



A Report from the Coastal & Marine Working Group of the Maine Climate Council

5 June 2024



June 5, 2024

Hannah Pingree and Melanie Loyzim, Co-Chairs, Maine Climate Council

Dear Co-Chairs Pingree and Loyzim,

We are pleased to present the Coastal and Marine Working Group (CMWG) Report, prepared as part of our commitment to the Maine Climate Council's mission to address and mitigate the impacts of climate change on Maine's coastal and marine environments. This report represents the culmination of extensive research, analysis, and collaboration among the diverse members of the CMWG, encompassing expertise from government, academia, non-profit organizations, and the private sector. The CMWG has worked diligently over the past several months to develop a comprehensive set of strategies, recommendations, and actions aimed at addressing the critical challenges facing Maine's coastal and marine ecosystems and are responsive to the evolving needs of Maine's coastal communities.

It is notable to highlight the facilitation and support of the CMWG by Laura Singer, working with the Consensus Building Institute. Laura's dedication led directly to the timeliness, organization and inclusivity of the CMWG report.

The detailed strategies and actions outlined in this report are intended to provide a robust framework for enhancing the resilience and adaptation of Maine's coastal and marine resources in the face of climate change. We believe these recommendations are actionable and feasible if properly resourced and will support vulnerable coastal communities and economic sectors.

We are particularly proud of the collaborative process that underpinned this report. The CMWG's discussions and document development were enriched by the diverse perspectives and expertise of our members, and we have strived to integrate equity considerations into all our recommendations. However, we acknowledge that ongoing efforts are needed to fully incorporate the perspectives of Tribal communities and other priority populations.

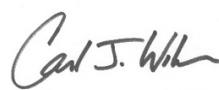
Finally, state leadership and strong partnerships are integral to the success of many of these recommendations. Others will require legislative guidance. Additional funding will be necessary for state agencies, municipalities, universities and colleges, and non-governmental partners to conduct further outreach, develop ideas, implement strategies, and launch pilot projects.

Thank you for your leadership and dedication to addressing climate change and its impacts on Maine's communities and ecosystems. We are committed to continuing our work and collaboration with the Council to achieve these critical goals. We look forward to discussing our findings and recommendations with you in greater detail and to supporting the Maine Climate Council's efforts to implement these important strategies.

Sincerely,



Curt Brown
Ready Seafood, Lobsterman & Scientist



Carl Wilson
Director, Bureau of Marine Sciences
Department of Marine Resources

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Introduction

The Coastal and Marine Working Group (CMWG) of the Maine Climate Council (MCC) met eight times from October 2023 to May 2024 with six of those meetings in person and all meetings offering virtual participation. The group's discussions and document development process involved numerous additional meetings in subcommittees and with other working groups, reflecting significant collaborative effort. Four subcommittees (Fisheries and Aquaculture; Working Waterfronts and Infrastructure; Monitoring; Coastal Habitats and Blue Carbon) met multiple times in between CMWG meetings to generate recommendations and address the items outlined in the template provided by the Governor's Office of Policy Innovation and the Future (GOPIF). The 42-member CMWG represented diverse expertise, experience and perspectives from a variety of government, academic, and non-profit organizations and for-profit businesses. The list of members can be found in the Appendix. Overall, there was an incredible amount of time and effort dedicated by the CMWG members throughout this process. The work produced by the subcommittees was synthesized by the co-chairs and staff for review by the CMWG prior to finalizing in this report. Ultimately, the co-chairs take responsibility for the content to ensure that it accurately reflects the collective efforts of the CMWG members.

While CMWG members were aligned on common priorities, the group faced challenges due to the absence of tribal representation and timing constraints on engagement efforts. Despite this, deliberate efforts were made to integrate equity into recommendations, with ongoing work needed to incorporate language reflective of tribal perspectives and additional refinement based on ongoing engagement efforts with priority populations. Equity remains a broad concern among CMWG members and the MCC is encouraged to incorporate future findings by the University of Maine Mitchell Center.

One of the reasons equity remained central to the CMWG is that coastal communities are home to vulnerable people that will be some of the first to experience the direct environmental and economic impacts of climate change. These populations include the coastal subset of the following geographic or community areas: Rural communities; Small towns with limited municipal capacity; Climate-frontline communities ("first and worst impacted by climate change"). Vulnerability in these communities emerges from many sources, including: demographics (e.g., age, immigrant status), economics (poverty, unemployment, limited access to housing), dependence on natural resources, physical vulnerability and limited capacity of local government. The working group acknowledged early in the process that all coastal communities are frontline communities. They are the first in the state to feel the impacts of sea level rise (as identified and described by the Science and Technical Subcommittee) and increased severe storm events. Coastal communities, especially in eastern parts of the state, have a heavy cultural and economic reliance on fisheries and aquaculture that will be impacted not only by changes in marine ecosystems but by resulting changes in fisheries policy. The direct and indirect costs of climate change will be borne not only at the community level but by specific individuals making it essential to recommend equitable paths forward for mitigation and adaptation. We encourage the MCC to view CMWG recommendations as equity recommendations, particularly where they are associated with, close to, or a more refined version of broader recommendations.

Members of the CMWG represented a broad suite of complex perspectives and their willingness to share their stories with the group undoubtedly improved our work. For example, Chuck Bennett, a lobsterman from Sorrento and a member of the working group, presented his perspectives and experiences on growing up in a multi-generational lobstering family in Maine. Chuck is also co-owner of Sorrento Seafood with his brother and father. The challenges facing the lobster industry are many, both on the water and on the shoreside aspects of the business. Chuck spoke to the group about these challenges - from ecosystem changes to market disruptions. He emphasized that with challenges come opportunities and shared how he recently invested in gear and infrastructure to harvest and sell pogies (Atlantic menhaden), which only began arriving in eastern Maine waters a few years ago.

The final working group meeting was hosted by Ready Seafood at their facility in Saco and many working group members were able to tour Maine's largest lobster processing plant. As recently as 2012, over 60% of lobster harvested in Maine were shipped directly to processing plants in Canada due to Maine's lack of processing capacity. Over the last decade, both the state and the industry have invested significantly in the processing sector. At Ready Seafood, the CMWG saw the infrastructure and the workforce required to process over 100,000 pounds of lobster a day. The group also witnessed first-hand the essential role new Mainers play in Maine's seafood industry. Maine's seafood workforce is global and highly skilled. From picking lobster meat to working as an engineer on multi-million dollar pieces of equipment to managing human resource and language training, new Mainers clearly play a pivotal role in the future of Maine's marine economy.

Underlying all of the recommendations for the resilience of Maine's fisheries, other marine industries and healthy coastal communities, is the need to monitor changing conditions and maintain healthy and resilient coastal and marine waters and habitats. Therefore, these recommendations include specific monitoring requirements, recommendations for disseminating data, and ways to provide technical support. For both tribal nations and Mainers, coastal habitats have sustained and defined coastal communities and ways of life. Those habitats and waters face unprecedented threats from sea level rise, warming ocean temperatures, acidifying waters, increased stormwater loading, storm surge, habitat loss and more. Maintaining healthy coastal and marine habitats will be vital to the success of Maine's climate action plan. These habitats contribute to the physical, emotional and spiritual health of residents and visitors alike. Additionally, they support numerous species, many of which form the backbone of Maine's marine and tourism economy and hold value that extends beyond economic measures.

The CMWG reviewed the *Maine Won't Wait* language, proposing enhancements to incorporate coastal and marine resources alongside inland ones in various sections of the plan. The CMWG also heard updates from working group members on implementation of recommendations including parallel regional and federal efforts to incorporate climate change into the State Wildlife Action Plans, the integration of natural infrastructure into coastal resilience planning and new opportunities for climate resilient fisheries. Efforts were also made to address potential overlap with Community Resilience, Natural and Working Lands, and Transportation working groups. However, further integration over the coming months will be necessary.

The CMWG recommendations follow three broad themes:

- **Build healthy and resilient coastal communities and protect critical place-based infrastructure.**
- **Support climate adaptation of Maine’s fisheries, aquaculture and seafood industries.**
- **Monitor, conserve and increase resilience of coastal and marine ecosystems.**

Summarized below are the approaches to supporting these three themes at various levels:

- *Funding:*
 - *Investments in Specific Projects:* This involves large and small resilience actions and program development. For example, long-term access protection for both public and private infrastructure. The required scale is significant (over \$100 million), potentially sourced from bonds, budget surpluses, or federal funding. Sustaining monitoring programs (fisheries, environmental) will be smaller scale (\$1 million or less per project) but will be the underpinning for all the work described here.
 - *Support for Sector-wide Activities:* This includes funding (ranging from \$1-10 million) for community tools like the Working Waterfront Inventory Template, resilience information sharing, statewide coordination hubs, resilience assessments, model ordinances, and related projects.
- *Capacity Building:*
 - *Within State Agencies:* Enhanced capacity and leadership is needed to lead and manage projects and deploy funding effectively.
 - *Outside State Agencies:* Additional capacity is required at municipal, regional, and nonprofit levels to tailor approaches to specific coastal contexts. Coastal and marine businesses also need support for resilience and access protection projects.
- *State Agency Leadership:*
 - State agencies can initiate much of the recommended work, with limited need to address legislative or regulatory barriers. However, funding and staffing will require legislative actions.

This report is broad and comprehensive, offering specific actions and implementation steps for consideration by the Maine Climate Council. Additionally, the detailed recommendations outlined in this report are relevant for those who have an interest in sustaining Maine’s coastal and marine ecosystem, and assisting Maine’s coastal communities as they continue to adapt to a changing climate.

SUMMARY OF STRATEGIES, RECOMMENDATIONS AND ACTIONS

BUILD HEALTHY AND RESILIENT COASTAL COMMUNITIES AND PROTECT CRITICAL PLACE-BASED INFRASTRUCTURE (Aligns with <i>Maine Won't Wait</i> – Strategy F and G)	
RECOMMENDATION	ACTIONS
Empower local and regional community climate adaptation and resilience efforts	A) Support and incentivize the ability of municipalities to use comprehensive planning and zoning/other land use related strategies to support or protect working waterfronts and related commercial fisheries and aquaculture uses. B) Increase technical assistance and funding to municipalities in order to support local and regional climate resilience initiatives, specifically including working waterfront, aquaculture, and fisheries as set asides for these projects in broader programs. C) Provide governmental leadership that catalyzes additional work and leadership from nonprofits, businesses, and others who can support community resilience related work. D) Increase public literacy around the role of working waterfronts in resiliency and adaptation and the ecosystem service connection to fisheries and aquaculture businesses.
Increase resilience of public and private working waterfront infrastructure to climate change	A) Fund resilience upgrades and include protection for working waterfront access. B) Make information about resilience upgrades to public and private working waterfront infrastructure widely accessible and understandable. C) Identify and address local, state, and federal permitting barriers to adapting and building more resilient working waterfront infrastructure. D) Prioritize clean energy projects on the working waterfront as a way to improve the resilience of critical place-based infrastructure. E) Identify and fill workforce and contractor capacity needs/gaps for resilience related work, particularly in the marine construction, physical coastal resilience work, and also the engineering, planning, permitting components of these projects.

<p>Preserve and expand waterfront access, including intertidal access</p>	<ul style="list-style-type: none"> A) Develop a statewide working waterfront strategy by the end of 2025. B) Increase the amount of data and information about working waterfronts at local, regional, and statewide scale. C) Increase funding for the purchase of working waterfront properties, covenants, easements, natural infrastructure, and related forms of permanent or long-term protection. D) Increase the technical assistance and related support for privately owned working waterfront businesses and properties. E) Increase the capacity of public infrastructure to support working waterfront activities in order to help mitigate the risk/impact of the loss of private infrastructure at the community scale. F) Identify and address barriers to equitable, safe and diverse access to Maine’s nearshore environment, particularly for those people and populations most vulnerable, through collaboration with coastal communities. G) Inventory existing access points, supplemented where possible with traditional and Indigenous knowledge, and consider future access.
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**SUPPORT CLIMATE ADAPTATION
OF MAINE’S FISHERIES, AQUACULTURE AND SEAFOOD INDUSTRIES**
(Aligns with *Maine Won’t Wait* – Strategy D)

RECOMMENDATION	ACTIONS
<p>Promote stewardship of climate resilient ecosystems to take advantage of diverse markets and grow existing opportunities</p>	<ul style="list-style-type: none"> A) Manage and adapt Maine fisheries and aquaculture for climate resilience and sustainability, including evaluating potential permitting/licensing, regulatory and management reforms to enable opportunities for economic diversity. B) Support investments, policies, and research that prioritize the inherent ability of Maine’s coastal and inland natural environments to support diverse innovative economies and societies resilient to climate change impacts. C) Increase the amount of food consumed in Maine from state food producers from 10% to 20% by 2025 and 30% by 2030 through local and regional food system development, marketing, new product development, and subsidizing costs in order to take advantage of sustainable, emerging, and underutilized fisheries and aquaculture opportunities. D) Produce and disseminate a climate focused resilience assessment by 2027 using participatory, community-based socioecological and socioeconomic approaches with focus

	<p>on fisheries, recreational harvesters, aquaculture operations, and seafood harvesters.</p> <p>E) Grow Maine’s living marine resources and forest-products systems to support communities through bioproduct innovation, supporting climate adaptive economic growth and sustainable forest management and preservation of harvested lands and waters.</p>
<p>Maintain and expand equitable access to cultural, traditional, emerging and heritage industry</p>	<p>A) Create climate adaptive natural resource employment that provides financial security and offers pathways for advancement that can be accessed by priority populations.</p> <p>B) Identify locally relevant economic diversification opportunities and provide workforce training opportunities to support climate adaptation for natural resource dependent communities.</p> <p>C) Focus climate adaptation and resilience actions/efforts on fisheries and aquaculture in communities with little economic diversity, inclusive of Indigenous and cultural fishing practices.</p> <p>D) Engage with coastal communities to develop and support strategies in response to socio-economic impacts of regulatory uncertainty.</p>
<p>MONITOR, CONSERVE AND INCREASE RESILIENCE OF COASTAL AND MARINE ECOSYSTEMS (Aligns with <i>Maine Won’t Wait</i> – Strategy E)</p>	
<p>RECOMMENDATION</p>	<p>ACTIONS</p>
<p>Enhance ongoing monitoring and data collection that provide baseline data to guide informed decision making and create new monitoring programs to fill data gaps</p>	<p>A) Expand capacity to document and study the positive and negative effects of extreme events – on people and natural resources - via partnerships with academic institutions and community groups.</p> <p>B) Create and fund a state-wide framework, regional coordinating hubs, and technical capacity to implement coordination of comprehensive monitoring.</p> <p>C) Provide resources for state agencies and non-state partners ongoing and new long-term monitoring efforts and collaborations focused on characterizing changes to coastal and marine ecosystems due to climate change.</p> <p>D) Through active engagement and co-production, ensure data gaps are filled and data is collected and communicated alongside the communities using it.</p>

<p>Protect natural and working lands and waters and seek opportunities to restore and increase resilience of coastal, marine, and inland habitats</p>	<ul style="list-style-type: none"> A) Prioritize the identification, conservation and monitoring of essential habitat areas that support land and water connectivity, ecosystem health, and resilience of ecosystems to sea-level rise and other climate change impacts. B) Identify and create an inventory of coastal and marine habitats most vulnerable to climate change by either using current habitat climate vulnerability assessments or by conducting a state specific coastal and marine habitat climate vulnerability assessment. C) Invest in coastal and marine habitats through restoration, protection, and management to increase habitat resilience. D) Consider multiple perspectives on uses of natural resources when establishing habitat restoration, resilience and protection priorities (e.g. traditional and Indigenous knowledge) and traditional uses of the coast. E) Explore policy tools for protection and restoration of subtidal and intertidal habitats. F) Evaluate emerging science regarding carbon uptake and storage in additional marine environments, such as subtidal kelps and intertidal rockweed, tidal flats, and sheltered bays.
<p>Expand outreach to offer information and provide technical assistance</p>	<ul style="list-style-type: none"> A) Increase technical service provider capacity by 2027 to deliver data, expert guidance, and support for climate solutions to communities, farmers, loggers, marine harvesters, and foresters at the Department of Agriculture, Conservation and Forestry, Maine Forest Service, Department of Inland Fisheries and Wildlife, the Department of Marine Resources, Department of Environmental Protection, and the University of Maine. B) Strengthen availability of information and technical assistance on “nature based solutions” to coastal management challenges, including coastal erosion and water quality protection. C) Expand Maine’s analytical and technical services to increase its capacities to collect, process, and analyze samples and data to better understand the impacts of climate change. D) Empower local decision making by strengthening participatory science initiatives in priority population communities and engaging community members with data collection and observation to strengthen understanding of positive and negative impacts of climate change.

Implementation Next Steps

Build Healthy and Resilient Coastal Communities and Protect Critical Place-Based Infrastructure

These recommendations are aimed at supporting Maine's working waterfront infrastructure amidst climate change impacts. The recommendations primarily aim to increase capacity for businesses, communities, and the working waterfront sector to undertake climate resilience improvements, protect access, and develop necessary tools, resources, and information products to support this work. The recommendations are based on four critical considerations:

- Maine's working waterfronts include both publicly and privately owned properties, each facing unique challenges and resource access issues. Publicly owned infrastructures provide essential access to coastal resources.
- Paths and access points to the intertidal zone are crucial for clambers, wormers, and others relying on these areas for their livelihoods. These access points should be integral to the working waterfront discussions.
- The definition of working waterfronts can be broad or narrow, often focusing on infrastructure supporting fisheries and aquaculture due to their frontline exposure to climate change. However, boatyards, marinas, and other infrastructures are also vital for community support.
- Beyond physical access, working waterfronts encompass significant cultural heritage and play a crucial role in the mental health and well-being of those who depend on them. There is a strong sense of loss if access to these areas is significantly altered or lost.

RECOMMENDATION: Empower local and regional community climate adaptation and resilience efforts

A) Support and incentivize the ability of municipalities to use comprehensive planning and zoning/other land use related strategies to support or protect working waterfronts and related commercial fisheries and aquaculture uses.

- Increase municipal capacity to navigate complex shoreland zoning and other land use issues as it pertains to working waterfront uses and locations.
- Develop updated model working waterfront ordinance that reflects current needs.
- Develop model marine resources section for comprehensive planning that is more robust.

B) Increase technical assistance and funding to municipalities in order to support local and regional climate resilience initiatives, specifically including working waterfront, aquaculture, and fisheries as set asides for these projects in broader programs.

- Increase municipal capacity to address local land use issues that adversely impact working waterfronts.

- C) Provide governmental leadership that catalyzes additional work and leadership from nonprofits, businesses, and others who can support community resilience related work.**
- Add working waterfront inventories to eligible activities for the Community Resilience Partnership (CRP) process (if not currently included).
- D) Increase public literacy around the role of working waterfronts in resiliency and adaptation and the ecosystem service connection to fisheries and aquaculture businesses.**
- Educate and train those involved in supporting municipal land use planning about the needs of the working waterfront sector.
 - Develop additional standard materials, including templates that can help guide this process.

RECOMMENDATION: Increase resilience of public and private working waterfront infrastructure to climate change

Note: The information, resources, and lessons learned from implementing the 2024 Infrastructure Adaptation fund should help inform the implementation of these recommendations.

- A) Fund resilience upgrades and include protection for working waterfront access.**
- Establish Infrastructure Adaptation Fund in 2024:
 - Allocate \$50 million targeted specifically for working waterfronts, covering both public and significant private infrastructure.
 - Engage DMR, DOT, and GOPIF to learn from the funding deployment process.
 - Identify additional capacity needs and assess the magnitude of funding demand to build resilience at both working waterfronts that were damaged by the storms and also working waterfronts that were not damaged by the recent storms but are vulnerable to storm surge and sea level rise.
 - Assess the magnitude of damage from 2024 storms to wharves that received previous resilience upgrades to quantify the potential benefits of proactive measures and cost of inaction.
 - Conduct a state-wide assessment of publicly-owned waterfront infrastructure and invest in necessary resilience upgrades.
 - Conduct needs assessments for new resilient public infrastructure as part of the State's working waterfront strategy.
 - Create a sustained Infrastructure Adaptation Fund on the order of \$100 million by 2025:
 - Ensure sustained funding for at least four years to enable proper project planning and implementation.
 - Focus on developing a robust project pipeline, providing necessary capacity support within the sector.
 - Include protections to ensure funded properties remain working waterfronts for 10-20 years, allowing flexibility for related business development.
 - Pair state funds with larger amounts of federal funds to maximize resilience upgrades.
 - Assess the potential for a working waterfront resilience investment tax credit to incentivize private investments, considering key aspects such as the value of the

credit, its refundability, and coverage of resilience upgrades and deferred maintenance.

