Chesapeake Bay Non-Tidal Wetlands Communication Strategy

A project submitted in partial fulfillment of the requirements for the degree of Master of Science School for Environment and Sustainability at the University of Michigan- April 2025

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MEET OUR TEAM

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EXECUTIVE SUMMARY

The Chesapeake Bay Watershed spans 64,000 square miles across six states (New York, Pennsylvania, West Virginia, Maryland, Delaware, Virginia), as well as the District of Columbia. As the largest estuary in the United States, the watershed is home to a range of different ecosystems, from forests to both freshwater and saltwater wetlands. The Chesapeake Bay Program was founded to address the pollution and degradation of these ecosystems and focuses on restoring and enhancing vital habitats, like wetlands. The Wetlands Workgroup aims to restore and enhance both the tidal and non-tidal wetlands of the Chesapeake Bay region through goals, such as improving mapping, addressing barriers to restoration, and expanding local stakeholder involvement. Despite 86% of wetlands in the region being non-tidal wetlands, as compared to tidal, non-tidal wetlands are under-discussed and under-prioritized when it comes to restoration and enhancement projects in the region.

This research is focused on understanding current perceptions of non-tidal wetlands, identifying barriers to communication and participation in restoration projects, and developing a targeted strategy to better engage local stakeholders. There are two main phases of this research project: a comprehensive literature review and semi-structured interviews with local stakeholders. The literature review investigated three key elements to non-tidal restoration and preservation including policy, communications and ecosystem science. The semi-structured interviews focused on engaging stakeholders for the region primarily in D.C, Maryland, and Virginia. These stakeholders consisted of representatives from federal, state, and local governments, as well as nonprofit organizations and the private sector. Based on the findings from these interviews, eight key themes were identified which explored topics related to the three contexts used in our literature review: current state of the Bay, legislative and regulatory background, barriers and challenges, current public perceptions, communication channels, engagement strategies, messaging content, and ideal future.

Recommendations are focused on improving communication around non-tidal wetlands, increasing community engagement, using funding opportunities efficiently, and encouraging policy alignment to ecological and community needs. Achieving an ideal vision for the Chesapeake Bay Watershed requires a collaborative, cross-disciplinary approach to increasing communication, policy-making, and ecosystem restoration. By harnessing community identity around the Bay and emphasizing the link between community well-being and healthy wetlands, the Chesapeake Bay Program can foster a collaborative path forward for the watershed.

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List of Acronyms

ACE - America's Conservation Enhancement Reauthorization Act (2024)
BMP - Best Management Practices
CBCR - Community-Based Conservation and Restoration
CBP - Chesapeake Bay Program
Chesapeake WILD - Chesapeake Watershed Investments for Landscape Defense Act (2020)
CWA - Clean Water Act (1972)
EPA - Environmental Protection Agency
FEMA - Federal Emergency Management Agency
HOA - Homeowners Association
IIJA - Infrastructure Investment and Jobs Act (2021)
IRA - Inflation Reduction Act (2022)
LC/LU - Land Cover/Land Use
NAWCA - North American Wetlands Conservation Act (1989)
NFIP - National Flood Insurance Program
NGO - Non-Governmental Organization
SDM - Structured Decision-Making
SWCD - Soil and Water Conservation District
TMDL - Total Maximum Daily Load
UVVR - Unvegetated-Vegetated Ratio

INTRODUCTION

Background & Context of the Chesapeake Bay

The Chesapeake Bay watershed spans 64,000 square miles and is home to more than 18.5 million people across six different states (New York, Pennsylvania, West Virginia, Maryland, Delaware, Virginia) and the District of Columbia. The watershed also comprises 150 major rivers and streams and 11,684 miles of shoreline making it the largest estuary in the United States (Chesapeake Bay Program, 2025). The Chesapeake Bay is currently threatened by several complex issues such as excess nutrients and sediment, invasive species, pollution and runoff, and a changing climate. The region has a wide variety of landscapes and ecosystem types such as estuaries, forests, and both freshwater and saltwater wetlands. Each wetland type contains distinct geographical profiles requiring specialized attention in protection and restoration efforts. With the large scale of the watershed in mind, hundreds of organizations, governments, academic institutions, and agencies serve as regional partners of the Chesapeake Bay Program (CBP) working to restore and conserve resources in the Bay. The multi-agency collaborative work is guided by goals laid out in the 2014 Chesapeake Bay Watershed Agreement that was later amended in 2022. Some of the main goals of the agreement focus on creating sustainable fisheries, conserving vital habitats, improving water quality, reducing toxic contaminants, promoting healthy watersheds, increasing local stewardship, increasing land conservation, increasing public access to the Bay, improving environmental literacy, and building climate resilience (Chesapeake Bay Program, 2022).

Role of the Chesapeake Bay Program (CBP)

The CBP was founded in 1983 to address the pollution and degradation impacting the Bay at the time and has continued this focus by establishing pollution limits, such as the Total Maximum Daily Load (TMDL), and agreements, such as the 2014 Chesapeake Bay Watershed Agreement (Chesapeake Bay Program, 2022). A focus of the Agreement is to restore, enhance, and protect the vital habitats of the Bay, including the 85,000 acres of tidal and non-tidal wetlands and enhance the function of an additional 150,000 acres of degraded wetlands (Chesapeake Bay Program, 2022).

The sponsoring organization (herein referred to as the client) of this Master's Project is the Wetlands Workgroup within the CBP. The Workgroup is composed of members from federal, state, and local government agencies, as well as non-profit organizations and academic institutions, who meet monthly to discuss and address wetland restoration goals (Wetlands Workgroup, 2025). The mission of the Wetlands Workgroup focuses on restoring and enhancing both tidal and non-tidal wetlands throughout the watershed. This workgroup was established by the CBP to address the 'vital habitats' goal of the Watershed Agreement. Their restoration efforts focus on providing benefits to species that are dependent on high-quality wetland habitats and improving water quality. The goals and actions of this workgroup are shared within their Wetlands Logic and Action Plan which is updated and published on their website on a bi-annual basis. The current version of this plan details six management approaches that they would like to achieve by the end of 2024. These management approaches describe goals geared towards improving wetland mapping and tracking, addressing barriers to wetland restoration, increasing technical understanding of factors influencing restoration and enhancement success, prioritizing

areas for wetland restoration, expanding the involvement of local stakeholders, and promoting funding for projects (*Wetlands Logic and Action Plan 2023-2024*, 2023).

Need for the Project and Main Objectives

The CBP has proven to be a successful regional partnership, with positive conservation influence across the watershed. However, wetlands continue to be at risk of degradation and loss. The Wetlands Workgroup recognizes that low public awareness of wetlands to humans and to ecosystem integrity is a contributing factor to wetland decline. In light of that issue, the clients recognize the need for a "strategy and materials to communicate complex wetland issues to the general public in order to garner engagement and support by local governments and their communities for Chesapeake Bay wetland protection and restoration" (Lawal, 2023). As a result of the Workgroup's need, **this project's main objective was to create a non-tidal wetlands communications strategy directed at local governments and their constituents** that bolsters the CBP Wetlands Outcome goals of restoring and creating 85,000 acres of wetlands and enhancing the ecosystem services for 150,000 acres of wetlands for the broader aim of improving water quality and habitat in the watershed (*Wetlands Logic and Action Plan 2023-2024*, 2023).

> *"But the public doesn't necessarily understand the value that wetlands bring. A lot of people are trying to get that message out, but you know, not everybody in class is paying attention. And that just means we have to redouble our effort. We have to talk more about it."*
> **-Restoration Ecologist from Maryland**

Wetlands can be divided into two broad categories: tidal and non-tidal. Tidal wetlands are influenced by the changing tides and are saline or brackish, compared to non-tidal wetlands that are found in and along freshwater creeks, streams, ponds, lakes, and upland regions and have no tidal influence. While non-tidal wetlands account for 86% of the wetlands in the Chesapeake Bay, tidal wetlands receive more focus in Chesapeake Bay restoration and resilience projects (Wetlands Workgroup, 2025). The research presented focuses on current perceptions surrounding the restoration and protection of non-tidal wetlands. **Specific goals to support the wetlands communication strategy objective included:**

(1) identifying knowledge gaps in ecosystem science, policy, and communication of non-tidal wetlands through a systematic literature review and
(2) gathering perspectives from stakeholders directly affected by wetland policies in the region through semi-structured interviews, and
(3) developing recommendations for effective strategies to engage local stakeholders and how to effectively communicate the importance of restoring and conserving non-tidal wetlands.

These goals will aid the CBP and its Wetlands Workgroup in their engagement with stakeholders, to better inform community and government involvement in non-tidal wetlands science and management. Throughout this process of working to achieve Wetlands Logic and Action Plan goals, this research will also help the CBP to more broadly achieve the multitude of goals and outcomes mentioned above from the Chesapeake Bay Watershed Agreement and more specifically those relating to Stewardship, Public Access, Environmental Literacy and Healthy Watersheds (Chesapeake Bay Program, 2022).

Research Questions

CBP Background: Who is the Chesapeake Bay Program and what do they do?

- What are the main goals of the CBP/Wetlands Workgroup?
- How do they work towards achieving these goals and monitoring progress?

Legislative Background: What is the current state of legislation and regulation of the Bay and its non-tidal wetlands?

- What are current protections in place for wetlands (local, state, federal)?
    - How might these differ across different states/regions of the Bay?
- What are some key cases that have altered the way that wetlands are protected/restored?
- How could collaborative governance be utilized/improved in the watershed?
- What policy gaps exist in the protection of wetlands?

Current State of Chesapeake Bay: What is the overall assessment of the health of the Bay?

- How are the wetlands changing over time ecologically?
- What are some of the larger/significant threats to the wetlands?
    - How are these threats approached when thinking about the long-term health of wetlands?
- Where are current protection and restoration efforts being focused?
- Where and how is data collected regarding wetlands in the Chesapeake Bay?

Ecological Understanding of Chesapeake Bay: What is the current state of ecological understanding of the Bay?

- What are some of the significant native flora and fauna around the Bay?
- How will the ecological constraints of the Bay change over time as the impacts of climate change increase in frequency and duration?
- Why are healthy wetlands important to the broader ecosystem?
- What are the ecosystem services and other co-benefits that wetlands offer?

Successes and Progress: What makes a project successful in restoration & conservation?

- What are some examples of when wetland projects have succeeded?
- What aspects of a project make it successful?
- How is long-term success measured and monitored?
- How can models of success be replicated?

Engagement: How is engagement currently being approached and how can it be improved?

- How do local and community stakeholders currently perceive and feel about the Chesapeake Bay and wetlands?
- Where is the largest disconnect between scientists/managers and the community in terms of acknowledging the importance of wetlands?
- What are some limitations/barriers that are preventing effective and urgent action in restoring and conserving wetlands?
- What are ways in which public engagement could positively impact the health of the watershed and aid in reaching the CBP and the Wetlands Workgroup's short and long-term goals?

- What role do community members currently play in restoration and conservation efforts?

Effective Communication: How can the CBP improve their communication strategies with communities of the Bay?

- What are effective strategies for communication about wetlands?
- What channels of communication are most effective for engaging with different Bay communities?
- What information is most important to relay regarding wetlands?
- What sort of information gaps about wetlands exist throughout Bay communities?

Envisioning: What would the community like to see for the future of the Bay?

- What do residents of the Chesapeake Bay want to see the Bay look like in the future?
- What are some actions that can be taken to achieve this vision?
- What does adequate and active engagement between the community and the CBP/Wetlands Workgroup look like?

RESEARCH METHODS

This research on developing a communication strategy for wetland conservation and restoration efforts in the Chesapeake Bay followed a structured, multi-phase approach designed to comprehensively assess the ecological, political, and social dimensions influencing wetland management. Each phase of this approach—**site visit, literature review, stakeholder mapping, interview development, semi-structured interviews, stakeholder group reassessment, and data analysis**—built upon the previous one, ensuring a robust methodology that effectively integrated both qualitative and quantitative insights.

Phase 1: Site Visit

Figures 1 (top left), 2 (top right) and 3 (bottom): Pictures from the research site visit to Annapolis, Maryland. Figure 1 shows the Blackwater National Wildlife Refuge visitor information center. Figure 2 features a living shoreline project in Annapolis. Figure 3 shows members of the research team at the living shoreline site.

In June 2024, the CBP and US Fish and Wildlife Service provided the opportunity for the research team to travel to Annapolis, Maryland and tour the Chesapeake Bay region, gaining first hand experience with the Bay and wetlands. A few team members toured Blackwater Wildlife Refuge, where a wetland manager discussed key issues that the refuge is facing as well as current education and outreach strategies used at the refuge. Additionally, the team attended a CBP Non-Tidal Wetlands Workgroup meeting to understand Workgroup processes, meet with members, and discuss the project in person. The trip provided the team with *pivotal knowledge* and *first-hand experience* with the Bay that was foundational to how the team proceeded with the research methods and questions.

Phase 2: Literature Review

The second phase of research involved an extensive literature review, which served as the foundation for understanding of wetlands in the Chesapeake Bay (**Appendix A**). The team systematically reviewed academic papers, government reports, and case studies to develop a comprehensive knowledge base on the **ecological functions of wetlands**, their role in watershed health, and the existing regulatory frameworks governing their protection. A particular focus was

placed on **non-tidal wetlands**, which, despite their ecological importance, receive less attention than their tidal counterparts in the Bay literature. Wetlands play a crucial role in nutrient filtration, flood mitigation, groundwater recharge, carbon sequestration, and biodiversity conservation, making their restoration and protection an essential component of Chesapeake Bay's broader conservation efforts.

