water quality goals for each water body by designating uses and setting criteria necessary to protect those uses. 40 C.F.R. § 130.3. Water quality standards should "provide water quality for the protection and propagation of fish, shellfish and wildlife and for recreation." 40 C.F.R. § 130.3. Already, the EPA and states have water quality standards for marine pH and aquatic life uses that can be applied to measure ocean acidification.

In turn, section 303(d) of the Clean Water Act requires states to establish a list of impaired water bodies within their boundaries for which existing pollution controls "are not stringent enough to implement any water quality standard applicable to such waters." 33 U.S.C. § 1313(d). This provision of the Clean Water Act has been used to address other situations where atmospheric deposition contributes to a water quality problem, such as mercury deposition and acid rain.

Once a water body is listed as impaired pursuant to Clean Water Act § 303(d), the state has the authority and duty to control pollutants from all sources that are causing the impairment. Specifically, the state or EPA must establish total maximum daily loads of pollutants that a water body can receive and still attain water quality standards. 33 U.S.C. § 1313(d). States then implement the maximum loads by controlling pollution from point sources and nonpoint sources. The goal of section 303(d) is to ensure that our nation's waters attain water quality standards whatever the source of pollution.

On November 15, 2010, EPA issued a decision memorandum on ocean acidification that affirms that states have the authority and duty to address ocean acidification under section 303(d) of the Clean Water Act.[53] EPA acknowledged the seriousness and threat of ocean acidification as a water quality problem. EPA concluded that "States should list waters not meeting water quality standards, including marine pH …, on their 2012 303(d) lists, and should also solicit existing and readily available information on [ocean acidification]."[54] EPA also recommended that states focus on vulnerable waters that are at risk from ocean acidification affecting fisheries and shellfish resources. The memorandum provides recommendations for how state assessments, monitoring, and sources for more information on ocean acidification and assessment. In sum,

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[53] Environmental Protection Agency, Memo: Integrated reporting and listing decisions related to ocean acidification (2010). (available at http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/oa_memo_nov2010.cfm)
[54] *Id.*

EPA has affirmed that the Clean Water Act provides the authority and duty for states and the EPA to monitor, assess, and address ocean acidification.

There are several important ways that NOAA can and should leverage its research and monitoring to complement Clean Water Act implementation.

1. NOAA should provide monitoring data and other relevant information to EPA, tribes, and states for use during their water quality assessments.

2. NOAA research should be conducted to inform water quality standards that can be used to detect ocean acidification. Already, pH is explicitly recognized as a pollutant under the law. 33 U.S.C. § 1314(a)(3). EPA's current CWA 304(a) recommended criterion for marine pH requires waters to attain a "pH range of 6.5 to 8.5 for marine aquatic life (but not varying more than 0.2 units outside of the normally occurring range)." Research should be used to determine whether this criterion is sufficient to protect water quality for aquatic life uses. Other criteria should also be developed that may also be important indicators of ocean acidification, including aragonite saturation.

3. NOAA should develop biological criteria for ocean acidification's biological consequences, not only for coral reefs but also for other important marine ecosystems. Research should be conducted to inform biological criteria that can be used for water quality standards. Pteropod fitness has been identified as a biological indicator that would be relevant for ocean acidification.[55] The EPA has condoned the use of biological criteria for water quality standards. For example, in 2010 EPA developed a technical guidance for coral biological criteria, which includes ocean acidification.[56] The guidance suggests biocriteria for calcification and growth rates of corals.

4. NOAA should facilitate the use of ocean acidification data and information for science-based water quality management by states and EPA. Beginning in 2007, the Center for Biological Diversity has provided ocean acidification data from peer reviewed scientific journals to all coastal states for their water quality assessments. Nonetheless, many states have ignored the information or declined to consider it because they require a preapproved quality assurance project plan ("QAPP") -- despite the fact that most of the research probably far exceeds data quality

[55] Bednaršek, N., T. Klinger, C.J. Harvey, S. Weisberg, R.M. McCabe, R.A. Feely, J. Newton, N. Tolimieri, New ocean, new needs: Application of pteropod shell dissolution as a biological indicator for marine resource management, 76 Ecological Indicators 240 (2017) (available at https://www.sciencedirect.com/science/article/pii/S1470160X17300316)

[56] Bradley P, Fore L, Fisher W, and Davis W., Coral Reef Biological Criteria: Using the Clean Water Act to Protect a National Treasure. U.S. Environmental Protection Agency, Office of Research and Development, Narragansett, RI. EPA/600/R-10/054 (July 2010) (available at http://www.epa.gov/bioiweb1/pdf/EPA-600-R-10-054_CoralReefBiologicalCriteria_UsingtheCleanWaterActtoProtectaNationalTreasure.pdf)

standards required by the states or EPA. This presents a major obstacle to science-based water quality management because the QAPPs for these studies are not easily accessible.

5. NOAA should conduct research and monitoring for coastal waters because of the high conservation value, biological diversity, and economic value of these areas; it should also recommend research and monitoring that can readily be used by states to understand environmental baseline conditions and to detect ocean acidification and its consequences within state waters along the coast. Research priorities should be honed to create high resolution monitoring data for coastal areas as well as establish baseline environmental information.

7. <u>Make federal government solutions inclusive and focused on equity.</u>

We urge NOAA to research and reflect on the inequities existing in ocean communities to ensure that policies do not perpetuate systematic segregation. On January 20, 2021, President Biden published the Executive Order On Advancing Racial Equity and Support for Underserved Communities Through the Federal Government.[57] This established a policy that the "Federal Government should pursue a comprehensive approach to advancing equity for all," which applies to NOAA's efforts to monitor, mitigate, and adapt to climate change.

The existing lack of diversity in ocean stakeholder communities has been documented.[58] NOAA has a responsibility to research historical policies of the federal government to examine the extent to which they reduced opportunities for minorities. As one example, Black oystermen in Suffolk, Virginia, were given no opportunity to participate in a public process before the Army Corps built a dam in 1968 that separated their community from oyster grounds they had worked for a century.[59] We urge NOAA to recognize that the racial makeup of ocean stakeholders reflect past federal government actions that excluded minorities and that NOAA has an obligation to reverse discriminatory public policies.

Conclusion

We appreciate NOAA's efforts to make fisheries and protected resources more resilient to climate change. We ask that NOAA use its existing authority to monitor and reduce emissions

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[57] https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/20/executive-order-advancing-racial-equity-and-support-for-underserved-communities-through-the-federal-government/

[58] Arismendi, I. and Penaluna, B.E., 2016. Examining diversity inequities in fisheries science: a call to action. BioScience, 66(7), pp.584-591; *see also* AFS Commitment to Diversity, Equity, and Inclusion and the Cover Art in the August 2020 Issue of Fisheries Magazine, Sept. 4, 2020, https://fisheries.org/2020/09/afs-commitment-to-diversity-equity-and-inclusion-and-the-cover-art-in-the-august-2020-issue-of-fisheries-magazine/

[59] Matthew Korfhage, A century before civil rights, Black oystermen in Suffolk forged economic independence, Feb. 27, 2021, https://www.pilotonline.com/history/vp-db-hobson-oyster-history-20210227-2vpje6pnxnhaxdijtbdrd2c3ti-story html

from agency actions and quickly mitigate emerging climate-change threats to protected resources. Through this process, we request that NOAA examine and reverse federal policies that excluded minority communities because the detrimental impact of those decisions continues today. Thank you for your consideration of these comments.

Sincerely,

Catherine W. Kilduff, Senior Attorney
Center for Biological Diversity
[redacted]

Keisha Sedlacek
Director of Regulatory Affairs
Humane Society Legislative Fund
[redacted]

Sharon Young
Senior Strategist, Marine Issues
The Humane Society of the United States
[redacted]

Responsible Offshore Development Alliance

April 2, 2021

Dr. Paul Doremus, Acting Assistant Administrator for Fisheries
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910

Re: Coalition Letter on Climate-Resilient Fisheries

We, the undersigned, offer this response to the National Marine Fisheries Service (NMFS) request for feedback to make fisheries and protected resources more resilient to climate change.