- Include a priority for upgrades to WWAP properties where the state has an interest in making sure the property remains a working waterfront.
- Address the challenge of workforce housing, allowing waterfront properties to provide housing for workers.

B) Make information about resilience upgrades to public and private working waterfront infrastructure widely accessible and understandable.

Key actions for the Maine Coastal Program:

- Develop information and materials that identify and promote resilience upgrades that private working waterfronts can undertake.
- Develop tools that help guide public working waterfront infrastructure resilience related upgrades.
- Develop site specific recommendations for high priority pieces of infrastructure in consultation with local stakeholders.

The actions listed in B aim to support both public and private working waterfronts, with an emphasis on providing information to help private owners start and potentially fund resilience upgrades independently.

C) Identify and address local, state and federal permitting barriers to building more resilient working waterfront infrastructure.

- Review regulations that working waterfronts must comply with when rebuilding for resiliency.
- Identify regulatory provisions at the state and federal level that make it harder for working waterfronts to rebuild with resilience.
- Advocate for a regulatory approach that prioritizes the hardening of working waterfront infrastructure in places that are already significantly impacted.
- Identify regulatory barriers and or create opportunities in order to make it easier for those activities and uses that would like to move out of harm's way to do so.
- Identify places where flood insurance regulations complicate building resilience or working waterfront protection efforts.

D) Prioritize clean energy projects on the working waterfront as a way to improve the resilience of critical place-based infrastructure.

- Conduct baseline assessment, energy audits, and GHG audits of working waterfront businesses and industries.
- Grow state and local capacity to develop projects that can be funded through USDA REAP, the DERA program, EMT programs and other opportunities.
- Increase capacity and financial support for clean energy innovation in the marine sector. Creative businesses are already working on new products and services ranging from electric outboards to phase change materials for coolers and refrigerators.

- Review existing programs to identify barriers and hurdles to develop and implement new technologies that save energy or enable use of clean energy within working waterfront communities.
- Increase capacity and funding to develop clean energy projects in this sector.

E) Identify and fill workforce and contractor capacity needs/gaps for resilience related work, particularly in marine construction, physical coastal resilience work, and also the engineering, planning, permitting components of these projects.

- Document lessons learned from responses to the January 2024 storms regarding gaps in availability of workers, contractors and firms with specialized skills to prepare for and respond to climate vulnerabilities on the coast.
- Develop programs for connecting and training new Mainers and underserved groups to pursue careers that support resilience of coastal and marine communities, industries and infrastructure.
- Work with workforce training organizations, community colleges, coastal industries and others to cross-train people with existing skills to apply them in the coastal and marine context.
- Develop a pipeline strategy for increasing the number of people in the state with skills and experience to manage coastal construction and restoration efforts. These people need a wide range of skills and knowledge, such as understanding of permitting, ability to negotiate contracts, to track budgets and to draft grant proposals.

While D and E are important, these topics did not receive as much discussion time in the work group as other areas of this strategy. Additional conversations may help solicit other key considerations.

RECOMMENDATION: Preserve and expand waterfront access, including intertidal access

A) Develop a statewide working waterfront strategy by the end of 2025.

- Development of this strategy should include the following considerations:
 - Local involvement and connections to the regional economy are critical.
 - Incorporate a forward-looking perspective in recognition that the future looks different in this sector than today and planning means looking beyond the status quo.
 - Identify what kinds of working waterfronts are most at risk and those kinds of working waterfronts where significant investment is flowing. The group noted that seafood related infrastructure feels particularly at risk.
 - There should be strategy alignment or connection to the Blue Economy Task Force recommendations. There may be funding opportunities if the State has a plan and it is framed for funding from the federal government.
 - Align public investments in working waterfronts with preservation of access. If public monies are spent, commercial or public access should be committed proportional with the level of investment.

B) Increase the amount of data and information about working waterfronts at local, regional and statewide scale.

- Convene a state-supported workshop about the various existing inventory efforts and help those involved identify synergies or opportunities for collaboration.
- Improve existing knowledge base of working waterfronts at the local level, particularly through empowering municipalities to conduct inventories that can be populated into a larger state-wide inventory.
- Conduct a statewide working waterfront inventory to develop a baseline, include information or assessments on the potential risks and vulnerabilities facing that particular working waterfront, i.e. elevation above water/BFE. The development of a statewide inventory should include information and lessons learned from local inventories, including effective community engagement strategies and to the extent possible, based on local inventories and work.
- Develop and fund a long-term monitoring strategy to inventory, map and track changes to Maine's working waterfront.
- Consider aligning working waterfront inventory efforts with Growth Management Act requirements for local comprehensive planning.

C) Increase funding for the purchase of working waterfront properties, covenants, easements, natural infrastructure and related forms of permanent protection or long-term protection.

- Increase funding for the LMF WWAPP, coupled with capacity support to assist businesses in understanding and utilizing the program and build the pipeline of eligible projects.
- Explore mechanisms to create a revolving loan fund or other forms of dedicated gap financing to allow for rapid response to potential sale of critical working waterfront property.
- Develop various financial mechanism to promote the ongoing use/operations/and preserving access.

D) Increase the technical assistance and related support for privately owned working waterfront businesses and properties.

- Establish a clearinghouse to connect infrastructure opportunities with owners to aid in managing and supporting the sales process (e.g., DECD's point-person for campgrounds)

E) Increase the capacity of public infrastructure to support working waterfront activities in order to help mitigate the risk/impact of the loss of private infrastructure at the community scale.

F) Identify and address barriers to equitable, safe and diverse access to Maine's nearshore environment, particularly for those people and populations most vulnerable, through collaboration with coastal communities.

- Collaborate with Maine-based research institutions and experts with local and traditional knowledge to research what barriers exist to safe, equitable access to Maine lands and waters for a range of activities including commercial, research, cultural, spiritual, and educational.

- Work to ensure the Maine Coastal Program’s updated Public Access Guide is communicated equitably to Maine communities and includes information on access for mobility impaired populations.
- Continue to actively communicate public access points through multiple different channels and in collaboration with priority populations and Wabanaki nations.
- Survey existing programs that involve student, volunteer, or staff presence in the field for information regarding potential instances of harassment and discrimination.
- Work across government agencies, research institutions, volunteer monitoring networks, and other relevant groups to provide training in safe field practices and ensure field-based programs are well communicated to communities in which they are performed.

G) Inventory existing access points, supplemented where possible with traditional and Indigenous knowledge, and consider future access.

- Ensure documentation of existing access points happens collaboratively with a network of local partners that include priority populations and the Wabanaki nations.
- Using the DMR and DACF Working Waterfront Access Protection Program as a template, explore expanding the use of covenants to protect access points for a broader range of coastal uses and value systems.

Support Climate Adaptation of Maine’s Fisheries, Aquaculture and Seafood Industries

These recommendations were crafted in an attempt to capture the diverse perspectives, needs, and future considerations of marine industries and the ecosystems that support them. The goal of these recommendations is to integrate coastal considerations into existing and developing work to sustain Maine’s natural resources and associated industries as described in the 2020 Maine Climate Action Plan. A healthy and robust marine ecosystem is central to the cultural identity of coastal communities, Indigenous peoples, Maine’s economy, and sustainable fisheries and aquaculture operations across the state over the long term. Preparing for the future by supporting all facets of our marine commercial and recreational economy will be centered around the ability to stay nimble to new opportunities, regulations, species, and innovating to meet the moment. An equitable path forward for these industries, communities, and the incoming Mainers that will sustain them are based on the following considerations:

- Pursue flexibility and diversification opportunities for marine resource harvesters and growers to take advantage of emerging opportunities and design the adaptation strategies best suited for their business or communities.
- Conduct thoughtful and comprehensive assessments of climate vulnerability in ecosystems, industries, and communities in a collaborative manner to best prioritize funding, research, and policy efforts designed to make Maine’s coast resilient.
- Integrate multiple types of seafood including emerging and underutilized species into local food markets and develop new pathways to make local seafood more accessible to all Mainers.

- Work to develop marine resource employment across supply chains that offers financial and cultural security, particularly to new Mainers and other underserved populations.
- Support communities in understanding and responding to climate-induced ecosystem and regulatory shifts.

RECOMMENDATION: Promote stewardship of resilient ecosystems to take advantage of diverse markets and grow existing opportunities

A) Manage and adapt Maine fisheries and aquaculture for climate resilience and sustainability, including evaluating potential permitting/licensing, regulatory and management reforms to enable opportunities for economic diversity.

- Provide funding for the Maine Department of Marine Resources (DMR) to develop long term monitoring of natural resources.
 - Expand existing state agency long-term research programs (e.g. lobster, urchin, scallop, trawl survey, intertidal, aquaculture) to monitor species abundance changes and distributional shifts within and into coastal Maine waters and inform harvest recommendations to state and regional management bodies in an effort to secure quota for Maine industries.
 - Monitor changes in the species cultivated on aquaculture sites and changes to harvest techniques.
- Continue to support and develop research programs focused on ecosystem impacts to understand the resource and socioeconomic environment at DMR.
 - Include considerations of ecosystem impacts of management actions and to minimize deleterious effects on non-target species.
 - Consider coordination and partnerships statewide between DMR and research groups (academia, nonprofit, citizen science and others).
- Charge DMR to explore potential permitting, licensing, regulatory and management reforms in alignment with existing management structures to enable more rapid responses and innovation in the face of changing environmental and economic conditions.
 - Conduct an initial evaluation by 2030 of managed resources to develop a climate adaptation plan that triage and creates a prioritized list of risks and resilience options, ideally developed collaboratively with other applicable groups (tribes, fishers, etc.). This evaluation should be re-visited and reconducted as needed every five years.
 - Develop climate-informed harvest targets or other management controls for existing state managed fisheries that are robust under different projections of future warming.
 - For emerging species, design flexible and new permitting mechanisms, fund programs for new monitoring and research, and generate data series that align with existing programs outside of Maine that inform MEDMR, ASMFC, regional councils and management policies.
 - Collaboration with industry and co-management of state fisheries should continue to be the central framework for any proposed reforms.

- Support for policy staff to implement new fisheries and aquaculture opportunities, and to develop new pathways to diversification in a timely manner.
 - State government will need additional staffing capacity and resources to adequately respond to shifts and permitting requests. This includes additional funding for existing programs to secure adequate diverse staffing, climate adaptation training, and other resources.
- Dedicate support and funding for DMR and academic collaborators to monitor for emerging diseases, study how climate change triggers and amplifies outbreaks, and assess how to respond accordingly as species shift and fishing and aquaculture opportunities change.
 - Review new climate-resilient sources of bait, import/export regulations, and other considerations intended to avoid the spread of disease.

B) Support investments, policies, and research that prioritize the inherent ability of Maine’s coastal and inland natural environments to support diverse innovative economies and societies resilient to climate change impacts.

- Implementation includes regional planning organizations, economic development corporations, nonprofits/conservation organizations. Support for this work is required (e.g., grants administration, serve as fiscal hosts, provide technical assistance, incorporate initiatives into regional/local climate adaptation plans, etc.).
- Develop and implement pathways to climate-informed restoration and adaptation actions for species and their habitats.
 - Evaluate, prior to restoration efforts, climate impacts on habitats using modeling and downscaled climate projections under different emission scenarios to identify important vulnerable resources and project where suitable environmental conditions are likely to persist and support activities over short and long-term.
- Create new climate-informed metrics that effectively detect and track system thresholds and tipping points and provide early warning indicators for additional management actions that support resilience and adaptation goals.

C) Increase the amount of food consumed in Maine from state food producers from 10% to 20% by 2025 and 30% by 2030 through local and regional food system development, marketing, new product development, and subsidizing costs in order to take advantage of sustainable, emerging, and underutilized fisheries and aquaculture opportunities.

- Develop long-term funding for programs to get Maine seafood into local schools, food insecure communities, and seafood deserts within Maine.
- Build incentives for developing local supply chains within in-state markets. Coordinate with DMR, seafood industry reps, and the Maine Seafood Promotion Council to explore how local seafood is distributed within the seafood supply chain for existing and emerging climate resilient fisheries and aquaculture.
- Provide funding for research on climate benefits and nutritional aspects (e.g., protein, micronutrients) of Maine Seafood

- Evaluate Maine’s marine resources to determine which species are underutilized, bycaught and wasted, and resilient to climate change in the short and long term.
- Conduct market research on emerging and underutilized species to increase awareness and consumer demand for climate resilient seafood products.
- Increase industry and public outreach and education on what climate resilient seafood means and provide examples. This work could be executed by Sea Grant and other extension agents, non-profit organizations (e.g., GMRI, TNC, Eating with the Ecosystem) and conservation groups.
- Fund and conduct an assessment of restaurants and grocery stores to evaluate the proportion of local vs imported seafood and then provide informational resources to improve awareness and options for local, climate resilient seafood options, and expanding access to seafood to underserved communities or exploring how various communities are utilizing seafood.
- Continue multicultural seafood marketing research and community outreach.

D) Produce and disseminate a climate focused resilience assessment by 2027 using participatory, community-based socioecological and socioeconomic approaches with focus on fisheries, recreational harvesters, aquaculture operations, and seafood harvesters.

- Fund a series of participatory community-based workshops that brings together the DMR, researchers, industry, tribes, and the public to scope and co-develop a Climate Change Vulnerability Assessment and climate adaptation plan for implementation.
 - Identify the resources and activities that are at highest risk to climate impacts as well as for novel opportunities and/ or expansions of existing fisheries/aquaculture/harvest and will help prioritize short term vs longer term actions and funding schedules.
 - Conduct a cost-benefit analysis of declines and increases in access, and availability. This should also identify sustainable practices that consider culturally and historically important stocks vs emerging stocks.
 - Use existing tools and frameworks (e.g., Climate Vulnerability Index, <https://cvi-heritage.org/>) and experienced facilitators to conduct the assessment. The products of this work should also be designed to support scenario planning efforts.
- Include timelines of expected impacts and research to evaluate “tradeoffs” of new opportunities.
- Conduct research to understand impacts on and mitigation recommendations for natural resource economy infrastructure, biology/ecology/stocks, and public health.
- Engage the Maine Community College system in this work and regional development group.

E) Grow Maine’s living marine resources and forest-products systems to support communities through bioproduct innovation, supporting climate adaptive economic growth and sustainable forest management and preservation of harvested lands and waters.

- Align any new work with SEAMaine and ForMaine outcomes

RECOMMENDATION: Maintain and expand equitable access to cultural, traditional, emerging and heritage industry

- A) Create climate adaptive natural resource employment that provides financial security and offers pathways for advancement that can be accessed by priority populations.**
- B) Identify locally relevant economic diversification opportunities and provide workforce training opportunities to support climate adaptation for natural resource dependent communities.**
- Ensure the availability of low- or no-cost workforce training to priority populations and underserved communities with state supported financing.
 - Partner with “Live and Work in Maine” to share success stories focused on growing a new and diverse workforce within the seafood industry.
 - Revive programs from Washington County Community College and Sunrise County Economic Council on training across seafood and marine industries including aquaculture.
- C) Focus climate adaptation and resilience actions/efforts on fisheries and aquaculture in communities with little economic diversity, inclusive of Indigenous and cultural fishing practices.**
- Include fisheries, aquaculture, and working waterfront initiatives in the ‘List of Community Actions’ that are eligible for funding in the Community Resilience Partnership. For example, developing marine resources sections of comprehensive plans, working waterfront inventories, land acquisition/conservation easements, economic/social impact assessment, marine employment diversification analyses.
 - Increase public outreach and educational opportunities on climate resilience.
 - Understand local practices that support community resilience and share additional practices of what climate resilience looks like and what options are available.
- D) Engage with coastal communities to develop support strategies in response to socio-economic impacts of regulatory uncertainty.**
- Collaborate with DMR to provide resources and pathways to support coastal communities, including fishery diversification.
 - Support ecosystem surveys (oceanographic, biological) and ME OSW research consortium studies conducted by DMR and research partners to be able to quantify the impacts of offshore wind development (including transmission) on fisheries and the ecosystem.
 - Continue ecosystem surveys to quantify and describe the movements of the North Atlantic Right Whale (NARW) and their prey on an ongoing basis.
 - Support DMR’s efforts to develop management measures that are resilient and estimate how NARW risk will change in the Gulf of Maine (e.g. dynamic management, alternative gear use).
 - Provide conflict resolution training for state agency staff and other collaborating organizations working at the forefront of climate adaptation and resilience initiatives.

- Provide funding for socio-economic work to quantify the community level impacts and identify the most vulnerable communities.

Monitor, Conserve and Increase Resilience of Coastal and Marine Ecosystems

These recommendations recognize that communities along Maine's coast have been, and long will be, dependent on the health of coastal and marine habitats and ecosystems. Healthy coastal habitats provide for the physical, emotional and spiritual health of residents and visitors alike. Coastal and marine habitats are also important economic assets for the state, undergirding fisheries and tourism industries that anchor the economic life of many Maine communities. Resilience of the people of the Maine coast is inextricably linked to the health of coastal and marine habitats that are already changing. These recommendations are based on the following considerations:

- Maine's approach to coastal habitat management needs to shift from solely focusing on protection to prioritizing habitat restoration and resilience, aiming to restore functions, mitigate harm, and enhance resilience to sustain valuable ecosystem services for generations to come.
- The concept of "Blue Carbon" should encompass all coastal and marine ecosystems that contribute to carbon uptake and storage, not just traditional habitats like eelgrass beds and salt marshes, necessitating further research into the carbon sequestration potential of diverse habitats including kelp forests and tidal flats.
- Recognition of the many important functions provided by coastal and marine habitats, beyond the blue carbon benefits, is critical. An integrated approach is necessary to evaluate diverse habitats, ecosystem services, and cultural significance when prioritizing actions for coastal ecosystem resilience.
- Community and ecological resilience are deeply intertwined, as demonstrated by many ecosystem restoration projects that simultaneously address built infrastructure deficiencies. This interconnectedness underscores the need to bridge the gap and identify synergies between discussions of community resilience and consideration of coastal habitat health.
- Managing Maine's coastal and marine habitats and marine resources in an era of climate change necessitates robust, long-term monitoring and comprehensive data collection across various parameters including water quality, habitat conditions, trends in marine resource populations, and community demographics. Existing data collection programs must be adapted and expanded to address climate change monitoring needs, requiring reliable, long-term funding to maintain monitoring programs and evaluate impacts. Strengthening public-private collaborations is crucial for effective data stewardship, management, and dissemination to inform coastal decision-making.

RECOMMENDATION: Enhance ongoing monitoring and data collection that provide baseline data to guide informed decision making and create new monitoring programs to fill data gaps

A) Expand capacity to document and study the positive and negative effects of extreme events – on people and natural resources -- via partnerships with academic institutions and community groups.

- By the end of 2025, convene state agencies and non-state partners to define extreme events, develop parameters to be monitored, best practices, and assign responsibility for state and non-state partners to conduct monitoring before and following extreme weather or environmental events.
- Create a discretionary funding source to fund the state agencies and partners identified in the response plan to conduct reactive monitoring following extreme events.
- Continue funding of the monitoring plan developed.

B) Create and fund a state-wide framework, regional coordinating hubs, and technical capacity to implement coordination of comprehensive monitoring.

- Task GOPIF with identifying what monitoring data exists and is available from state agencies and non-state agencies that is useful for climate resilience planning and create and maintain a public hub to identify how to access these data. This could be via collaborative efforts by convening relevant groups (DEP, DMR, DIFW, DACF), inventorying existing monitoring efforts, identifying priority data gaps in monitoring programs, and funding efforts to fill identified data gaps.
- Task GOPIF with identifying or creating sources of climate-related information by region that are accessible on publicly available platforms that fishers, municipal officials, and others can rely upon to inform decision-making.
- Define the role of the Maine Climate Science and Information Exchange in distributing local climate information needed to make management and policy decisions to address climate change, and in convening periodic meetings of state agencies and partner organizations.
- Task an entity such as the Maine Climate Science and Information Exchange with creating or identifying regional hubs to coordinate coastal monitoring efforts and identify resource needs. Regional hubs can serve to facilitate communication and data sharing among different research programs. Funding or other resources would be needed for implementation.

C) Provide resources for state agencies and non-state partners ongoing and new long-term monitoring efforts and collaborations focused on characterizing changes to coastal and marine ecosystems due to climate change.

- Task GOPIF with creating a state funding model by 2025 to sustain long-term monitoring by state agencies to collect the critical time series and geographical data needed to inform climate resilience planning and decision-making.
- DMR and DEP will evaluate their respective long-term monitoring programs to determine data gaps, and ways to improve collaborative efforts, and will enhance their respective ongoing monitoring programs or develop new monitoring programs to fill the

identified data gaps by 2026. Sustainable funding and resources need to be provided to sustain, enhance and develop new long-term monitoring programs.