In addition to ecological considerations, the literature review explored the **policy landscape surrounding wetlands**, assessing the effectiveness of TMDL laws, wetland permitting regulations, and federal and state-level conservation initiatives. The team identified key barriers to implementation which informed the questions later posed to policymakers and wetland managers during interviews. Furthermore, the team investigated stakeholder engagement strategies by reviewing case studies on community-based conservation and restoration (CBCR) efforts. These studies discussed both successes and persistent challenges in mobilizing local communities to participate in wetland conservation initiatives.

Another component of the literature review involved analyzing **communication strategies employed in wetland conservation efforts.** Effective environmental communication is essential in bridging the gap between scientists, policymakers, and the general public. The team reviewed research on public outreach, environmental messaging, and information accessibility, focusing on the barriers that prevent meaningful engagement with conservation issues. This examination provided valuable insights into how different stakeholders perceive and interpret wetland science, guiding the project's approach to interview development and stakeholder mapping.

Phase 3: Stakeholder Mapping

Given the complexity of wetland management in the Chesapeake Bay, the next step in this research involved conducting a stakeholder mapping exercise to identify key actors involved in conservation efforts. This process allowed for categorization of stakeholders based on their level of influence, responsibilities, and perspectives on non-tidal wetland issues. The project aimed to gather diverse viewpoints to ensure a comprehensive understanding of the challenges and opportunities in wetland restoration.

Initially, stakeholders were categorized into five primary groups: **state/local government officials, CBP members, wetland managers, private sector representatives, and landowners/residents**. Local government officials were a critical group because they are responsible for land-use planning, stormwater management, and regulatory compliance, all of which directly impact wetland conservation efforts. CBP members included scientists, policymakers, and program coordinators who contribute to wetland restoration initiatives through research, policy advocacy, and funding allocation. Wetland managers, often biologists or restoration specialists, play a key role in implementing conservation projects and monitoring wetland health. The private sector category included businesses involved in agriculture and environmental consulting sectors that have significant influence over land-use decisions and conservation efforts. Finally, landowners and residents were included as a key stakeholder group because their cooperation and understanding of issues are essential for conservation initiatives to be successfully implemented on private lands and widely accepted in communities.

This initial mapping exercise led to development of an engagement strategy tailored to each group and helped determine which stakeholders would be the most valuable to interview and what types of questions would be most relevant for each group. Furthermore, it ensured that

the research captured perspectives from a wide range of individuals, from policymakers and scientists to community members directly affected by wetland health and management.

Phase 4: Interview Development

Based on the study's core research questions, clusters of interview questions were developed to address each research theme. First, a broad set of interview questions were developed that could be asked across multiple stakeholder groups (**Appendix B**). These questions were designed to uncover perspectives on wetland conservation, policy effectiveness, communication strategies, and stakeholder engagement. In addition, different clusters of questions were interwoven for each interview to target the expertise and experience of each participant (also called interviewee in this report) through a loosely structured interview guide (**Appendix C**). This allowed the interviews to be semi-structured where key themes and topics were addressed while allowing flexibility to follow-up on respondent's answers.

For local and state government officials, the interview guides focused on their jurisdiction's approach to wetland conservation, policy enforcement, and interagency collaboration. Federal government employees were questioned about the effectiveness of federal legislation, program implementation, and initiatives. Chesapeake Bay Program members were asked about the program's goals, successes, and areas in need of improvement, particularly in relation to wetland restoration. Wetland managers in both the public and private sector were questioned about the technical aspects of wetland restoration, including the challenges of project implementation and monitoring effectiveness. Private sector representatives were asked about their organization's purpose, relevance to wetland conservation, and perspectives on for-profit environmental consulting. Landowners and residents were engaged in discussions about the economic and practical impacts of wetland conservation on their properties, as well as their experiences with local conservation programs. Each group was then asked about their vision for an ideal future of the Chesapeake Bay in terms of ecosystems and communities as well as how they interact with each other.

Phase 5: Semi-Structured Interviews

After submitting the research proposal to the University of Michigan Institutional Review Board, this study (HUM00260585) was approved on September 17, 2024. Initial participant prospects were identified through existing partnerships and collaborations that the Chesapeake Bay Program has with other entities. As interviews progressed, participants were asked at the end of each interview if there were other individuals that they would recommend for the study resulting in a snowball sampling approach. These recommended individuals were then contacted to assess interest in participation.

Outreach to assess interest in participation among identified prospects was primarily conducted through direct emails, although website contact forms and phone calls were used for some participants. Through these communications, interested prospects were directed to sign up for available interview time slots using Calendly appointment scheduling software. All outreach communications with prospects were conducted between November 8, 2024 and February 10, 2025. In total, 79 individuals were contacted for the study. Individuals were initially contacted up to three times if a response was not obtained after the first request. Of the 79 that were contacted: 32 individuals participated in interviews, 4 individuals declined to participate, and 43 individuals did not respond. Of the 32 individuals who participated in interviews: 21 were from Maryland, 8

were from Virginia, 1 was from the District of Columbia, 1 was from Pennsylvania, and 1 was from Massachusetts (**Figure 4**).

Interviews were conducted via video conferencing (Microsoft Teams) by pairs of the five research team members, beginning on November 15, 2024 and ending on February 18, 2025. At the commencement of each interview, participants were verbally read a statement by the interviewer explaining the purpose of the interview and how the transcription data and recording files from the interviews would be managed and stored throughout the duration of the study. Participants were also notified that they could withdraw their consent from the study at any time. Participants were then asked for their verbal consent to participate. Each interview ranged from 27 minutes to 73 minutes and participants were asked between 8 and 30 questions during the interview. The general structure of each interview began with asking each participant about their background and relation to the study topic, then moved through different research theme questions from the interview guide based on their backgrounds, and ended with asking for their ideal envisioned future for the Chesapeake Bay. At the end of each interview, the interviewer asked for permission to reach out to the participants with any follow-up questions or for permission to use direct quotes in this report.

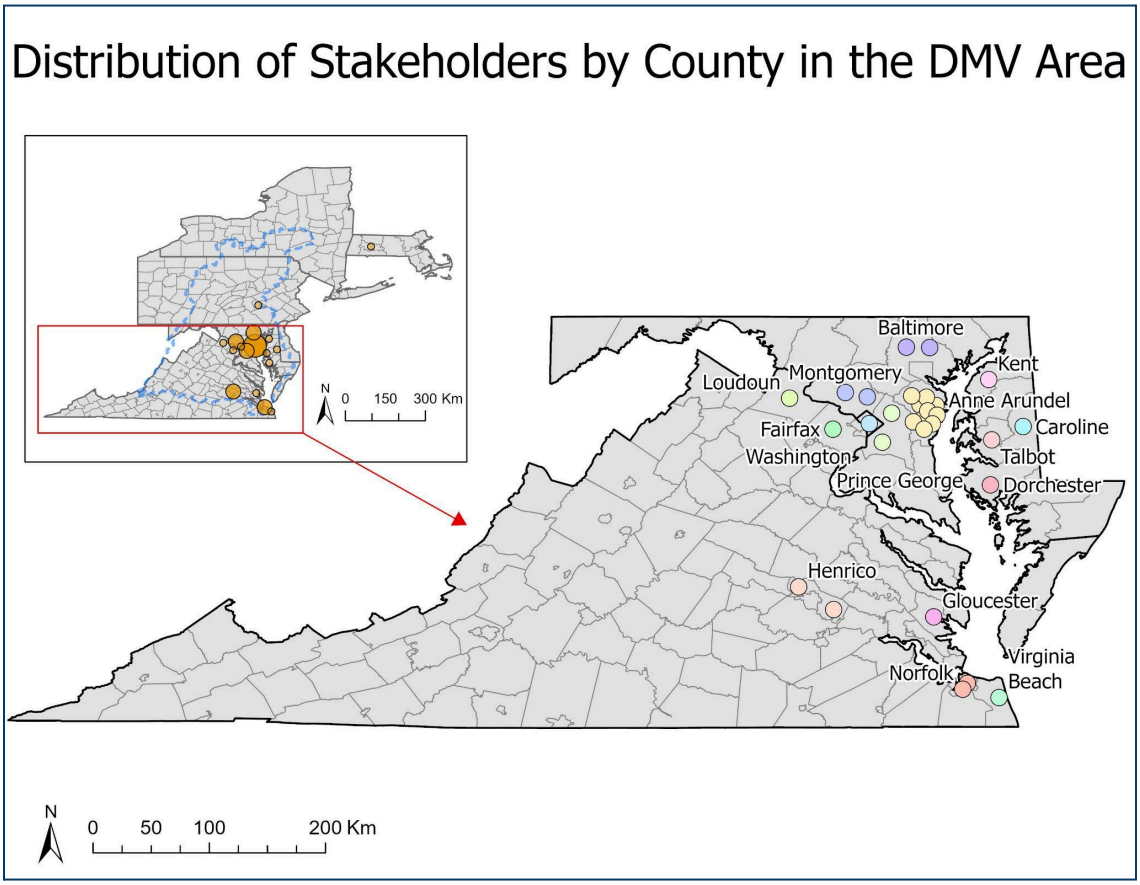

Figure 4: Map of interview participants' locations within the Chesapeake Bay Watershed. Symbol colors (main map) correspond to individual counties where stakeholders were interviewed. Symbols in the inset map correspond to the number of interviewees per county, with larger circles indicating a greater number of participants. The extent of the Chesapeake Bay Watershed is outlined in blue (inset map). Data sources: U.S. Census Bureau (state and county boundaries), Chesapeake Bay Program (watershed extent), project interview data (stakeholder locations).

Phase 6: Stakeholder Group Reassessment

Following the completion of interviews, the team recognized that initial stakeholder classifications did not fully capture the roles, responsibilities, and perspectives expressed by the participants. Many participants operated across multiple stakeholder categories, while others held perspectives that challenged the boundaries of the original groupings. In response, stakeholder classifications were reassessed and reorganized to better reflect the real-world relationships and interactions shaping wetland conservation efforts. Through this reassessment, four primary stakeholder sector groupings were identified that best represented the individuals and organizations influencing wetland conservation: **Federal Government Agencies, State and Local Government Agencies, Nonprofit Organizations, and Private Organizations**. This included drawing out a 'results matrix' which organized responses by the new sector groupings to look for similarities in responses among sectors (**Appendix E**).

The Federal Government Agencies stakeholder sector group includes individuals from national regulatory bodies and agencies responsible for enforcing environmental laws, managing federally protected wetlands, and providing funding for conservation initiatives. These agencies play a significant role in shaping broad conservation policies, implementing national-level programs, and in working with state and local agencies to address regional wetland issues. Their authority extends to setting and enforcing legal requirements for wetland protection, coordinating large-scale restoration projects, and conducting ecological monitoring.

State and Local Government Agencies oversee the direct implementation of wetland conservation programs at the state, county, and municipal levels. These agencies are responsible for enforcing environmental regulations, managing permits, funding restoration projects, and collaborating with federal agencies and local communities. They also play a critical role in integrating wetland conservation efforts into broader land-use planning, stormwater management, and climate resilience strategies. Local governments, in particular, engage closely with community stakeholders, balancing conservation objectives with development and economic concerns. Both these levels of government agencies are deeply entrenched in the needs of their constituencies, and involve professionals in a myriad of disciplines related to the Bay.

Nonprofit Organizations play a vital role in wetland restoration and advocacy, education, and community engagement. These organizations contribute to wetland conservation, bridging the gap between science, policy, and outreach in a multifaceted way. Nonprofits are incredibly diverse and often provide technical assistance to landowners, advocate for stronger wetland protections, and lead educational initiatives to raise public awareness. Additionally, many nonprofits work in partnership with government agencies and research institutions, facilitating the implementation of conservation programs and ensuring that local communities are actively involved in decision-making processes.

Private Organizations and companies related to environmental conservation also provide technical assistance to landowners, develop and implement restoration plans, and conduct long-term monitoring and outreach. Though not every private organization affiliated with one of the participants was in the environmental sphere, the project considered any organization or company which generates a profit to be in the private sector. The private sector is essential to the restoration and conservation landscape, as private companies often have more funding and capacity to start and maintain projects, and are less constrained by public program stipulations and rules.

While these four stakeholder sectors represent the primary actors in wetland conservation, engagement groups were also identified that classify the types of people and

organizations each stakeholder group regularly interacts with. Engagement groups do not function as decision-makers themselves but instead represent the key audiences, partners, and affected communities involved in wetland conservation efforts. Engagement groups include **Local Governments, State Governments, Federal Government, Tribal Governments, Non-Governmental Organizations (NGOs) and Nonprofits, Farmers and Landowners, and the General Public**. These groups play a crucial role in shaping how conservation policies are received, understood, and implemented. Tribal governments bring cultural and historical perspectives to wetland stewardship, often advocating for conservation strategies that align with Traditional Ecological Knowledge and Indigenous Knowledge. Farmers and landowners are frequently the direct managers of wetland-adjacent lands and must navigate conservation regulations while maintaining agricultural productivity. The general public, meanwhile, consists of citizens, advocacy groups, and local communities who may be affected by wetland policies or engaged in grassroots conservation efforts. Interacting and engaging with the public is crucial, as the public has a large impact on the health of the watershed.