Under the Magnuson-Stevens Act, the definition for fisheries includes both stocks of fish *and* the fishing for such stocks. The Merriam-Webster Dictionary defines resilient as "characterized or marked by resilience: such as: (a) capable of withstanding shock without permanent deformation or rupture; (b) tending to recover from or adjust easily to misfortune or change." Combining these two concepts, we suggest fisheries climate resilience be defined as:

> **The ability of fishing communities, businesses and managed stocks to withstand impacts without long-term decline and to effectively adapt to external challenges or change, including through minimization of impacts from factors external to managed fisheries.**

We recommend the following priorities and considerations:

- The **regional fishery management councils** and commissions are the appropriate venue for any climate related changes in management and conservation, which rely upon open, public, and inclusive processes and benefit from the most expert knowledge and science. Fisheries are best managed at the regional level, according to the intent of the Magnuson-Stevens Act.

- Current **management policies and practices are too inflexible** to respond to changing ocean conditions. This is true at the domestic and international levels. The Councils often have inherent flexibility to adapt and respond as needed, however they are often resource constrained and the NMFS rulemaking process (necessary to implement Council action) is generally hindered by overly burdensome processes.

- For recent lessons on resilience, we can look to the Covid-19 pandemic, which has profoundly impacted the U.S. seafood industry. Each and every fisherman, buyer, processor, and related business suffered different but serious impacts that will take a long time to fully understand and recover from. These impacts underline the importance of **supply chain health** as a component of resilience. It has also shown the key role that seafood plays in the U.S. food system: when beef, pork, and poultry processors shuttered because of the pandemic, we continued to provide a healthy, sustainable and low carbon protein for American families. This highlights the need for the supply chain to be able to adapt to changing composition in landings, due to climate change, in order to meet market demand with a potentially variable supply. NMFS should closely coordinate with agencies that have jurisdiction over related topics to provide its expertise and support healthy fisheries.

- We endorse the NMFS priority of expanding **promotion of the health and environmental benefits of seafood**. The climate "cost" of U.S. harvested seafood is extremely low and *much* lower than that for imported seafood. There are numerous studies that extol the virtues (and climate benefits) of prioritizing and promoting domestic production of seafood.[1] In effect, wild fisheries are themselves a climate solution and should be upheld as such.

- The future of U.S. wild-capture seafood providers is in the balance, due to a number of exogenous factors, of which climate change is only one. We must **ensure that successors exist** for our harvesters and shoreside businesses and that younger generations have the opportunity to build their careers in the same fulfilling line of work that we have. This requires certainty in our ability to make business plans beyond the short term. We must facilitate a viable and secure future for our seafood providers.

- We are fully supportive of any and all reasonable measures and programs which support **gear adaptation** to make our fisheries more resilient to climate change, while at the same time maintaining efficiency. Funds should be earmarked for such programs that support innovations in our fleets and maintain the goal of optimum yield.

- NMFS must prioritize securing adequate funding and expansion of its **fish and protected resource surveys** and addressing adaptability of those surveys to the effects of climate change on species distributions and abundance, or if they are otherwise disrupted by new ocean uses. It should also seek to enhance cooperative research on survey efforts and utilize approaches that augment surveys to improve understanding of stock estimates.

- Climate resilient fisheries management must consider, and where possible address, non-fishing impacts and hold equal accountability for the other sources of impacts to ecosystems. *By contrast*, in the U.S. fisheries management system, fishermen are held unfairly accountable for impacts to fish stocks and habitats *that fishing did not cause.* Any action on climate resilient fisheries thus has to **acknowledge and address the contributions of land-based activities** *to the depletion of fish stocks (when it occurs), rather than simply layering more restrictions on fishermen and fishing communities*.

- We need robust **cumulative impact** analysis, inclusive of all activities impacting the ecosystem, and not focused solely on temperature changes, to best protect an increasingly vulnerable ecosystem.

- We support the prioritization of scientifically vetted methods for **carbon sequestration and capture**. Any emerging ocean-based forms should be developed through cooperative research and co-planning with fishermen. Fishermen's knowledge of long-term trends in fish distribution and water temperatures is invaluable in analyzing the impacts of climate change on the marine ecosystem; these trends can also provide early detection of changes.

- "Ecosystem Based Management" has been unevenly defined and implemented. Fishing communities are part of the ecosystem, as are industrial ocean uses. Managing for ecosystem health will fail when used as a political tool with the predetermined goal of lowering allowable catch. We also cannot strictly manage one part of an ecosystem while leaving another unchecked. **Ecosystem policies must strike a balance between human use and environmental protection**, including those addressing protected resources. The Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires such balance.

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[1] See *The environmental cost of animal source foods* – Hilborn et al., June 2018; Greenhouse gas emissions of Norwegian seafood products in 2017 – Winther et al., February 2020.

- **Scientific transparency and independence** must be a pillar of this Administration, not just in language but in practice. The MSA also requires actions to be based on the best scientific information available. Any and all climate-related actions must meet this threshold. Recent announcements about "aggression" policies, such as for offshore wind, are irrational; instead strong adherence to the recent Executive Order on scientific integrity and evidence-based policymaking is critical.

- The service we provide, sustainably harvesting the living marine resources in our waters as part of a strategic food supply, is the only way the vast majority of U.S. residents will be able to obtain access to those resources. Fishing and seafood are a source of tradition, jobs, income, and nutrition for many millions of U.S. citizens–including "environmental justice" populations and subsistence and tribal communities. These **communities must have equal access to policy protections and economic stimulus programs** as those under the jurisdiction of other agencies. Data-poor decisions and loss of access to seafood in the U.S. EEZ will result in imports from areas of the world where environmental protections are minimal or wholly lacking.

- The Administration's goal of **conserving 30% of the nation's land and waters by 2030 is arbitrary and wrongly conflated with climate action**. There is no scientific justification for this figure, which could dramatically impact our abilities to support national food security and manage natural resources effectively. We must be mindful of existing protections that are designed to protect habitat and biodiversity while striking scientifically-derived balance that supports food production and minimizes adverse effects of poorly conceived closures. In direct contrast to policies such as "30x30," static closures can thwart the ability to adaptively manage in response to the effects of climate change. They artificially compress fisheries into smaller areas regardless of actual distributions of target and non-target stocks, which increases the probability of bycatch and protected resource interactions and can increase swept area due to decreased catch per unit effort.

Sincerely,

Associations

Alliance of Communities for Sustainable Fisheries
Alan Alward, Co-Chair
California

American Scallop Association
John Whiteside, General Counsel
National

American Albacore Fishing Association
Tim Thomas, President
West Coast

California Wetfish Producers Association
Diane Pleschner-Steele, Executive Director
California

Cape Cod Commercial Fishermen's Alliance
John Pappalardo, Executive Director
Massachusetts

Coalition of Coastal Fisheries
Dale Beasley, President
Washington

Columbia River Crab Fishermen's Association
Dale Beasley, President
Washington

Commercial Fisheries Center of Rhode Island
Fred Mattera, Executive Director
Rhode Island

Commercial Fishermen of Santa Barbara
Kim Selkoe, Executive Director
California

Downeast Lobstermen's Association
Sheila Dassatt, Executive Director
Maine

Fisheries Survival Fund
James Gutowski, Chairman
Northeast and Mid-Atlantic

Fishermen's Association of Moss Landing
Tom Hart, President
Central Coast California

Fishing Partnership Support Services
Dan Orchard, Vice President & COO
East Coast

Garden State Seafood Association
Scot Mackey, Executive Director
New Jersey

Long Island Commercial Fishing Association
Bonnie Brady, Executive Director
New York

Massachusetts Lobstermen's Association
Beth Casoni, Executive Director
Massachusetts

Maine Lobster Dealers' Association
Annie Tselikis, Executive Director
Maine

Maine Lobstermen's Association
Patrice McCarron, Executive Director
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Midwater Trawlers Cooperative
Heather Mann, Executive Director
West Coast & Alaska

Morro Bay Commercial Fishermen's Organization
Tom Hafer, President
California

New Hampshire Commercial Fishermen's Association
Erik Anderson, Executive Director
New Hampshire

Northeast Seafood Coalition
Jackie Odell, Executive Director
Northeast

Northeast Sector Service Network
Elizabeth Etrie, Program Director
Northeast

Oregon Trawl Commission
Yelena Nowak, Executive Director
Oregon

Pacific Coast Federation of Fishermen's Associations
George Bradshaw, President
California

San Diego Fishermen's Working Group
Pete Halmay, President
California

Northeast Fishery Sector X
Northeast Fishery Sector XIII
John Haran, Sector Manager
Northeast

West Coast Seafood Processors Association
Lori Steele, Executive Director
Northwest

Western Fishboat Owners Association
Wayne Heikkila, Executive Director
West Coast

Yankee Fishermen's Cooperative
Linda Hunt, General Manager
New Hampshire

Businesses & Vessels

F/V Jocka
Terry Alexander, Owner
Maine

The Town Dock
Katie Almeida, Senior Representative of Government Relations and Sustainability
Rhode Island

