

Climate Adaptation in Fishery Management and Natural Resources-Based Economies in Maryland



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1. Background and Introduction

The impacts of climate change are already being felt and seen in communities and ecosystems across Maryland. Climate change poses a significant threat to the coastal habitats of some of the Chesapeake and Atlantic Coastal Bays and Atlantic Ocean's most iconic fish species. Climate impacts come in the form of ocean acidification and warming, inundation of habitat, and changes in invasive species. Resource managers and fishermen already see the effects of a changing climate, more frequently observing and catching warm-water species in coastal waters. Commercial and recreational fisheries contribute significantly to Maryland's economy and work is needed to understand the exposure of this natural resource-based economy to climate impacts, identify adaptive management options, and track progress.



State responsibility for fisheries management and climate adaptation coordination and tracking exist within the Maryland Department of Natural Resources (MDNR) in the Fishing and Boating Services Unit (FABS) and the Chesapeake and Coastal Service Unit (CCS). CCS is the lead agency for the state's Coastal Management Program (CMP) and staffs Maryland's Commission on Climate Change (MCCC) Adaptation and Resiliency Work Group (ARWG) that is responsible for leading and advancing state adaptation action.

Fisheries-specific adaptation needs are reflected in state climate priorities. In both of Maryland's 2008 and 2011 adaptation plans, ARWG partners identified strategies to help the state's natural resources, and the coastal economies dependent upon them, to adapt. In 2021 following a decade of implementation, the ARWG undertook work to refresh priorities and reassess actions that will address the most urgent and pressing climate impacts. That work culminated in the draft of the Maryland Climate Change Adaptation and Resilience Framework 2021-2030 (Framework). The Framework includes sectors focused on natural resources and ecosystems, and working lands and natural-resources based economies.

As the Framework is finalized, Maryland will need to establish a clear plan for implementation, coordination, and tracking of these updated priorities. By establishing and maintaining a robust tracking system, Maryland will be able to monitor progress and adapt the approach to meet the needs of the state now and into the future as climate change continues to impact all sectors. Only by fully understanding what the plan is and how it is being implemented, can Maryland ensure that we are protecting our natural resources as effectively as necessary to ensure their resilience.

This fellowship will provide much-needed support to CCS and FABS to advance work on fisheries and natural resources-based economy climate adaptation priorities. The fellow will develop a template for climate resilience elements in Fishery Management Plans (FMPs); help the state to understand and quantify the exposure of fisheries-based economies to climate change; recommend options for adaptation, especially in licensing structures; and, support discussions around implementation and tracking of related Framework strategies to improve adaptation and communication.

2. Goals and Objectives

Goal #1 - Understand the Exposure of Maryland Fisheries-Based Economies to Climate Change Impacts

Review and scope the range of potential climate risks to Maryland fisheries-based economies in the Chesapeake and Atlantic Coastal Bays and Atlantic Ocean. Begin to quantify the exposure of these industries to climate impacts. Develop a summary document that provides an overview of climate vulnerabilities, risk areas and exposures, and potential actions to avoid, minimize, or mitigate risk.



Photo Credit: T. Sweeny

Objective: Meet with CCS and FABS program staff, Mid-Atlantic partners, constituents, fishing industry representatives, and others to research, scope, and identify key aspects and infrastructure that comprise the Maryland fisheries-based economy.

Objective: Meet with CCS and FABS staff to discuss and identify the exposure of and risks to different aspects of the state's fisheries-based economy due to climate change and where regional differences within the state may exist.

Objective: Develop a summary document that characterizes each aspect of the fisheries-based economy, the climate exposure and risk, and potential actions - noting any regional differences that exist for each. Where risks to habitat exist, this may include some basic work with MDNR GIS staff to create high-level maps. This will result in a summary document/whitepaper.

Goal #2 - Develop Climate Adaptation Options for Fisheries Management

Identify opportunities to incorporate climate change into FMPs and other management practices to reflect anticipated future conditions and advance adaptation. Develop templates and draft content for FMPs to highlight and identify species-specific adaptation opportunities. Develop content for adaptation in other management practices such as licensing.