- Develop opportunities for state and non-state partners to convene and collaborate to advance climate-related monitoring by the end of 2025. For example, continue to support meetings such as the Nearshore Monitoring meeting convened by DMR in 2023.
- Expand the public-private ocean acidification monitoring network to build out coast wide monitoring; hold a training session for this purpose; identify labs that can process the samples or the unmet need for lab capacity.
- Task DEP with developing monitoring plans to evaluate the effects of increased stormwater runoff and pollution as a result of more intense rain events year-round.
- Task DEP with evaluating potential use of MEPDES and other permits to help track the effects of climate change including increased stormwater.
- Continue the state and private collaboration to test new technologies that advance ocean acidification monitoring; share results within state-wide collaboration of OA scientists.
- Consider developing a seven day ocean acidification (OA) forecast by region to inform aquaculture and shellfish management.
- Evaluate monitoring needs and capacity, and target resources to fill data gaps for priority populations.

D) Through active engagement and co-production, ensure data gaps are filled and data is collected and communicated alongside the communities using it.

- Ensure effective and efficient communication with priority populations and other communities when planning data collection endeavors aimed at addressing data gaps.
- Ensure equitable and safe access to information gathering for nature/climate, including decisions on what data is collected and how it is used.

RECOMMENDATION: Protect natural and working lands and waters and seek opportunities to restore and increase resilience of coastal, marine and inland habitats

A) Prioritize the identification, conservation, and monitoring of essential habitat areas that support land and water connectivity, ecosystem health and resilience of ecosystems to sea-level rise and other climate change impacts.

Habitat prioritization needs to occur in two stages: first identifying important habitat types or categories (e.g., tidal flats) and second, selecting local, regional, and state-level priority sites based on site characteristics, geography, or community values.

- Convene a state-wide process by the end of 2025 to identify important coastal and marine habitat categories, taking into account multiple habitat benefits, including blue carbon (carbon sequestration), habitat connectivity, biogenic habitats (like eelgrass, shellfish bars, and kelp forests), support for rare species, and significance to Maine's coastal fisheries.
- Engage state agencies and researchers to conduct geospatial analysis based on available data to identify priority sites or examples of important coastal and marine habitats.

- Target grants and other direct financial assistance to priority and vulnerable coastal and marine habitat types and sites.
- Integrate priority and vulnerability information on coastal and marine habitats into the 2025 State Wildlife Action Plan.
- Provide funding and the resources needed for DMR’s Maine Coastal Mapping Initiative and DEP’s Marine Vegetation Mapping Program to continue to map coastal and marine habitats at state-wide scale.
- Establish “sentinel sites” for important coastal and marine habitat types where long-term data collection will be collected using consistent methods to document long-term ecosystem change.
- Work with researchers and state agencies to develop standard methods to use remotely sensed data to track changes in extent of important coastal and marine habitats.
- Fund and designate agencies responsible for regular updates to priority analyses and analyses and related maps
- Communicate coastal and marine habitat priorities to other agencies. Encourage them to consider the impact of actions (funding, permitting, planning, etc.) on priority and vulnerable coastal habitats.

B) Identify and create an inventory of coastal and marine habitats most vulnerable to climate change by either using current habitat climate vulnerability assessments or by conducting a state specific coastal and marine habitat climate vulnerability assessment.

- Commission a report (based on a literature review and existing geographic data) to evaluate climate vulnerability of Maine’s important coastal and marine habitats in response to primary and secondary climate stressors.
- Map vulnerable habitats (within and across habitat categories) using principles from the report described above and available geographic and remote sensing data., .
- Designate an agency to be responsible for updating vulnerability analyses and maps on a regular basis.
- Commission STS, MGS, or UMAINE to summarize the state of our understanding of coastal sediment supply, transport and deposition. Evaluate how sea level rise might affect sediment supply for key coastal habitats, including tidal wetlands and tidal flats.
- Work with the University of Maine system to strengthen the community of people in Maine able to study sediment processes and advise communities about coastal erosion and sediment transport.

Vulnerability to climate stressors is not the same as importance as described in Action A. The two analyses are complementary, and together provide the information needed for risk assessment and thus managing climate-related risks. Highest priority areas for active efforts to protect or restore habitat resilience are those that are important because of the benefits or functions they provide and also especially vulnerable to climate stressors.

C) Invest in coastal and marine habitats through restoration, protection, and management to increase habitat resilience.

- Implement and fund pilot projects that increase habitat resilience and ultimately serve as models for habitat “restoration.”
- Expand state and philanthropic funding for habitat resilience and protection. When possible, use local and state dollars to leverage federal funding, especially in underserved or under resourced communities and to benefit priority populations.
- Expand capacity of Maine’s Coastal Program to assist with and fund coastal restoration.
- Catalog state programs that fund coastal and marine habitat restoration or provide technical assistance on managing coastal habitats; identify information and resource gaps.
- By the end of 2026, conduct a state-wide analysis to document funding needed to address priority coastal habitat vulnerabilities over the short-term (5- 10 year) and medium term (10 - 20 year; Sea Grant or Coastal Program).

D) Consider multiple perspectives on uses of natural resources when establishing habitat restoration, resilience and protection priorities (e.g. traditional and Indigenous knowledge) and traditional uses of the coast.

- Begin conversations with priority populations, Indigenous and traditional use communities, and the Wabanaki nations through existing engagement networks in Maine on priority setting for coastal activities related to restoration, resilience, and protection.
- Develop a formal state protocol for engaging, and applying when requested, traditional ecological knowledge in coastal resilience projects. Build off existing state network structures to inform.

E) Explore policy tools for protection and restoration of subtidal and intertidal habitats.

- Commission a review of legal, policy and planning alternatives by Maine Law School or the Muskie School of Public Service to identify legal and policy tools that offer protection for subtidal habitats from direct and indirect human impacts.
- Evaluate regulatory and other hurdles to restore or enhance resilience of intertidal and subtidal habitats such as eelgrass beds, shellfish bars, and kelp forests.
- Strengthen state and local policies that protect coastal and marine habitats
 - Review state comprehensive plan guidance to ensure comprehensive plans consider climate change impacts, including impacts on important marine and coastal habitats.
 - Leverage state funding, such as Coastal Community Planning Grants, to encourage integration of coastal habitat consideration in comprehensive plans.
 - Revisit shoreland zoning requirements and recommendations and consider whether they need to be modified to reflect growing understanding of climate-related risks in coastal and riparian areas.
 - Consider how stormwater rules (including Chapter 500, and “MS4” permits) can reduce impact of development and stormwater runoff on coastal habitats.
 - Continue to implement other recommendations in the SLR Resolve to amend state coastal land use laws and regulations.

- F) Evaluate emerging science regarding carbon uptake and storage in additional marine environments, such as subtidal kelps and intertidal rockweed, tidal flats and sheltered bays.**
- Commission related literature review by the MCC Science and Technical Subcommittee
 - Continue state agency involvement with “Blue Carbon” and “Coastal Carbon” initiatives by Maine DEP, DMR, and Natural Areas Programs.
 - Expand collection of Maine-specific data on stored carbon in marine and coastal sediments to improve understanding of site to site variation in carbon and increase sampling in marine environments beyond eelgrass beds and tidal wetlands.
 - Update and improve Maine’s estimates of stored “blue carbon” within tidal wetlands and eelgrass, based on emerging understanding
 - Fund research on sequestration rates in kelp and rockweed and the fate (burial, oxidation) of kelp and rockweed-derived organic matter

RECOMMENDATION: Expand outreach to offer information and provide technical assistance

- A) Increase technical service provider capacity by 2027 to deliver data, expert guidance, and support for climate solutions to communities, farmers, loggers, marine harvesters, and foresters at the Department of Agriculture, Conservation and Forestry, Maine Forest Service, Department of Inland Fisheries and Wildlife, the Department of Marine Resources, Department of Environmental Protection, and the University of Maine.**
- B) Strengthen availability of information and technical assistance on “nature based solutions” to coastal management challenges, including coastal erosion and water quality protection.**
- C) Expand Maine’s analytical and technical services to increase its capacities to collect, process and analyze samples and data to understand the impacts of climate change.**
- Grow in-state capacity of academic and commercial laboratories for analysis of low-level marine nutrients, coastal acidification parameters, and tissue and sediment carbon parameters.
 - Provide training for implementation of new methods, funding to purchase new laboratory equipment, and capacity to develop quality assurance measures and create business models that support expansion of these services.
 - Work with the University of Maine System to broaden in-state training of data analysts able to work with complex “big data” marine and coastal data sets, such as “continuous” ocean monitoring data, satellite imagery, and output from ocean models.
- D) Empower local decision making by strengthening participatory science initiatives in priority population communities and engaging community members with data collection and observation to strengthen understanding of positive and negative impacts of climate change.**
- Inventory existing participatory science initiatives in Maine, including official DEP monitoring networks, and collect demographic information on volunteers.
 - Work with existing participatory science initiatives to develop broader, inclusive, community-driven data collection programs focusing on priority populations and Wabanaki nations.

Analysis and Supporting Information

Impacts

BUILD HEALTHY AND RESILIENT COASTAL COMMUNITIES AND PROTECT PLACE-BASED INFRASTRUCTURE (STRATEGY F AND G)

These revised sections as led by the Working Waterfronts and Infrastructure Subcommittee were created with a focus on **increasing resilience, creating economic opportunity, and achieving equity through Maine's climate response.**

These recommendations recognize that much of the actual work of building resilience happens at the local level and many of the communities along our coast face significant capacity constraints to tackle the major challenges they are facing. Additionally, communities are navigating multiple intersecting challenges at the same time. While these intersections are apparent to the community officials dealing with these issues, the connections are not always apparent to those who are supporting or funding specific aspects of the projects. These recommendations are also partially aimed at helping communities navigate the tough choices that will be necessary as the ecosystem changes due to climate change and the management system adjusts accordingly. It is key to recognize that even with strong support for comprehensive planning, zoning, and support for municipalities undertaking resilience projects, there is a need for targeted support specific to working waterfronts due to the complexity of the environment, regulatory overlays, and economic considerations. This highly technical expertise is well suited to be held regionally or at the statewide level. Additionally, there may be changes needed to the Growth Management Act that increase the rigor and minimum requirements for the marine resources section.

The actions described help decrease the vulnerability to climate hazards and increase the ability for communities to recover. The two climate hazards impacting the working waterfront are sea level rise/storm surge and the rapidly changing Gulf of Maine ecosystem which has significant impacts on the businesses that rely on harvesting organisms from that ecosystem. These businesses are being directly impacted by climate change and the communities that have a high dependency on these businesses are on the front lines of climate change. This strategy helps secure the base of operations for some of Maine's most climate vulnerable economies and helps support the resilience of natural heritage industries.

The actions are primarily focused on community capacity building, support for communities through technical assistance and funding, and educational opportunities. Increasing public literacy about climate change is important and the action recommended here is specifically focused on connecting working waterfronts to Maine's climate and economy. Development of new, non-resilient uses and infrastructures should be actively discouraged within flood vulnerable areas, while marine uses and other resilient uses should be allowed and encouraged. Voluntary landward migration of non-water-dependent uses can be encouraged by implementing sensitive zoning allowances for marine industrial uses at suitable, less vulnerable sites, and by making resilience upgrades to transportation infrastructure that provide access to marine resources.

The recommendations are aimed at reducing the risk that sea level rise and storm surge pose to publicly and privately owned working waterfront infrastructure. The January 2024 storms highlighted the significant risk storm surges pose to coastal communities and in particular to the infrastructure that underlies much of our coastal economy. This strategy reduces the risk of disruption in these key places to the fisheries and aquaculture sector. This recommendation and the associated work to develop this recommendation was happening contemporaneously with the development of the State's Infrastructure Adaptation Fund as a tool to support privately owned working waterfronts rebuilding with resilience. The lessons learned from implementing that program should inform the next steps for this work. It is important to note that this recommendation is broader than just working waterfronts that were impacted by the January storms and includes building resilience at working waterfronts to avoid being impacted as severely by future storms. When used here, "resilience upgrades", should be broadly construed to be about the actions that build or enhance resilience and not limited to hardening or elevating infrastructure. The 2014 marine bond and the 1978 fish pier bond are both good examples of significant public investment in infrastructure that supports fishing communities and builds different kinds of resilience.

These actions focus on protecting and strengthening the cornerstone of one of Maine's most climate vulnerable industry sectors, the fisheries and aquaculture sector. They also reduce the risk that climate hazards displace small coastal businesses by helping the businesses that have to be proximate to the water become more resilient. This work is aimed at preventing rapid or abrupt job loss as a result of damage to key pieces of infrastructure that disrupt or inhibit economic activity. For context and a sense of scale, in the aftermath of the January storms, Island Institute has identified over 50 working businesses that support 550 jobs on land and over 1100 commercial vessels, almost all fisheries and aquaculture businesses.

This strategy is essential for maintaining an ocean-based food system and the associated environmental benefits that result from this. An important co-benefit of maintaining the health of the nearshore environment is its role in food production. Working waterfronts are crucial access points for fisheries, which contribute to a low-carbon seafood supply. In addition, accessing intertidal zones by footpath for shellfish results in lower carbon emissions compared to boat access. The recommendations offer some limited but relevant environmental benefits by supporting resilience upgrades that prevent plastics, oil, and other marine debris from entering the water after a storm. Working waterfronts are often designed to coexist with water, with some built to withstand overtopping and others experiencing minimal damage when overtopped, unlike other types of built infrastructure like houses.

Some of the actions proposed here mitigate the risks posed by a warming Gulf of Maine and the resulting ecosystem changes to individual license holders, resource-dependent communities, and the fisheries and aquaculture sectors of the economy. Preserving and expanding working waterfront access helps ensure the businesses that rely on the Gulf of Maine can adapt in response to ecosystem changes. Negative economic shifts in this sector are likely to strain the working waterfront operations on which these businesses depend. The lead time or time to profitability for any adaptation may not align with the timing and business needs of working waterfronts, potentially resulting in a rapid loss of infrastructure as the industry shifts. This would make it significantly more difficult for these businesses to continue adapting.

Implementation these strategies will require additional workers in the marine construction field, this may be an opportunity for job creation. There may be additional workforce development opportunities in the marine construction sector, but the group did not have the expertise to do more than identify the need. Of note, working waterfront businesses are currently struggling to find employees to fill existing jobs and housing costs are a significant barrier.

SUPPORT CLIMATE ADAPTATION OF MAINE’S FISHERIES, AQUACULTURE AND SEAFOOD INDUSTRIES (ALIGNS WITH STRATEGY D)

From our earliest review of the 2020 Climate Action Plan *Maine Won’t Wait*, the working group was struck by the lack of fisheries and aquaculture directed language in the Plan despite the importance of these industries to Maine’s cultural identity and economy. The Fisheries and Aquaculture Subcommittee updated the existing recommendations centered on forestry and agriculture to include coastal industries and community considerations while also working to contribute thoughtful additions that would capture the unique climate driven challenges ahead. Given the diversity of coastal communities across the state and the reality that the physical toll of climate change will be unequally experienced across the coast, as supported by the work of the Science and Technical Subcommittee, **the recommendations and actions for this revised section focused on increasing resilience, creating economic opportunity, and achieving equity through Maine’s climate response.**

The first set of recommendations and actions is centered around identifying points of climate resilience in coastal communities and developing regulatory flexibility. This will allow small businesses to quickly respond to the challenges ahead by offering new business opportunities and potentially allow for fishery diversification. Both these themes were also drafted in support of our shared goal with the Community Resilience Group of making local seafood more affordable and easily accessible across the state.

The second set of recommendations and actions recognizes and looks to support and maintain the inherent cultural richness of coastal Maine including tribal communities. These actions were developed around our working group’s conversations to maintain fishery opportunities, develop fair employment in these sectors, and engage with local communities to best support them in the face of ecological and regulatory uncertainty.

This strategy directly protects and strengthens businesses that are the cornerstone to one of Maine’s most climate vulnerable economies, the fisheries and aquaculture sector, and reduces disruption in the face of pressures due to a rapidly changing Gulf of Maine ecosystem. Seafood production in southern Maine is a significant employer of migrant and minority populations providing stable incomes and upward mobility. Additionally, programs like Luke Lobster’s “Lift All Boats” is a good example of a workforce development program that is opening up new economic opportunities for those who may not be able to easily access this sector. Based on work done by the City of Portland, 50% of the employment in the regional seafood processing sector is from the BIPOC/immigrant community. This sector is wholly reliant on working waterfronts as the connection between fisheries and aquaculture businesses on the water and the food system/processing sector on shore.

The actions are aimed at preventing long-term job loss in this sector by helping fisheries and aquaculture businesses adapt their business model to a rapidly changing Gulf of Maine. This might also result in some job creation activity as a result of the innovation these businesses are doing.

MONITOR, CONSERVE, AND INCREASE RESILIENCE OF COASTAL AND MARINE ECOSYSTEMS (STRATEGY E)

These revised sections as led by the Monitoring and Habitat Subcommittee were created with a focus on **increasing resilience, creating economic opportunity, and achieving equity through Maine’s climate response.**

Strategy E in *Maine Won’t Wait* implicitly applied to Maine’s coastal habitats, but the wording of several actions does not reflect the way work on coastal and marine habitats has evolved over the past several years as the impacts of climate change on coastal ecosystems have become clearer.

Linguistically, a focus on “natural lands” tends to direct attention away from the state’s waters (including wetlands). Similarly, a focus on biodiversity protection directs attention away from certain coastal habitats that are not especially species rich, despite their economic and ecological importance.

Maine Won’t Wait used language about conservation priorities that focused on “protection” of natural areas. Yet in an era of changing climate, protection of coastal ecosystems, while essential, is no longer sufficient. Increasingly, coastal scientists believe maintaining the health of coastal habitats like eelgrass beds and tidal wetlands will require active short-term interventions to help them adapt to changing conditions. In some cases, scientists fear there may be a decade or two to take action to support the health of important coastal habitats before they undergo largely irreversible changes. This subcommittee identified several specific examples. Here we offer just two:

- Many Maine and New England salt marshes have a deep history of human use that has resulted in subtle alterations of marsh surface hydrology. Hydrological changes, in turn, alter marsh vegetation, and reduce the ability of tidal wetlands to trap sediment and thus keep up with sea level rise. With appropriate and relatively inexpensive interventions, some of the effects of historic human impacts can be reduced, greatly increasing marsh resilience.
- While science and practice are less well developed here in Maine, conversations are occurring along much of the eastern seaboard about actively managing genetic diversity of eelgrass populations. Warmer waters have a negative effect on eelgrass growth. Maine’s eelgrass is adapted to cooler waters; genotypes from further south are more heat tolerant. Emerging practices, ranging from use of seeding (to increase genetic diversity of eelgrass beds) to “assisted migration” that imports heat-tolerant genotypes, are under discussion, and face significant regulatory and policy uncertainty.

Traditional habitat conservation (e.g., via fee ownership or easements) has proven to be an essential tool for enhancing climate resilience, especially for terrestrial habitats, but those tools of “protection” are less applicable to the marine world. Most coastal habitats are state lands held in the public trust, and accessible to all. Thus, protecting and restoring resilience of coastal and marine habitats must rely on different tools. Members of the subcommittee identified several habitats at risk (including kelp beds,

shellfish bars and intertidal rockweed), and a number of planning, regulatory, and policy approaches that could improve or protect habitat resilience. The subcommittee did not have time to reach consensus about specific priorities, but did agree that new tools are needed and policy discussions should begin.

Finally, conversations about community resilience and habitat resilience often occur separately and should be better integrated. One place to start is by using emerging networks of individuals providing technical assistance to communities and individuals on climate resilience to provide up-to-date information on “nature-based solutions” like “living shorelines” and riparian plantings.

The subcommittee discussed the impact of this winter’s storms on coastal beaches, dune systems that protect coastal towns, erodible bluffs, and other vulnerable shorelines. In addition to short- and medium-term impacts on coastal economies and ecosystems, these storms are likely to have secondary long-term impacts on coastal ecosystems. Severe storms naturally spur communities to seek solutions for shoreline erosion. As storms become stronger and water levels rise, Maine will see a growing number of individuals and communities seeking permits to “harden” shorelines with riprap or sea walls. Less environmentally destructive alternatives exist, although they are not always suitable for higher energy shorelines. These less destructive alternatives, however, are still uncommon in Maine. They are little understood and face practical and regulatory barriers and will not be widely adopted unless people learn about them.

The primary benefits of all the proposed changes are to focus state efforts on resilience of coastal ecosystems and the coastal economies that depend on them. Many coastal ecosystems (more than previously thought) have the potential to act as long-term sinks for carbon. Actively protecting and enhancing resilience of coastal ecosystems, therefore, will have significant “Blue Carbon” benefits as well.