Understanding these engagement structures provided valuable insight into *how communication flows between stakeholders, where gaps in outreach exist, and how future conservation efforts could be more effectively tailored to different audiences*. For example, while federal agencies primarily engage with state and local governments and scientific institutions, local governments interact more frequently with community organizations, nonprofits, and private landowners. Both governmental and non-governmental entities collaborate with research institutes to ensure that scientific findings inform conservation decisions, while nonprofits and private organizations act as key intermediaries that translate scientific and policy information into actionable strategies for communities.

Reassessing stakeholder groups allowed the team to refine the analytical framework and ensure that findings were structured around the actual dynamics of wetland conservation efforts. By restructuring stakeholder groups and identifying the engagement networks that connect them, this research's applicability and impact was strengthened, ensuring that the findings would be useful not only for understanding the current state of wetland conservation but also for informing future strategies to improve collaboration, outreach, and policy implementation.

Phase 7: Data Analysis

In preparation for the qualitative analysis portion of the interview process, Microsoft Teams' automatic transcription and meeting recording features were used. At the conclusion of each interview, research team members manually corrected any mistakes made by the Microsoft Teams transcription software by comparing the documents to the recorded video files. Next, transcripts were de-identified to anonymize each participant and uploaded to NVivo 15, a qualitative data analysis software, where each transcript was coded based upon pre-determined and emergent codes developed from the main research themes of this study (**Appendix D**). Sections of interviews which related to one or more codes were highlighted and assigned to that code in the software. Once every interview was coded, every highlighted passage for each code was listed in respective documents and exported from NVivo for analysis. Each code summary document was grouped with like codes and analyzed based on its broader topic or theme. Within each theme and code, the frequency of responses which connected back to major research themes and questions were calculated. The results of the response frequencies were combined under each theme and synthesized with the completed literature review to develop and inform the recommendations.

During the qualitative analysis, the team also pulled out relevant and impactful quotes from coded passages which encapsulate the major results and themes of the project. After prominent quotes were pulled out and identified, the participants were asked for permission to include them, either anonymously or not, in the final report and presentation.

RESULTS

It is important to note that not all interview participants were asked about every research theme directly. Therefore, the analysis identifies how many individuals discussed these themes, whether prompted by specific questions or mentioned spontaneously, and the various ways in which these themes were addressed. Additionally, while participants sometimes discussed wetlands in general, they were informed that the project pertains specifically to non-tidal wetlands. Within this framework, the insights pertain to non-tidal wetlands specifically, though broader discussions on wetlands in general have also contributed context to the findings.

Interviewee Sector Breakdown

After reassessing stakeholder groups, interview participants were categorized into the newly identified stakeholder sector groups based upon both their professional role and who they engage with the most in their work, respectively. Interviewees came from a diverse range of sectors, with most of the participants holding roles in State/Local Governments, and Nonprofits. Based upon role: 10 individuals work in Nonprofits, 13 individuals work in State/Local Government, four individuals work in Federal Government, and five individuals work in the Private sector (**Figure 5**).

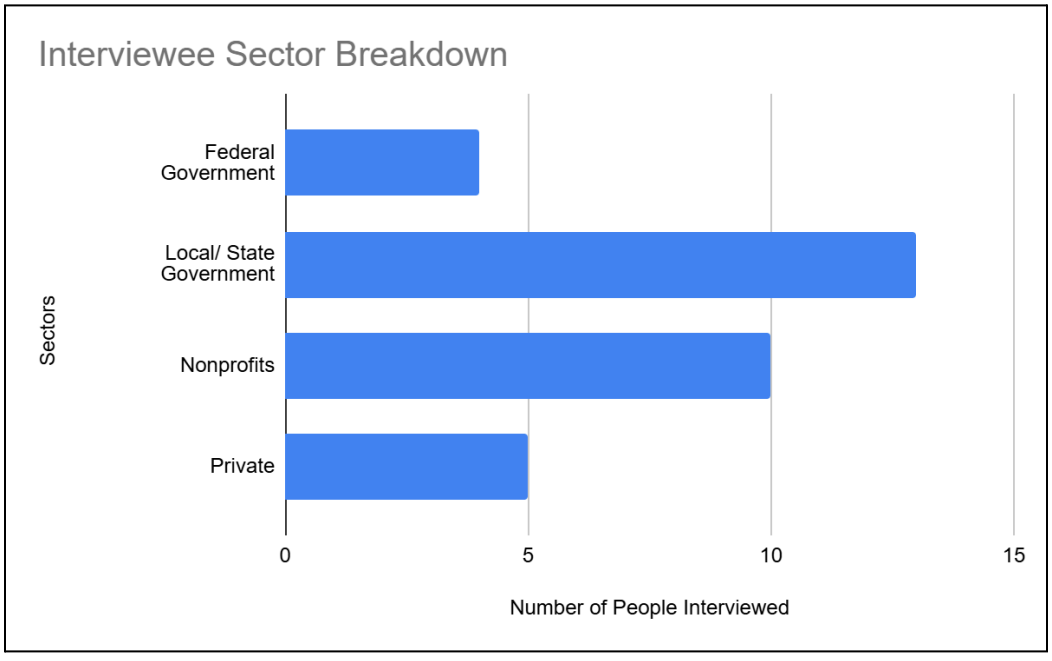

Figure 5: Breakdown of interview participants based on the primary stakeholder sector they work in.

The second portion of analysis focused on the groups that participants engaged with most frequently. Many participants reported engaging with more than one group, with some

participants falling into three or more categories. In total: 11 participants frequently engaged with Federal Government Agencies, 19 participants frequently engaged with State Government Agencies, nine participants frequently engaged with Local Government (City and County) Agencies, one participant frequently engaged with Tribal Government, 12 participants frequently engaged with Farmers/Landowners, 19 participants frequently engaged with Non-Governmental Organizations/Nonprofit Organizations, and 14 participants frequently engaged with the General Public/Community Members (**Figure 6**).

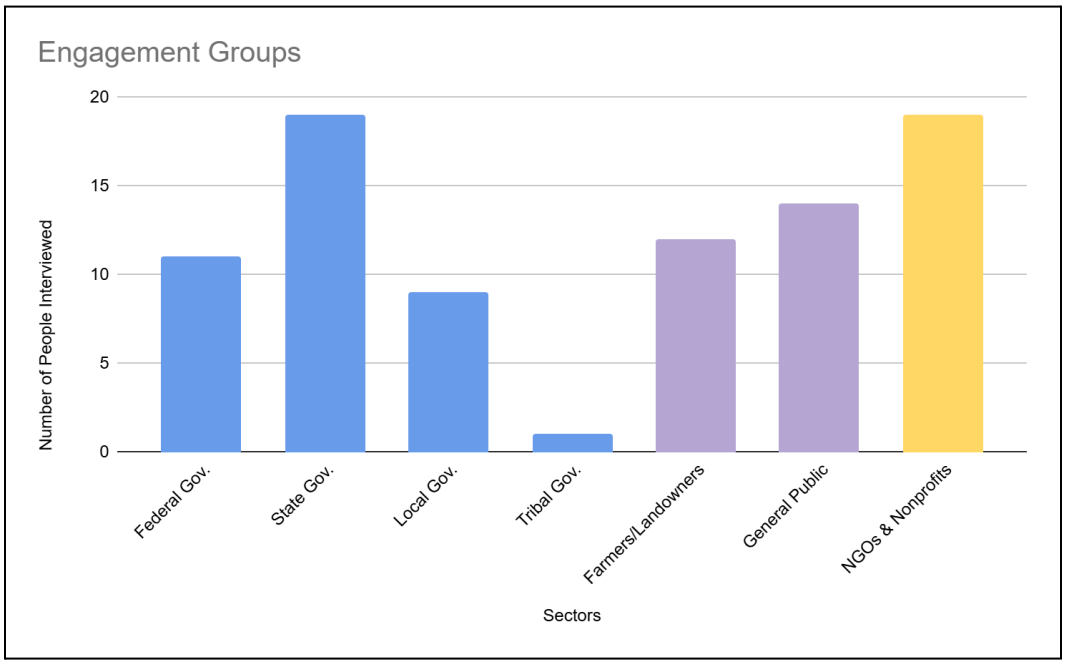

Figure 6: Breakdown of engagement groups that interview participants engage with in their work. Note: A single participant can engage in multiple groups or none at all.

Chesapeake Bay Program Purpose and Goals

Not all of the 32 participants had a relationship to the CBP, or were familiar with the Program. Familiarity with the organization varied depending on the role of the interviewee. Of the participants who were familiar with the CBP, four offered recommendations for improving the Program. Recommendations included widening the scope of the Program, reallocating money to increase funds for project implementation, increasing site/project visits, and contributing outreach to link good water quality with improvements in human quality of life. One participant referred to the CBP as "phenomenal." Two participants also noted the confusing structure of the organization, with regards to how the various stakeholders are organized and function together.

Of participants who were affiliated with the CBP, three mentioned difficulty meeting goals set by and for the organization, with two of those referring to the challenges in long-term tracking and monitoring wetlands. One participant noted that while there are challenges meeting CBP goals, they have also seen success in other areas. Five participants acknowledged how the goals outlined in the Chesapeake Bay Watershed Agreement (2014) shifted horizons to the more recent 'Beyond 2025' plan within that same framework as a work in progress and the hope for further advancement of wetland protection and restoration.

Current State of the Bay

A plethora of issues were mentioned regarding current ecological issues within the Chesapeake Bay watershed. Given the focus of this project, water quality and abundance was a prominent topic. 10 participants noted issues with water quality, six mentioned stormwater drainage or flooding problems, and five referred to the impacts of agricultural farming practices or runoff. Total loss of wetlands was another common theme, with six participants noting various practices that led to fewer wetlands in the Bay (**Figure 7**).

When discussing threats to wetlands within the Bay watershed, 12 participants emphasized development as a significant threat. Eight discussed climate change, with five of those responses also referring to marsh migration and saltwater intrusion associated with sea level rise. Other issues mentioned include habitat fragmentation (also associated with development), invasive species, disease, and subsidence of land.

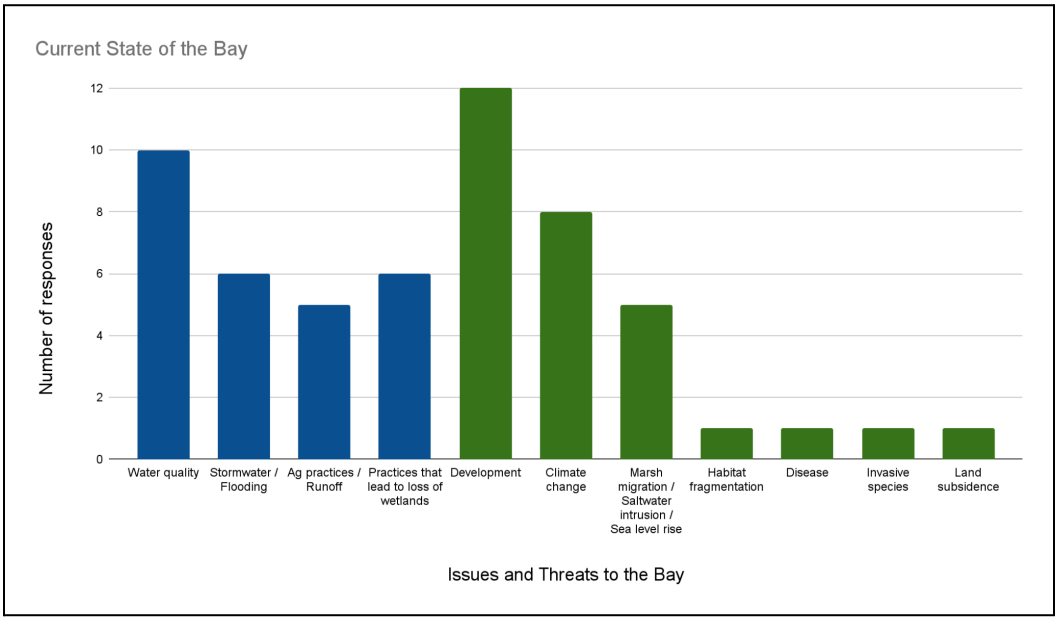

Figure 7: Responses from interview participants about the state of the Chesapeake Bay, including the number of comments about general current issues (blue) and threats (green).

Many of the participants reported that they had participated in restoration projects within the Bay watershed. Roles in this process ranged widely, and included positions such as consulting, project management, grant writing, grant reviewing, and community outreach. While this research focus was on non-tidal wetlands, various restoration techniques for wetlands and coastline were mentioned. Eight participants addressed restoration targeting streams and wetlands. Four participants discussed using predictive modeling for work on nutrient and sediment reduction, three noted work on nature-based flood mitigation, two noted shoreline stabilization and introduction of living shorelines, and two referred to bird habitat restoration, including the creation of islands for bird habitat. Six participants also discussed the routes through which they sourced funding for restoration projects, with federal, state, and municipal grants all playing a role.

Agricultural management techniques were a common topic of discussion as well, with three participants referring to organic and/or rotational farming as a management technique to

improve wetland quality, and three others noting the resistance of farmers to shift from traditional methods to more environmentally friendly practices. According to participants, funding in the agricultural sector comes from a variety of sources including conservation grants, government programs, and joint public-private partnerships.

When approaching environmental protection, some common themes presented themselves among various participants. Four participants noted the importance of targeting improvements to the health of ecosystems before targeting the wetlands specifically. This included improving upstream ecosystems before restoring wetlands. Three participants noted the importance of financial incentives to encourage land conservation. Three participants noted that landowners often hesitate to implement conservation practices without financial compensation, particularly if they anticipate monetary losses from conservation or restoration efforts. Landowners sometimes have other objectives in mind for a project, but are willing to incorporate restoration when it opens avenues for further funding such as grants.