Nordic Fisheries
F/V Perception
F/V Generation
F/V Wisdom
F/V Tradition
F/V Norseman
F/V Fjord
F/V Expectation
F/V Rost
F/V Ambition
F/V Neskone
F/V Monomoy
F/V Nordic Pride
F/V Reflection
F/V Frontier
F/V Maelstrom
F/V Horizon
Peter Anthony, Director
Massachusetts

F/V Caitlin and Mairead
Bonnie Brady, Owner
New York

Sea Watch International
Bob Brennan, Owner
Delaware, Maryland, New Jersey, Massachusetts

Atlantic Capes Fisheries, Inc., *NJ, MA*
Fishing Vessel Enterprises, Inc., *NJ, MA*
Galilean Seafood, Inc., *RI*
Martin Fish Company, *MD*
Point Pleasant Packing, Inc., *NJ*
Sea Harvest, Inc., *NJ*
Barry Cohen, Chairman

West Coast Fisheries Consultants
Mike Conroy, Principal
California

Surfside Foods LLC
Tom Dameron, Government Relations & Fisheries Science Liaison
New Jersey, Maryland, Northeast

Eastern Fisheries, Inc.
Ronald Enoksen, Vice President
Massachusetts

F/V Gabby G
F/V Kimberly
F/V Megan Marie
Silver Dollar Seafood, Inc
Dan Farnham, Owner
New York

F/V Queen Corinne
F/V Yaznak
Fosmark Fisheries, LLC
Scott Fosmark, Owner
Oregon

Chris Electronics Corporation
Dave Frank, Owner
Massachusetts

Explore the Ocean World, LLC
Ellen Goethel, Owner
New Hampshire

F/V Ellen Diane
David Goethel, Owner
New Hampshire

F/V Kingfisher
Todd Goodell and Susan McHugh, Owners
Massachusetts

F/V Anne Kathryn
RiverCenter Marine LLC
Dick Grachek, Owner & Manager
Massachusetts

Hansen Scalloping Inc.
F/V Endeavor
F/V Intrepid
Eric Hansen, Owner
Massachusetts

F/V Tarbaby
Dewey Hemilright, Owner
North Carolina

F/V Iva Jean
Kristofer Koerber, Owner/Captain
Maine

Seafreeze Ltd.
Seafreeze Shoreside
Meghan Lapp, Fisheries Liaison/General Manager
Rhode Island

Viking Village
Kirk Larson, President
New Jersey

LaMonica Fine Foods
Daniel P. LaVecchia, President
New Jersey

TMT Clams
James Meyers, Owner
New Jersey, New York, Massachusetts

F/V Buckeye, Buckeye Scalloping Company
F/V Hunter, Hunter Scalloping Company
F/V Kathryn Marie, Kathryn Marie Scalloping Company
F/V Ligia, Ligia Peirera Scalloping Company
Cameron Miele, Chief Executive Officer
Massachusetts

Northern Pelagic Group, LLC- NORPEL
Waterfront Cold Store
F/V Nordic Explorer
F/V Nordic Prospector
Brendan Mitchell, Director of Sustainability
Massachusetts

O'Hara Corporation
Frank O'Hara, President
Maine, Washington

Cape Seafoods
F/V Challenger
F/V Endeavor
Gerry O'Neill, President
Massachusetts

Lund's Fisheries, Inc.
Cape Clam, Inc.
Cape May Ice Co., Inc.
Cape Trawlers, Inc.
Cumberland Freezers, L.L.C.
Dorothy May, L.L.C.
Elise G, L.L.C.
Evening Star LLC
F/V Charisma LLC
F/V Gannett LLC
Golden Nuggett, L.L.C.
Illex One, L.L.C.
Loper-Bright Enterprises Inc.
Lund-Marr Trawlers, L.L.C.
Lund's Export Sales Co., Inc. *(cont'd)*

Miss Madeline, LLC
Mnt. Vernon, LLC
Nancy Elizabeth, LLC
993 Ocean Drive, LLC
Ocean Leader LLC
Shakari, LLC
Scombrus One, LLC
Squid Light, LLC
Top Fish, LLC
Western Explorer, LLC
WIFTEK, L.L.C.
Windy Jane, LLC
Oxnard Unloading Serv LLC
Port Hueneme Inc, LLC
Sun Coast Calamari, Inc.
Wayne Reichle, President
New Jersey, Massachusetts, California

Marine Alliances Consulting
Steve Scheiblauer, Principal
California

F/V Steel Fin
Maighread Thomas, Owner
Oregon

South Jersey Surf Clam Company
Martin Truex Sr., Owner
New Jersey

President Joseph Biden 2 April 2021
The White House
1600 Pennsylvania Avenue NW
Washington, DC 20500

Ms. Heather Sagar
National Oceanic and Atmospheric Administration
Via email: OceanResources.Climate@noaa.gov
cc. Senator Peter A. Micciche, President Alaska Senate
cc. Senator Josh Revak, Chair Alaska Senate Resources Committee

Re: Climate: Recommendations for Fisheries and Protected Resources; technology ready for immediate deployment to restore ocean pastures and 'Bring Back the Fish'

Dear President Biden,

Thank you for this opportunity to respond to your January 27, 2021 Executive Order calling for Tackling the Climate Crisis at Home and Abroad that commands action on the critical issue of climate change and most importantly the effect on our oceans and fisheries. OPR Alaska, Inc. is an Alaskan company based in the village of Kodiak, Alaska working to 'Bring Back the Fish.' Our method is to deploy our proven nature-based technology in the offshore waters of Alaska, its vital ocean pastures, which we believe will closely meet the goals of your order. We have coined the term 'ocean pasture restoration' (OPR) to explain our work. This calls for us to become 'good ocean shepherds' to restore and nurture the ocean pastures that feed Alaska's salmon and other ocean life in much the same way that humanity works as 'good shepherds' on our land-based pastures.

OPR Alaska's team of experienced businesspeople, Alaskan fishermen, ocean and climate scientists are working to deploy a 3-year pilot R&D program with major OPR work to begin in the summer of 2022. This science-driven, large-scale pilot project is already collecting vast amounts of preliminary data. Significantly more data will be available following the results of our 3-year pilot project, which is intended to prove the work's safety, sustainability, and economic viability.

As the company's founder, I recently was privileged to testify, answer questions, and hear support from Alaskan government officials regarding our proposed work when I testified to the Alaska Senate Resources Committee on March 8, 2021. The full recording is available for viewing on the Alaska State Legislature (akleg.gov) website. A brief write up is available on our own https://www.opralaska.com website.

Ocean pasture restoration is a new phrase to describe a well-researched concept that has been subject to more than 30 years of intensive public and private research. The USA has devoted hundreds of millions of dollars of public money to this work. We engage in OPR in a novel way empowered by our decades of research on ocean pasture ecology. Our prescriptions have been demonstrated to restore ocean productivity to historic levels of health and productivity by replenishing minute amounts of vital natural minerals in specifically targeted ocean pastures (ocean eddies) where they are currently depleted.

Decades of NOAA and internationally funded research and experiments have demonstrated this work to be effective at delivering the required minute concentrations of these vital missing minerals, especially iron. When these nutrients arrive at the right place, right time, and in the right manner, the blooming ocean pastures offer much-needed food for fish and all of ocean life while also capturing and repurposing tens of millions of tonnes of CO_2.

We have proven in our large-scale experiments, the largest ever conducted, that our methods and technologies are the most effective at meeting both of your stated goals of replenishing depleted fish populations and providing a means for capturing CO_2 from the atmosphere. In fact, there is no other existing carbon dioxide removal solution on land or sea with the potential to be as efficient, low cost, and immediately ready to be deployed. OPR will, with your help, begin addressing the horrific impacts we face today in the form of fisheries collapse, global warming, ocean acidification, food shortages, and more. Perhaps most important of all our work is unique in its proven ability to 'Bring Back the Fish.'