Cross-over

- X Transportation
- X Buildings, Infrastructure, and Housing
- X Community Resilience
- X Natural and Working Lands

The co-chairs and subcommittee leads stayed engaged with the leaders of all working groups, but the strongest points of collaboration were with the Community Resilience and the Natural and Working Lands Groups. Several CWMG members met with the co-chairs and staff of the Community Resilience working group on April 12, 2024 to discuss overlapping themes in recommendations. After that point, staff exchanged templates and both groups were given the chance to edit and comment on the draft language put forward by the other group. These conversations highlighted key themes related to “getting out of harm’s way” for coastal communities and the community level impact on the health and economic wellbeing of coastal communities. Members of the CMWG also attended meetings of the Natural and Working Lands group to represent seafood considerations in their goals to develop local

food pathways in Maine in service of their “30% local food by 2030” goal from the 2020 Maine Climate Action Plan.

Other specific points of collaboration include:

- Strategy F: zoning includes aspects of retreat and these are related to Community Resilience work group conversations. CMWG members participated in the cross-work discussion about land use and housing and also had informal discussions with some members of the community resilience work group.
- Strategy G: The Energy or the Buildings and Housing groups both likely have components of recommendations related to supporting the deployment of clean energy projects and upgrading grid infrastructure. The Working Waterfront group is raising the need for clean energy projects on the working waterfront to support long term business resilience through stabilizing or making costs more predictable which is an important adaptation strategy for these businesses on the frontlines of climate change as an equity consideration for the groups looking at mitigation related recommendations.
- Members from Transportation Working Group and CMWG held a marine electrification conversation and some of information and recommendations from that conversation and included here.

Priority Populations

These strategies all are intended to have positive impacts on a set of priority populations, though the full extent of those impacts are not fully understood and negative unintended consequences may exist. Taken together, these recommendations are directly targeted towards a set of priority populations and will positively impact them. These populations include the coastal subset of the following geographic or community areas: Rural communities; Small towns with limited municipal capacity; Climate-frontline communities (“first and worst impacted by climate change”). These recommendations also are intended to positively impact specific natural resource industries - fishing and aquaculture, by helping to make their base of operations more resilient. The working waterfront sector and the marine based activity it supports is predominantly made up of small businesses or self-employed individuals. Working group members consulted informally with various priority population stakeholders in their networks. Many working group members either represent a priority population or work very closely with the priority populations these recommendations are targeting.

Data to help demonstrate that the coastal communities that depend on Maine’s fisheries are frontline communities include:

- Distribution of various fishing licenses, value of fisheries landed by port, both show a significant reliance on working waterfront infrastructure in small coastal communities that have limited capacity.
- STS reports about the warming Gulf of Maine and the changes to the ecosystem.
- Scientific literature connects warming waters to changing the timing of key biological functions and distribution of species.
- Associated regulatory changes that impact Maine’s fisheries, whether through the management of a target fish stock, bycatch, or a protected species.

Working group members also acknowledged that there were some key stakeholders who were not engaged in the process. These include harvesters from a diversity of fisheries and aquaculture sectors, tribal governments and members who rely on coastal resources, and a range of perspectives from municipal governments beyond the city and town officials who participated in the CMWG.

All marine harvest industries will be strongly affected by climate change. Coastal harvesters' livelihoods are dependent on continued health of coastal ecosystems. Recreational harvesters and those harvesting for sustenance will also be affected. Many of Maine's coastal communities are geographically isolated and/or economically disadvantaged. Demographically, these communities tend to include many people over the age of 65. While analysis was not state-wide, Casco Bay Estuary Partnership's Equity Strategy was based in part on analysis of data from CEJST and EPA's "EJScreen" tool, as well as information on planning capacity of municipalities. Through all of the discussions, there was a strong recognition that working closely with local communities on working waterfront issues is absolutely critical. Working waterfront infrastructure is place based infrastructure that is heavily connected to the local context. Working with and through communities rather than a top-down approach is preferred and likely to be more successful. Capacity for small communities to engage productively in these conversations is challenging and many communities lack the capacity to implement the measures being proposed. The small businesses in this sector also lack the capacity to both plan and implement the proposed actions and will need various forms of capacity support in order to fully realize the benefits of these strategies. The income for working waterfront businesses has a strong seasonal component and income fluctuates according to the season. There are also community scale impacts from this fluctuation, particularly in the communities that depend on fisheries resources. These communities tend to be more geographically isolated and more rural communities. Earnings and resources in the spring are in short supply.

Working group members expressed support for addressing equity in the way coastal protection and restoration activities are prioritized and implemented. It is important to incorporate both traditional ecological knowledge (TEK) and traditional uses of coastal ecosystems when evaluating coastal habitat priorities. (TEK and traditional uses comprise both Indigenous and non-Indigenous voices and perspectives). In addition, there are growing challenges with access to coastal resources, driven in part by rising property values on and near the coast. It is likely to prove important in coming years to consider issues of both public and commercial access to coastal resources together with protection of coastal habitats and coastal habitat resilience. Land conservation and habitat resilience activities can offer opportunities to provide access to the coast to members of multiple priority populations for cultural, sustenance recreational and commercial purposes.

Timeframe

Detailed in the Implementation section.

Measuring Outcomes

- Develop a statewide working waterfront strategy by the end of 2025.
- Produce and disseminate a climate focused resilience assessment by 2027 using participatory, community-based socioecological and socioeconomic approaches with focus on fisheries, recreational harvesters, aquaculture operations, and seafood harvesters.
- Conduct an initial evaluation by 2030 of managed resources to develop a climate adaptation plan that triage and creates a prioritized list of risks and resilience options, ideally developed collaboratively with other applicable groups (tribes, fishers, etc.). This evaluation should be re-visited and reconducted as needed every five years.
- Increase the amount of food consumed in Maine from state food producers from 10% to 20% by 2025 and 30% by 2030 through local and regional food system development and marketing and new product development in order to take advantage of sustainable and underutilized fisheries and aquaculture opportunities.
- By the end of 2026, conduct a state-wide analysis to document funding needed to address priority coastal habitat vulnerabilities over the short-term (5- 10 year) and medium term (10 - 20 year; Sea Grant or Coastal Program).
- Convene a state-wide process by the end of 2025 to identify important coastal and marine habitat categories, taking into account multiple habitat benefits, including blue carbon (carbon sequestration), habitat connectivity, biogenic habitats (like eelgrass, shellfish bars, and kelp forests), support for rare species, and significance to Maine's coastal fisheries.
- Create a state funding model by 2025 to sustain long-term monitoring by state agencies to collect the critical time series and geographical data needed to inform climate resilience planning and decision-making.
- Develop opportunities for state and non-state partners to convene and collaborate to advance climate-related monitoring by the end of 2025.

Appendices

Working Group Members

Working Group Co-chairs

- Curt Brown, Ready Seafood
- Carl Wilson, Maine Department of Marine Resources

Subcommittee co-chairs

- Working Waterfront and Infrastructure: Nick Battista (Island Institute) and William Needleman (City of Portland)
- Fisheries and Aquaculture: Jessica Waller (Maine Department of Marine Resources) and Ben Martens (Maine Coast Fishermen's Association)
- Monitoring: Rebecca Peters (Maine Department of Marine Resources) and Ivy Frignoca (Friends of Casco Bay)
- Coastal Habitat and Blue Carbon: Curtis Bohlen (University of Southern Maine) and Jeremy Gabrielson (Maine Coast Heritage Trust)

Members

Susie Arnold, Island Institute

Bob Baines, Maine Lobstermen's Association

Nick Battista, Island Institute

Christine Beitzl, University of Maine

Chuck Bennett, independent lobsterman

Kathleen Billings, Town of Stonington

Curtis Bohlen, Casco Bay Estuary Partnership

Damian Brady, University of Maine

Lydia Crafts, Maine State Legislature

Ivy Frignoca, Friends of Casco Bay

Jeremy Gabrielson, Maine Coast Heritage Trust

Wendy Garland, Maine Department of Environmental Protection

Carla Guenther, Maine Center for Coastal Fisheries

Ben Gutzler, Wells National Estuarine Research Preserve

Dawn Hallowell, Maine Department of Environmental Protection

Heather Hamlin, University of Maine

Robert Holmberg, Roger Williams University

Beverly Johnson, Bates College

Natalie Johnson, Maine Maritime Academy

Jessica Joyce, Tidal Bay Consulting / DMR Shellfish Advisory Council

Ben Martens, Maine Coast Fishermen's Association

Marissa McMahan, Manomet

Gabe McPhail, Resilient Communities, L3C

Kathy Mills, Gulf of Maine Research Institute

Marianne Moore, Maine State Legislature

Bill Needelman, City of Portland

Anne Langston Noll, Maine Aquaculture Innovation Center

Rebecca Peters, Maine Department of Marine Resources

Cameron Reny, Maine State Legislature

Jocelyn Runnebaum, The Nature Conservancy

Michelle Staudinger, University of Maine

Thew Suskiewicz, Atlantic Sea Farms

Josh Stoll, University of Maine

Tiffany Strout, Maine State Legislature

Edge Venuti, Sunrise County Climate Coalition/Maine Youth for Climate Justice

Jesica Waller, Maine Department of Marine Resources

Meredith White, Maine Department of Marine Resources

Lisa White, Maine Department of Marine Resources

Amy Winston, Coastal Enterprises, Inc

Gayle Zydlewski, Maine Sea Grant at the University of Maine

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DMR Staff Support

Melissa Britsch, Matt Davis, Devin Domeyer, Amanda Ellis, Melissa Smith, Lisa White

DEP Staff Support

Angela Brewer

Advisors on Subcommittees

Kristen Grant, ME Sea Grant

Monique Coombs, Maine Coast Fishermen's Association

Natalie Springuel, ME Sea Grant

Olivia Richards, Island Institute

Stephanie Sun, Gulf of Maine Research Institute

Ed Billings, Town of Deer Isle

Daniel Devereaux, Town of Brunswick

Helena Tatgenhorst, The Nature Conservancy

Christopher Meaney, US FWS Gulf of Maine Coastal Program

Bonnie Turek, US FWS Gulf of Maine Coastal Program

Addendum to
Report from the Coastal & Marine Working Group
of the Maine Climate Council

June 2024

The following templates and documents outline in detail the full deliberations of the subcommittees for the Coastal & Marine Working Group (CMWG). These were consolidated and refined to develop the final report of the CMWG.

THEME:

**INVESTING IN BUILDING HEALTHY AND RESILIENT COASTAL COMMUNITIES AND
CRITICAL PLACE-BASED INFRASTRUCTURE.**

1. SUMMARY OF STRATEGIES, RECOMMENDATIONS AND ACTIONS

The Working Waterfront subgroup of the Coastal and Marine Working Group met 13 times between December and May to develop the following recommendations. The recommendations represent significant conversations about how to support the State's working waterfront infrastructure within the context of direct and indirect climate change impacts and how climate change is adding to significant uncertainty facing the sector. The sector faces significant workforce challenges and there are equity issues within the sector that are beyond those related to responding to climate change.

These recommendations target a set a priority populations and are underpinned by four important considerations:

- Working waterfronts in Maine are both publicly owned and privately owned. Privately owned working waterfronts face different challenges and have access to different (fewer) resources than publicly owned infrastructure. Publicly owned infrastructure plays an important role in back stopping access to coastal resources.
- Paths and other ways of accessing the intertidal zone are important part of Maine's working waterfront infrastructure. They support critical access to mudflats for clambers, wormers, and others who make their living off of the intertidal zone. The access points for these industries should not be left out of the working waterfront conversation.
- Working waterfronts can be broadly defined or more narrowly defined to be focused on the infrastructure that supports fisheries and aquaculture. This distinction and when to be broad versus when to be more narrowly focused on fisheries and aquaculture was a topic of significant conversation. As noted below, there are good reasons to focus on fisheries and aquaculture related working waterfronts, they are supporting businesses on the frontlines of climate change. And, boatyards, marinas, and other forms of infrastructure can also play a critical role in supporting communities.
- Beyond the physical coastal access and working waterfront infrastructure, there is significant intangible cultural heritage and a deep connection between these places and the well-being and mental health of individuals who rely on these places. There can be a strong sense of loss if the ability to use these places changes significantly or disappears.

To a large extent these recommendations are focused on increasing capacity for businesses, communities, and the working waterfront sector to undertake the work outlined here and funding for specific activities like resilience improvements, protecting access, or supporting the development of specific tools, resources, information products.

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STRATEGY F – BUILD HEALTHY AND RESILIENT COMMUNITIES	
<p>STRATEGY F Recommendation 1 – Empower Local and Regional Community Resilience Efforts</p>	<ul style="list-style-type: none"> • Support and incentivize municipalities ability to use comprehensive planning and zoning/other land use related strategies to support or protect working waterfronts and related commercial fisheries and aquaculture uses. • Increase technical assistance and funding to municipalities in order to support local and regional climate resilience initiatives, specifically including working waterfront, aquaculture, and fisheries as set asides for these projects in broader programs. • Provide governmental leadership that catalyzes additional work and leadership from nonprofits, businesses, and others who can support community resilience related work. • Increase public literacy around the role of working waterfronts, as well as climate change impacts to the Gulf of Maine, and the connection to fisheries and aquaculture businesses.
STRATEGY G – INVEST IN CLIMATE-READY INFRASTRUCTURE	
<p>STRATEGY G Recommendation 3 - Rapidly Increase Resilience of Public and Private Working Waterfront Infrastructure to climate change.</p>	<ul style="list-style-type: none"> • Fund resilience upgrades with protection for working waterfront access protection. • Make information about resilience upgrades to public and private working waterfront infrastructure widely accessible and understandable. • Identify and address local, state, and federal permitting barriers to building more resilient working waterfront infrastructure. • Prioritize clean energy projects on the working waterfront as a way to improve the resilience of critical place-based infrastructure. • Identify and fill workforce and contractor capacity needs/gaps for resilience related work, particularly in the marine construction, physical coastal resilience work, and also the engineering, planning, permitting components of these projects.
<p>STRATEGY G Recommendation 4 -Preserve and Expand Waterfront Access, including intertidal access</p>	<ul style="list-style-type: none"> • Develop a statewide working waterfront strategy by the end of 2025, that includes a goal of preserving 30% of the State’s working waterfronts by 2030. • Increase the amount of data and information about of working waterfronts at local, regional, and statewide scale. • Increase funding for the purchase of working waterfront properties, covenants, easements, and related forms of permanent protection or for securing long term protections like leasing. • Increase the technical assistance and related support for privately owned working waterfront businesses and properties.

	<ul style="list-style-type: none">• Increase the capacity of public infrastructure to support working waterfront activities in order to help mitigate the risk/impact of the loss of private infrastructure at the community scale.• Identify and minimize the impact of other adaptation and mitigation measures on access to marine resources - both at the working waterfront and also in the water/licensing/ability to fish.
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2. ANALYSIS AND SUPPORTING INFORMATION

Key Questions

1. **Impacts** - Describe the recommendation and its actions and how they address Maine’s four climate goals – *reducing greenhouse gas emissions, increasing resilience, creating economic opportunity, and achieving equity through Maine’s climate response.*

F1 - Empower Local and Regional Community Resilience Efforts

- Support and incentivize municipalities ability to use comprehensive planning and zoning/other land use related strategies to support or protect working waterfronts and related commercial fisheries and aquaculture uses.
- Increase technical assistance and funding to municipalities in order to support local and regional climate resilience initiatives, specifically including working waterfront, aquaculture, and fisheries as set asides for these projects in broader programs.
- Provide governmental leadership that catalyzes additional work and leadership from nonprofits, businesses, and others who can support community resilience related work.
- Increase public literacy around the role of working waterfronts, as well as climate change impacts to the Gulf of Maine, and the connection to fisheries and aquaculture businesses.

F1 recognizes that much of the actual work of building resilience happens at the local level and many of the communities along our coast face significant capacity constraints to tackle the major challenges that they are facing. Additionally, communities are navigating multiple intersecting challenges at the same time and while these intersections are apparent to the community officials dealing with these issues, the connections are not always apparent to those who are supporting or funding specific aspects of the projects.

This recommendation is also partially aimed at helping communities navigate the tough choices that they will have to make as the ecosystem changes due to climate change and the management system adjusts accordingly.

F1 recognizes that even with strong support for comprehensive planning, zoning, and support for municipalities undertaking resilience projects, **there is a need for specific target support for working waterfront related work due to the complexity of the environment, regulatory**

overlays, and economic considerations. This is highly technical expertise that not every town needs to have and is well suited to be held regionally at RPOs or at the statewide level.

Additionally, there may be changes needed to the Growth Management Act that increase the rigor and minimum requirements for the marine resources section.

The actions in F1 helps decrease the vulnerability to and increase the ability for communities to recover from climate hazards. The two climate hazards impacting the working waterfront are sea level rise/storm surge and the rapidly changing Gulf of Maine Ecosystem which has significant impacts on the businesses that rely on harvesting organisms from that ecosystem. These businesses are being directly impacted by climate change and the communities that have a high dependency on these businesses are on the front lines of climate change. This strategy helps secure the base of operations for some of Maine's most climate vulnerable economies and helps support the resilience of natural heritage industries.

F1 actions are primarily focused on community capacity building, support for communities through technical assistance and funding, and educational opportunities. Increasing public literacy about climate change is important and the action recommended here is specifically focused on connecting working waterfronts to Maine's climate and economy.

F1 actions related to comprehensive planning and land use reforms are inclusive of both shoreside restrictions and landside permissions. Development of new, non-resilient uses and infrastructures should be actively discouraged within flood vulnerable areas, while marine uses and other resilient uses should be allowed and encouraged. Voluntary landward migration of non-water dependent uses can be encouraged through sensitive zoning allowances for marine industrial uses on appropriate less vulnerable sites and resilience upgrades to transportation infrastructure allowing access to marine resources.

G 3 - Rapidly Increase Resilience of Public and Private Working Waterfront Infrastructure to climate change.

- Fund resilience upgrades with protection for working waterfront access protection.
- Make information about resilience upgrades to public and private working waterfront infrastructure widely accessible and understandable.
- Identify and address local, state, and federal permitting barriers to building more resilient working waterfront infrastructure.
- Prioritize clean energy projects on the working waterfront as a way to improve the resilience of critical place-based infrastructure.
- Identify and fill workforce and contractor capacity needs/gaps for resilience related work, particularly in the marine construction, physical coastal resilience work, and also the engineering, planning, permitting components of these projects.

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G3 is recommended to reduce risk sea level rise and storm surge pose to publicly and privately owned working waterfront infrastructure. The January 2024 storms highlighted the significant risk storm surges pose to coastal communities and in particular to the infrastructure that underlies much of our coastal economy. G3 reduces the risk of disruption in these key places to the fisheries and aquaculture sector.

This recommendation and the associated work to develop this recommendation was happening contemporaneously with the development of the State's Infrastructure Adaptation Fund as a tool to support privately owned working waterfronts rebuilding with resilience. The lessons learned from implementing that program should inform the next steps for this work. It is important to note that this recommendation is broader than just working waterfronts that were impacted by the January storms and includes building resilience at working waterfronts to avoid being impacted as severely by future storms.

When used here, resilience upgrades, should be broadly construed to be about the actions that build or enhance resilience and not limited to hardening or elevating infrastructure.

The 2014 marine bond and the 1978 fish pier bond are both good examples of significant public investment in infrastructure that supports fishing communities and built different kinds of resilience. Efforts of a similar or greater magnitude are needed here.

G3 protects and strengthens the cornerstone of one of Maine's most climate vulnerable industry sectors, the fisheries and aquaculture sector.

G3 also helps to reduce the risk that climate hazards displace small coastal businesses by helping the businesses that have to be proximate to the water become more resilient.

G3 is aimed at preventing rapid or abrupt job loss through damage to key pieces of infrastructure that disrupt or inhibit economic activity. For context and a sense of scale, in the aftermath of the January storms, Island Institute has identified over 50 working businesses that support 550 jobs on land and over 1100 commercial vessels, almost all are fisheries and aquaculture businesses that have at least 1 job associated with them and often 2 or 3 or more.

G3 will require additional workers in the marine construction field, this may be an opportunity for job creation. Note, working waterfront businesses are currently struggling to find employees to fill existing jobs, in particular, housing costs and availability are a significant barrier.

There are limited natural environmental co-benefits associated with this recommendation, but an important co-benefits related to maintaining the health of the near-shore environment as a place for food production. The recommendations in G3 will provide some limited, tangential, environmental benefits through supporting resilience upgrades that help avoid plastics, oil, and other forms of marine debris from entering the water after a storm. Additionally, some working waterfronts like paths to shore, may be subject to erosion and resilience or stabilization efforts may help the local ecosystem.