Objective: Discuss the FMPs, fisheries management, and climate adaptation processes with CCS and FABS staff to understand how fishery resources and the industries are managed, how the state can respond to and adjust management actions over time, and what steps and actions can be taken to address various climate vulnerabilities.

Objective: Review Maryland FMPs and analyze state, regional, and national fisheries data, literature, discussions, and policies regarding adaptation and climate-driven fisheries changes. Scope potential actions, content, and policies that could be developed to advance fisheries and climate adaptation in FMPs and other management processes (e.g. licensing and surveys).

Objective: Work with fishery managers to understand species-specific climate management concerns and ways that survey work could provide early indications of change. Coordinate discussions about identified adaptation options to gather feedback. Select priority actions and develop adaptation-related content for some FMPs. As time allows, develop draft materials that could be used to translate FMP content into future management and survey actions.

Objective: Understand the existing licensing processes with FABS. Research and perform a literature review of how other jurisdictions license new species or have adopted adaptive licensing frameworks; how other states regulate new fisheries; and how other management entities may be starting to employ adaptive fisheries management for climate change. Summarize findings and draft policy options and proactive management approaches that could be used to adjust the state's licensing structure for climate-driven fishery changes.

Goal #3: Support two MCCC ARWG Adaptation Framework Sector Groups in identifying, implementing, tracking, and communicating priority actions related to natural resources-based economies.

Objective: Translate Adaptation Framework strategies and actions related to natural resources-based economies into potential coordination actions.

Objective: Coordinate a subset of members from two ARWG Framework sector groups (Working Lands & Natural Resources-based Economies and Natural Resources & Ecosystems) toward project and actionable outcomes to advance and track strategies. Select priorities for annual work plans.

Objective: Compile updates on Framework activities related to fisheries and natural resources-based economies, with particular focus on work completed in Goals #1 and #2, to inform the overall Framework tracking system. Annually, coordinate the drafting of fisheries and natural resources-based economies priority activities reporting for the MCCC Annual Report.

3. Milestones and Outcomes

The following milestones and outcomes provide a general timeline and work plan details. Outcome deliverables are in *italics*. Key responsibilities are generally divided into two areas: climate strategies for Maryland fisheries and fishery-based economies (Goals #1, #2), and coordination of ARWG implementation and tracking for natural resources-based economy Framework actions (Goal #3). The CCS and FABS teams have a broad range of expertise in climate resilience, adaptation strategy development and implementation, fishery management and surveys, and fisheries regulations. This provides flexibility to adjust the work plan depending on individual interests, strengths, and expertise.

August - November 2022

Orientation and onboarding with CCS and FABS. Initial meetings to review existing FMPs, fishery management processes and surveys, and constituent group involvement in resource management [Goals #1, #2]. Initial meetings with MDNR's Framework coordinating team to review sections of the Framework related to Working Lands & Natural Resources-based Economies; Natural Resources & Ecosystems; Climate Jobs & Training; and Justice, Equity, Diversity, and Inclusion (JEDI) to identify priority activities to begin tackling. Meet with co-leads of the Framework sector groups related to this project. Work with MDNR to draft the Adaptation and Resiliency section of the 2022 MCCC annual report and attend quarterly ARWG meetings in August and November [Goal #3 - *report content*].

December 2022 - April 2023

Explore needs and options for climate adaptation sections in FMPs and surveys and begin drafting text [Goal #1 - *FMP text*]. Conduct a review of other state, regional, and national fishery and natural resources-based economy plans and policies that address climate change adaptation. Begin to compile a summary document outlining approaches being taken in other jurisdictions to integrate climate into fishery management. Discuss these options within the context of existing management, regulatory, and licensing structures in Maryland [Goal #2 - *draft summary document, options analysis*]. Work with the sector group co-leads to draft agendas, set priorities, establish and advance work plans, and collect progress updates on priority actions. Lead effort to begin implementing at least one priority strategy for each sector group. [Goal #3 - *sector meetings, strategy advancement*].