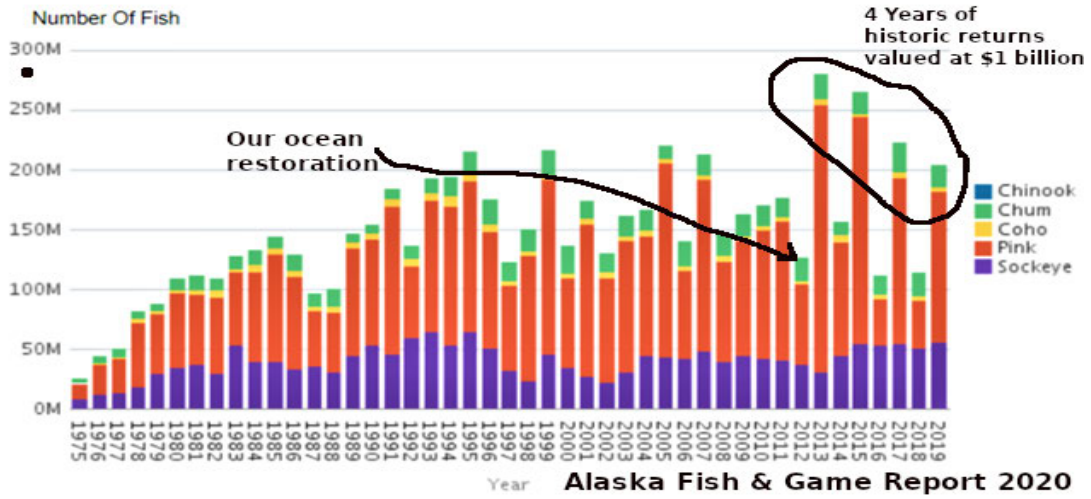
We welcome your questions and would be happy to provide more detailed information to you upon request. Through the coordination of programs such as OPR along with your ongoing work, we are confident that the US may become a leader in the global effort to restore fisheries and combat climate change.

Sincerely,

Russ George, Founder & President
OPR Alaska, Inc.
Kodiak, AK
[redacted]

Incl.

The chart below from a 2020 State of Alaska Report shows proof of our OPR work in Bringing Back the Fish. The year following our work, the largest catches of salmon in all of history resulted (35 years of data is showing). In 2013, instead of a catch of 50 million Pink Salmon, 225 million were caught, and the fish kept coming back! Keep in mind, Alaska represents approximately 61% of the entire USA fishing industry.



Email for comment submission: OceanResources.Climate@noaa.gov
Subject line must be: "Climate: Fisheries and Related Resources"

RE: Request for Recommendations for More Resilient Fisheries and Protected Resources Due to Climate Change

TO: National Marine Fisheries Service (NMFS), National Ocean Service (NOS), National Oceanic and Atmospheric Administration (NOAA), Department of Commerce

Thank you for the opportunity to provide recommendations on how to make fisheries more climate resilient. This topic as well as many elements of Executive Order 14008, "Tackling the Climate Crisis at Home and Abroad" are in line with the needs of Alaska's fishing communities, which are on the frontlines of dramatic climate change. In Alaska, climate resilient fisheries that support healthy fish stocks will serve to sustain thousands of independent, family-run fishing operations across our state and supply seafood processors and fishing industry that are the number one private employer in our state. In our comments below we highlight the following recommendations:

1) The processes established to implement EO 14008 should be driven by the people and communities who stand to be most heavily impacted by both climate change and the forthcoming government policies that seek to address those impacts.
2) It is critical that any ocean-based solutions be locally-defined and crafted in such a way that they support local livelihoods, both in terms of commercial fishing and traditional user groups. For example, the definition of "conservation" must include sustainable fisheries as an allowable activity.
3) Ocean-based climate solutions that are ecosystem- and science-based, as well as informed by the knowledge of local and traditional users of our oceans, will contribute immensely to the durability and effectiveness of such solutions.
4) Any policies or actions affecting fisheries management must enact a commitment to social justice and protecting public health, while simultaneously spurring economic growth.
5) Climate must be considered in all fisheries management decisions and managers should be directed to address climate related challenges head on and given the tools to respond quickly to extreme events.
6) The Magnuson-Stevens Act should be improved and reauthorized to ensure fisheries management is science based and uses the precautionary approach in all fisheries management decisions.
7) Fundamentally, carbon emissions reductions are needed to achieve the goal of climate resilient fisheries by slowing the trajectory of ocean acidification, marine heatwaves, coastal erosion and lower oxygen levels in the ocean.

Alaska fisheries and fishing communities are experiencing in real time the magnitude and urgency of the global climate crisis. The changes we are experiencing include, but are not limited to: persistent, unusually high water temperatures in the Gulf of Alaska and Bering Sea in 2018

and 2019; wider swings in precipitation from drought-like conditions (including in the Tongass National Forest, typically one of the wettest regions on Earth) to flooding via atmospheric rivers, both of which disrupt salmon life cycles; unusually high water temperatures in salmon spawning grounds in Western Alaska; a rapid transition from glacial and meltwater runoff to less stable, rain-fed hydrology; and shifts in abundance and range of economically and culturally important marine fish and shellfish species.

These climatic events have directly impacted fisheries via large-scale prespawn die-offs of mature adult salmon; changes in prey availability at all life stages for all species; shifts in predator populations and ranges; water temperatures that exceed survivable limits; large scale scouring of anadromous spawning beds due to flooding of freshwater systems associated with heavy rainfall events; and the loss of spawning and rearing habitat due to absence of water during drought and periods of abnormally high temperatures in summer months. Furthermore, infrastructure for our commercial fishing industry and coastal communities must be continually upgraded and reimagined as we adapt to new storm patterns and melting permafrost along the coast.

Conservation of watersheds, oceans, and biodiversity protects the investments of thousands of fishing families throughout the state of Alaska who depend on those ecosystem goods and services to sustain their livelihoods. However, conservation measures taken at the federal level must also embody a commitment to social justice and protecting public health, while simultaneously spurring economic growth. In practice, this means developing a process where the power to craft solutions lies with the people who rely most upon these resources, whether culturally, economically, or for food security. Examples of existing entities that could provide this type of leadership include tribal governments, the Department of Interior's Subsistence Regional Advisory Councils, the 84 locally-based Alaska Department of Fish and Game Advisory Committees, the Borough councils for Alaska's fishing communities, and community-based fisheries organizations and businesses. The establishment of a cross-agency task force that ensures full and active participation of Indigenous and coastal communities to identify and implement durable climate solutions is appropriate given the magnitude and urgency of the moment, as well as the limitations of existing management structures.

As stated in the Executive Order on Tackling the Climate Crisis at Home and Abroad, "Coastal communities have an essential role to play in mitigating climate change and strengthening resilience by protecting and restoring coastal ecosystems, such as wetlands, seagrasses, coral and oyster reefs, and mangrove and kelp forests, to protect vulnerable coastlines, sequester carbon, and support biodiversity and fisheries."

Any durable ocean-based climate solutions must be ecosystem- and science-based as well as informed by the knowledge of local and traditional users of our oceans, in particular fishing communities, tribes, and commercial fishermen, all of whom are already experiencing the impacts of a rapidly changing climate. Meaningful, equitable engagement with fishing communities is a prerequisite to establishing broad ocean policy goals. Lasting solutions must cross jurisdictional boundaries to achieve conservation connectivity. Any changes to management or conservation measures need to be scientifically, rather than politically, driven.

Seafood-producing regions like Bristol Bay, the Tongass National Forest, and the Bering Sea and Pribilof Islands present immediate action opportunities to conserve large areas that are not only important in terms of carbon sequestration and biodiversity, but are also critical to thousands of independent fishing businesses and Alaska fishing communities. In each of these instances there is already broad leadership and support from tribal entities and commercial fishermen for conservation measures that enhance resource resilience and local economies.

As with regenerative foresters, farmers, and ranchers; sustainable, community-based fisheries are part of the solution to the climate crisis, and conserving the ecosystems that they rely upon for their livelihoods while simultaneously allowing those fisheries to continue to be executed in line with sustainable management practices is of paramount importance for successful implementation of climate resiliency policies.

Thank you,

ALEUT COMMUNITY OF ST. PAUL TRIBAL GOVERNMENT

CITY OF Saint Paul ALASKA

PROVIDING OPPORTUNITIES "ACCEPT THE CHALLENGE" BBEDC

Tanana Chiefs Conference

YUKON RIVER INTER-TRIBAL FISH COMMISSION

Alaska Longline FISHERMEN'S ASSOCIATION

KUSKOKWIM RIVER INTER-TRIBAL FISH COMMISSION

Alaska Marine Conservation Council

SalmonState

BSFA BERING SEA FISHERMEN'S ASSOCIATION

BRISTOL BAY Regional Seafood Development Association

SITKA SALMON SHARES

TAKU RIVER Reds

ALASKANS OWN

Alaska Boats & Permits, Inc.