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Note, working waterfronts are often built to coexist with water. Some working waterfronts are designed to be overtopped, others can be overtopped with minimal damage. This is notable and different from other kinds of infrastructure in the built environment like houses.

The working waterfront strategies all are intended to have positive impacts on a set of priority populations, though the full extent of those impacts and negative unintended consequences may exist. G3 is directly targeted towards a set of priority populations and will positively impact them. These populations include the coastal subset of the following geographic or community areas: Rural communities; Small towns with limited municipal capacity; Climate-frontline communities (“first and worst impacted by climate change”). The G3 recommendation also positively impacts specific natural resource industries - fishing and aquaculture, by helping to make their base of operations more resilient.

Data to help demonstrate that the coastal communities that depend on Maine’s fisheries are frontline communities include:

- Distribution of various fishing licenses, value of fisheries landed by port, both show a significant reliance on working waterfront infrastructure in small coastal communities that have limited capacity.
- STS reports about the warming Gulf of Maine and the changes to the ecosystem
- Scientific literature connecting warming waters to changing the timing of key biological functions, distribution of species, and such.
- Associated regulatory changes that impact Maine’s fisheries, whether through the management of a target fish stock, bycatch, or a protected species.

One recommended action, *Make information about resilience upgrades to public and private working waterfront infrastructure widely accessible and understandable* helps build community capacity to address working waterfront resilience and supports community action, particularly as it relates to public infrastructure. This recommendation also helps address the acute challenges private working waterfront businesses are facing and the limited opportunity for public investment in those working waterfronts.

Another recommended action, *Prioritize clean energy projects on the working waterfront as a way to improve the resilience of critical place-based infrastructure*, should be viewed as equity consideration FOR clean energy related recommendations about reaching a set of priority populations identified in the legislation that created the climate council. Specific concerns about grid capacity in coastal and peninsula communities that make it harder for working waterfronts to implement clean energy projects.

G4 - Preserve and Expand Waterfront Access, including intertidal access

- Develop a statewide working waterfront strategy by the end of 2025, that includes a goal of preserving 30% of the State’s working waterfronts by 2030.
- Increase the amount of data and information about working waterfronts at local, regional, and statewide scale.

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- Increase funding for the purchase of working waterfront properties, covenants, easements, and related forms of permanent protection or for securing long term protections like leasing.
- Increase the technical assistance and related support for privately owned working waterfront businesses and properties.
- Increase the capacity of public infrastructure to support working waterfront activities in order to help mitigate the risk/impact of the loss of private infrastructure at the community scale.
- Identify and minimize the impact of other adaptation and mitigation measures on access to marine resources - both at the working waterfront and also in the water/licensing/ability to fish.

G4 reduces the risks a warming Gulf of Maine and associated ecosystem changes poses to individual license holders, communities that depend on these resources, and the fisheries/aquaculture sector of the economy. Preserving and expanding working waterfront access helps ensure the businesses that rely on a shifting GoM can pivot or change or diversify in response to ecosystem changes. Negative economic shifts in this sector are likely to stress the working waterfront operations that these businesses rely on and the lead time or time to profitability for any adaptation may not align with the timing/business needs of working waterfronts, resulting in a rapid loss of infrastructure as the industry shifts, making it significantly harder for these businesses to continue adapting.

Note, working waterfronts provide a critical access point to fisheries, which in turn is a low carbon seafood. One example is that for shellfish like clams when the intertidal zone is accessed by footpath there are likely lower carbon emissions than when accessed via boat. G4 is a critical part of maintaining an ocean based food system and the associated environmental benefits that come from that.

G4 is directly targeted at a set of priority populations.

- G4 protects and strengthens critical infrastructure and businesses that are the cornerstone to one of Maine's most climate vulnerable economies, the fisheries and aquaculture sector.
- G4 supports the fisheries and aquaculture sector, reducing the risk of disruption in this sector that is facing pressures due to a rapidly changing Gulf of Maine ecosystem. G4 also helps to reduce the risk that climate hazards displace small coastal businesses by helping the businesses that depend on fisheries and aquaculture operations to build their resilience to changes in the fisheries and aquaculture sector due to warming waters in the Gulf of Maine.
- Seafood processing is dependent on harvesting raw and live product and such activities depend on reliable and robust marine access. **Seafood production in southern Maine is a significant employer of migrant and minority populations providing stable incomes and upward mobility.** Additionally, programs like Luke Lobster's Lift All Boats is a good example of a workforce development program that is opening up new economic opportunities for those who may not be able to easily access this sector. Note, based on

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work done by the City of Portland, 50% of the employment in the regional seafood processing sector is from the BIPOC/immigrant community. This sector is wholly reliant on working waterfronts as the connection between fisheries and aquaculture businesses on the water and the food system/processing sector on shore.

G4 is aimed at preventing long-term job loss in this sector by helping to provide a secure base of operations for fisheries and aquaculture businesses to adapt their business model to a rapidly changing Gulf of Maine. G4 might also result in some job creation activity as a result of the innovation these businesses are doing.

G4 will require additional workers in the marine construction field, this may be an opportunity for job creation. There may be additional workforce development opportunities in the marine construction sector but the group did not have the expertise to do more than identify the need. However, G4 is not necessarily designed as a strategy to attract workers to Maine.

Broadly speaking, G4 supports the long time cultural norm that diversified marine businesses are more sustainable and resilient. The preservation of traditional points of access to infrastructure and intertidal resources is important both economically and culturally in coastal communities.

Note, working waterfront businesses are currently struggling to find employees to fill existing jobs, in particular, housing costs and availability are a significant barrier.

2. **Cross-over** - Does the recommendation involve other working groups/sectors? *Select all which apply.*

- Transportation
- Buildings, Infrastructure, and Housing
- Energy
- Community Resilience
- Coastal and Marine
- Natural and Working Lands
- Other (please describe)

How did the Working Group coordinate with others around these overlaps?

- F1 zoning includes aspects of retreat and these are related to community resilience work group conversations. CMWG members participated in the cross work discussion about land use and housing and also had informal discussions with some members of the community resilience work group.
- G3 - the Energy or BHI groups both likely have components of recommendations related to supporting the deployment of clean energy projects and upgrading grid

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infrastructure. The Working Waterfront group is raising the need for clean energy projects on the working waterfront to support long term business resilience through stabilizing or making costs more predictable which is an important adaptation strategy for these businesses on the frontlines of climate change as an equity consideration for the groups looking at mitigation related recommendations.

- G3 - Transportation Working Group held a marine electrification conversation and one of the actions in G3 pulls in info and recommendations from that conversation.

3. Priority Populations - Consider the priority populations impacted or affected by this recommendation.

- a. POPULATIONS: Identify any priority populations impacted or affected by this recommended strategy.*

The working waterfront strategies all are intended to have positive impacts on a set of priority populations, though the full extent of those impacts and negative unintended consequences may exist. Taken together, F1, G3 and G4 are directly targeted towards a set of priority populations and will positively impact them. These populations include the coastal subset of the following geographic or community areas: Rural communities; Small towns with limited municipal capacity; Climate-frontline communities (“first and worst impacted by climate change”). These recommendation also are intended to positively impacts specific natural resource industries - fishing and aquaculture, by helping to make their base of operations more resilient. The working waterfront sector and the marine based activity it supports is predominantly made up of small businesses or self employed individuals.

- b. IMPACTS: Using the Equity Sub-Committee analysis from March 2023 as a starting place, consider both potential positive outcomes and any unintended consequences/byproducts. Describe these potential impacts/benefits.*

Materials to do this work were not available.

- c. SOURCES OF INFORMATION: Describe how you know what groups are impacted/affected. Cite relevant data sources and/or formal conversations (MCC-organized panels, focus groups, etc.) with priority populations.*
- d. RESULT OF ENGAGEMENT: Describe any consultation or engagement with these priority population (either by the Working Group or through GOPIF’s community engagement contractor). Describe how the Working Group’s recommendations have changed as a result of these conversations.*

Working group members consulted informally with various priority population stakeholders in their networks. Many working group members either represent a priority population or work very closely with the priority populations these recommendations are targeting.

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Working group members also wanted to acknowledge that there were some key stakeholders who were not engaged in the process. These include harvesters from a diversity of fisheries and aquaculture sectors, tribal governments and members who rely on coastal resources, and a range of diversity of perspectives from municipal governments beyond the City and town officials who are participating in the CMWG.

- e. *IMPLEMENTATION: How might the recommended strategy be implemented in consultation with priority populations? Do priority populations have the resources and capacity necessary to implement or access this recommended strategy? How might you make recommendations to improve equitable access to resources and capacity-building? You might consider planning capacity, financial capacity, programmatic capacity, human capital, and other.*

Through all of the discussions, there was a strong recognition that working closely with local communities on working waterfront issues is absolutely critical. Working waterfront infrastructure is place based infrastructure that is heavily connected to the local context. Working with and through communities rather than a top-down approach is preferred and likely to be more successful.

Capacity for small communities to engage productively in these conversations is challenging and many communities lack the capacity to implement the measures being proposed.

The small businesses in this sector also lack the capacity to both plan and implement the proposed actions and will need various forms of capacity support in order to fully realize the benefits of these strategies.

The income for working waterfront businesses has a strong seasonal component and income fluctuates according to the season. There are also community scale impacts from this fluctuation, particularly in the communities that depend on fisheries resources. These communities tend to be more geographically isolated and more rural communities. Earnings and resources in the spring are in short supply.

4. **Timeframe** - What is the timeframe for this recommendation and its actions?

	Short-term (2025)	Mid-term (2030)	Long-term (2050+)
To implement	F1, G3, G4		
To realize outcomes	G3, G4	F1, G3, G4	

5. **Implementation Next Steps** - What types of next steps would be required to implement the recommendation?

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- Legislation, rules/regulation, internal program guidance changes
- × Establishment of a new program or a fund,
- × Conduct additional research
- × Provide education or training
- × Coordinate with other parties/agencies/states
- Other (please describe)

Across the recommendations F1, G3, G4 there are 3 key themes for implementation. Additional details about implementation are contained in question 7.

- Funding - there are two different types funding called for in these recommendations.
 - Funding for investments in specific working waterfronts - this includes both large and small resilience related actions as well as long term protection of access. Some of this funding needs to go to publicly owned infrastructure and some needs to go to privately owned infrastructure. This funding is needed on scale (\$100m+) and in the past, has been bond funded, funded through budget surpluses, or possibly funded with Federal funding flowing through the State.
 - Funding to support the implementation of specific activities that support the sector and aren't directly tied to one piece of working waterfront infrastructure. Funding for communities to implement the Working Waterfront Inventory Tool, developing and sharing information about resilience improvements, building a statewide working waterfront strategy, crafting model ordinances, and related investments in projects that support the working waterfront sector. This funding is needed at a smaller scale (\$1-10m) and in the past this kind of work has been funded through the Maine Coastal Program and other state programs.
- Capacity - Capacity to implement work is needed at multiple different levels of government and in the broader working waterfront sector. This capacity likely requires funding as well.
 - Capacity in state agencies - Supporting this work will require State agencies to have the capacity to help provide leadership in the sector, manage specific projects that support the sector, and deploy funding at scale.
 - Capacity outside of state agencies - a common theme through the workgroup's work was the need for additional capacity outside of state agencies. Working waterfronts are place based infrastructure that exist in a complicated, specific coastal context. Effective approaches are more custom, individually tailored, or "bespoke" rather than one size fits all. Across the recommendations, capacity needs were identified at the municipal and regional planning level and the nonprofit sector. Additionally, working waterfront businesses will need some form of support to develop specific projects - whether resilience or access protection focused.

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- State agencies can lead the way - much of the work contained in these recommendations can happen or at least be started by State agencies. There are not significant legislative or regulatory hurdles that need to be addressed in order for this work to start. Funding and staffing will be needed and that will require legislative actions.

Key actors who should lead or help lead implementation of these recommendations:

- Maine DMR generally has been very involved and the Maine Coastal Program helped staff and develop these recommendations.
- Maine Sea Grant, the working waterfront coalition, as well as existing working waterfront stakeholders such as industry members, trade associations, non profits, municipal, regional planning, institutions of higher education and others.
- implementation requires community engagement and work to make sure this is happening in an equitable way. At the statewide level, we don't know the specific equity considerations in specific places other than that there are likely to be local considerations. Local knowledge is a critical ingredient in this work. Some of the equity issues are hard to see; generational changes and expanded access to live in these communities.

6. **Measuring Outcomes** - How will you know the recommendation and actions are effective? *Are outcomes measurable using current monitoring/data collection? Are there benchmarks or short-term indicators of success?*

- Triple the amount of existing working waterfront preservation and conservation projects by 2030.
- Increase the resilience of XX of working waterfronts by 2028 (need is 100s, ability to implement may be fewer, these projects take capacity, lessons learned from the Spring 2024 infrastructure adaptation fund grants should inform this number)
- Existing municipal Working Waterfront Inventory Tool completed for coastal communities by 2030

7. **Other - Additional Rationale/Background Information**

The work group spent time to flesh out how some of these recommendations would be implemented, important considerations for those moving forward with any of this, and successful models to be looking at. It is the intention of the group that the following components are considered by State agencies in implementing work related to these recommendations.

F1 - Empower Local and Regional Community Resilience Efforts

State and other support will be needed to help communities navigate the tough choices about their future that they will have to make as the ecosystem changes due to climate change and

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the management system adjusts accordingly. Layering in changing demographics in coastal communities further complicates the work facing communities. Robust support for municipalities to engage in comprehensive planning, zoning, and other work is needed.

For the working waterfront group, it is particularly important for communities to have the capacity to support robust conversations about what belongs near the water and what might need to be discouraged from being near the water - and where those activities or uses might go.

Broadly speaking, continued strengthening of the State and other entities' support for these kinds of activities is needed. Implementation of general support should follow other existing or developing mechanisms for support comp planning and zoning.

Working waterfront specific support also needs to be provided. Local, regional, or non profit partners may be best suited to deliver this kind of support, particularly if they are appropriately resourced.

The work group favored providing technical assistance and funding to support this work and to reward or incentivize communities to undertake these processes rather than making them highly prescriptive. There were some comments about tightening up or making the marine section of the Growth Management Act more robust.

For communities that have done the work and understand their working waterfront resources, being able to easily access additional resources to make those resources more resilient is helpful. There is also a corresponding need for support for communities to do this work.

Specific notes about implementation:

- State opportunities that communities are using for planning, all seem to happen at the same time. This creates an issue for community capacity. Q1 of the calendar is particularly challenging because of all the opportunities and the need to get ready for town meetings. This challenge is exacerbated in low capacity communities.
- Importance of recognizing the connection between this climate resilience work and mental health stressors in communities. For many, the damage to communities and working waterfronts from the recent storms is an added stressor for populations already facing multiple significant stressors.
- Support efforts to encourage/incentivize broader participation in town planning processes. Night meetings or day meetings have certain implications for who can attend and access. This is a procedural equity consideration that could be part of the award criteria for receiving state support.
- An equity consideration is that many coastal communities have changing demographics and ownership patterns. In places along the coast, those involved in working waterfront businesses are no longer living in the towns where the working waterfront is located. In local decision making processes, it may be helpful to explicitly create space for working

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waterfront stakeholders to participate or inform the process. There are also important considerations related to access to coastal resources, for example, self employed clambers may lose access to clam flats if they move out of a particular community - the difference between resident and nonresident municipal licensing for shellfish harvests further complicates the impact of these demographic trends.

- In zoning conversations, working waterfronts are places that regularly deal with water and in some cases are designed to get wet or can get wet with minimal impacts to human health or safety. This is an important fact to recognize in land use related conversations.

Additional details relevant to implementing the activities in F1 include:

- Increase municipal capacity to navigate tricky shoreland zoning and other land use issues as it pertains to working waterfront uses and locations.
- Develop updated model working waterfront ordinance that reflects today's needs.
- Increase municipal capacity to address local land use issues that adversely impact working waterfronts.
- Educate and train those involved in supporting municipal land use planning about the needs of the working waterfront sector.
- Develop additional standard materials, including templates that can help guide this process. What we have is strong but the forward looking components aren't as strong.
- Develop model marine resources section for comp planning that is more robust
- G4 includes activities related to working waterfront inventories and assessments, there is a strong connection between that action and municipal planning.
- Add working waterfront inventories to eligible activities for the CRP process (if they aren't already there) .

Additionally the group noted that there is a predominantly capacity challenge. Additional tools and even in some cases funding, without the capacity to support and manage implementation is challenging for communities and businesses. Investing in capacity to support this work, help implement tools, and help communities undertake new efforts is critical to the success of this work. New tools for municipalities to learn and deal with are not needed. Capacity to help these communities understand, access, and engage with existing resources is very helpful. Individually, each tool may not take a ton of work but in the aggregate with everything else, it can be overwhelming.

For getting out of harm's way related conversations the group discussed:

- Establish land use regulation and zoning to allow and prioritize working waterfront uses on and off shoreland properties.
- Promote land use regulatory reform that allows voluntary migration of non-water dependent marine support industries (storage, processing, manufacturing) to less flood vulnerable inland locations. This is a linkage to the Community Resilience's work group's

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☒conversations about getting out of harm's way. Additional land along the shore may allow working waterfront properties to shift where they are located and into less vulnerable spots. Additionally, this may help protect some parts of the seafood supply chain from disruption. This is primarily a zoning and land use strategy.

G3 - Rapidly Increase Resilience of Public and Private Working Waterfront Infrastructure to climate change

This is a rapidly evolving part of the working waterfront space and this recommendation came forward as the state is developing and funding the infrastructure adaptation fund. The inclusion of privately owned working waterfronts as eligible entities for this fund is a strong recognition of the important role privately owned working waterfronts play in coastal communities and in supporting many other businesses.

The information, resources, and lessons learned from implementing this fund should help inform the implementation of these recommendations.

- Make widely accessible and understandable information about resilience upgrades to public and private working waterfront infrastructure.

That said, Maine Coastal Program can help identify and provide information about resilience upgrades that can help working waterfronts

- Develop information and materials that identify and promote resilience upgrades private working waterfronts can undertake.
- Develop tools that help guide public working waterfront infrastructure resilience related upgrades.
- Develop site specific recommendations for high priority pieces of infrastructure in consultation with local stakeholders.

This information is intended to help both publicly owned working waterfronts and also privately owned ones. For privately owned working waterfronts, having information available about options to build resilience is a key part of starting the process of making these upgrades and at least of the upgrades may be able to be made using private resources alone.

- Fund resilience upgrades with protection for working waterfront access protection.

The State should provide dedicated funding in the Infrastructure Adaptation Fund that is targeted to working waterfronts and includes program design elements to meet the needs of working waterfronts, both public and significant or regionally important private infrastructure. The \$50 million for this fund with some carve out for working waterfront infrastructure that supports communities is in line with this thinking. As these funds are deployed in the spring and summer of 2024, DMR, DOT, and GOPIF should emphasize learning from this process about what is needed, where additional capacity supports might be helpful, and the magnitude of demand for this sort of funding.

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It is likely that additional funds will be needed to build resilience at both working waterfronts that were damaged by the storms and also working waterfronts that were not damaged by the recent storms but are vulnerable to storm surge and sea level rise. Many discrete working waterfronts that support family businesses were damaged in recent storms. These pieces of infrastructure play an important role in the State's working waterfront ecosystem and likely will require different funding or approaches to support them.

Funding is needed at a scale sufficient to tackle this challenge. Funding should allow for larger projects like elevating whole piers and also smaller upgrades like moving electrical, equipment, or otherwise making small but helpful resilient improvements. \$100m over 4 years was considered as a helpful order of magnitude guide to this challenge, however actual need is not well understood within the sector. One proposed way to look at the funding need is the cost of inaction and the potential savings. The January storms provide an opportunity to look at damage assessments, similarly situated wharves that received less damage and attempt to determine if resilience upgrades helped avoid damage.

There is also a need to make significant investments in publicly owned working waterfront infrastructure. Funding for resilience upgrades at public fish piers and other pieces of publicly owned working waterfront - lifts, hoists, electrical as well as elevating piers and infrastructure. The initial fish pier bond from the late 1970's and the 2014 marine bond are both good examples. There likely needs to be multiple kinds of investments in public infrastructure including significant upgrades to existing infrastructure and smaller resilience upgrades to existing infrastructure. There may also be a need to develop new public working waterfront infrastructure that is resilient and can support commercial fisheries. Assessing the need for new infrastructure would be a good component of the State's working waterfront strategy.