Most participants noted the importance of wetlands to the Bay watershed and cited a wide variety of ecosystem services provided by these wetlands. Many individuals listed multiple different ecosystem services. Notably, 10 participants included habitat for biodiversity of animal and plant species, nine mentioned water filtration and improvement of water quality by wetlands, and seven discussed flood attenuation and stormwater abatement. Other noted ecosystem services included erosion control, human enjoyment and recreation, carbon sequestration, and economic benefit. One participant noted the usefulness of allocating economic values to these ecosystem services as a way to aid policymakers and stakeholders in decision-making processes.

Legislative and Regulatory Background

Many participants noted that they interact with wetlands policies and regulations as part of their profession, whether they are affiliated with a government entity or not. These policies can range from the local to federal level and from regulation to funding opportunities. Participants were asked about their experience with wetlands policies, any gaps they see in the current regulatory scheme, and recommendations for changes.

Federal, state, and local policies were all found to be important for wetland protection. Six participants emphasized the importance of federal policies. Four of these participants highlighted the Clean Water Act (CWA). The CWA was mentioned for both the regulatory protections of wetlands and the permitting processes it requires. However, two participants discussed that all policies, but particularly federal policies, are jeopardized with the outcome of recent Supreme Court cases, such as *Sackett v. EPA*, which limits what are defined as wetlands and which wetlands can be protected. Other federal policies more broadly related to habitat and wildlife protection were found to be important included the Magnuson–Stevens Fishery Conservation and Management Act and Endangered Species Act with one participant mentioning each, respectively.

Federal government policies were also found to be important for funding wetland protection projects. Eight participants discussed that federal policies are important for funding these projects. The Farm Bill in particular was an important piece of legislation to provide grant funding, with five participants raising this as the most critical piece of legislation for funding. One participant discussed the Inflation Reduction Act (IRA) and one participant also discussed the Infrastructure Investment and Jobs Act (IIJA) for funding as well. Seven participants emphasized that they rely heavily on federal grant funding to be able to execute their work.

However, there were concerns that the deprioritization of wetlands from the federal government (Supreme Court) could lead to less federal funding for wetland projects.

State and local policies were found to be important to fill in the gaps of regulatory protection that exist in federal policy. Five participants discussed the importance of state and local policies for protecting wetlands. Two of these participants focused on the gaps of the CWA permitting process and said that local policies regarding permitting were important. Others found that state and local policies were also crucial for funding. Three participants mentioned that much of their project funding comes from state or local grants.

Overarching opinions on the effectiveness of the current policies and regulations were mixed. While five participants found that current policies are effective in protecting wetlands, five participants also acknowledged that the effectiveness and compliance of these regulations greatly depends on the local and state capacity to enforce them. One participant mentioned that this effectiveness of compliance comes from the fact that there are multiple federal agencies overseeing the protection of the wetlands. Two participants thought that this varied effectiveness could come from a lack of staff to enforce compliance. One of these participants mentioned that the varying state laws can impact the compliance of federal laws. Three participants found that the policies are sometimes not effective in protecting wetlands. In fact, two stated that they believe policies are actually a barrier to achieving wetland protection or restoration.

There are many varied reasons for why participants believed that policies were not effective. Most commonly, five participants found a lack of vision, motivations, or incentives to implement restoration. As noted above, the multiple scales of regulations and enforcement was seen as a problem. Two participants noted a lack of coordination as an issue in enforcing regulations. Another common barrier that participants cited was that policies are outdated. One person associated the differing types of habitats and wetlands as a barrier to effective policies, citing the difference between tidal and non-tidal wetlands. One other person believes it is because no one is invested in finding violations.

Multiple participants suggested solutions to these barriers and gaps. One participant suggested that the CBP should update their goals. Another one of the five participants felt that the states should be spearheading wetland protection and restoration projects, rather than the federal government. Five participants mentioned that they value and believe that collaboration between scales is crucial for the Bay and the wetlands.

Barriers and Challenges

The next portion of the interviews asked participants to reflect on what they thought were the biggest barriers and challenges to the conservation and restoration of non-tidal wetlands in the Bay, to which a total of 31 participants discussed. The most prevalent barriers that were discussed related to issues finding or obtaining funding, challenges specific to the capacity or reach of an organization, and challenges within the regulatory and enforcement landscape (**Figure 8**).

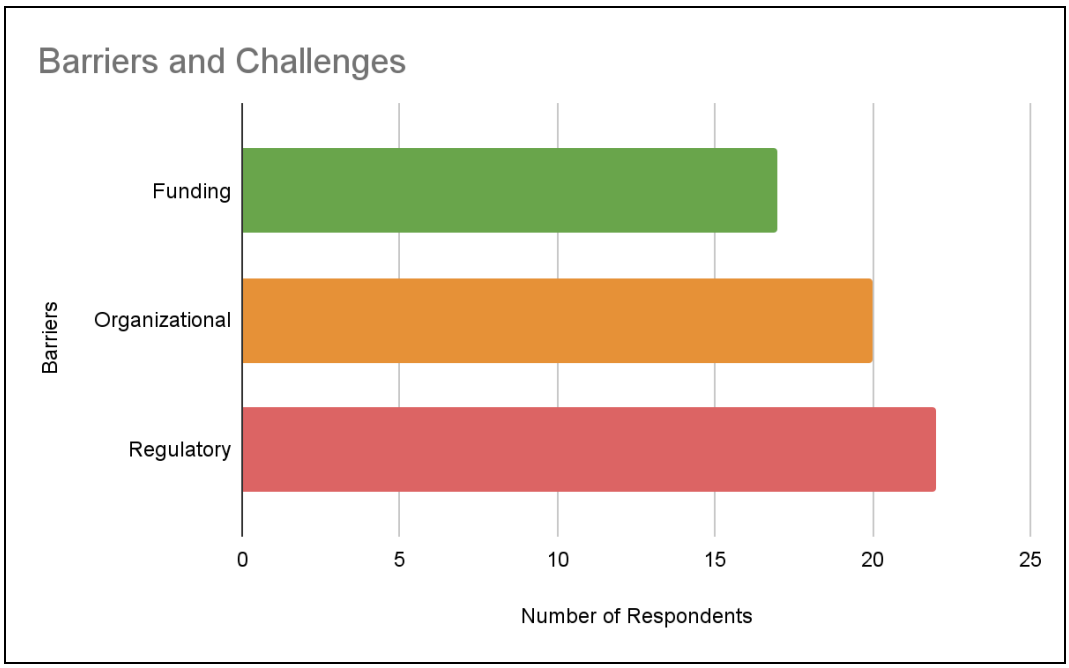

Figure 8: Number of interview participants who discussed a barrier or challenge related to funding, regulations, or organizations.

A theme present among barriers and challenges to restoration related to funding for programs and projects, and was discussed by 17 out of 31 participants (**Figure 9**). A general lack of funding was described as a common barrier to these programs, particularly in terms of funding for data monitoring or collection, long-term project maintenance, and the design and implementation costs of projects. Along these lines, a need for more comprehensive long-term success metrics was identified as a simple way to alleviate this particular lack of funding. The different sources of funding utilized for these projects were seen to be inconsistent throughout different jurisdictions within the Chesapeake Bay, with participants stating that different states and jurisdictions prioritize conservation programs at different levels. These funding sources are also seen as being hard to navigate, complicated, and restrictive, which leads to an underutilization of funding.

Another prevalent theme within this scope relates to most funding in the Bay being based on water quality improvements, creating a prominent restoration struggle. This struggle occurs between funding projects in underserved or urban communities- which may have poorer water quality - and funding projects that have better ecological benefits. Underserved communities were also identified as lacking access both geographically to the Bay and to other resources that included funding, making it even more difficult for them to compete for federal grants and programs and to be a part of important conservation conversations.

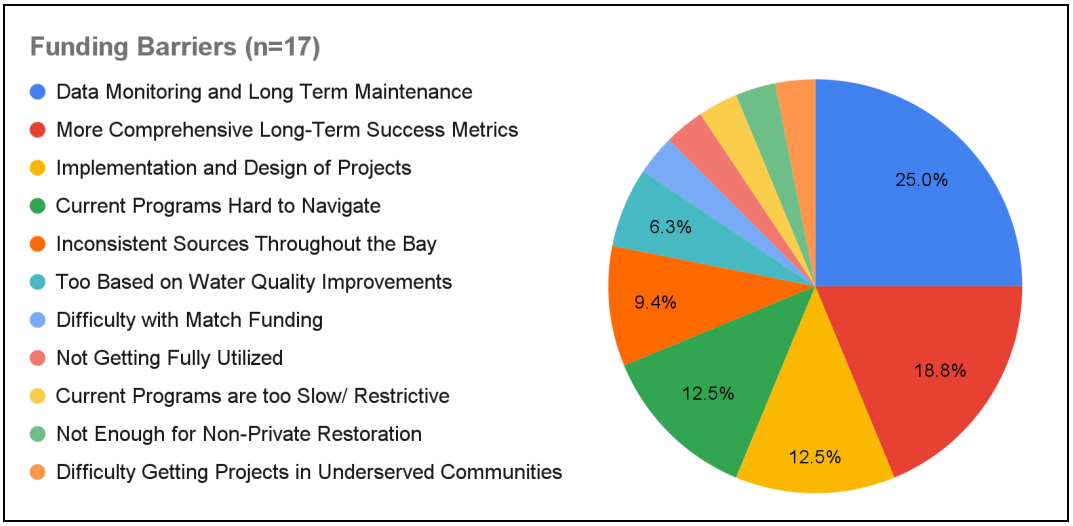

Figure 9: Challenges related to funding that were discussed by interview participants. Themes are listed in decreasing order.

Challenges specific to various organizations doing restoration and conservation work were mentioned by 20 out of 31 participants, with organizational capacity being the more prominent challenge mentioned. Organizational capacity also contributed to a lack of community outreach for many organizations, as well as scaling up successful initiatives, and was discussed by 18 interviewees. Other limitations identified included organizations working in silos and doing work that others are already doing without coordination, difficulty with the suitability of sites for projects, and limited access to conservation decision-support tools (**Figure 10**).

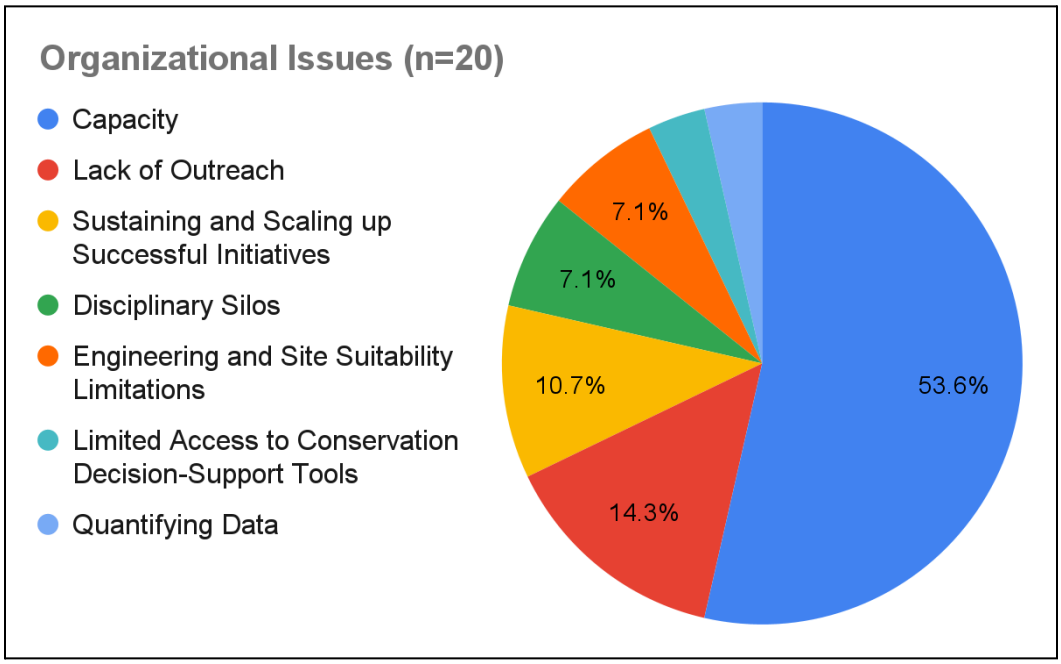

Figure 10: Challenges related to organizations that were discussed by interview participants. Themes are listed in decreasing order.

Barriers within the regulatory landscape were prevalent in the interviews, with 22 out of 31 participants mentioning the topic. Four participants discussed how the power of regulatory agencies differs based on the entity in question, creating an uneven balance between conservation and development. Four participants also mentioned difficulties navigating wetland conservation and restoration according to the federally appointed definition of a wetland, which informs the majority of wetland regulations. Specific regulatory programs also present significant challenges to wetland conservation and restoration. Participants listed barriers such as unbalanced mitigation allowances, non-competitive land value for farmers, long wait times for project implementation, limited monitoring requirements, and lack of consistency among regulatory agencies in the watershed, for example (**Figure 11**).