UNITED COOK INLET DRIFT ASSOCIATION
UCIDA

eatonthewildside.org

SALMON HABITAT INFORMATION PROGRAM

COPPER RIVER PRINCE WILLIAM SOUND MARKETING ASSOCIATION
A Regional Seafood Development Association

FEED 'EM FISH
HAINES PACKING CO.

COMMERCIAL FISHERMEN FOR BRISTOL BAY

DEEP SEA
Est. 1912
FISHERMEN'S UNION

ATA
ALASKA TROLLERS ASSOCIATION

(Matt Kinney): Thank you very much. I'm pleased to offer - thanks very much. I'm pleased to offer comments today on behalf of (Unintelligible) Processes Association. Tackling climate resilience in (unintelligible) is a tall order, so please review our written comments for far more detailed input.

APA represents six seafood companies operating in the North Pacific and Pacific Fisheries. Full operating (unintelligible) process and therefore in the Bering Sea (unintelligible) and Alaska (public) fishery which is by far the largest fishery in the United States and the largest seafood fishery in the world.

Fishermen are on the front lines of climate change. Our region is already exhibiting noticeable shifts in the marine environment, including reductions in seasonal (unintelligible) and increased duration temperature ranges. Implementing science based strategies to promote resilience in the face of climate change is in everybody's interest.

Indeed, our system has the most to lose. The fisheries management fails to adapt. It is critical that scientists and managers have the tools they need to understand what is occurring and to ensure that fisheries and protected resources remain resilient. That is why APA strongly supports efforts to ensure that resilience to a changing climate is (effectively) incorporated into every level of fishery science and management.

The Biden Administration can (set) us how to proceed. We seek to highlight three overarching points. First, it is critical that science be at the center of the decision making process. Accordingly, NOAA's regional fisheries science centers must be funded at a new level, in order to meet the dawning challenges ahead. The work of the Alaska Fishery Science Center has never been more important, yet the amount being made on that (center) is simply not sustainable in the current funding environment.

We usually make increased regional marine science funding the first order of business of your climate resilience initiative. Second, as the marine environment changes, dynamic rather than static management, must be the order of the day. It does not make sense that some of the advocates who have been most forcefully sounding the alarm on ocean climate change is simultaneously seeking to promote outdated, static, area-based management approaches.

Most alarming are efforts to present scaling up the permanent - the scaling up of permanent (no take) (NCA)s as a climate resilience tool (unintelligible). That simply isn't supported by the science. Permanent static (NPA)s are tying the hands of fishery scientists and managers who could otherwise work to distribute fishing effort over the entire range of their jurisdictional borders in ways that optimize conservation outcomes.

Third, the North Pacific is already pioneering new approaches to build climate resilience. Please gain a detailed familiarity with these visionary efforts, as a starting point for your work. APA is very much looking forward to working with the Biden Administration on this. I appreciate the chance to comment.

Kate Naughten: Thank you, (Matt). Good to hear from you. (Lorraine), who's next?

Leigh Habegger: Hi. My name is Leigh Habegger. I'm the Executive Director for the Seafood Harvesters of America. Harvesters represents 19 different fishing organizations from Alaska to Hawaii to (unintelligible) to Florida, that harvest a wide variety of sustainable seafoods.

I appreciate the opportunity to speak today about NOAA's work to support climate (ready) fisheries. Commercial fishermen are some of the first to witness climate change impacts on and under our oceans, including warming waters, shifting stocks, deoxygenation and altered circulation patterns.

These impacts and many others, have serious implications for fishermen, fishing businesses, and coastal communities that all rely on fisheries resources. We see NOAA's work to ensure our fisheries and protected resources are climate ready, as critically important, and strongly urge the agency to view fishermen as partners rather than adversaries in this work.

To that end we see a few priority areas of work for the agency. First, there needs to be a strong investment in prioritization of science and research, to understand the impacts of climate change. Our ability to adapt to and mitigate the worst of climate change, will depend on the degree to which we understand what is happening in our waters.

We strongly encourage NOAA to conduct expanded and more regular stock assessments which will continue to serve as underpinnings of our fisheries management System. We cannot accept major disruptions or gaps in between our surveys anymore. We also urge NOAA to increase collaborative research and partner with the fishing industry, to conduct research.

NOAA can capitalize on fishermen's unique expertise of the natural environments and their on the water historical perspective of trends and patterns. Second, NOAA should work to collect and provide real time

environmental data to the fishing industry so that fishermen can better plan their fishing activities to avoid (unintelligible) while targeting their catch species.

Third, we urge NOAA to increase the ability for councils and other management bodies to be flexible, adaptive and responsive to the needs of their particular region. NOAA should prioritize closing the gap between data collection and management action, if we are to support the councils in adaptive management.

On this note I will add that we strongly discourage NOAA from establishing any static, permanent, and closed areas for the sake of satisfying 30 by '30. Closing 30% of our (EEZ) to commercial fishing activity without the opportunity to review specific closure boundaries, wholly ignores what scientists are telling us about what will drive successful adaptive marine conservation outcomes in the face of climate change.

And finally, we urge NOAA to prioritize educating the public not just about the benefits of eating US caught seafood, but what they should be eating and when. Climate change will continue to impact the seasonal availability of seafood in regions around the country and consumers can play a pivotal role in ensuring their continued demand for what fishermen are catching at any given time of the year.

Additionally, NOAA should help educate consumers about the environmental benefits of eating US caught seafood. It is one of the (unintelligible) sources of protein and should be considered a climate solution itself. I will also just put a nod in that we did see the recent publication by NOAA Fisheries which was great.

Climate change is one of the biggest challenges of our lifetime, but it need not be a death knell for the fishing industries nor for our oceans. We appreciate the efforts to solicit feedback on this important topic and we will provide additional written comments with more details. Thank you.

Kate Naughten: Leigh, thanks for your comments. Okay (Lorraine), who's next?

Kyle Schaefer: Hey folks. Thanks so much for allowing me to comment today. My name is Kyle Schaefer. I am on the Board of the American Saltwater Guides Association. I am a fly fishing guide. It's how I make my career throughout the years. I am running a guiding business out of Southern Maine. And as of 2019 my business is also carbon neutral.

This is obviously a topic that is very near and dear to our heart. As fishing guides we are seeing changes right under our noses. I've been lucky to guide in the western United States - Maine, the marshes of Argentina, and also run lodges in the Bahamas. I've seen the firsthand effects of climate change in all of these fisheries. And enormous challenges that are in front of us, it's imperative that we get in front of.

Over the past 30 years the Gulf of Maine has warmed 99% faster than the rest of the world's oceans. And with that on a year to year basis, when I'm out guiding I'm seeing, you know, stocks are shifting. We're seeing access to new species that we've never seen in Southern Maine on a more regular basis. We're seeing that the stocks are shifting and we're also seeing those migration patterns and fish are sticking around longer.

Of course these are all firsthand observations but they correlate very closely with science and also with other guides and professionals around the world that are making their living off the water. Addressing these climate change issues must be a top priority. We need to approach these issues very carefully and with a very conservation minded perspective, one that has a very narrow degree.

We need better research and data and love to see how we can address shifting stocks and more of a real time schedule which I know is very, very challenging. But we're seeing a lot of these changes happening in a short amount of time and how do we adjust as users of these resources.

So I mostly speak today as a concerned angler, a guide, somebody that makes his living off of the water. And thanks a million for the opportunity to speak today. I really appreciate it.

Kate Naughten: Thank you, Kyle, for your comments. (Lorraine), who's next? (Lorraine), we have some more speakers lined up? Operator, are you with us?

Michaela Morris: Hi. My name is Michaela Morris and I'm an Oceans Associate with Environment America. We are a nationwide network of state based nonprofits that work to protect clean air, clean water and open spaces. And I offer these comments today on Section 216(c), on the organization's behalf.

First, I entered the ocean conservation space because I grew up on the sea coast of New Hampshire. And my time spent on the beach with my family and later as a lifeguard, was integral to the formation of my own identity, so learning to swim, surf and sail in the water, both taught me confidence in myself and built a deep respect for our natural world.

Healthy and clean beaches matter deeply not only to me but also my family and my community. Experiences related to the ocean are a part of what makes my hometown, Seabrook, New Hampshire, is so special. It's tradition to dig clams in the marsh flats at low tide or to surf at the wall on North Beach. And every summer seasonal shops and our boardwalks flourish as vacationers from out of state travel here.

Today I just want to thank the Biden-Harris Administration for prioritizing our wildlife, wild places and our coastal communities by taking action to adjust the climate crisis and its impacts on our nation's ocean resources. We know, quite literally, the ocean is taking the heat from climate change, absorbing over 90% of the heat and nearly a third of the carbon dioxide from greenhouse gas emissions.