May 2023 - October 2023

Compile legislative concepts that can be considered for departmental submission for the 2024 Maryland General Assembly legislative session. Work with FABS and legislative staff to write justifications, explanations, and draft statute text for submission to the Governor's office by August. Follow up on questions or text changes by October [Goal #2 - *draft concepts text*]. Complete the summary document outlining approaches being taken in other jurisdictions to integrate climate into fishery management and options for Maryland. Complete

additional FMP text for various species [Goal #2 - *summary document, FMP text*]. Work to identify priority recommendations and work plan actions for the 2024 ARWG work plan and the 2023 MCCC report [Goal #3 - *2023 report content, 2024 work plan*].

October 2023 - January 2024

Develop discussion materials for and hold listening sessions with fisheries groups or communities to gain industry feedback. Depending on if and how listening sessions advance, summarize discussions and possible options updates [Goals #1, #2 - *materials and session summaries*]. Work with coastal fisheries staff conducting annual surveys to discuss adjustments that could aid in monitoring changes over time to provide early indications of when management options may need to be altered [Goals #1, #2 - *survey design summary*]. Continue to convene the sector groups to refine, advance, and track actions [Goal #3].

February 2024 - August 2024

Present project findings to CCS and FABS staff and the ARWG [All Goals - *presentations*]. Develop communications products that describe the various climate risks to commercial and recreational fisheries and ways climate adaptation can be advanced in Maryland fishery management. Provide recommendations about survey adjustments and constituent engagement to detect species changes over time [Goals #1, #2 - *communications products, whitepapers*]. Work with the two sector groups to develop a 2-3 year timeline for continued action [Goal #3 - *strategic sector timelines and continued implementation steps*]. Wrap up fellowship.

4. Project Description

As Maryland explores the economic and job aspects of climate adaptation and works to characterize the potential impacts to resource-based economies, this project focuses on ways to advance actions within the Department to improve coastal resource management and track progress. The previously-outlined 'Goals and Objectives' and 'Milestones and Outcomes' sections describe overarching goals for this project and the work plan that will position the state to integrate climate into fishery management, track adaptation progress for natural resources-based economies, and foster a dialogue on these issues.



Photo Credit: A. Wiley

This project was purposefully organized to fit within the context of existing management structures and present an opportunity for a fellow to engage in both high-level state adaptation strategies and the operational aspects of advancing issues-specific adaptation actions. Building skills and experience in framing how individual actions contribute to overall strategy progress is important to communicating how goals translate to action, and vice versa.

The milestones workflow aligns with opportunities for the fellow to experience a state legislative process and for the project to capitalize on ongoing fisheries and natural resources-based economies work in partner organizations and with the MCCC. Several staff that the fellow would work with are actively engaged with the Atlantic States Marine Fisheries Commission and the Mid-Atlantic Fishery Management Council (MAFMC) to manage fisheries and discuss emerging issues like climate change. This project is expected to both complement conversations occurring in these organizations and also position Maryland to plan for and incorporate change over time in its own programs. To the extent that the fellow has interest and time, they can follow discussions at federal, regional, and state advisory meetings by either attending the meetings or speaking with MDNR staff. This back-and-forth dialogue will be incorporated into concepts for adaptive management approaches.

Within the context of the state ARWG, the project will require a fellow to take a team approach and work with groups and individuals with a variety of subject matter backgrounds. The Framework draft completed in 2021 outlines the work needed over the next decade to meet the most pressing challenges and prepare our

communities, economies, and resources for the impacts of climate change. Topics that emerged from the Framework related to the natural resources-based economy discussions include:

- exploring new markets opportunities that may emerge for agriculture, forestry, and fisheries;
- increasing or establishing new monitoring practices to understand how fisheries are changing including range expansions of warm-water species, and aquaculture;
- convening partners to discuss programs, funding, research, policy, and implementation activities related to climate adaptation... in natural resources-based economies.

As the project develops and ideas about adaptation options emerge, the project team and fellow would discuss ways to engage different ARWG members, organizations working on related topics, and natural resources-based communities and groups. For this aspect of the project, the team envisions an opportunity to discuss how to incorporate JEDI factors into this work and be inclusive across geographies and populations.