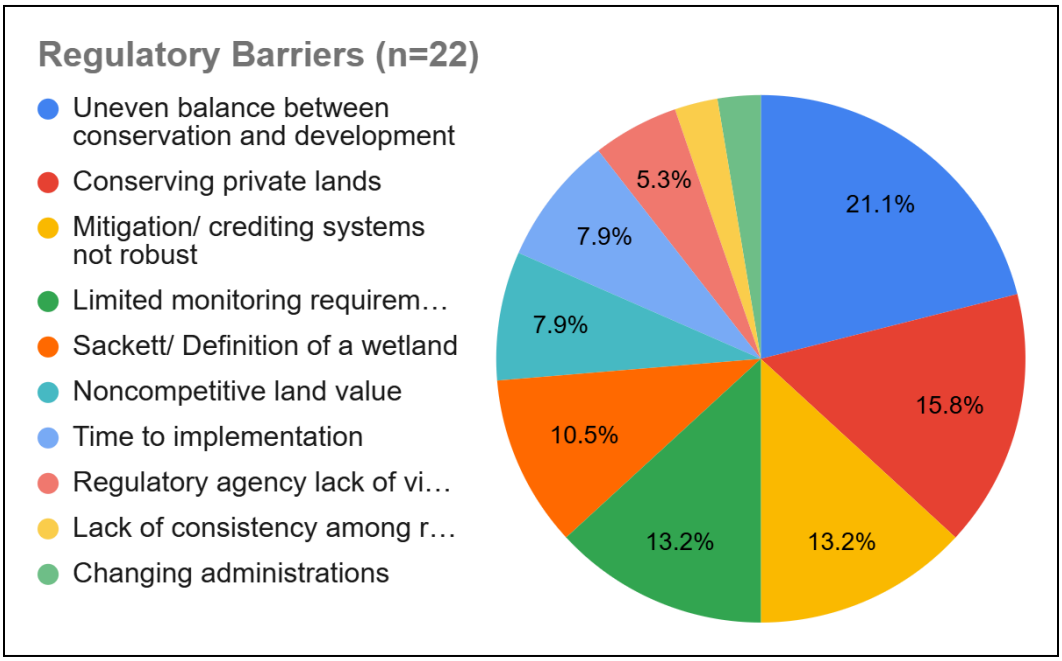

Figure 11: Challenges related to the regulatory and policy landscape discussed by interview participants. Themes listed in decreasing order.

Current Public Perceptions

A common thread throughout all of the interviews involved examining current public perceptions among residents and stakeholders in the Chesapeake Bay region to better understand the effectiveness of current projects in engaging the public. From these responses, 29 of 32 total participants discussed how the public relates to wetlands in the region, their general perception of wetlands, as well as their interest in related projects or programs.

How the public relates to wetlands was discussed by nine total participants, with around half of those respondents indicating the public having a positive relationship to wetlands (**Figure 12**). The importance and proximity of the Bay to people's identities and understanding of the environment was a key result within this theme, while two participants discussed how some people may not know what wetlands are, but are in support of protecting the Bay as a whole. Still on a positive note, two participants also described how land-owners can see the benefits of wetlands to their land. However, some participants mentioned the public having a complex relationship to wetlands in the region, with one respondent discussing a generational divide between those who care about the Bay and those who are indifferent.

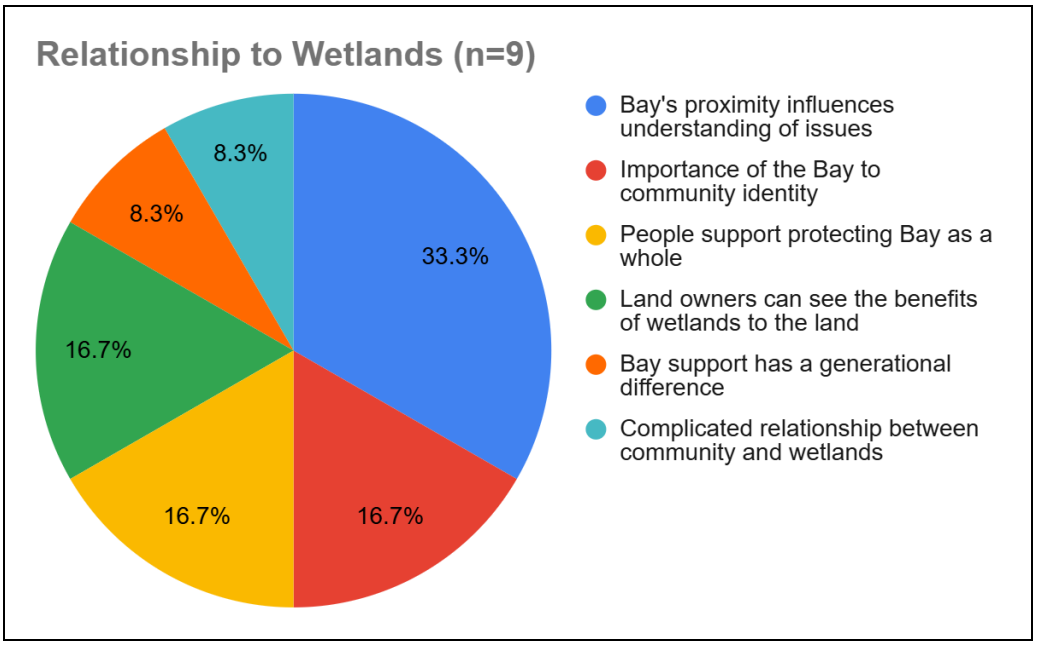

Figure 12: Topics discussed by interview participants on how the public relates to wetlands in the Bay. Themes are listed in decreasing order.

Within this theme, 28 participants mentioned how community members perceive and understand wetlands in the Bay (**Figure 13**). Overall, 12 participants responded that the public perceive wetlands negatively, due to the idea that they harbor mosquitos, require ample maintenance, are easily overrun by invasive species, and that they don't meet aesthetic standards. Six of the respondents indicated that the public perceives wetlands as swamps with little value.

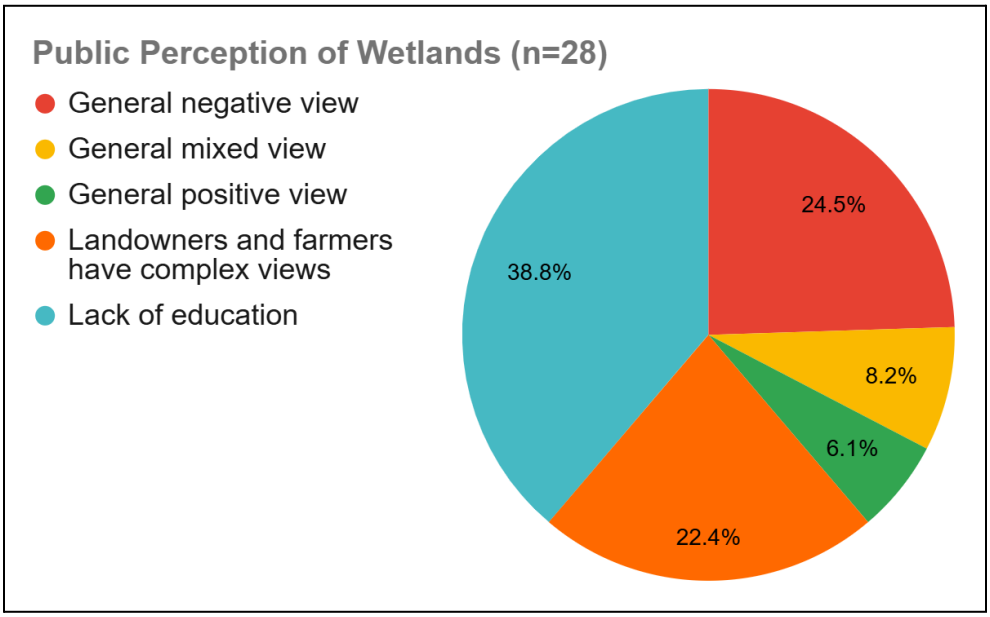

Figure 13: Public perceptions of wetlands in the Bay as discussed by interview participants. Themes are listed in decreasing order.

Three participants mentioned that wetland restoration construction practices often create negative perceptions of wetlands in their respective communities. However, three participants indicated that the public has a generally positive or neutral perception of wetlands, while three participants mentioned the public having a mixed perception of wetlands, with some wetlands having more value than others.

Eighteen out of 32 participants discussed a lack of education among the public, with 14 of these respondents mentioning that the general public does not have a good understanding of wetlands which leads to a poor understanding of the benefits that wetlands provide. Overall, participants drew a connection between the stakeholders' level of knowledge on wetlands to their perceptions of wetlands, with those who have more wetlands knowledge having a generally positive perception. Tactics to increase awareness and interest in protecting the Bay and its wetlands were discussed by five participants. Five participants also discussed a difficulty with changing the public's perception of the Bay to better see its value.

Another common thread within the topic of public perceptions of wetlands was specific to landowners and farmers. 10 total participants identified the topic and discussed how landowners and farmers have negative opinions of wetlands, with a central theme being conflict between land management and farming practices and wetland restoration practices. One participant mentioned that landowners and farmers in the agricultural industry often have distrust toward government programs and agencies, while two indicated prevalent friction between the agricultural industry and regulatory agencies.

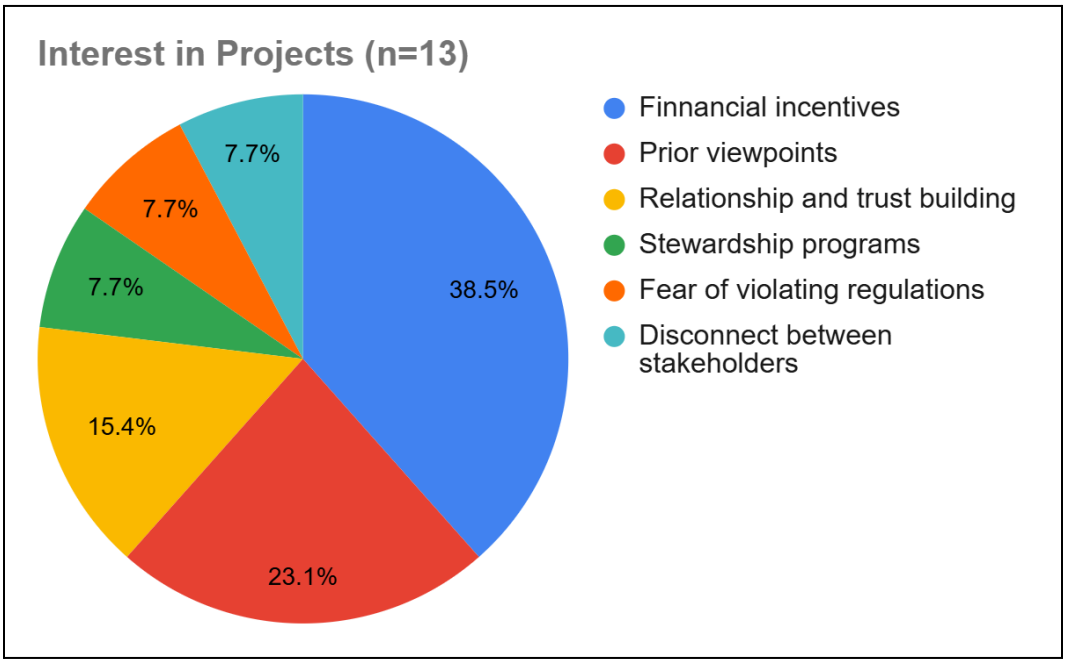

Figure 14: Public interest in restoration and conservation projects as discussed by interview participants. Themes are listed in decreasing order.

During the interviews, participants were asked what determines public interest in current or past projects or programs. Within this theme, five participants responded that projects with financial incentives increased public interest (**Figure 14**). A key strategy to increasing interest in wetland restoration and conservation projects identified by three participants was relationship and trust building with communities, including creating stewardship programs in communities to

raise awareness and interest. Alternatively, public fear of violating environmental statutes, conflicts between stakeholders, and the perception that natural areas reduce safety and bring crime were respectively discussed by an interviewee as reasons why people are not interested in projects by participants.

Current Communication Channels

One topic of interest that was asked of participants throughout the interviews involved understanding the most commonly used communication channels to engage with other stakeholders throughout the Chesapeake Bay. From these responses, both effective and ineffective communication channels were identified based on the experiences of participants. In total, 30 different communication channels were mentioned by participants either through their answers of other questions or when asked directly about communication channels (**Figure 15**).

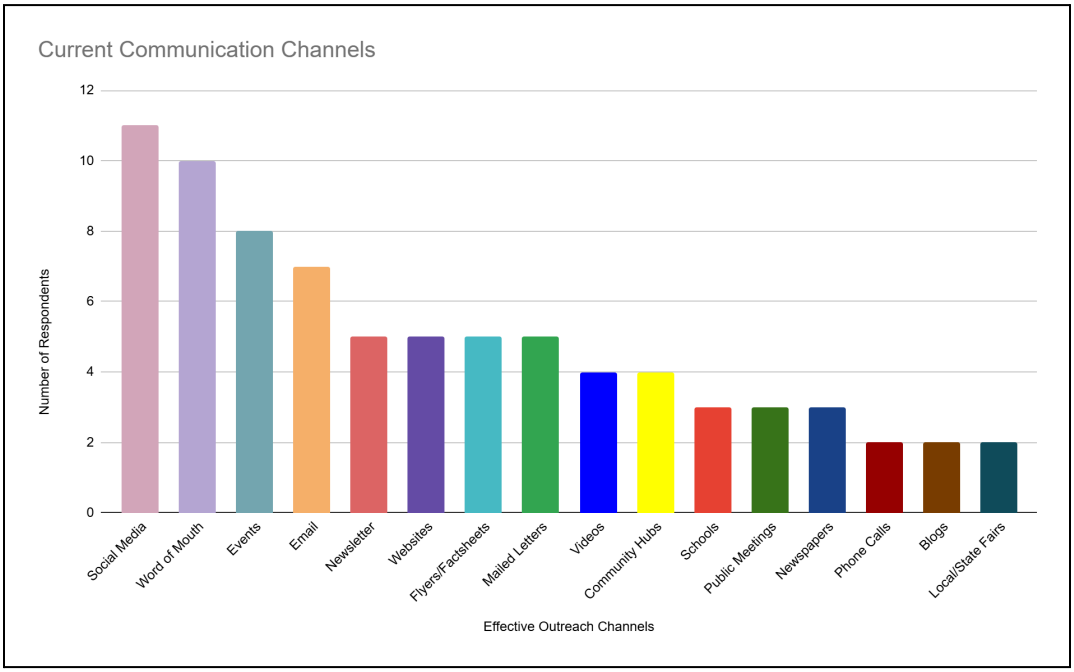

Figure 15: Communication channels utilized by interview participants in reaching and educating the public.