The result is an ocean that is warmer, more acidic and less habitable for fish and wildlife. Our ocean (unintelligible) is also at risk, with a third of reforming corals and more than a third of all marine mammals threatened with extinction. But we also know that the ocean is not just a victim of climate change, it can also be part of the solution.

Scientific research has shown that by placing at least 30% of our ocean in marine protected areas by 2030, is necessary to extend the extinction of ocean wildlife, support fisheries' resilience, stabilize our climate and safeguard our future. To achieve this bold target we must harness the power of marine protected areas or MPAs.

MPAs protect the ocean's biodiversity by reducing stress like offshore drilling, that our sea creatures face. Some species protected include threatened and endangered species, marine mammals and sea turtles. Additionally, MPAs enhance fisheries by protecting the older, larger fish and shellfish, that can replenish the population.

My childhood on the coast of New Hampshire, instilled me with an understanding of our country's incredible natural legacy and our legal framework to recognize this legacy, and our creative pathways for their protection. The clear benefits of the MPAs (unintelligible) the power of this policy as a critical tool to protect our treasured ocean.

By strongly protecting at least 30% of the US ocean and marine protected areas by 2030, a commitment supported by four out of five american voters, the US can ensure our ocean life is protected, our fisheries remain resilient and that our seas are given a chance to adapt to climate change.

We want thriving, oceans, fisheries, sea creatures, and coastal communities for generations to come. And 30% - 30 by '30 will help us get there.

Kate Naughten: Thank you, Michaela.

George Baldwin: Hi. I'm George Baldwin. I'm a 53 year recreational fisherman and an educator at a school concentrating on marine biology and technology. I'm also President of the Connecticut Surfcasters Association, and have been involved in grassroots fisheries conservation for over 30 years.

Things I've seen as a fisherman and a teacher of marine biology, who has done troll and (same) studies, tagging studies, monitored fish traps for over 20 years and done extensive rod and reel fishing for several decades, I've seen here on Long Island Sound the loss of many organisms for whom we're at the warmer end of the range, and an influx of species from warmer Mid-Atlantic waters moving into Long Island Sound as it's warming, that we were once at the cooler end of their habitat or even beyond it.

And this is really to a great magnitude. It's at the point where black seabass which were pretty uncommon in Long Island Sound, are now eating everything off the bottom. I've had days when every drop of my (jig) was literally inhaled by juvenile black seabass.

But it's a lot more than that. This problem's a lot bigger than a lot of people realize. And everyone looks at the big, you know, macro fauna, you know, the whales and the, you know, the game fish, etc., but there's a lot more to it than that. We're looking at changes in water temperature, pH water chemistry, hypoxia, re-rooted ocean currents, rising waters, increasing severe storm frequency and rising water levels.

All right. When translated to the effects on fish and fisheries this means changes in breeding times, fecundity and recruitment success, habitat destruction, habitat ranges, breeding locations and migration patterns, catch and release mortality, forage base and the entire food web. The plankton that are supporting the fin fish are changing. It's all changing from the atoms that control the water chemistry, to the apex predators.

All right, so we've got to make our fisheries impervious and resilient to the changes inevitable in the near future. We've got to be more vigilant in protecting them against both purposeful and accidental overharvest. Protect habitat and clean up our waters, restore our fisheries to an abundance level that can withstand severe weather events and other phenomena that can cause repeated annual recruitment failures.

Ecosystem based management is imperative and cannot be put off and just talked about like we have done the last 30 years, and it has been 30 years. I remember speaking at hearings 30 years about it, and we're still doing that this year. Entire ecosystems will be rearranging. The whole thing. The days of species by species management, each one in isolation, are over. Let's get on it. The changes are already happening. Let's not wait until it's too late.

One thing we could do is work with distributing grants to educational institutions and local organizations, so we can collect local data on the water chemistry habitat changes and monitoring fish population. You know, there's going to be a lot of things happening and a lot of places that are going to need to be addressed in different ways.

It's a complex situation with many facets. The science and solutions must also be multifaceted and widespread. So like I said, more local monitoring and local projects also. And let's beef up our fisheries so that they can withstand short term and long term changes that they've got to deal with. All right. And that's what I have to say. Thank you very much for the opportunity to comment.

Kate Naughten: George, thanks for calling in today. I appreciate it. And (Lorraine), before we go to the next caller, will you just repeat the instructions in case people have a comment? And then we can go to the next caller. Thank you.

David Monti: Yes. Thanks (Lorraine). Thank you NOAA. Arguably, our nation has the best managed fisheries in the world and we thank you for all your hard work. I am a charter captain from the state of Rhode Island. I am a member of the American Saltwater Guides Association. I'm a board member from Rhode Island. But I am also second vice president of the Rhode Island Saltwater Anglers Association which has 7500 affiliated members and 28 different fishing organization affiliates throughout New England.

So anglers are really experiencing profound changes from climate impacts and many of those mentioned today - warming water, high levels of acid, lower oxygen, rising sea level and habitat deterioration. The fish I catch today as a charter captain, are vastly different in type and abundance than I caught ten years ago.

Warm water fish as we know, have moved into the northeast United States area including black seabass, scup, and summer flounder. And certainly, cold water fish such as winter flounder and American lobster, have left for colder and deeper water. All of this is leading to less abundance, less productive stock which could lead to lower catches, less stability, shifting stock certainly have already occurred, new (buy) catch and extreme events.

These climate change impacts have created challenges - challenges such as shifting stock and the need for reallocation both by states, regions and even between sectors. States with quota fish outside of their normal geographic range to catch fish. And those in the areas where there are fish in abundance have little (quota).

A recreational fishing example is the hope anglers have in regard to the summer flounder, (scup) and black seabass reallocation (amendment) now before the Mid-Atlantic council and the commission. We hope our nation will restore commercial and recreational reallocations back to the "real" level that

they were when allocations were originally made and estimated. And of course, I'm referring to the (unintelligible).

With multiple regions and sectors vying for the same fish NOAA needs to step in to make decisions if regional councils cannot agree on these allocation issues. Our national fisheries need to have strong and sustainable science based management more than ever before.

We should not move to weaken standards as some stakeholders have suggested and advocated for. Lowering the bar on ecological reference points such as biomass thresholds and targets, is not the way to go. We need to both rebuild fish stocks as usual and work hard to mitigate and anticipate climate impacts today and in the future.

For solutions first we need to make fisheries climate ready by building healthy stocks and overfishing and rebuild stocks. Second, we need to fill the science gap with enhanced surveys and assessments that are done more frequently. And third, we need more funding into the enhanced science and management programs.

We also need to explore creative ways to anticipate climate impacts, developing a series of leading indicators that ring an alarm when fish stocks or habitat are changing in the region. Indicators could include electronic monitoring for recreational catch and effort in real time, watching for major shifts in species that are caught or not caught in their relative abundance.

On the commercial fisheries side, a leading indicator certainly could be a decline in catch from previous year or years. I thank you for this comment opportunity.

Kate Naughten: David, thank you for calling in. (Lorraine) back to you, for our next caller.

Tony DiLernia: Thank you very much. Thank you for the opportunity to make my comments. I am Tony DiLernia and while I am a current member of the Mid-Atlantic Fishery Management Council, the comments that I'm offering are my own. I'd like to speak to East Coast shipping stocks and how they should be managed.

One of the guiding principles of the Fisheries Management and Conservation Act of '76, later to become the Magnuson-Stevens Act was that fishermen would be involved of the management of the species of their coasts. Each of the eight regional fisheries managers councils was assigned species to manage based on the distribution of the stocks in 1977.

Many stocks have shifted since then. In 1977 black seabass were abundant in the waters of Virginia to New York and they were rarely seen in the waters of Southern New England. Today black seabass are more abundant than cod in Connecticut, Rhode Island and Massachusetts water.

Data for the Northeast Fisheries Science Center has demonstrated a 250 mile northeastern shift in the center of the summer flounder population and (scup) stocks continue to grow and expand into New England waters. These species which were always found in Southern New England in limited quantities, are now quite plentiful and have expanded their range from the offshore waters of Virginia and Maryland, to include the region of New Jersey to Massachusetts.

Yet the fishermen of Connecticut, Rhode Island and Massachusetts do not have a vote when the final federal recommendations for these species are transmitted to the US Secretary of Commerce. True, the New England Fishery Management Council Liaisons is permitted to represent the Southern New England region at meetings of the Mid-Atlantic Fishery Management Council and meetings of the (unintelligible) committee.