Some program design notes

- Sustained funding for 4 years and ideally longer would allow working waterfront owners the time to develop and apply for funds. Consistent predictable funding helps make planning these projects easier and feasible, particularly for the larger projects or projects that include elevating infrastructure. Effectively planning this sort of project and lining up funding beyond a State grant takes a while. One time funding makes it harder for businesses to proactively be planning.
- Building a project pipeline will take time and capacity support within the working waterfront sector, whether at the State or at outside entities.
- Public funding for resilience upgrades should include some level of protection that ensures the properties will remain working waterfronts for a period of time. Generally, the conversation was supportive of including tying eligibility to maintaining the use of the property as working waterfront infrastructure and recognizing that it should not be so restrictive that it inhibits business development or diversification. The existing definitions in LMF about primarily/predominantly as eligibility is a good starting point for being broad and flexible. The group talked about two options, a 10 or 20 year tail on

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the funding that requires the facility to maintain access for fisheries and aquaculture uses and also not being so rigid as to prevent associated or collaborative businesses that did not impede the use of the facilities for commercial fisheries and aquaculture from being developed.

- Support high leverage opportunities where a smaller amount of State funds can be paired with larger amounts of federal funds allowing greater resilience upgrades. With the right capacity and planning support, there may be opportunities to build a robust project pipeline.
- Include a priority for upgrades to WWAP properties where the state has an interest in making sure the property remains a working waterfront

Additional note that workforce housing remains a challenge for this sector and there may need to be flexibility for working waterfront properties to provide housing for the people who are working on that waterfront.

Additional note, scope whether a working waterfront resilience investment tax credit would help incentivize private working waterfronts to make resilience related investments or upgrades. Key questions to guide conversations include: is a state tax credit valuable enough to be a helpful incentive? (8% is better than a sharp stick in the eye). Is the credit non-refundable, allowed to be carried forward? Probably needs to cover both resilience upgrades and associated deferred maintenance as long as the result meets some resilience standard or threshold (which also improves resilience)

- Address state and federal permitting barriers to building more resilient working waterfront infrastructure.

Some additional details, this work should likely be done by State agencies in collaboration with the working waterfront sector:

- Review regulations that working waterfronts must comply with when rebuilding for resiliency
 - Identify regulatory provisions at the State and Federal level that make it harder for working waterfronts to rebuild with resilience
 - Advocate for a regulatory approach that prioritizes the hardening of working waterfront infrastructure in places that are already significantly impacted.
 - Identify regulatory barriers or opportunities in order to make it easier for those activities and uses that would like to move out of harms way to do so.
 - Identify places where flood insurance regulations complicate building resilience or working waterfront protection efforts.
- Prioritize clean energy projects on the working waterfront as a way to improve the resilience of critical place-based infrastructure.

Maine's working waterfronts exist in a highly variable environment. From changing environmental conditions in the Gulf of Maine to market shifts, working waterfronts rely on

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fishing and aquaculture businesses that inherently have a high degree of variability in revenue and a low degree of predictability. An important resilience strategy is reducing, controlling, making costs more predictable. Doing so helps the working waterfront business become more resilient and better able to with stand other shifts and variability.

Prioritizing clean energy projects on the working waterfront is an adaptation strategy that serves the needs of multiple different priority populations. Reaching this sector with clean energy projects takes additional effort and capacity - particularly technical assistance for the development, design, and implementation of the project. Reaching these places also requires a workforce that is available in rural Maine and willing to travel to the ends of peninsulas or out to islands to conduct this work. Additionally, the working waterfront sector has experienced instances where working waterfront businesses were stymied from implementing clean energy projects like adding solar because of where they were located on the edge of the grid. From an equity perspective, it is important for these priority populations to be able to join in the clean energy economy.

Specific kinds of support that would be helpful:

- Baseline assessment, energy audits, GHG audits
- Capacity support for developing projects that can be funded by programs like USDA REAP, the DERA program, EMT programs and other opportunities.
- Capacity and financial support for clean energy innovation in this sector - from electric outboards to phase change materials in coolers and refrigerators, there are businesses innovating in the space.
- Review existing programs for barriers, hurdles, as well as capacity to reach and funding sufficiency projects in this sector

Additional notes

- Maine has fishing and other vessels with old, high CO2 emitting engines. Depending on the age of the engines and other factors, they may not qualify for the DERA funded clean diesel program but replacing them through a program that targets CO2 reductions instead of NOx could see significant benefits in CO2 reductions.
- Transportation electrification, particularly for heavy duty vehicles may be of interest to stakeholders in this sector and there be specific use cases and challenges that are helpful to incorporate into broader heavy duty vehicle conversations.

While important, this topic did not receive as much discussion time in the work group as other areas of this strategy. Additional conversations may help solicit other key considerations.

G4 - Preserve and Expand Waterfront Access:

Maine's fisheries and aquaculture businesses are on the front lines of being impacted by climate change. Preserving and expanding working waterfront access helps ensure the businesses that rely on a shifting GoM can pivot or change or diversify in response to ecosystem changes. Implementation for this recommendation rests primarily with DMR and outside

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stakeholders. This recommendation is meant to reduce the risk of climate impacts on fisheries and aquaculture businesses by securing a base of operations for these businesses that can support their ability to adapt, otherwise changes in the environmental conditions that result in regulatory changes or changes in landings. The abrupt loss of a working waterfront business can be significant to local issue with economic impacts that ripple through the community. Measures that make it less likely for a working waterfront business to shutter its doors or be converted to other incompatible uses help secure and stabilize fisheries and aquaculture businesses as they adapt to a changing ecosystem and the associated regulatory changes.

This action is specifically calling out the connection between working waterfront infrastructure and the health of Maine's fisheries and fishing businesses that are on the front lines of climate change. Fishing businesses may be impacted by warming waters and shifting species. Working waterfront businesses are impacted by changes to fishing businesses.

Working waterfronts provide important physical access to Maine's coast resources. The need for access speaks to the need for fishing and waterfront businesses to be able to diversify based on economics and impacts (climate change, gentrification) rather than being resilient to storms, etc. So, it's funding and support for infrastructure - and also funding and support for businesses. Capacity and support to reduce user conflicts at public access points can also help secure access.

Access itself is beyond just physical access. Access includes access to permits, markets, opportunities, in addition to access to the water. For shellfish, access includes access to open/approved shellfish growing areas. Good water quality and water quality monitoring is critical to preserving or expanding this form of access and this is an area DEP is working on. Shoreside access points may be needed or may be at risk of conversion depending on how local water quality and the resulting ability of harvesters to harvest shellfish changes.

Note, monitoring shellfish flats, including more rain gauges, an opportunity to increase the economic benefit these areas provide for shellfish harvesters. The communities along the Kennebec river and in Washington County were specifically mentioned here. Similarly for monitoring and testing related to HAB events, locating and effectively addressing OBDs, are all ways to improve access for shellfish harvesters and have corresponding implications for needs for working waterfront access.

This recommendation recognizes that working waterfronts are broader than those associated with fisheries and aquaculture and that there also needs to be programs tailored to fisheries and aquaculture working waterfront businesses.

The focus of this recommendation is on providing secure, functional access to the ocean across working waterfront businesses. Importantly, this includes the retention/expansion of discrete points of shore access. Access to clam flats and intertidal land across private property was repeatedly mentioned and should not be left out of working waterfront conversations.

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The group noted that expanding access will be a challenge, holding on to working waterfront property will be hard enough. Efforts focused on expansion will take dedicated resources and attention.

Because working waterfronts often support businesses from beyond the community, these conversations are both local and also regional in nature. Capacity support for regional planning and economic development organizations is helpful.

The group did feel it was important to clearly articulate the baseline for working waterfront improvements and protections should be pre-January 2024 storms so as to capture those that aren't rebuilding.

Note the importance of working access to achieve other Climate Action Goals, such as resilient food systems. This working waterfront strategy has a connection to various food system strategies in Maine. In particular, high quality protein in the oceans is an important component in our State's overall food system and this connection relies on working waterfront infrastructure.

- Develop a statewide working waterfront strategy by the end of 2025.

The State lacks a working waterfront strategy and particularly one that proactively looks at the threats facing working waterfronts and the potential opportunities for interventions. The plan needs to start wide and focus on the places with significant risk to climate change whether SLR or changing marine environment or climate related demographic trends, like seafood infrastructure. Different kinds of working waterfront infrastructure face different pressures.

Notes for the development of this strategy:

- Local involvement is critical.
- Incorporates a forward looking perspective in recognition that the future looks different in this sector than today and planning means looking beyond the status quo.
- Identify what kinds of working waterfronts are most at risk and those kinds of working waterfronts where significant investment is flowing. The group noted that seafood related infrastructure feels particularly at risk.
- There should be strategy alignment or connection to the Blue Economy Task Force recommendations. There may be funding opportunities if the State has a plan and it framed for funding from the federal government.

Notes on important substantive components of the strategy:

- Working waterfront protections need to be flexible enough to adapt and support working waterfronts in the face of a changing environment and allow for innovation to occur, particularly innovation that supports the continuation of fisheries and aquaculture uses at a particular working waterfront.
- Consider who is undertaking the protections and who is enforcing the protections for privately owned working waterfronts.

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- Inventories at the municipal level should feed back into the statewide planning process in a connected and informed manner.
 - The connections between places and working waterfronts are also important, in particular, the example of bait being landed in community and trucked or carried to another highlights the regionally important role that some working waterfronts play.
 - Commercial marinas, particularly those that are hauling out fishing boats play a critical role, and have been impacted. Billings Marina in Stonington is an example of working waterfront infrastructure that is critical to the fisheries economy but might not fully fall within traditional notions of infrastructure that supports the fisheries and aquaculture industry.
 - Long term, consistent funding strategies that allow for the development of a pipeline of infrastructure projects and sufficient funding to make a meaningful difference in addressing this challenge.
 - Capacity support needed to effectively deploy this funding.
 - There needs to be a multi source funding strategy, direct grants, loan, on going support, packaging smaller projects, planning support, on going support.
 - The strategy should also consider looking at other funds, opportunities to package projects together, and high leverage opportunities. Hardening fuel tanks was cited as a specific example of a possible opportunity to package small but important resilience projects into a larger fundable package.
 - The connection between working waterfront related support, access, and food systems.
 - The different types of funding that are needed, including grant funds, low interest loans, and the impact of associated strings that may come with some types of funding on the ability for working waterfront businesses to effectively use that funding source. For example, loans that require flood insurance are particularly tricky given the cost of flood insurance and the challenges with successfully filing a claim.
 - Flood insurance challenges themselves and potential solutions such as cooperative models or alternative financing that don't include to highly expensive or unavailable flood insurance are an important component for this strategy as well.
- Increase the amount of data and information about of working waterfronts at local, regional, and statewide scale.

This recommendation is focused on building the information and data sets about working waterfronts that help form the basis for good policy and planning decisions. The recommendation is to do this work at different levels, though ideally, statewide work would include strong local engagement and even the rolling up of local or regional inventories to a statewide one.

An early step could be for the State to convene a conversation about the various existing inventory efforts and help those involved identify synergies or opportunities for collaboration.

Specific implementation activities include

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- Improve existing knowledge base of working waterfronts at the local, particularly through empowering municipalities to conduct inventories that can be populated into a larger state-wide inventory. Local identification of and categorizing of working waterfront resources that critical can help guide efforts to protect, preserve, or otherwise ensure those working waterfronts remain supportive of the community. There may be lessons learned from the historical preservation community about how to undertake this process. The municipal inventory tool that has already been developed and used by some communities, particularly those in Casco Bay, is an example of an existing tool that accomplishes this goal. Communities are more likely to complete this work if they have the capacity to do and having state or regional navigators who are trained in the use of the inventory tool can help provide this capacity. Providing funding to municipalities to undertake this work is another possible way to add capacity, this could include making sure these inventories are clearly allowable uses in various state capacity support programs. Connection to or incorporation in county level hazard mitigation plans should also be considered in the process of improving the existing knowledge base about working waterfronts.
- Conduct a statewide working waterfront inventory to develop a baseline, include information or assessments on the potential risks and vulnerabilities facing that particular working waterfront, ei elevation above water/BFE. The development of a statewide inventory should include information and lessons learned from local inventories, including effective community engagement strategies and to the extent possible, based on local inventories and work.
 - Assess the key attributes that make a particular working waterfront significant at a regional or statewide scale (ID characteristics of critical working waterfront infrastructure)
 - ID specific working waterfronts that have statewide or regional significance
 - Develop a statewide strategy to proactively ensure these critical facilities remain working waterfronts.
 - Ensure the inventory recognizes that while the themes are similar in communities the specifics around the problems and solutions are all going to vary depending on location and community.
 - Develop a GIS layer that has working waterfront and key attributes - RI example <https://www.rigis.org/datasets/ports-and-commercial-harbors/explore?location=41.580697%2C-71.410787%2C13.00> and https://www.crc.uri.edu/download/coast_ph_report.pdf
 - For a statewide inventory, MA Port Profile Project is one that can be adapted and revised to focus on the actual land as well as the infrastructure. That said, this would be a multi-year and very expensive project with data collection, survey development, and analysis/reporting. FMI: <https://www.mass.gov/lists/port-profile-project> MA Port Profile, looks like it was \$41k - we have a larger universe of ports and fishermen but thats probably the right order of magnititude. <https://www.bluecapecod.org/cape-cod-port-profiles-project/>

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- Increase funding for the purchase of working waterfront properties, covenants, and related forms of permanent protection.

Increase the ability for the State, municipalities, and other entities to directly acquire easements, fee ownership, or otherwise permanently protect parcels for working waterfront use. Particularly Increase the amount of working waterfronts that guarantee access for fisheries and aquaculture businesses. Funding levels should be commensurate with the need.

The State's primary mechanism for securing permanent protection for working waterfronts is the Land for Maine's Future program. Continued funding for LMF WWAPP is important, as is the capacity support to help specific businesses understand the program, the benefits/costs, and support them in undertaking this process. Regular funding in the program coupled with capacity support can help build the pipeline of eligible projects.

Note, in the agricultural community, leasing a common tool to help secure long term protections.

Beyond LMF, there is an opportunity for non-state capital to participate in this work. State funding can help build the capacity of the sector and strengthen the understanding of working waterfront issues for with local, regional, statewide land trusts and increase the support for those organizations to understand working waterfront operations.

The sector currently lacks a quick response mechanism that provides for people capacity and funding or financial capacity to buy 6 months to 1 year of additional time to respond to a rapidly moving potential sale of a critical (prime?) working waterfront. The goal of this mechanism would be to develop the longer term partnerships, funding, and operational basis to keep the parcel as working waterfront. Some implementation parameters discussed include:

- Dedicated bridge loan fund as a possible tool to help get ahead of a fast moving sale. This could be a revolving loan fund or other forms of gap financing.
- Needs 6 week turnaround time frame

Additional ideas included:

- There may be language or helpful parallels in the affordable housing world about notification provisions.
 - Develop various financial mechanism to promote the ongoing use/operations/and preserving access.
 - Other mechanism like impact fees for conversion or change of use
- Support the ongoing business operations of working waterfront infrastructure

One of the strongest protections for a working waterfront is its ability to be a viable business. Providing technical assistance to, and expanding financial support, for private working waterfronts that support fisheries and aquaculture businesses. This is different from supporting these businesses in dealing with other impacts of climate like sea level rise.

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This kind of support would help privately owned working waterfronts as they navigate the changes in the ecosystem and industries that support/use them as working waterfronts are key to the adaptation of other marine businesses.

One additional idea, was providing some sort of support the ongoing business operations of working waterfront infrastructure, including putting opportunity for using infrastructure together with the people who own the infrastructure. this sort of clearinghouse/opportunity to approach that can help manage/support/get in front of the sales process. Example DECD has a person who does campgrounds, kind of like that as a point to aggregate interests and resources and needs

THEME:

**SEEKING OPPORTUNITIES TO MONITOR, CONSERVE AND INCREASE RESILIENCE
OF COASTAL AND MARINE ECOSYSTEMS.**

1. SUMMARY OF RECOMMENDATIONS AND ACTIONS

For thousands of years, Maine’s coastal habitats have provided sustenance and meaning to Maine’s coastal communities. Healthy coastal habitats today continue to sustain Maine communities, provide opportunities for cultural expression, and mold the identity of the people of Maine. They provide for the physical, emotional and spiritual health of residents and visitors alike. Coastal habitats are also important economic assets for the state, undergirding fisheries and tourism industries that anchor the economic life of many Maine communities. We recognize that communities along Maine’s coast have been, and long will be, dependent on the health of coastal habitats and ecosystems. Resilience of the people of the Maine coast is inextricably linked to the health of coastal habitats that are already changing.

(1) Emphasize habitat restoration and resilience, not just protection

Discussion of habitat in *Maine Won’t Wait* focused on protection of natural and working lands. That framing fails to address the challenges of managing coastal resources in the era of climate change.

Many coastal habitats are already changing due to climate change and other stressors. A passive approach that aims only to “protect” coastal ecosystems will allow some coastal ecosystems to degrade in coming years and decades.

Our perspective must be more forward looking. Many coastal habitats are already changing due to rising seas and other impacts of a changing climate, including warmer waters, more intense storms, and ocean acidification. These changes will continue for generations. Managing Maine’s coastal ecosystems needs to protect not the current coast, but the capacity of our coast to continue to provide valuable ecosystem services for decades to come.

Maine should not only protect existing habitats, but also the functions those habitats provide. That means we need to ameliorate the harm that is already affecting coastal (and inland!) habitats, prevent it when possible, and enhance ecosystem resilience so that even as ecosystems change, they continue to offer habitat for fish and wildlife, and support Maine communities.

(2) Include language in strategies and actions to clarify that they apply to coastal, not just inland, areas.

Maine Won’t Wait included strategies and actions that in principle apply to both inland and coastal areas. Where coastal issues were not directly identified, however, implementation has sometimes focused on inland areas by default. For example, most readers would not associate the term “natural and working lands” with important coastal habitats such as tidal marshes, clam flats, rocky shores or submerged ledges. This concern does not only apply to strategies and actions related to coastal habitats, but also in other areas. This problem may be exacerbated by the segregation of responsibilities and expertise among state agencies. (in this case, especially DMR, ACF, IF&W and DEP).

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(3) When considering “Blue Carbon” benefits of coastal and marine ecosystems, include all coastal and marine communities that provide those benefits.

As research on coastal storage of carbon has advanced, it has become clear that more coastal ecosystems than originally thought play a role in carbon uptake from the atmosphere or carbon storage in soils and sediments. To date, most of the attention in Maine and New England has been on eelgrass beds and salt marshes, where both carbon uptake and carbon storage can be high. However, uptake and storage need not occur in the same locations. In marine systems, photosynthesis (which removes carbon from the atmosphere) and burial of organic matter (which can store carbon for decades or centuries) don't always occur in the same place or at. Kelp, rockweed and other macroalgae are effective at removing carbon from the atmosphere, while marine depositional environments such as tidal flats and sheltered bays, may be important locations for long-term sequestration of carbon. These important coastal habitats need to be further studied to fully understand their blue carbon potential.

(4) Focus on the full suite of benefits provided by coastal and marine habitats to Maine communities.

Coastal and marine ecosystems support Maine's coastal communities and economies. The cultural history and identity of Maine communities are tied to nearby rivers, tidal flats, salt marshes, and bays. Not only Maine's fishing, but also our tourism economy depends on the health of coastal and marine habitats.

A focus on “Blue Carbon,” in *Maine Won't Wait* directs resources towards coastal habitats with well-documented blue carbon benefits such as tidal wetlands and eelgrass beds. Those are among Maine's most important coastal habitats, so increased attention provides a wide range of benefits.

They represent, however, only a subset of coastal habitats vulnerable to sea level rise and climate change. Tidal flats, for example, provide essential habitat for commercially important shellfish and worm species. Statewide, tidal flat fisheries have an annual landed value well in excess of \$20 million. Cumulatively, they are the second largest source of fisheries-related income in Maine after lobster. While there is growing recognition that tidal flats are more important for carbon sequestration than was thought, there is absolutely no doubt that they are vulnerable to warming temperatures, coastal acidification and sea level rise (among other climate stressors) and provide important economic benefits as well as non-market ecosystem services.

While a focus on blue carbon can help address net zero carbon emission goals, it should not be used as the primary lens through which to evaluate the importance of coastal habitats, and thus of the selection of priorities for actions such as restoration and protection that enhance coastal ecosystem resilience. A more integrated approach that evaluates a wider range of habitats, ecosystem services and cultural significance is needed.

(5) Emphasize interdependence of community and ecological resilience goals and activities

Many, although not all, ecosystem restoration projects address deficiencies in built infrastructure. Restoration of salt marshes in Maine, for example, often involves restoring the natural flow of the tides through tide gates or culverts, which enhance safety and transportation for coastal communities. Similarly, community resilience actions in coastal areas (like protection of eroding shorelines) can have

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habitat benefits or cause harm to marine ecosystems. Habitat resilience and community resilience actions are not only conceptually related, but also practically linked.