The most commonly used channel to disseminate information to other stakeholders and the general public was social media. 11 out of 32 participants made reference to the importance of the use of social media in their communication efforts. Frequently used platforms included Instagram, YouTube, Facebook, X (formerly known as Twitter), and LinkedIn. Participants reported that this was an effective channel due to its ability to reach a wide audience and its ability to share multiple forms of media in a rapid manner.

Another effective communication channel that was identified by participants was the use of word-of-mouth between stakeholders throughout the community. 10 out of 32 participants discussed the importance of sharing information through existing community networks by having community members share information with friends, neighbors, and coworkers. More specifically, some participants highlighted that landowners are often the most effective channels for communicating with other landowners about programs and projects throughout the watershed. On a similar note, this communication channel was found to be effective for

recruiting new individuals to engage in watershed restoration work when community members shared their experiences working with watershed organizations and participating in restoration projects.

"Everyone is plugged in somewhere, they have to be. No one can be an isolated island. So really trying to identify some of those key organizations where they are touching as many sources and individuals and resources out there...I think that's definitely the key way to go about getting some information out"

-Taryn McFarland, Land Stewardship Advisor, Willowsford Conservancy

Another common channel that participants described as effective was to attend educational events and conferences where an organization can send a representative to either lead a presentation or conduct a workshop to educate community members and peers about some of the issues throughout the watershed. In total, eight out of 32 participants stated these events and conferences as important communication channels. This was primarily identified by participants as a way to share their organization's specialized expertise with other professionals and as an outlet to reach different demographics of community members such as farmers.

Email, newsletters, websites, flyers, factsheets, mailed letters, videos, newspapers, phone calls, blogs, and local fairs were also commonly identified by participants as channels that were effective mediums for sharing information with community members. A caveat for the use of videos that was mentioned by two participants was that these videos should be short in length (ranging from about 3-5 minutes) in order to hold the attention of the viewer. Seven individuals mentioned the importance of connecting with key community hubs (schools, libraries, churches, post offices, etc.) in order to both post/share informational materials as well as coordinate and co-lead opportunities for field trips and events with students and other connected community members.

Other less common, but effective, communication channels that were mentioned by participants include: conducting webinars, connecting with local Boy Scout and Girl Scout troops, developing radio advertisements, going door-to-door to meet community members, developing maps/story-maps, having one-on-one conversations with community members, holding competitions/contests for community members to participate in, utilizing fundraising software to manage nonprofit donations, and using virtual community targeting tools to find groups to prioritize for outreach.

In general, ineffective communication channels and gaps in communication were less reported by participants. Two participants mentioned that cold-calling/cold-emailing individuals was not an effective strategy for moving forward with a project or starting a conversation about watershed issues. One participant identified that this process made him feel like a salesman which he described as an uncomfortable feeling. Another participant identified traditional news media outlets like televised news as ineffective because many of these outlets can hurt brand awareness by mixing up different organizations with "Chesapeake Bay" in their name which can lead to misattributions of successes and criticisms. Another issue that was brought up by one participant was that surveys can become an ineffective communication tool if there is no follow-up with respondents or if the follow-up occurs too long after the survey was completed. This can lead to respondents forgetting about the survey and forgetting about the issue as a whole.

While not traditionally viewed as a communication channel, one participant identified penalties as ineffective ways of communicating with landowners what is beneficial or harmful to

the watershed. This participant noted that, in their experience, people will continue to partake in harmful land management practices regardless of whether a penalty is instilled or not, thus suggesting that these penalties do not communicate the importance of best management practices.

Finally, while seven people identified email as an effective tool for sharing information with community members, one participant said that this medium was ineffective because people may not check their email due to various circumstances that may prevent them from doing so. Similarly, while five participants mentioned that mailed letters were an effective way to reach community members, one participant found that mailed letters were ineffective because many people throw away mail without opening it if it is coming from an organization that they may be unfamiliar with. When speaking about communication gaps, three participants identified that there is a gap in communication which leaves landowners confused about how to apply for a grant, what financial options are available to them, and who can help connect them to nonprofits that can assist them.

Engagement Strategies

Towards the end of each interview, participants were asked about different strategies that they utilize to effectively engage and communicate with community members about watershed issues. This collection of responses revealed effective message framing techniques, different methods for sparking initial conversations, and how to maintain cordial relationships and productive conversation over time (**Figure 16**).

The dominant strategy that participants identified as effective for engaging with different community members was to find ways to connect to the various interests that people in the community possess. In total, 12 individuals mentioned this strategy in their interview and provided examples of how to do this in a variety of ways. Prevalent recommendations included: (a) understanding opinions, beliefs, and hobbies of the target community; (b) connecting the message to familiar cultural and economic symbols throughout the Bay such as blue crabs, black-eyed Susans, oysters, black ducks, or monarch butterflies; (c) drawing connections between everyday actions and their impacts on the health of the Bay; (d) sharing common interests and points of agreement with community members to establish the communicator as a relatable person rather than an organization; and (e) understanding why community members have questions about environmental issues in the Bay and taking the time to hear out their concerns and non-negotiables related to restoration and conservation work.

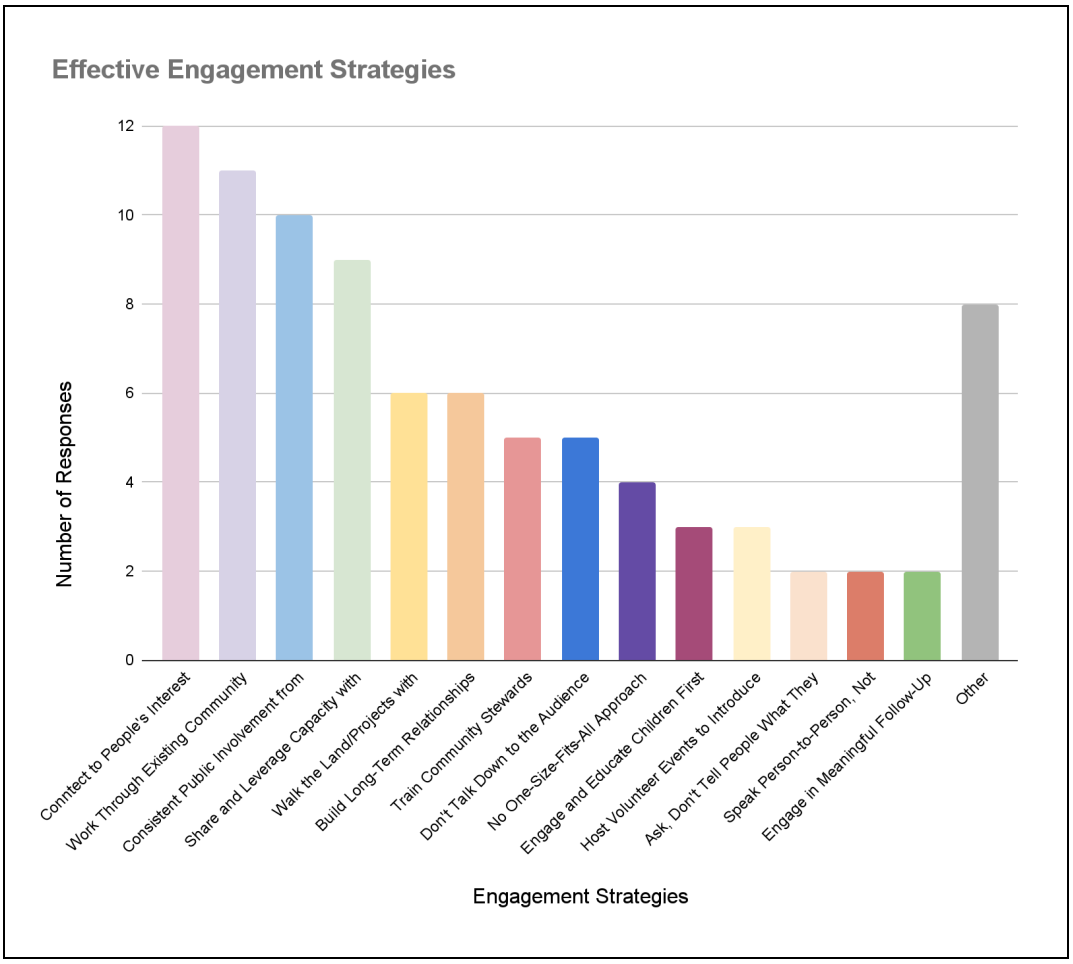

Figure 16: Engagement strategies discussed by interview participants.

"Community engagement is what drives long-term success. We've seen people come out for invasive species removal and planting events because they recognize the value of these spaces"
-Retired Soil Scientist from Virginia

Another common strategy that was recommended by 11 individuals was to conduct outreach and engagement efforts through existing community networks. This response was often given in the context of efforts to reach farmers specifically, which was identified by multiple participants as a challenge. Four participants identified that connecting with county level offices that assist farmers in yearly management plans as well as other organizations that farmers frequently engage with could be a useful tool for starting a thread of communication. Participants also identified the importance of connecting to community organizations that are involved and similar environmental work as well as those that are not involved in this type of work but still have strong community connections. Organizations that are involved in similar types of work and were identified as potential partners included Soil and Water Conservation Districts (SWCDs) and local university extension offices that can assist with education efforts. In terms of organizations that are not involved in environmental work, participants mentioned the

effectiveness of connecting with Homeowners Associations (HOAs) and other entities that frequently engage with and provide assistance to residents and landowners.

The third most common strategy reported was to keep people involved from the beginning and to make sure that all affected groups have a representative at the table. This strategy was mentioned by 10 participants and emphasized the importance of holding public meetings where people can provide questions, concerns, and comments as well as the importance of meeting early with involved parties to clear up expectations and discuss impacts of a project. One participant elaborated on these points and expressed that these steps can help develop a sense of pride and collective ownership of a restoration or conservation project by community members who feel that they played a role in different phases of the project.

"Community-driven restoration projects are scalable models. When people feel ownership over these efforts, they become invested in their success and longevity"
-Education and Community Programs Coordinator from Maryland

Many participants identified lack of capacity (workforce, monetary, etc.) as a barrier to achieving the scale of outreach and engagement efforts that they would like to conduct. In relation to this, nine participants highlighted success in reaching some of their outreach and engagement goals by sharing support and resources with partner organizations who possess similar goals. This sharing of support and resources could consist of helping with educational events, project development and/or implementation, grant development, proposal requests, pooling financial resources, or sharing strategies and network connections. Of these nine participants, seven specifically mentioned the importance of forming coalitions or networks of different stakeholders who are engaged in education and restoration of the Bay. One example that was shared in an interview consisted of an educational nonprofit representative providing an informational presentation where they shared their expertise on particular issues at an event that was put on by a larger organization that provided the funding for the event.

Six participants stressed the importance of long-term relationship building while acknowledging that this has been challenging and that their organization has not spent enough time working to build trust with community members. Two of these six participants expressed the need for meaningful follow-up on projects. Eight participants admitted that long-term monitoring and checking in with community members after a project was conducted was nearly non-existent. These participants noted that this was due to a lack of capacity caused by the need to start other projects and not having enough staff to follow-up with community members.

As previously mentioned, participants identified that community members were one of the most effective channels of communication for sharing information about watershed issues. In relation to this, seven participants highlighted the success that has come from identifying and training community liaisons/stewards that can serve as a community messenger. These participants noted that this step is essential for achieving community buy-in since many people prefer to receive information from a trusted community voice rather than an outside organization.

Another strategy that six participants found effective was to "walk the land" with community members. Participants identified this as an opportunity to teach community members how conservation works on a physical scale and to help educate them on the process through visual learning. Two of these six participants mentioned instances where they were able to show community members what a finished restoration project looks like and answer questions. These participants identified this as a helpful tool for addressing concerns that individuals may have about future projects that could be implemented in their community. Conversely, one participant

noted the knowledge they were able to gain about a specific community after walking with residents throughout their neighborhood.

Some other strategies that were recommended by participants included: avoiding talking down to the audience, acknowledging that there is no one-size-fits-all approach to communication, engaging with children first who can then help engage adults, hosting volunteer events where people can be introduced to the organization, asking people what they need rather than telling them, making sure to include smaller farms in outreach, avoiding assumptions that people do not care about conservation issues, and approaching community members as partners instead of stakeholders.

Messaging Content

Throughout the interviews, participants also provided recommendations for how to structure and frame the messages utilized in communication efforts (**Figure 17**). The most common recommendation was to "meet the audience where they are at" in terms of their familiarity and interest in the topic. Nine participants recommended this as a strategy to focus on throughout communication efforts. More specifically, participants felt that it was important to tailor the message based on the specific audience being addressed in order to help community members form a connection between their own interests and the environmental issues of the Bay.