However, that same liaison is not permitted to vote in full council where the - when the final recommendations are transmitted to the Secretary of Commerce. It is for this reason that in recent years Rhode Island has requested to be added to the Mid-Atlantic Fishery Management Council.

Other stocks have a southern distribution. Virginia and New Jersey have significant scallop fisheries, yet neither state as a member of the Mid-Atlantic Council can vote on the final recommendations of the scallop fisheries. It is the New England Council that has been assigned scallops. The Mid-Atlantic Council has voting representation on the New England Scallop Committee who in final council - final scallop recommendations to the Secretary of Commerce, have decided members of the Mid-Atlantic Council are not permitted to vote.

Just as the New England representatives or the Mid-Atlantic (unintelligible) Committee cannot vote on final recommendations. The list of states of fishermen unable to participate in the final decisions of species found in federal waters off of their shorelines, continues to grow as climate change results in stocks expanding or shifting their range.

Two additional Mid-Atlantic examples include surf clams and ocean (quahog)s originally distributed from Maryland to New York, now currently harvested in (critical) waters offshore of New Jersey to Massachusetts. And the squids both loligo and illex, primarily in New Jersey and New York fisheries, have now expanded into Rhode Island waters.

In addition, current landing information shows that many species managed by the South Atlantic Fisheries Management Council such as mahi mahi, Spanish American or (blue line) (tile fish), are now shifting into federal waters offshore of the Mid-Atlantic states. As climate change progresses species will continue to expand, shift, or change their ranges and it is clear that shifting

stocks are creating situations where fishermen are not involved in the final recommendations of the fisheries off their shores.

To date, fisheries management has not been adaptive to changes in stock abundance and distribution. How to solve this dilemma without adding more states to each of the regional councils? One solution would be to change the voting structure for the final recommendations of each species. For example, when the Mid-Atlantic Council needs to manage black seabass, summer flounder or (scup)…

Kate Naughten: Hey Tony, I'm sorry to interrupt you. You're way over time here. Do you want to wrap it up and we'll go on with the next caller?

Tony DiLernia: Sure. Well finally, what I would suggest is that Section 302 of the Magnuson-Stevens Act be amended so that the Secretary can for purposes of management, assign different states for managing different - sorry.

Kate Naughten: (Lorraine)? (Lorraine), are you there? (Lorraine), are we good? Hello? Paul, can you come off mute and let me know if you can hear me?

Patrick Cassidy: Hi. Can everybody hear me?

Kate Naughten: Yes, sir. We can. Please go ahead.

Patrick Cassidy: Thank you. My name's Patrick Cassidy. I'm a full time fishing guide from boat and shore on Cape Cod in Massachusetts, arguably where fisheries management got its start. I also teach Coast Guard approved captains, launch tender and boating safety classes, and I'm a member of the American Saltwater Guides Association. I'm a member of the Flyfishing Climate Alliance and am currently a consultant on water quality issues.

Formerly, I covered energy and environmental beats as a reporter and a news editor at the Cape Cod Times including writing stories and leading coverage on debates over renewable energy projects and climate change. In my current role as a small business owner and a guide who is on the water all the time, I have experienced and witnessed firsthand, the effects of climate change.

Whether it's the flying fish that kept pace with my boat in Nantucket Sound last year, the tarpan and other southern species I've seen mixed in with the fish that we traditionally target with, or the extraordinarily uncomfortable feeling of wading through water that felt more like a hot tub than water directly connected to the North Atlantic, these changes are more obvious with every passing year.

The flat Earth theorists must not be getting their feet wet. As you know, these anecdotal experiences are borne out in science. The water as the Gulf of Maine as has already been mentioned, is warming faster than 99% of the planet's oceans. And the conveyor belt that is the Gulf Stream, is in danger of breaking down entirely. Fishermen know perhaps more than anyone, how important moving water is.

I worry that Cape Cod will someday become a place striped bass in particular, pass by on their way to summer in cooler waters, something that may already be happening. My request to you as part of this process is for more federal funding and attention to the effects of climate change in warming waters on our fisheries.

This should include direction to all agencies that interact with and manage these fisheries, to make research including done in cooperation with the people who make their living on the water, on the issue and the integration of the results of that research in decision making and priority. Funding through the federal government to states, should be predicated on the same.

I know I speak for many of the people who do what I do for a living, as well as for many of our clients. They tell us in conversations, every time we're on the water with them. These changes have the potential to devastate not only my livelihood but also the place I call home.

Because of this I'm putting my time and money where my mouth is. I along with many other guides, led by people like Kyle Schaefer who you heard from earlier, shops and larger businesses are actively seeking to reduce our carbon footprints with the goal of carbon neutrality.

I also just want to - a quick reference to our commercial brethren and we see them as that. Although the for hire sector and recreational sectors may not always agree with the commercial sector on some things, I do believe that everyone in all these sectors should agree that managing fisheries to abundance is good for everyone. Thank you for the time and your attention to this critical topic.

Kate Naughten: Thank you, Patrick. I appreciate your comment. Operator, could you give folks instructions again in case they're interested in making a comment? And we'll go to our next call.

Allison Colden: Thank you. This is Allison Colden. I'm with the Chesapeake Bay Foundation and I appreciate the opportunity to speak with you all today. The Chesapeake Bay Foundation is the largest regional conservation organization, dedicated to the protection and restoration of the Chesapeake Bay, our nation's largest estuary.

We represent over 300,000 members and (e-subscribers), with offices in Virginia, Maryland, Pennsylvania, and Washington, DC. Our work in fisheries at the state and federal level, spans decades, working to conserve and protect our most important fisheries and the habitats they depend upon.

As a leading environmental education and restoration organization, our staff are in the field every day. And unfortunately, they're already seeing the effects of climate change on numerous species. They are reporting increased frequencies of southern fish species in our sampling efforts, reduced abundance of underwater grasses and decreased oyster spawning and increased mortality from changing rainfall patterns.

These observations highlight the need for increasing climate resiliency and the need to do so now to protect the viability and productivity of fisheries in the Chesapeake Bay region and throughout the nation. With that, we strongly urge NOAA to consider the following recommendation - prioritize funding for research on climate drivers of fisheries productivity toward the development of predictive models that will help to determine where stocks may shift and how climate change will impact important vital rates of fish populations, particularly recruitment and survival.

We urge you to fund research into better understanding how climate change effects will alter efficiency of fisheries. Fish may become more or less vulnerable or react different to fishing gear based on their physiological stressers brought on by climate change.

Understanding these impacts are critical as many assumptions about these interactions underly the analyses that drive fisheries management at both the state and federal level. We urge you to maintain, expand, and improve upon our ocean observing network, to better understand in real time, the changes to environmental variables that are impacting the productivity distribution and survival (unintelligible).

And use this information to track and predict the shift in central habitats that support these species, including providing planning and observation tools for aquaculture operators to improve sighting and operations under (unintelligible). Finally, we urge you to undertake a strategic evaluation of the policies, procedures and governance (factors) that fishery management councils and commissions determine how best to cope with shifts in climate change impact in a sustainable, proactive, and equitable manner.

We know that climate change will impact all aspects of our nation's fisheries and aquaculture sectors. Planning ahead for these changes and just as importantly, allocating adequate resources to address these changes, is critical to (unintelligible) productivity of our nation's fisheries in coastal communities.

Thank you for the opportunity to provide these comments. And I hope you take them into consideration.

Kate Naughten: Allison, thank you for calling in. We're ready for our next caller.

Captain Brian Williams: Hey. Can you hear me all right?

Kate Naughten: We sure can. Go ahead, Captain.

Captain Brian Williams: Okay. Hey, thank you for your time. I'm actually sitting here right now in my truck in an area I can only access at low tide now, where a house used to stand, as these waters have rose. My name is Captain Brian Williams. I'm a full time fishing guide and owner of Bad Fish Charters.

I operate around the back waters and oceanfront of the Great Egg Harbor River Basin, located in Ocean City, New Jersey. We now see a southern shift of species we could have only dreamed of in the past. (Unintelligible) actually have runs now, rays and summer sharks by the thousands. Just last season I saw two tarpan roll in the back country. And we now have a world class sheepshead fishery that is currently unregulated and not studied whatsoever. I've tagged multiple sheepshead in the hopes of learning their movements.

I think we need to manage all of these fish accordingly, managing ahead of the arrival of more of these species, with regulations in place before they become a target. This will assure we don't see overfishing. I'm already seeing that with the sheepshead as they're unregulated and they're already becoming a heavy target.