The way community and habitat resilience actions are funded and managed tends to enforce an unhelpful separation between discussion of community resilience and consideration of the health of our coastal habitats. In the future, it is likely to become ever more important to identify synergies between community resilience goals and protection of the coastal ecosystems upon which community economies depend.

(6) Enhance ongoing monitoring and data collection and create new monitoring programs to fill data gaps.

Managing Maine’s coast in an era of climate change requires robust long-term monitoring, adequate mapping, and access to data to inform decision-making and resource management. Data collection encompasses many water quality parameters, bathymetry, habitat conditions, biological monitoring to inform marine harvests, demographics and community values. Existing data collection programs were not designed to monitor climate change, and will need adaptation, expansion to fill data gaps. Many existing programs rely on inconsistent federal funding with little reliable year to year funding to maintain monitoring programs. Reliable long-term funding is needed to meet the data collection needs and to maintain time series to evaluate impacts of climate change on Maine’s coastal and marine ecosystem. The public private collaborations to advance climate change science must also continue with state participation and leadership in convening meetings when appropriate. Public-private collaborations must be strengthened to steward data collection, data management, interpretation and dissemination, with the aim of delivering useful information and insight into the hands of coastal decision makers.

STRATEGY E – PROTECT MAINE’S ENVIRONMENT AND WORKING LANDS AND WATERS: PROMOTE NATURAL CLIMATE SOLUTIONS AND INCREASE CARBON SEQUESTRATION	
<p>STRATEGY E Recommendation 1 – Protect Natural and Working Lands and Waters and seek opportunities to restore and increase resilience of coastal, marine, and inland habitats.</p>	<ul style="list-style-type: none"> • Prioritize the identification, monitoring, and conservation of critical habitat areas to support land and water connectivity, ecosystem health, and resilience. • Identify and create an inventory of coastal and marine habitats most vulnerable to climate change by either using current habitat climate vulnerability assessments or by conducting a state specific coastal and marine habitat climate vulnerability assessment. • Develop strategies to invest in coastal and marine habitats through increased monitoring, policy, restoration, protection, and management. • Inventory, map, and track changes to working waterfronts and coastal access. • Focus protection and restoration activity on high value areas that support land and water connectivity and ecosystem health and enhance resilience of ecosystems to sea-level rise and other climate change impacts.

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	<ul style="list-style-type: none"> • Explore policy tools for protection and restoration of subtidal and intertidal habitats. • Charge the STS with evaluating developing science regarding carbon uptake and storage in additional marine environments, such as subtidal kelps and intertidal rockweed, tidal flats, and sheltered bays.
<p>STRATEGY E Recommendation 3 – Expand Outreach to Offer Information and Technical Assistance</p>	<ul style="list-style-type: none"> • Increase technical service provider capacity by 2024 to deliver data, expert guidance, and support for climate solutions to communities, farmers, loggers, marine harvesters, and foresters at the Department of Agriculture, Conservation and Forestry, Maine Forest Service, Department of Inland Fisheries and Wildlife, the Department of Marine Resources, Department of Environmental Protection, and the University of Maine. • Strengthen availability of information and technical assistance on “nature based solutions” to coastal management challenges, including coastal erosion and water quality protection. • Expand Maine’s analytical and technical services to increase its capacities to collect, process, and analyze samples and data to better understand the impacts of climate change.
<p>STRATEGY E Recommendation 4 – Enhance ongoing monitoring and data collection that provide baseline data to guide informed decision making, and create new monitoring programs to fill data gaps.</p>	<ul style="list-style-type: none"> • Expand capacity to document and study the positive and negative effects of extreme events – on people and natural resources -- via partnerships with academic institutions and community groups. • Create and fund a state-wide framework, regional coordinating hubs, and technical capacity to implement coordination of comprehensive monitoring by convening relevant groups, inventorying existing monitoring efforts, and identifying priority data gaps to address via collaborative efforts to provide sustainable, publicly available platforms for at the scales needed to make management, resilience, and policy decisions to address climate change in the coastal and marine ecosystems. • Support state agencies and non-state partners ongoing and new long-term monitoring efforts and collaborations focused on characterizing changes to coastal and marine ecosystems due to climate change, including, for example, the impacts of sea level rise, bluff erosion, and storm surge. • Evaluate monitoring needs and capacity, and target resources to fill data gaps for priority populations.
<p>Chapter E Equity Goal #1 – Ensure equitable access to Maine lands and waters, improving the lives and health of</p>	<ul style="list-style-type: none"> • Identify and address barriers to equitable and diverse access to Maine’s lands and waters.

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<p>people in Maine, particularly for priority populations and the Wabanaki nations.</p>	<ul style="list-style-type: none"> • Ensure all Maine lands and waters are safely accessible, particularly for those people and populations most vulnerable to harassment and discrimination. • Support protection of existing access points, supplemented where possible with traditional and Indigenous knowledge, within a framework of respect to ensure future access.
<p>Chapter E Equity Goal #2 – Address data gaps and capacity needs through collection and implementation programs co-produced with priority populations and the Wabanaki nations.</p>	<ul style="list-style-type: none"> • Through active engagement and co-production, ensure data gaps are filled and data is collected and communicated alongside the communities it’s being used by. • Collaborate with Indigenous and traditional users of the coast when establishing research, planning, and implementation priorities for habitat restoration, resilience, and protection. • Empower local decision making by strengthening participatory science initiatives in priority population communities.

2. ANALYSIS AND SUPPORTING INFORMATION

Key Questions

1. **Impacts** - Describe the recommendation(s) and its actions and how they address Maine’s four climate goals – *reducing greenhouse gas emissions, increasing resilience, creating economic opportunity, and achieving equity through Maine’s climate response.*

Strategy E in *Maine Won’t Wait* implicitly applied to Maine’s coastal habitats, but the wording of several Actions does not reflect the way work on coastal and marine habitats has evolved over the past several years as the impacts of climate change on coastal ecosystems have become clearer.

Linguistically, a focus on “natural lands” tends to direct attention away from the state’s waters (including wetlands). Similarly, a focus on biodiversity protection directs attention away from certain coastal habitats that are not especially species rich, despite their economic and ecological importance.

Maine Won’t Wait used language about conservation priorities that focused on “protection” of natural areas. Yet in an era of changing climate, protection of coastal ecosystems, while essential, is no longer sufficient. Increasingly, coastal scientists believe maintaining the health of coastal habitats like eelgrass beds and tidal wetlands will require active short-term interventions to help them adapt to changing conditions. In some cases, scientists fear we may have a decade or two to take action to support the health of important coastal habitats before they undergo largely irreversible changes. The subcommittee identified several specific examples. Here we offer just two:

Many Maine and New England salt marshes have a deep history of human use that has resulted in subtle alterations of marsh surface hydrology. Hydrological changes, in turn, alter marsh vegetation, and reduce the ability of tidal wetlands to trap sediment and thus keep up with sea

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level rise. With appropriate and relatively inexpensive interventions, some of the effects of historic human impacts can be reduced, greatly increasing marsh resilience.

While science and practice are less well developed here in Maine, conversations are occurring along much of the eastern seaboard about actively managing genetic diversity of eelgrass populations. Warmer waters have a negative effect on eelgrass growth. Maine's eelgrass is adapted to cooler waters; genotypes from further south are more heat tolerant. Emerging practices, ranging from use of seeding (to increase genetic diversity of eelgrass beds) to "assisted migration" that imports heat-tolerant genotypes, are under discussion, and face significant regulatory and policy uncertainty.

Traditional habitat conservation (e.g., via fee ownership or easements) has proven to be an essential tool for enhancing climate resilience, especially for terrestrial habitats, but those tools of "protection" are less applicable to the marine world. Most coastal habitats are State lands held in the public trust, and accessible to all. Thus, protecting and restoring resilience of coastal and marine habitats must rely on different tools. Members of the subcommittee identified several habitats at risk (including kelp beds, shellfish bars and intertidal rockweed), and a number of planning, regulatory, and policy approaches that could improve or protect habitat resilience. We did not have time to reach consensus about specific priorities, but we agree new tools are needed and policy discussions should begin.

Finally, we note that conversations about community resilience and habitat resilience often occur separately and should be better integrated. One place to start is by using emerging networks of individuals providing technical assistance to communities and individuals on climate resilience to provide up-to-date information on "nature-based solutions" like "living shorelines" and riparian plantings.

The committee discussed the impact of this winter's storms on coastal beaches, dune systems that protect coastal towns, erodible bluffs, and other vulnerable shorelines. We noted that, in addition to short- and medium-term impacts on coastal economies and ecosystems, these storms are likely to have secondary long-term impacts on coastal ecosystems. Severe storms naturally spur communities to seek solutions for shoreline erosion. As storms become stronger and water levels rise, Maine will see a growing number of individuals and communities seeking permits to "harden" shorelines with riprap or sea walls. Less environmentally destructive alternatives exist, although they are not always suitable for higher energy shorelines. These less destructive alternatives, however, are still uncommon in Maine. They are little understood, and face practical and regulatory barriers. They will not be widely adopted unless people learn about them.

The primary benefits of all the proposed changes are to focus state efforts on resilience of coastal ecosystems and the coastal economies that depend on them. Many coastal ecosystems (more than previously thought -- see the narrative description included above) have the potential to act as long-term sinks for carbon. Actively protecting and enhancing resilience of coastal ecosystems, therefore, will have significant "Blue Carbon" benefits as well.

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2. **Cross-over** - Does the recommendation involve other working groups/sectors? *Select all which apply.*

- Transportation
- Buildings, Infrastructure, and Housing
- Energy
- Community Resilience
- Coastal and Marine
- Natural and Working Lands
- Other (please describe)

How did the Working Group coordinate with others around these overlaps?

- Jeremy Gabrielson reached out to Natural and Working Lands.

3. **Priority Populations** - Consider the priority populations impacted or affected by this recommendation.

a. POPULATIONS: Identify any priority populations impacted or affected by this recommended strategy.

All marine harvest industries will be strongly affected by climate change. Coastal harvesters' livelihoods are dependent on continued health of coastal ecosystems. Subsistence and recreational harvesters will also be affected.

Many of Maine's coastal communities are geographically isolated and/or economically disadvantaged. Demographically, these communities tend to include many people over the age of 65.

b. IMPACTS: Using the Equity Sub-Committee analysis from March 2023 as a starting place, consider both potential positive outcomes and any unintended consequences/byproducts. Describe these potential impacts/benefits.

Subcommittee members expressed support for addressing equity in the way coastal protection and restoration activities are prioritized and implemented. The committee felt it is important to incorporate both traditional ecological knowledge (TEK) and traditional uses of coastal ecosystems when evaluating coastal habitat priorities. (We considered TEK and traditional uses to comprise both Indigenous and non-Indigenous voices and perspectives).

In addition, we recognize growing challenges with access to coastal resources, driven in part by rising property values on and near the coast. It is likely to prove important in coming years to consider issues of both public and commercial access to coastal resources together with protection of coastal habitats and coastal habitat resilience. Land conservation and habitat resilience activities can offer opportunities to provide access to the coast to members of multiple priority populations for cultural, subsistence, recreational and commercial purposes. Land conservation and habitat resilience activities can offer opportunities to provide access to the coast to members of multiple priority populations for cultural, subsistence, recreational and commercial purposes.

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- c. *SOURCES OF INFORMATION: Describe how you know what groups are impacted/affected. Cite relevant data sources and/or formal conversations (MCC-organized panels, focus groups, etc.) with priority populations.*

Several members of the subcommittee work closely with coastal harvesters, especially shellfish harvesters. While analysis was not state-wide, Casco Bay Estuary Partnership’s Equity Strategy was based in part on analysis of data from CEJST and EPA’s “EJScreen” tool, as well as information on planning capacity of municipalities.

- d. *RESULT OF ENGAGEMENT: Describe any consultation or engagement with these priority population (either by the Working Group or through GOPIF’s community engagement contractor). Describe how the Working Group’s recommendations have changed as a result of these conversations.*
- e. *IMPLEMENTATION: How might the recommended strategy be implemented in consultation with priority populations? Do priority populations have the resources and capacity necessary to implement or access this recommended strategy? How might you make recommendations to improve equitable access to resources and capacity-building? You might consider planning capacity, financial capacity, programmatic capacity, human capital, and other.*

4. **Timeframe** - What is the timeframe for this recommendation and its actions?

	Short-term (2025)	Mid-term (2030)	Long-term (2050+)
To implement	Planning activities	Project development under new priorities	
To realize outcomes	Some related coastal resilience activities are already underway, New priorities can be developed rapidly	Projects completed to enhance resilience typically take 3 to 5 years from identification of a need to completion of projects.	

5. **Implementation Next Steps** - What types of next steps would be required to implement the recommendation?

- Legislation, rules/regulation, internal program guidance changes

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- X Establishment of a new program or a fund,
- X Conduct additional research
- X Provide education or training
- X Coordinate with other parties/agencies/states
- Other (please describe)

- Please provide some detail around these steps. If possible, identify **specific actors** who would lead in the implementation of the recommendation and actions.

STRATEGY E Recommendation 1 – Protect Natural and Working Lands and Waters and seek opportunities to restore and increase resilience of coastal, marine, and inland habitats.

Action 1: Prioritize the identification, monitoring, and conservation of critical habitat areas to support land and water connectivity, ecosystem health, and resilience.

Habitat prioritization needs to occur in two stages: first identifying important habitat types or categories (e.g., tidal flats) and second, selecting local, regional, and state-level priority sites based on site characteristics, geography, or community values.

- Short term: Convene a state-wide process to identify important coastal habitat categories, taking into account multiple habitat benefits, including blue carbon (carbon sequestration), habitat connectivity, biogenic habitats (like eelgrass, shellfish bars, and kelp forests), support for rare species, and significance to Maine’s coastal fisheries.
 - The discussion needs to be informed by present-day understanding of ecosystem services and how different habitats work together at a landscape scale to support healthy coastal ecosystems.
 - This process needs to be tied to, but not entirely determined by existing habitat prioritizations such as those developed by the State Wildlife Action Plan and the Atlantic Coast Joint venture.
 - The analysis needs to be forward looking, considering the health of Maine’s coastal habitats in the future even as species present along Maine’s coast change.
 - This effort could be led by Sea Grant or the Coastal Program. Participants should include academics, representatives of DMR, DEP, IF&W, individuals or organizations representing affected constituencies and local government.
 - Prioritization involves consideration of values. Equity considerations suggest this step needs to incorporate a variety of community perspectives as well as technical expertise.

(Some of the following steps are well underway for a few coastal habitat types, notably tidal wetlands. For others, the work has not yet begun.)

- Short to medium term: Provide funding and the resources needed for DMR’s Maine Coastal Mapping Initiative and DEP’s Marine Vegetation Mapping Program to continue to map coastal and marine habitats at state-wide scale. The purpose of mapping is to help to support prioritization and establish a baseline for documenting long-term change.

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- For many habitat types, available maps are based on data that is years or decades old, making them of little value for present-day priority setting or for documenting coastal change.
- Update data on a regular schedule.
- Short to medium term: Establish “sentinel sites” for identified important habitat types.
 - Sentinel sites are locations where long-term data collection will be collected using consistent methods to document long-term ecosystem change.
 - Establish institutions or mechanisms that can fund, organize and manage sentinel site monitoring for the long-term (decades).
 - This is likely to require legislation establishing or expanding dedicated programs, likely within state agencies. DMR and DEP both already host related data collection programs, but the Maine Natural Areas Program, Maine Geological Survey and the Maine Coastal Program also have significant related expertise.
 - While some “sentinel” site data is likely to be collected at the local level by towns, land trusts, or lake associations, these local efforts will require state-level coordination to support comparison and data access.
 - See discussion of monitoring priorities below for related ideas
- Medium term: Work with researchers and state agencies to develop standard methods to use remotely sensed data to track changes in extent of priority habitats. (This work can start right away, but developing consistent, cost effective tools will take several years).
- Medium term: Engage state agencies and researchers to conduct geospatial analysis based on available data to identify priority **sites** or **examples** of important coastal and marine habitats.
 - Priorities should be developed at regional, not only at state-wide scale, to provide guidance for towns and local nonprofits for whom statewide priorities are not always relevant.
 - Criteria for identifying high priority habitats and sites are situation-specific, and so may vary across Maine’s coast based on local geography, land use, and community priorities.
 - Several studies have identified priority tidal wetlands, including by identifying large sites with tidal wetland migration potential, and by identifying significant habitat for saltmarsh sparrow, an at-risk species. No similar analysis has been conducted for many coastal habitats, especially subtidal habitats. Criteria for developing priorities do not exist for many important habitat types.
- Long term: Develop institutional structures or designate existing agencies to be responsible for updating vulnerability analyses and maps on a regular basis.

Action 2: Identify and create an inventory of coastal and marine habitats most vulnerable to climate change by either using current habitat climate vulnerability assessments or by conducting a state specific coastal and marine habitat climate vulnerability assessment.

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Vulnerability to climate stressors is not the same as importance and priority as described in Action 1. The two analyses are complementary, and together provide the information needed for risk assessment and thus managing climate-related risks. This vulnerability analysis, like prioritization, also needs to be conducted first at the level of understanding vulnerabilities of habitat types, and second on a site by site basis.

- Short term: Commission a report (based on a literature review and existing geographic data) to evaluate climate vulnerability of Maine’s important coastal and marine habitats in response to primary and secondary climate stressors
 - No one organization is likely to have the breadth of knowledge to characterize vulnerabilities across the breadth of multiple habitat types under consideration. A team-based approach will be needed to bring together people with complementary knowledge.
 - Academic expertise will be essential, but should be complemented with regional understanding. Several state agencies, including Maine Geological Survey, Maine Natural Areas Program, Department of Marine Resources, Department of Environmental Protection and the Coastal Program have related expertise.
 - The work needs to be received as authoritative and unbiased.
 - That suggests the report should be commissioned through a unit of the University of Maine system that has the capacity to organize work by multiple scholars and experience coordinating with agency staff and other scientists.
- Short to medium term: Fill in gaps of understanding of coastal sediment processes to help forecast impact of rising seas on coastal habitats, including tidal flats, eelgrass beds, and salt marshes.
 - Commission STS, MGS, or UMAINE to summarize the state of our understanding of coastal sediment supply, transport and deposition. Evaluate how sea level rise might affect sediment supply for key coastal habitats, including tidal wetlands and tidal flats.
 - Work with the University of Maine system to strengthen the community of people in Maine able to study sediment processes and advise communities about coastal erosion and sediment transport.
- Medium term: Using principles from the report described above, and available geographic and remote sensing data, map vulnerable habitats (within and across habitat categories).
 - Maps should reflect regional geographic settings and geomorphology.
 - Limits of availability of geospatial data will constrain map accuracy.
- Long term: Designate an agency to be responsible for updating vulnerability analyses and maps on a regular basis.

Action 3: Develop strategies to invest in coastal and marine habitats through increased monitoring, policy, restoration, protection, and management.

- Short term: Implement and fund pilot projects that increase habitat resilience and ultimately serve as models for habitat “restoration.”
 - Pilot projects test emerging resilience methods, uncover practical and regulatory barriers to implementation, engage suppliers of materials and

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- services, and offer opportunities to train coastal scientists, managers, engineers, and planners.
- Projects are often implemented by local and regional organizations like land trusts, lake associations and community groups. State agencies and regional organizations often provide technical assistance.
- Short term: Expand capacity of Maine's Coastal Program to assist with and fund coastal restoration.
 - A state agency with a focus on restoration and resilience projects can provide a single point of contact for prioritization, technical assistance and funding and help nurture local projects. It could also be charged with regularly updating priority and vulnerability maps.
 - (The Massachusetts Office of Ecological Restoration offers an instructive model, although with substantially more resources than a similar MAine office is likely to have).
- Short term: Catalog state programs that fund coastal and marine habitat restoration or provide technical assistance on managing coastal habitats; identify information and resource gaps. Conduct state-wide analyses to document need for funding (and other support) over the short-term (5- 10 year) and medium term (10 - 20 year). (Sea Grant or Coastal Program)
- Medium term: Expand state and philanthropic funding for habitat resilience and protection investments. When possible, use local and state dollars to leverage federal funding, especially in underserved or under resourced communities and to benefit priority populations.
 - Substantial federal funding is currently available for resilience projects, but funding is expected to decline in two to three years.
 - Non-federal match requirements have historically been a barrier to tapping federal funds for project implementation. While match requirements are often waived right now due to special provisions in recent federal funding bills, that flexibility will also sunset in a couple of years.
 - Non-federal match requirements can prevent smaller Maine communities from accessing federal funds (not only for habitat projects, but also for community resilience projects).