Similarly, six participants stressed the need to use non-scientific language when communicating with community members. They also emphasized the benefits of keeping the message simple, local, and personal to the audience while still introducing the science behind the specific issues throughout the watershed. One of these six participants also mentioned that it is important to keep a message to five main points or less so that it is easier for the audience to remember and they will not feel overwhelmed.

"Be simple, but be specific. You don't need a whole bunch of terms. What are the key terms people need to know?"

-Terryl Acker-Carter, Community Engagement Specialist, Anne Arundel County Watershed Stewards Academy

Within the content of the messaging, 15 participants felt that it was important to highlight the co-benefits of wetland restoration through the explanation of visible, concrete benefits that people can recognize. Participants felt that this is a necessary response to the perceived lack of understanding of the function of wetlands that is prevalent among community members. Some examples that participants provided include impacts on animals and wildlife, habitat health, flood mitigation, erosion control, water quality, and overall benefits to ecosystem health. In contrast to this perspective, two other participants felt that it was more important to highlight the economic benefits of wetlands than some of the environmental and societal benefits. They elaborated on their position by noting that concern for the economy is universal and that the Chesapeake Bay ecosystem is of great importance to the local economy.

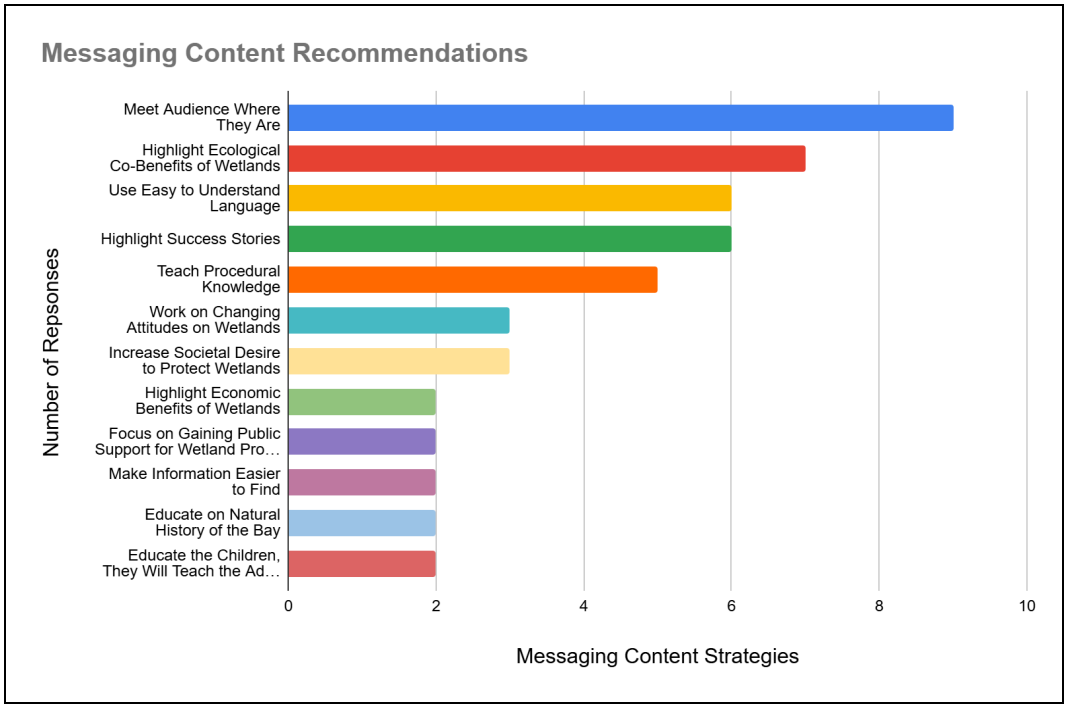

Figure 17: Messaging content strategies discussed by interview participants.

Seven participants also mentioned the need to include procedural knowledge (how to perform a specific skill or action) alongside declarative knowledge (facts, concepts, and information) in the message. Because participants identified that they are not very involved in long-term monitoring of completed restoration and conservation projects, they felt that it is important to both design projects that are easy for community members to upkeep and to teach community members the skills necessary to do this upkeep such as pulling invasive species, maintaining trails, planting trees, etc. One of these seven individuals specifically connected the ability of community stewards to serve as "point people" in maintaining restored or conserved sites while also being able to share their knowledge and skills related to upkeep of the sites with other community members.

Other messaging recommendations that were mentioned throughout the interviews included: highlighting success stories, cutting back the discussions on legal protection and prioritizing gauging support for what protection means, visually displaying changes in the land over time, making an effort to work with farmers rather than against them, connecting to local lifestyles rather than politics, thanking people for their efforts, using a positive tone throughout the message, and building communication techniques into messaging early and not as an afterthought.

Ideal Future

At the conclusion of each interview, participants collectively described an ambitious yet attainable vision for the future of the Chesapeake Bay—one in which the ecosystem is self-sustaining, resilient, and thriving despite the ongoing pressures of climate change, urban expansion, and economic development. Six participants highlighted this aspiration, emphasizing the importance of restoring ecological balance to a point where natural systems can largely

maintain themselves without constant human intervention. In this envisioned future, **the Bay's waterways would be cleaner, native species populations would be robust, and habitat restoration efforts would have successfully reversed decades of degradation**. Achieving this state of equilibrium would require proactive planning, sustained investments, and the integration of both policy-driven and community-led approaches to conservation.

A key element in realizing this future lies in the development and implementation of strong policy frameworks and reliable funding mechanisms to support long-term conservation efforts. Five participants emphasized that while restoration efforts have made measurable progress, continued success depends on securing dedicated financial resources and ensuring that policies align with ecological and community needs. Without consistent funding streams and legislative backing, conservation initiatives run the risk of stalling due to shifting political priorities or economic downturns. Participants stressed the importance of innovative financing strategies- such as conservation grants, public-private partnerships, and incentive programs- to ensure that environmental protection remains a long-term priority rather than a temporary campaign.

The expansion of green infrastructure and sustainable urban development also emerged as a crucial strategy for securing a healthier future for the Chesapeake Bay. Four participants pointed to the need for cities and towns throughout the watershed to integrate green infrastructure—such as rain gardens, permeable pavements, and living shorelines—into their development plans. These solutions not only help to reduce stormwater runoff, a major source of pollution for the Bay, but also provide additional co-benefits, such as urban cooling, improved air quality, and enhanced biodiversity. Urban areas were described as having the potential to become key contributors to watershed health when sustainability is placed at the center of planning and design, rather than being viewed solely as sources of degradation.

Beyond physical infrastructure, participants highlighted the need to prioritize community-driven restoration models as a way to build long-term engagement and stewardship. Three participants specifically discussed the value of empowering local communities to take ownership of conservation projects, arguing that grassroots involvement fosters stronger and more sustainable commitments to protecting the Bay. Programs that encourage volunteerism, citizen science, and local leadership in restoration projects were seen as essential for maintaining momentum in conservation work. Participants noted that lasting restoration requires collective effort across sectors—including individual landowners, local governments, and businesses—rather than relying exclusively on large government agencies or institutions.

In addition to community engagement, advancements in environmental monitoring and adaptive management were also highlighted as critical to ensuring the Bay's long-term sustainability. Three participants stressed that improved data collection and real-time monitoring technologies could significantly enhance the ability to track changes in water quality, habitat conditions, and species populations. By utilizing cutting-edge scientific tools, conservationists can refine their strategies, quickly respond to emerging threats, and ensure that restoration efforts remain effective over time. The integration of adaptive management practices—where restoration strategies are continuously refined based on new data and insights—was seen as a necessary step toward achieving a more resilient Chesapeake Bay.

Landowners also play an integral role in shaping the future of the Bay, and two participants emphasized the need to strengthen conservation incentives to encourage participation efforts from private property owners in restoration efforts. Because a substantial portion of land within the watershed is privately owned, providing financial and technical

assistance to landowners was seen as an effective way to expand conservation efforts beyond publicly managed lands. Expanding incentive programs for wetland restoration, forest conservation, and pollution reduction on private lands could create a ripple effect, leading to broader ecological benefits throughout the region.

Education and public awareness were also cited as essential components of a successful long-term conservation strategy. Two participants stressed the importance of fostering environmental literacy and stewardship through enhanced education programs, particularly for younger generations. By integrating environmental education into school curriculums, community workshops, and outreach initiatives, conservation organizations can cultivate a culture of responsibility and active participation in Bay restoration efforts. Participants noted that increasing public understanding of ecological challenges—and the role individuals can play in addressing them—could drive greater public support for policies and initiatives aimed at protecting the Bay.

DISCUSSION & RECOMMENDATIONS

Chesapeake Bay Program Purpose and Goals

While recommendations and opinions on the effectiveness of the CBP were varied, the overall assessment of the organization was positive and supportive. Generally, external opinions of the CBP should be monitored, especially given that these opinions could impact the effectiveness of partnerships with stakeholders and communication/outreach with the general public. Having transparent and clear goals for the CBP is also helpful, as the disconnect between science and the public can be bridged if the motivations of the organization are relatively easy to understand. This seems to be a success coming from the Agreement of 2014 and can be continued in the Beyond 2025 plan. Noting and celebrating successes is also something the CBP does well, and can help maintain outsider perception of the organization.

–Recommendations–

- Continue assessing public and stakeholder opinion of the CBP to properly manage outreach and communication.
- Maintain clear, transparent goals for the CBP.
- Note and celebrate successes within the organization.

Current State of the Bay

The CBP is currently addressing a wide array of issues that the Bay faces. While those involved in restoration through the CBP are working closely with landowners and stakeholders, a limiting factor in the completion of projects appears to be the willingness of the landowners to be involved in potential projects. Often, this is a financial decision. Part of this is due to the fluid nature of funding for programs and policy-making with regards to environmental projections.

Through the interviews, insights into the perceived ecological challenges and opportunities were revealed. An emphasis on water quality issues underscores the ongoing concern about wetlands for environmentally-focused individuals within the watershed. The frequent citations of water quality degradation, stormwater drainage issues, and agricultural practices highlight the value of wetlands as providers of ecosystem services. With this in mind, the identification of development and climate change as significant threats to wetlands is relevant

for the growing population within the watershed. Continued development is likely to lead to further habitat fragmentation and direct wetland loss, while climate change exacerbates issues like marsh migration and saltwater intrusion. These ongoing threats can then lead to fewer wetlands, worsening the water quality issues highlighted in the interviews. Ultimately, the recognition of wetlands as inherent providers of ecosystem services is critical. Articulating the value of these services could bridge communication between ecological objectives and policy-making, with the goal of facilitating informed decisions on conservation and restoration of wetlands in the region.

Legislative and Regulatory Background

Due to the nature of the Chesapeake Bay encompassing 7 diverse jurisdictions, a decentralized, cooperative system for legislative and regulatory protection is utilized across federal, state, and local government levels. A theme across participants was the importance of these policies at all scales for protection of wetlands. Federal policies- particularly the CWA- are crucial for not only setting water quality standards for wetlands, but also for establishing and maintaining the cooperative federal-state system from controlling water pollution. However, feelings that federal policies were ineffective and uncertain also emerged. A notable cause includes the recent Supreme Court cases, such as *Sackett v. EPA* (2023), that leaves uncertainty with the ability of the CWA and other federal policies to protect the health of the wetlands and broader Chesapeake Bay. *Sackett v. EPA* has reduced the definition of which wetlands can be protected under the CWA to only wetlands that have a continuous connection to the navigable waters of the United States. This is particularly impactful to non-tidal wetlands that may not have this significant nexus connection to a larger waterway. For example, it is estimated that **35% of Virginia's wetlands will lose protection** as a result of the Sackett decision (Wetlands Watch, 2023).

"In light of some of the recent Supreme Court decisions, this is a dialogue that's occurring nationally, and there is a thought that is out there that maybe a regulatory construct really isn't the way to protect wetlands."
-Wetland Manager

A theme that also emerged in conversations was the importance of **utilizing state and local policies for filling in the federal regulatory gaps**. Yet, participants did note that the ability for state and local policies to be effective in filling in these gaps was very dependent on the overall strength of the laws. Some states, such as Virginia, have wetland protection laws stronger than what is dictated by federal laws, like the CWA. However, laws such as the Dillon's Rule, like in Virginia, and Home Rule, like in Maryland, dramatically skew the power of local governments. Under Dillon's Rule, states dictate and grant the power of local governments, while localities have the jurisdiction to govern themselves under Home Rule.

The disconnected nature of the laws at these different scales lead to another theme from participants, of the importance of **collaborating between scales** to ensure protection of the wetlands. Each state and locality has not only unique laws, but a unique environment that they need to protect. Participants also noted many outdated policies that lead to ineffective protection of wetlands. For example, there is difficulty in legal protection of wetlands when climate change is accelerating the transition of wetlands from non-tidal to tidal. Many participants voiced a desire for updated CBP program goals to address the outdated policies, need for better

coordination among scales, and the rapidly changing nature of the environment of the Bay and wetlands.

Another theme that participants discussed was the lack of enforcement of the federal, state, and local legal protections that do exist. Many cited a lack of capacity in offices as the reason for this. However, literature (Mueller, 2024) also supports that EPA has emphasized on several occasions that it has legal backstop authorities it could use to further Bay restoration, yet it has failed to use them effectively. To address this, the EPA should use the tools granted by Congress in the CWA to reduce pollution, and for the Bay jurisdictions to sign a binding and enforceable Bay agreement to ensure accountability (Mueller, 2024). This is another issue that participants believe should be incorporated into CBP goals.