But most importantly of all, I think to preserve any and all species, we need to see more sub-aquatic habitat replanning. As it stands, it's been over a century since (yellow) grass filtered my waters and cleared them of sediment as it went extinct in Southern New Jersey long ago, wiped out by a wasting disease in the early 1900s.

Shortly after this we lost most of our oysters due to what appears to be an overworking of their filtering capacity due to diminished water quality and increased sediment created by the barren, grassless bottom. But in closing, I think there's no doubt we need to plan ahead, creating hospitable habitats for these beings, as we're already seeing a 300 plus mile shift in species of both land and water. Thank you for your time.

Kate Naughten: Thank you for calling in. We're ready for our next caller.

(Taylor Clemente): Hi. Thank you so much for letting me comment. And thank you NOAA, for hosting this. And I also want to thank the Biden-Harris Administration for leadership on addressing the climate crisis and its impact on our nation's ocean resources. My name is (Taylor) and I attend the University of Washington, studying Environmental Studies.

And here in Washington State, our oceans are a key part of our identity. The fishing industry provides a significant number of jobs and revenue, the oceans and marine life living in them also play a huge role in many of the indigenous cultures in our state. And many Washingtonians, including myself, enjoy spending time on and around the water, whether it's kayaking or whale watching or just appreciating the view.

But our oceans are at more risk than ever. The ocean is literally taking the heat from climate change, absorbing over 90% of the heat and nearly a third of the carbon dioxide from greenhouse gas emissions. The result is an ocean that is warmer, more acidic, and less habitable for fish and wildlife. Our ocean's biodiversity is also at risk with a third of reforming coral and more than a third of all marine mammals threatened with extinction.

The ocean is not just a victim of climate change, it can also be part of the solution. Scientific research has shown that placing at least 30% of our ocean in marine protected areas by 2030, is necessary to (send) the extinction of ocean wildlife, stabilize our climate, and safeguard our future.

Marine protected areas are critical tools to enhance the resilience of US fish populations and protected resources. MPAs promote and retain complex intact ecosystems that are better at resisting the impact of climate change. They also protect the ocean's biodiversity including threatened and endangered species, marine mammals, including Washington's resident Orca whale pods and sea turtles, all considered protected resources by NOAA.

And MPAs protect them from multiple threats, reducing added stressers and boosting these species' resilience in the face of climate change. By strongly protecting at least 30% of the US ocean and marine protected areas by 2030, a commitment that is supported by four out of five American voters, the US can ensure that our ocean life is protected and that our ocean is given a chance to adapt to climate change. Thank you.

Kate Naughten: (Taylor), thank you for calling in. I'll just remind callers that as we said at the top of the call, any comments on the 30 by '30 we'll share with the Department of the Interior. They are the point on collecting comments on that section of this particular executive order. So thanks again. And we'll take our next caller.

Allison Lorenc: Good afternoon. Allison Lorenc commenting on behalf of Conservation Law Foundation. We are a New England based environmental advocacy organization that has been focused on promoting sustainable fisheries in New England, for over 30 years.

First, I want to thank NOAA and the Biden Administration, for your leadership on addressing the climate crisis and its impact on our fisheries. As has been said previously, New England's ocean, the Gulf of Maine, is warming faster than most of the global oceans and is likely more susceptible to acidification than previously thought.

New England's most iconic fish, Atlantic Cod, which has been overfished and been subject to overfishing for decades, is known to be influenced by environmental conditions. Ecological changes driven by climate change, are already impacting cod's (spatial) distribution and productivity.

In the long term, warming coastal waters are likely to further reduce the amount of habitat that is thermally optimal for cod. It's likely that stock rebuilding will be slower and more difficult due to climate change. CLF urges NOAA to first, maintain strong implementation of science based conservation requirements of the Magnuson-Stevens Act; second, invest in upgrades to climate ready fishery science, with which we see great opportunity for cooperative research with the industry who experience impacts of climate change on the water every day.

And third, establish guideline for integrated climate and to fishery management, including directly evaluating and addressing climate impacts on stocks within assessment models. Importantly, climate change is not an excuse to avoid difficult management decisions or legal obligations such as rebuilding overfished stock like Atlantic Cod.

Science shows that healthy, well managed stock are more resilient to ecological change. Specifically marine protected areas are an important conservation tool for building climate ready fisheries, and have been shown to improve overfished stock like cod. By strongly protecting at least 30% of the ocean (unintelligible) protect areas by 2030 the US can ensure that communities thrive, our ocean is protected, and our ocean is given a chance to adapt.

We additionally urge NOAA to establish an inclusive process and take swift action to achieve this 30 by '30 national goal. Thank you.

Kate Naughten: Thanks, Allison. Do we have another caller, (Lorraine)?

(Jason Overlink): Hello. And thank you for giving me an opportunity to speak today. I would like to thank the Biden-Harris Administration for their leadership on addressing the climate crisis and its impacts on our nation's ocean resources. Here in Florida, our oceans are a key part of our identity. When you think of our state you think of our beaches, our coral reefs and our world class fishing. People travel from all over the world to visit our state and explore our marine ecosystems, making tourism our number one industry.

As a native Floridian, an angler, and a scuba diver, Florida's oceans hold a special place in my heart and I look forward to sharing the experiences I've had with my future children. But our oceans are more at risk than ever. The ocean is literally taking the heat from climate change, absorbing over 90% of the heat and nearly 1/3 of the carbon dioxide from greenhouse gas emissions. The result is an ocean that is warmer, more acidic and less habitable for fish and wildlife.

Our ocean's biodiversity is also at risk with a third of reforming corals and more than a third of all marine mammals threatened with extinction. A recent report from NOAA found the reefs of the Keys and South Florida, are the most degraded in the nation, listed in the report as impaired. The ocean is not just a victim of climate change. It can also be part of the solution.

Scientific research has shown that placing at least 30% of our ocean in marine protected areas by 2030 is necessary to stop the extinction of ocean wildlife, stabilizing our climate and safeguarding our future. Marine protected areas are critical tools to enhance the resilience of US fish populations and protected resources. MPAs promote and retain complex intact ecosystems that are better at resisting the impact to climate change

MPAs also protect the ocean's biodiversity including threatened and endangered species, marine mammals and sea turtles, all considered protected

resources by NOAA from multiple threats, reducing added structures and boosting these species' resilience in the face of climate change.

By strongly protecting at least 30% of the US ocean and marine protected areas by 2030, a commitment that is supported by four out of five American voters, the US can ensure that our ocean life is protected and that our ocean is given a chance to adapt to climate change. Thank you.

Kate Naughten: Thank you, (Jason). We'll take our next caller.

Coordinator: (Karen Davis), your line is open.

Karen Davis): Hi. Can you hear me?

Kate Naughten: We can. Please go ahead.

(Karen Davis): Great. Thank you for taking my call. My name is (Karen Davis). I'm calling from Seattle, Washington. Breaching the lower four Snake River dams is one way that we can help fisheries be more resilient to climate change. These dams are driving salmon to extinction in part because of slow moving water in the slack water reservoirs behind the dams, causes river temperatures to rise to lethal levels for salmon.

These warming reservoirs also promote algae growth and decay, which in turn produce significant amounts of methane. Methane is an even more potent driver of climate change than is carbon. We've spent $17 billion trying to restore the 13 endangered and threatened Snake River salmon and steelhead species, but all of that has failed to recover a single run.

We clearly cannot recreate nature with our manmade systems. Given that the lower Snake River dams are not significant power producers and they are hemorrhaging money towards failed fish mitigation efforts, they must be breached immediately to help both the climate crisis and the extinction crisis that we are facing.

The United nations issued a recent report stating that humans are making the Earth a broken and increasingly unlivable planet through climate change, biodiversity loss and pollution. It calls for us to drastically change our ways. UN Secretary General Antonio Guterres, said "Without nature's help we will not thrive or even survive."

Rivers are the vascular systems of our planet. They promote biodiversity and act as a conduit for species and nutrients to move from oceans and back again.

This past century of dam building has proven that dams act like tourniquets, killing the very ecosystems that their rivers once supported. Science, economics, the environment, and the law have all demanded that the four lower Snake River dams be breached.

This one effort will bring about enormous benefit for our fisheries and our ecosystem as a whole. We have no more time to waste. These salmon are going extinct. The dams must be breached now. Thank you for taking my comment.

Kate Naughten: Thank you, (Karen). Back to you, (Lorraine), for our next caller.