5. Diversity, Equity, Inclusion, and Justice

The development of the Framework was organized using a sector-based approach and applying three focus areas that cut across all sectors. The focus areas serve to holistically incorporate key values that underpin how Maryland will achieve a resilient future. One of the focus areas is JEDI, which is the DEIJ acronym selected for use in Framework development. While all Marylanders will be impacted by climate change, those who have historically had more resources will be in a better position to respond, recover, and adjust as climatic changes occur, while others will be disproportionately affected. In many cases, the communities most vulnerable to climate impacts are underserved and overburdened as a result of generations of disinvestment due to racism and other forms of marginalization, creating social, health, environmental, and economic inequities. Weaving this focus area throughout the Framework strategies ensures that climate adaptation work acknowledges and addresses historic and current inequities, equitably involves underserved and overburdened communities in developing and implementing resiliency efforts across all sectors, and allocates equitable investments and resources through decision-making processes.

Through Goal #3, the fellow will work with the mentors and Framework sector group co-leads to ensure that the JEDI principles, strategies, and approaches outlined in the Framework are implemented across resources-based economy activities. The fellow will ensure JEDI principles are applied in strategy plan development and implementation, in any tool or technical assistance dissemination, and visible in any assessments. The fellow will also ensure that the sector groups and ARWG are made aware of JEDI concerns identified in the populations or geographic areas of focus for the natural resources and fisheries assessments undertaken during the fellowship.

Related to Goals #1 and #2, CCS and FABS recognize the inherent diversities that exist between fisheries and the communities that rely upon natural resources-based economies across the coastal zone. Maryland fishing communities have differing capacities to adapt in their fisheries depending upon multiple JEDI-related considerations including socioeconomic factors. The project team would like to explore how the project goals can consider JEDI principles in future fisheries adaptation approaches.

6. Fellow Mentoring

The fellow will become an integral member of, and represent, the MDNR CCS and FABS Units. Due to COVID-19 there are many differences in our workplace than existed two years ago. From a mentoring perspective, the MDNR team recognizes that for new professionals in the fellowship program, starting a new role in a telework environment can be challenging, especially for those that may also be relocating from another state. The mentor and project team wish to convey their recognition that not everyone works the same way in a virtual or hybrid environment and that networking and project development can be more challenging. The team is committed to establishing practices and work patterns to encourage success and expects a fellow to share a

similar perspective - that the ultimate success of the project depends upon the team's collective ability and commitment to continually improving communication and providing support. Additional details about telework and how the MDNR team plans to foster the fellow's integration into the organization and participation in other projects and work with the FABS and CCS Units are provided in the "Office Environment" section.

The fellow will be mentored by a team of cross-Unit program staff from CCS and FABS. The group includes mentors Tammy O'Connell (a Program Manager in the Legislative & Regulatory Review section of FABS, Goals #1 and #2) and Allison Breitenother (a planner staffing the ARWG in CCS, Goal #3). Catherine McCall (CMP lead in CCS, serving as supervisor), Sarah Widman (Division Manager in FABS), and Angel Wiley (Coastal Fisheries Program in FABS) will also be engaged in this project.

7. Office Environment

Maryland is currently hosting a 2020-2022 Coastal Management Fellow who relocated, onboarded, and is completing their project in a completely telework environment with some in-person site visits. MDNR looks forward to potentially welcoming a fellow to advance this work regardless of any changes to our working status come August 2022. Simple things like virtual "walks down the hall" to meet colleagues or participation in CCS' weekly "coffee and trivia hour" provide connections during the workweek. The team would ensure that introductions with key project partners occur whether virtually or in person.

Telework/Hybrid Work Week. As of Fall 2021, the MDNR is operating in 100% telework status with flexibility for staff to attend site visits (e.g. field work, community meetings) that are part of their work, and access the main office building - in Annapolis, Maryland - as needed (e.g. for IT, printing). A fellow would follow the same procedure as staff and Annapolis would be considered their primary work location. Current return to work discussions indicate that if and when the MDNR moves from 100% telework staff would likely assume a hybrid schedule. For most this would likely be 3 days telework, 2 days office/field. There is not currently a timeline for migration to a new schedule and if the proposal is accepted, updates would be provided to candidates at the matching workshop and thereafter.

Project Coordination Meetings. The CCS and FABS groups with whom this fellow would work periodically meet in person to catch up on projects and plan work and routinely check in virtually. The mentor-supervisor-fellow team would jointly develop a preferred project coordination and check-in schedule that works for all team members to keep everyone engaged and the project progressing.