Action 4: Inventory, map, and track changes to working waterfronts and coastal access.

- Short term: Charge DMR, the Maine Coastal Program, or another agency with developing a monitoring strategy.
 - The monitoring strategy needs to:
 - Clarify the purpose of collecting data and how the data will be used;
 - identify data users and develop a strategy for delivering data and information to those users;
 - Evaluate data that is already being gathered for other purposes;
 - Identify data gaps;
 - Evaluate costs of data collection and analysis;
 - And prepare a schedule and estimate of costs of not only creating data on working waterfronts once, but keeping that data up to date.
 - consider what additional data collection may be needed.

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- Fund periodic data collection so that data is up to date enough to guide land use and funding decisions.

Action 5: Focus protection and restoration activity on high value areas that support land and water connectivity and ecosystem health and enhance resilience of ecosystems to sea-level rise and other climate change impacts.

- Short term: Target grants and other direct financial assistance to priority and vulnerable coastal habitats (as defined above, under Action 1).
 - Several state agencies and programs offer funding (or influence funding) that can benefit coastal habitats, including Maine Natural Resources Conservation Program, (MNRCP), the state Coastal Program's Shore and Harbor Planning Grants, Coastal Community Grants, and DEP's Nonpoint Source Water Pollution Control Grants (among others). Grant programs should, where possible, steer funds towards priority habitat types and sites.
- Short to medium term: Integrate priority and vulnerability information into the State Wildlife Action Plan
- Medium term: Communicate coastal and marine habitat priorities to other agencies. Encourage them to consider the impact of actions (funding, permitting, planning, etc.) on priority and vulnerable coastal habitats.

Action 6: Explore policy tools for protection and restoration of subtidal and intertidal habitats.

- Short term: Commission a review of legal, policy and planning alternatives by Maine Law School or the Muskie School of Public Service to identify potential legal and policy tools for further consideration.
 - Habitat Subcommittee members quickly came up with ideas about policy tools to improve protection of resilience of coastal habitats, from tightened permitting programs, revisions to municipal ordinance to developing programs to pre-approve locations for aquaculture development. However, we did not have time, or people with the right expertise in the room to develop these concepts in full.
 - Subcommittee members were especially interested in considering how new policy tools (like marine protected areas, or identification of subtidal conservation areas) could reduce threats to subtidal habitats, where traditional habitat protection approaches (via acquisition and easement) are not relevant.
- Short Term: Strengthen local policies that protect coastal and marine habitats
 - Review state comprehensive plan guidance to ensure comprehensive plans consider climate change impacts, including impacts on important marine and coastal habitats.
 - Leverage state funding, such as Coastal Community Planning Grants, to encourage integration of coastal habitat consideration in comprehensive plans.
 - Revisit shoreland zoning requirements and recommendations and consider whether they need to be modified to reflect growing understanding of climate-related risks in coastal and riparian areas.

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- Consider how stormwater rules (including Chapter 500, and “MS4” permits) can reduce impact of development and stormwater runoff on coastal habitats.

Action 7: Charge the STS with evaluating developing science regarding carbon uptake and storage in additional marine environments, such as subtidal kelps and intertidal rockweed, tidal flats, and sheltered bays.

- Short term: Commission related literature review (STS leads)
- Short term: Continue state agency involvement with “Blue Carbon” and “Coastal Carbon” initiatives. (Maine DEP, DMR, and Natural Areas Programs)
- Short to medium term: Expand collection of Maine-specific data on stored carbon in marine and coastal sediments
 - Improve understanding of site to site variation in carbon storage;
 - Increasing sampling in marine environments beyond eelgrass beds and tidal wetlands.
- Medium term: Update and improve Maine’s estimates of stored “blue carbon” within tidal wetlands and eelgrass, based on emerging understanding

STRATEGY E Recommendation 3 – Expand Outreach to Offer Information and Technical Assistance

Action 1: Increase technical service provider capacity by 2027 to deliver data, expert guidance, and support for climate solutions to communities, farmers, loggers, marine harvesters, and foresters at the Department of Agriculture, Conservation and Forestry, Maine Forest Service, Department of Inland Fisheries and Wildlife, the Department of Marine Resources, Department of Environmental Protection, and the University of Maine.

Action 2: Strengthen availability of information and technical assistance on “nature based solutions” to coastal management challenges, including coastal erosion and water quality protection.

Action 3: Expand Maine’s analytical and technical services to increase its capacities to collect, process, and analyze samples and data to better understand the impacts of climate change.

- Short term: Grow in-state capacity of academic and commercial laboratories for analysis of low-level marine nutrients, coastal acidification parameters, and tissue and sediment carbon parameters. Increased capacity requires providing training for implementation of new methods, purchase of new laboratory equipment, development of quality assurance measures, and creating business models that support expansion of these services.

STRATEGY E Recommendation 4 – Enhance ongoing monitoring and data collection that provide baseline data to guide informed decision making, and create new monitoring programs to fill data gaps.

Action 1: Expand capacity to document and study the positive and negative effects of extreme events – on people and natural resources -- via partnerships with academic institutions and community groups.

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- Short term: Convene state agencies and non-state partners to define extreme events, develop parameters to be monitored, best practices, and assign responsibility for state and non-state partners to conduct monitoring before and following extreme weather or environmental events.
- Medium term: Create a discretionary funding source to fund the state agencies and partners identified in the response plan to conduct the reactionary monitoring following extreme events.
- Long term: Continue funding of the monitoring plan developed.

Action 2: Create and fund a state-wide framework, regional coordinating hubs, and technical capacity to implement coordination of comprehensive monitoring

- Short term: Task GOPIF with identifying what monitoring data exists and is available from state agencies and non-state agencies that is useful for climate resilience planning and create and maintain a public hub to identify how to access these data. This could be via collaborative efforts by convening relevant groups (DEP, DMR, DIFW, DACF), inventorying existing monitoring efforts, identifying priority data gaps in monitoring programs, and funding efforts to fill identified data gaps.
- Short Term: Task GOPIF with identifying or creating sources of climate-related information by region that are accessible on publicly available platforms that harvesters, municipal officials, and others can rely upon to inform decision-making.
- Short term: Define the role of the Maine Climate Science and Information Exchange in distributing local climate information needed to make management and policy decisions to address climate change, and in convening periodic meetings of state agencies and partner organizations.
- Medium term: Task an entity such as the Maine Climate Science and Information Exchange with creating or identifying regional hubs to coordinate coastal monitoring efforts and identify resource needs. Regional hubs can serve to facilitate communication and data sharing among different research programs. Funding or other resources would be needed for this implementation.

Action 3: Support state agencies and non-state partners ongoing and new long-term monitoring efforts and collaborations focused on characterizing changes to coastal and marine ecosystems due to climate change.

- Short term: Develop strategies to monitor the effects of more stormwater pollution as a result of more intense rain events year round.
- Short to Medium: Identify ways to implement the stormwater monitoring through permits and other means.
- Short term: Expand the public-private ocean acidification monitoring network to build out coast wide monitoring; hold a training session for this purpose; identify labs that can process the samples or the unmet need for lab capacity.
- Short term: Identify and/or create opportunities for state and non-state partners to convene and collaborate to advance climate-related monitoring. For example, continue to support meetings such as the Nearshore Monitoring meeting convened by DMR in 2023.
- Short term: DMR and DEP will evaluate their long-term monitoring programs to determine data gaps and ways to improve collaborative efforts, and will enhance ongoing monitoring programs or develop new monitoring programs to fill identified data gaps.

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- Medium term: Identify sustainable funding to enhance and further develop long-term monitoring programs in DMR and DEP. Long term monitoring is a priority to ensure decision-making can be based on data that reflects adequate time and geographical scales.
 - DMR's newly initiated Long Term Intertidal Monitoring Program with twelve sites along the coast currently lacks funding to collect intertidal environmental data alongside ecological data. To link ecological changes to climate change, ongoing funding support for environmental monitoring infrastructure is needed, as well as additional staff or seasonal support.
 - DMR requires sustained long-term funding to establish and maintain monitoring initiatives related to oceanographic monitoring and emerging marine species as a result of climate change. DMR will coordinate with other State agencies (i.e., DEP) to produce oceanographic monitoring programs that collect data in a format compatible to existing data sources, and will develop ecological monitoring programs which investigate the species composition of fish communities to evaluate the potential for emerging species, the presence of which can impact commercial and/or recreational fisheries industries. This work will involve the continued collaboration of DMR with various partners in academia, industry, non-governmental entities, and with citizen scientists.
 - DEP's Marine Environmental Monitoring Program is expanding monitoring parameters beginning in 2024 with discrete coastal acidification sampling, and will add substrate characterizations in coming years as funds allow. Although provided a modest annual General Fund budget as of fiscal year 2024, increasing laboratory analytical costs and staff limitations constrain the ability of the program to collect continuous water quality data and characterize the shifting biological communities in Maine's generally understudied estuaries.
 - As of fiscal year 2024, DEP's Marine Vegetation Mapping Program has been funded to map coastal habitats including seagrass and salt marsh annually across 1/3 of the coast on a rotating geographic basis. General Fund support is currently being pursued to sustainably fund the larger segments of the coast with extensive and in some cases, previously undocumented, essential habitats. Additional support for the program would also allow interpretation of aerial imagery for intertidal seaweed inventory, addition of multispectral imagery for speciating macroalgae and vegetation, and developing biomass estimates to calculate aboveground carbon stores.
- Medium term: Continue to test new technologies that advance ocean acidification monitoring; share results within state-wide collaboration of OA scientists.
- Medium Term: Identify and take next steps to implement and/or continue state and non-state collaborative monitoring networks. An example of this is the on-going MOCC dedicated to advancing ocean acidification monitoring.
- Long term: Task GOPIF with creating a state funding model to sustain long-term monitoring by state agencies to collect the critical time series and geographical data needed to inform climate resilience planning and decision-making.
- Long term: Consider developing a 7 day OA forecast by region to inform aquaculture and shellfish management.

Action 4: Evaluate monitoring needs and capacity, and target resources to fill data gaps for priority populations.

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Chapter E Equity Goal #1 – Ensure equitable access to Maine lands and waters, improving the lives and health of people in Maine, particularly for priority populations and the Wabanaki nations.

Action 1: Identify and address barriers to equitable and diverse access to Maine’s lands and waters.

- Short term: Collaborate with Maine-based research institutions and experts with local and traditional knowledge to research what barriers exist to safe, equitable access to Maine lands and waters for a range of activities including commercial, research, cultural, spiritual, and educational.
- Short term: Work to ensure the soon to be updated Maine Coastal Program’s Public Access Guide is communicated equitably to Maine communities and includes information on access for mobility impaired populations.
- Medium - long-term: Continue to actively communicate public access points through multiple different channels and in collaboration with priority populations and Wabanaki nations.

Action 2: Ensure all Maine lands and waters are safely accessible, particularly for those people and populations most vulnerable to harassment and discrimination.

- Short term - medium term: Survey existing programs that involve student, volunteer, or staff presence in the field for information regarding potential instances of harassment and discrimination.
- Medium - long term: Work across government agencies, research institutions, volunteer monitoring networks, and other relevant groups to provide training in safe field practices and ensure field-based programs are well communicated to communities in which they are performed.

Action 3: Support protection of existing access points, supplemented where possible with local, traditional, and Indigenous knowledge, within a framework of respect.

- Short term: Ensure documentation of existing access points happens collaboratively with a network of local partners that include priority populations and the Wabanaki nations.
- Medium - long term: Using the DMR and DACF Working Waterfront Access Protection Program as a template, explore expanding the use of covenants to protect access points for a broader range of coastal uses and value systems.

Chapter E Equity Goal #2 - Address data gaps and capacity needs through collection and implementation programs co-produced with priority populations and the Wabanaki nations.

Action 1: Through active engagement and co-production, ensure data gaps are filled and data is collected and communicated alongside the communities it’s being used by.

- Short - long term: Ensure effective and efficient communication with priority populations and other communities when planning data collection endeavors aimed at addressing data gaps.

Action 2: Collaborate with Indigenous and traditional users of the coast when establishing research, planning, and implementation priorities for habitat restoration, resilience, and protection.

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- Short term: Begin conversations with priority populations, Indigenous and traditional use communities, and the Wabanaki nations through existing engagement networks in Maine on priority setting for coastal activities related to restoration, resilience, and protection.
- Medium - long term: Develop a formal state protocol for engaging, and applying when requested, traditional ecological knowledge in coastal resilience projects. Build off existing state network structures to inform.

Action 3: Empower local decision making by strengthening participatory science initiatives in priority population communities.

- Short term: Inventory existing participatory science initiatives in Maine, including official DEP monitoring networks, and collect demographic information on volunteers.
- Medium - long term: Work with existing participatory science initiatives to develop broader, inclusive, community-driven data collection programs focusing on priority populations and Wabanaki nations.

THEME:

**SUPPORTING PATHWAYS TO ADAPTATION OF MAINE'S FISHERIES,
AQUACULTURE AND SEAFOOD INDUSTRIES.**

RECOMMENDATION: Promote stewardship of resilient ecosystems to take advantage of diverse markets and grow existing opportunities

A) Support investments, policies, and research that prioritize the inherent ability of Maine's coastal and inland natural environments to support diverse innovative economies and societies resilient to climate change impacts:

- Specific actors of implementation include regional planning organizations, economic development corporations, nonprofits/conservation organizations, support for this work, e.g., grants administration, serve as fiscal hosts, provide technical assistance, incorporate initiatives into regional/local climate adaptation plans, etc.
- Develop pathways to restoration for species and their habitats. A first step will be to evaluate prior to restoration work the climate impacts on habitats using modeling efforts downscaled climate model projections under different emission scenarios that project where suitable environmental conditions have the highest likelihood to persist and continue to support activities over short and long-term scales.
- Create new climate-informed metrics need to be developed that effectively detect and track system thresholds and tipping points and provide early warning indicators for additional management actions that support resilience and adaptation goals.

B) Manage fisheries and aquaculture for climate resilience:

- Provide funding for the Maine Department of Marine Resources (DMR) to develop long term monitoring of natural resources. For all species expanding existing state agency research long-term programs (e.g. lobster, urchin, scallop, trawl survey, intertidal, aquaculture) to monitor species range shifts into coastal Maine waters and inform harvest recommendations to state and regional management bodies in an effort to secure quota for Maine industries. This also includes monitoring changes in the type species cultivated on aquaculture sites and changes to harvest techniques.
- DMR continues to support and develop research programs focused on ecosystem impacts to understand the resource and socioeconomic environment. This should include considerations of ecosystem impacts of management actions and to minimize non-target species. DMR should consider coordinating and partnerships with state wide with research groups (academia, nonprofit, citizen science and others).

- Charge DMR to explore potential permitting/licensing, regulatory and management reforms in alignment with existing management structures to enable more rapid responses and innovation to include collaborative research frameworks in the face of changing environmental and economic conditions. This requires DMR and partners to conduct an evaluation of managed resources and collaborative approach to development of a climate adaptation plan that triages and creates a prioritized list of risks and resilience options, ideally developed collaboratively with other applicable groups (tribes, fishers, etc.).
 - For existing state managed fisheries, climate-informed harvest targets or other management controls need to be developed that are robust under different projections of future warming.
 - For emerging species, this will require flexible and new permitting mechanisms funding support for new monitoring and research programs to implement methods and data series that align with existing programs outside of Maine and can be used to inform MEDMR, ASMFC, regional councils and management policies.
 - Support for policy staff will also be required to implement new fisheries and aquaculture opportunities, and to develop new pathways to diversification in a timely manner. State government will need additional staffing capacity and resources to adequately respond to shifts and permitting requests. This includes additional funding for existing programs to secure adequate diverse staffing, climate adaptation training, and other resources.
 - Dedicated support and funding for pathology is critical to the Department's effort to monitor for emerging diseases, studies of how climate change triggers and amplifies outbreaks, and respond accordingly as species shift and fishing and aquaculture opportunities change. These shifts may require review of new climate-resilient sources of bait, import requests, and other considerations intended to avoid the spread of disease.
- C) **Produce, and disseminate a climate focused resilience assessment in coordination with stakeholders using participatory, community-based sociological and socioeconomic approaches with focus on Maine fisheries, recreational harvesters, aquaculture operations, and seafood harvesters.**
- Funding is needed for a series of participatory community-based workshops that brings together the DMR, researchers, industry, tribes, and the public to scope and co-develop a Climate Change Vulnerability Assessment and climate adaptation plan for implementation. This effort will identify the resources and activities that are at highest risk to climate impacts as well as opportunities for novel or expansions of existing fisheries/aquaculture/harvest and will help prioritize short term vs longer term actions and funding schedules. Some resources may require cost-benefit analyses of declines and increases in access, availability, and sustainable practices that consider culturally and historically important stocks vs emerging stocks. The assessment can be accomplished using existing tools and frameworks (e.g., Climate Vulnerability Index, <https://cvi->

heritage.org/) and experienced facilitators. The products of this work should also be designed to support scenario planning efforts.

- This assessment should include timelines of expected impacts and research to evaluate “tradeoffs” of new opportunities. Conduct research to understand impacts on and mitigation recommendations for natural resource economy infrastructure, biology/ecology/stocks, and public health.
- Researchers should engage the Maine Community College system in this work and regional development group.

D) Grow Maine’s living marine resources and forest-products systems to support communities industries through bioproduct innovation on supporting climate adaptive economic growth and sustainable forest management and preservation of harvested lands and waters .

- Align work with SEAMaine and ForMaine outcomes

E) Increase the amount of food consumed in Maine from state food producers from 10% to 20% by 2025 and 30% by 2030 through local food system development and marketing and new product development in order to take advantage of emerging fisheries.

- Develop and invest in programs to get Maine seafood into local schools, food insecure communities, and seafood deserts within Maine.
- Build incentives for developing local supply chains within in-state markets. Coordinate with the Maine Seafood Promotion Council to explore how local seafood is distributed within the seafood supply chain for existing and emerging fisheries and aquaculture.
- Provide funding for research on nutritional aspects (e.g., protein, micronutrients) of Maine Seafood
- Evaluate Maine’s marine resources to determine which species are underutilized, bycaught and wasted, and resilient to climate change in the short and long term
- Conduct market research on emerging and underutilized species to increase awareness and consumer demand for climate resilience seafood products
- Increase industry and public outreach and education on what climate resilient seafood means and provide examples. This work could be executed by Sea Grant and other extension agents, non-profit organizations (e.g., GMRI, TNC, Eating with the Ecosystem) and conservation groups.
- Conduct an assessment of restaurants and grocery stores to evaluate the proportion of local vs imported seafood and then provide informational resources to improve awareness and options for local, climate resilient seafood options, and expanding access to seafood to underserved communities or exploring how various communities are utilizing seafood.

RECOMMENDATION: Provide assistance and financing to maintain and expand equitable access to cultural, traditional, emerging and heritage industry and infrastructure

- A) **Develop proactive pathways for connecting and training new Mainers and underserved groups to pursue natural resource jobs that provide financial security, pay living wages, and provide pathways for advancement.**
- B) **Provide workforce training opportunities for natural resource industry workers to diversify and help adapt to a changing climate**
- Ensure the availability of low- or no-cost workforce training to priority populations and underserved communities with state supported financing.
 - Partner with “Live and Work in Maine” to share success stories focused on growing a new and diverse workforce within the seafood industry.
 - Revive programs from Washington County Community College and Sunrise County Development on training across seafood and marine industries including aquaculture.
- C) **Focus climate resilience actions/effort on fisheries and aquaculture with communities with little economic diversity, inclusive of Indigenous heritage and cultural fishing practices.**
- Include fisheries, aquaculture, and working waterfront initiatives in the ‘List of Community Actions’ that are eligible for funding in the Community Resilience Partnership. For example, developing marine resources sections of comprehensive plans, working waterfront inventories, land acquisition/conservation easements, economic/social impact assessment, marine employment diversification analyses.
 - Increase public outreach and educational opportunities on climate resilience.
 - Understand local practices that support community resilience and share additional practices of what climate resilience looks like and what options are available.
- D) **Prepare coastal communities for socio-economic impacts of regulatory uncertainty due to ecosystem shifts or regulatory changes.**
- Provide funding for socio-economic work to quantify the community level impacts and identify the most vulnerable communities.
 - Support DMR to provide resources and pathways to fishery diversification.
 - Support ecosystem surveys (oceanographic, biological) conducted by DMR and research partners to be able to quantify and describe the movements of the North Atlantic Right Whale (NARW) and their prey on an ongoing basis.
 - Support DMR’s efforts to develop management measures that are resilient and estimate how NARW risk will change in the Gulf of Maine (e.g. dynamic management, alternative gear use).
 - Provide conflict resolution training for staff working at the forefront of climate adaptation and resilience initiatives.