In-person Opportunities and Networking. Both CCS and FABS lead programs and initiatives that have a plethora of field work. Where a fellow has interest, the MDNR team would connect the fellow with field work and site visit opportunities. While not all of these activities would directly relate to the project, the team believes that as telework continues these events would offer regular opportunities for the fellow to meet in person with Unit colleagues and other MDNR team members to build rapport, acquire additional skills, learn about work in other coastal areas, and network. The CCS would provide a budget for both project-related travel and these other types of MDNR/state field opportunities. The fellow may also be able to utilize the state pool car system that provides vehicles for work-related activities.

Workspace, Technology, Virtual Collaboration. An office workspace in the Tawes state office building would be set aside for the fellow with a desk and phone line equipped with a VOIP system. The CCS will provide the fellow with a state laptop, email account, and access to shared office building printers and copiers. MDNR utilizes the Google platform and staff routinely use Google Meet and other Google suite products for collaboration (i.e. Docs, Sheets, JamBoard, Drive). The fellow will be set up with a state ID to gain access to parking facilities and state buildings. For at home telework, the fellow would be expected to use their state

laptop. The CCS would provide a budget for select remote work items such as an external mouse/keyboard, office supplies, and headset. The CMP will commit some limited, additional travel and training funds above and beyond what will be provided through the fellowship.

Project Networking. FABS staff work across multiple programs and with different management partners and constituent groups on fisheries management. Networking opportunities for that aspect of the project would include work with species/fisheries managers, the MAFMC, the Mid-Atlantic Regional Council on the Ocean (MARCO), the Atlantic States Marine Fisheries Commission, and MDNR advisory bodies and constituent groups. For the ARWG-related aspects of this fellowship project, opportunities for networking exist across state agencies such as Departments of Commerce, Environment, and Planning and across the University system.

8. Project Partners

This project aims to bridge climate resilience and natural resources-based economies. The CMP proposes this project in close alignment with the state's FABS Unit. Several management agencies, organizations, and other partners are working on various aspects of fishery management and climate resilience. At the regional level, for example, MARCO is involved in ocean acidification and shifting species work. The MAFMC is working on an East Coast Climate Change Scenario Planning Initiative where "fishery scientists and managers are working collaboratively to explore jurisdictional and governance issues related to climate change and shifting fishery stocks.¹" The NOAA Chesapeake Bay Office is supporting research on climate impacts on fisheries. Within the state, the Framework outlines opportunities for partners across the state to address climate and natural resources-based economies. The Maryland Coastal Bays Program has been working to complete a Climate Change Vulnerability Assessment. These organizations are regular partners of CCS and FABS and staff will work to connect the fellow into related discussions with them. The work being undertaken by these organizations will provide a solid foundation for this project to address the gap of adapting Maryland fishery management for future climate changes.

9. Cost-Share Description

The CCS will provide the 2-year \$15,000 fellowship match, likely in the form of 50:50 federal and non-federal fund sources. Due to recent changes the Unit may need to enter into a contract with the fellowship partner organization to be able to more easily transfer the cost share match.

10. Strategic Focus Area

Advancing climate adaptation work around fishery management and natural-resources based economies directly supports the strategic focus areas of healthy coastal ecosystems and resilient coastal communities. Where coastal economies and industries, like fisheries, rely upon healthy coastal ecosystems it is critically important to build resilience into management approaches to sustain these economies under future climate conditions. This fellowship proposal was developed to advance state Adaptation Framework priorities and complement CCS' and FABS' work utilizing the best available science in coastal and resource management and policy development. Understanding the scope of climate impacts facing the state's fisheries and natural resources-based economies will allow CCS and FABS to develop options to adapt practices and policies to reduce climate impacts and track progress over time.

Through this fellowship, the project team hopes to find ways to meaningfully engage natural resources-based industry and management partners to discuss climate risks and explore solutions to build a more resilient future. Targeted assistance and discussions with vulnerable communities or populations will increase the collective understanding of JEDI issues that face natural resources-based economies and foster mechanisms to develop meaningful solutions for all.

¹ <https://www.mafmc.org/climate-change-scenario-planning>