Participants felt that government funding was also critical to the success of wetlands protection projects. Participants noted federal funding as a major source of funding for these projects, including the Farm Bill, Inflation Reduction Act (IRA), and Infrastructure Investment and Jobs Act (IIJA). However, like the federal regulatory policies, federal funding is currently also uncertain; for example the the government-wide freeze on federal grant awards and contracts in January 2025 intended to allow for reviews that ensure those expenditures "align federal spending and action with the will of the American people as expressed through presidential priorities" (Bay Journal, 2025). Although the freeze order was reversed in early 2025, it left many Chesapeake Bay organizations temporarily unable to access funds. However, there have also been some recent federal successes, like the America's Conservation Enhancement (ACE) Reauthorization Act, which authorized several important conservation programs in January 2025. The package includes reauthorization of the North American Wetlands Conservation Act (NAWCA), the Chesapeake Watershed Investments for Landscape Defense (Chesapeake WILD) Act, the Chesapeake Bay Program, and the National Fish and Wildlife Foundation, among other provisions (Ducks Unlimited, 2025). Many participants noted the **shift to relying on state level government funding and using state level projects for wetland protection, rather than federal, due to the federal uncertainty for both protection and funding**. However, as the results show, going forward it will be imperative to have strong collaboration across scales to ensure that federal, state, and local policies are protecting wetlands and providing the funding to do so.

–Recommendations–

- Facilitate collaboration across federal, state, and local governments to ensure large coverage of policies protecting wetlands.

Barriers and Challenges

Within the realm of barriers and challenges, the results from the semi-structured interviews are prevalent at multiple levels and jurisdictions within the Bay. A **lack of funding** is a universal issue within the environmental sphere, but participants specified that more funding for project design, implementation, maintenance, and long-term data collection and monitoring would play a critical role in advancing the conservation and restoration of non-tidal wetlands. This, along with a set of metrics for evaluating and replicating long-term success in restoration projects, could ensure that, once completed, projects continue to provide ecosystem services and habitat benefits (Zedler and Callaway, 1999). This topic came about as, when asked how they determined long-term success of specific projects, most participants did not have an answer. Many restoration projects receive funding only for the duration and completion of the project,

and little else is done to evaluate how that project performs months or years after completion (Galatowitsch and Bohnen, 2021).

> *"We're learning that adaptive management is critical. Success isn't a single fixed outcome- it's about flexibility, monitoring, and continuous improvements over time."*
> **-Restoration Manager from Maryland**

While one easy fix for this might be to have more funding dedicated for all stages of a restoration project: design, implementation, construction, completion, maintenance, and monitoring, this report recognizes that is most likely beyond the control of most organizations or stakeholders. Thus, **establishing a set standard for the long-term monitoring** of completed restoration projects could alleviate some of the lack of funding on the tail end of projects, as there would be a basis for which to compare environmental data collected at designated points after project completion.

Another key result from the semi-structured interviews involved inconsistent funding sources throughout the multiple jurisdictions within the Bay watershed. Different programs exist based on one's location, with local, state, and federal funding being more or less prioritized. This inevitably leads to confusion for many farmers, landowners, and organizations who want to pursue funding.

> *"An overwhelming majority of landowners don't even know that there are options like financial incentive options for restoring wetlands."*
> **-Wetland Conservationist from Maryland**

As funding is already seen as constrained within the Bay, it is important to ensure that all available funding is being properly utilized. Funding programs and procedures which are confusing and difficult to navigate can act as a real barrier to proper use of funding. One way to alleviate this problem is to **provide a step-by-step guide to all relevant funding sources and programs within each jurisdiction**. While many of these steps and eligibility criteria are available online, having them all in one, easy to access place may make it easier to utilize the available funding sources. Some organizations have successfully utilized data hubs to organize materials for public use, like ArcGIS Hub, for example, and could be used as a case study for doing the same with Bay funding programs and opportunities. Creating simpler and more straightforward pathways to aid community members and stakeholders in learning about and applying for available funding could both reduce the amount of funding that is not utilized and help educate the public on available funding options.

Much of the funding for restoration projects in the Bay focus specifically on providing water quality improvements to ensure any project restoring a wetland has a measurable benefit on both the environment and the Bay watershed (*Water Quality Improvement Efforts in the Chesapeake Bay Watershed to Benefit From $22.4 Million in Watershed Restoration Grants,* 2025). This works well for large projects or those in more rural or upstream areas, where improving water quality is easier. However, participants described how, when funding is based primarily on improving water quality, it makes it more difficult to pursue projects which are smaller, located in urban areas, or primarily benefit underserved communities. This creates a dichotomy between what is best for the environmental health of the Bay–treating upstream and creating as many water quality improvements as possible–and what is best for people in the Bay–pursuing projects which provide access to greenspace or the waterfront for urban

communities with little access to the rest of the watershed, and alleviating issues of flooding and subsidence. Underserved communities in the Bay-- oftentimes include those which are located in urban areas, predominantly communities of color, and Indigenous communities- have the least access to both the Bay proper itself, and to other important resources like funding or information (Public Access Workgroup, 2022). Thus, maintaining a healthy balance between these two priorities is imperative for creating a healthier and more equitable version of the Bay.

Multiple challenges specific to organizations within the Bay were identified throughout the interviews, with **personnel capacity** being the most discussed. Personnel capacity is inextricably linked to funding, as most grant funds do not provide long-term funding to support existing salaries or new hires. Those that do often only provide salary funding for the length of the grant and for a position specific to what was outlined in the grant. This presents a dilemma for those working in nonprofit organizations or regulatory agencies: work overtime to try to provide outreach or increase engagement not specific to one's role or stay within one's designated capacity with the knowledge that more could be being done. Lack of organizational and personnel capacity makes it extremely difficult to continue to scale up successful initiatives and engage with communities on a regular basis. One solution to this issue involves **increasing coordination and communication among local, state, and regional organizations**, and would solve another barrier identified by interview participants: working in silos. Creating a channel for organizations within the Bay to communicate about their current projects, goals, data, procedures, and community engagement would allow each organization to leverage each other's work, reducing the need for additional capacity.

The last theme presented during interview discussions about major challenges related to the **environmental regulatory landscape**. Environmental regulators exist to balance the power of development over the preservation of natural resources but there is often a prevalent struggle within this dynamic. Multiple participants discussed how the power of those regulators can differ based on the stakeholder in question. For example, powerful developers or agricultural companies can have more sway over the regulation process than small businesses or independent farmers. This results in a power imbalance between both the regulators and developers, but also between large agricultural companies and independent farmers. While providing recommendations for both righting the balance between development and conservation and how to navigate the recent *Sackett v. EPA* ruling is beyond the scope of this report, there are communication specific strategies that can create better awareness related to the issues. For example, communications could focus on increasing public awareness of how federal administrative and judicial rulings about regulated water definitions affect non-tidal wetlands, what wetland mitigation means by comparing mitigation to conservation, and the importance of wetland buffer zones. Furthermore, landowner education about existing financial incentives for wetland restoration and buffers could include workshops, social media blurbs, or booths at local farmers markets and events.

These recommendations, along with more coordinated consistency among regulatory agencies across the watershed, provide a pathway to traversing the most significant barriers and challenges to achieving more wetland restoration and conservation in the Bay Watershed.

–Recommendations–

- Establish a set data-metric standard for long-term monitoring of completed restoration projects to alleviate issues from lack of funding on the tail end of projects, providing a

basis for which to compare environmental data collected at designated points after project completion.
- Provide a step-by-step guide to all relevant funding sources and programs within each jurisdiction, having them all in one, easy to access place to make it easier for stakeholders to fully utilize the available funding sources.
- Create a designated channel for increasing coordination and communication among local, state, and regional organizations to communicate about their current projects, procedures, and strategies, allowing each organization to leverage each other's work, reducing the need for additional capacity.
- Increase communication efforts around educating the public on how current regulatory frameworks and judicial rulings impact wetlands and the Bay ecosystems.

Current Public Perceptions

The general public can serve both as a catalyst and as a barrier to progress when it comes to restoration and conservation projects, with their understanding and perception of the issues driving their action or lack thereof. Thus, **how the public perceives non-tidal wetland restoration and conservation is imperative to the success of the Bay as a whole**, and serves as a central theme for this report. Understanding these perceptions can help guide how to modify existing projects and outreach to better engage the public and make their perception of Chesapeake Bay wetlands more positive.

"*I grew up here, but I can also laugh about the fact that if I say 'Chesapeake Bay,' 18 heads in a room will turn and be like, 'What?' Because that's our identity. That's who we are."*
-Community Coordinator from Washington, D.C.

It is no surprise that many of the interview participants reported they felt the public has an overall positive relationship with the Bay, as it is foundational to the common identity in the region. A collective identity connects a group of people through common interests, experiences, and solidarity, and the term 'Watershed identity' connects the definition of collective identity to a shared watershed (Mainzer, Dillard, and Cole, 2024). For many stakeholders and community members in the Bay watershed, the Bay is seen as more than a sum of its parts. Even for some people who aren't familiar with wetlands or conservation specifically, participants described how many members of the public still support protecting the Bay as a whole.

"Some people don't even know what a wetland is, but they know if you say, oh, this protects the Chesapeake Bay, you're probably gonna get a positive reaction to that."
Terryl Acker-Carter, Community Engagement Specialist, Anne Arundel County Watershed Stewards Academy

A person's everyday actions and lifestyle can have significant downstream impacts which occur far away from them, creating a significant disconnect between a person and their relationship to the Bay (Mainzer, Dillard, and Cole, 2024). **Drawing on this shared identity is a key strategy in creating a more positive perception of non-tidal wetlands**, and can be utilized in engagement or outreach efforts. Connecting the breadth and beauty of the Bay not only to its direct impact and relationship with the people that live there, but also to the integral ecosystems which keep it healthy is a key way to continue this positive momentum. Helping people relate to

the Bay in a more positive way can help connect those with more complex relationships to it and lead to a long lasting beneficial impact.

While a majority of the public is by no means uneducated about wetlands, there is a prevalent lack of understanding surrounding accurate information on both the benefits that wetlands provide and drawbacks to a wetland ecosystem. The drawbacks of wetlands are important, because non-tidal wetlands have historically been seen as valueless swamps- a tactic born out of a lack of information and used as reasoning for the filling and development of wetlands throughout United States history (*Why Are Wetlands Important,* 2016). This remains the case for many constituents of the Bay, as participants discussed how the public generally has negative feelings towards wetlands. Reasons for this ranged from an overall dislike to a specific critique on their aesthetic value. This is consistent with perceptions of wetlands in other regions, with the aesthetic value of wetlands remaining a source of division in public opinions (Ringgold, 2024). An incomplete understanding of wetlands often extends to the numerous benefits that wetlands provide. This is likely why interview participants related one's level of knowledge on wetlands to one's perception of wetlands, with more wetland knowledge leading to a more positive opinion. Changing these preconceived notions can be incredibly challenging but is crucial for garnering more public support and engaging people in non-tidal wetland restoration.

Involvement and engagement from the agricultural sector is crucial for the conservation and restoration of non-tidal wetlands, as many areas which today are farmland were wetlands just a few decades ago (Goetz et al., 2004). Thus, a lot of wetland restoration happens on farmland, and involves engagement and participation from landowners and farmers. Because wetlands are a regulated resource, landowners and farmers often quarrel with regulatory agencies about the kind of activity that is allowed on their property (Goldman and Needelman, 2015). This, along with complicated programs for wetland restoration, non-point pollution mitigation, and land easements, can lead these particular stakeholders to have a more negative perception of wetlands. This negative perception often draws from their personal experiences with regulatory agencies and government programs, and requires a more tailored approach that goes beyond better wetland benefit education.

How people feel about and view wetlands is critically important. Influencing these perceptions entails **coordination in messaging and outreach techniques from multiple levels within the Bay**. The next step in this process is getting people interested and involved in projects related to wetland restoration and conservation. One of the easiest ways to do this is through financial incentives for project participation, however, obtaining more funding for the expansion of such programs is complex, and is beyond the scope of this report. A key strategy for garnering general interest in projects is through relationship and trust building with communities and community members, and can result in a myriad of benefits for both parties. Implementing stewardship programs within a specific project or community can achieve this, and provides education and experience for those involved while building a robust foundational relationship for the organization or agency involved.

–Recommendations–

- Draw on a shared identity of the Chesapeake Bay watershed to better connect complex and often conflicting issues in an effective and universal way, to increase interest and engagement in projects.

- Expand education on the benefits and realities of wetland ecosystems to increase the public's knowledge base of non-tidal wetlands, leading to a more positive perception of these ecosystems.
- Implement community-based stewardship programs to build trust beyond the scope of a particular project, building a foundational relationship to create sustainable and long-term collaboration.

Current Communication Channels

The channels in which communication is conducted appears to be a key factor related to how effectively an organization can reach target audiences. Looking at the interview results, it was clear that **the ability to work through existing community networks is key in order to disseminate information to a wider audience and reach new people who may not be already engaged** with wetlands conservation and restoration efforts throughout the watershed. The content from the interviews strongly supported this sentiment and highlighted the need to connect through key community hubs like schools, libraries, and churches where people frequently exchange and seek out information.

"There's one person in a community that does something and that just could take off and spread. It's like the whole social diffusion model. So that's really big to be able to kind of pass that through 'cause people listen to their neighbors, they don't want to listen to regulators and things like that. So that's really critical"

-Rachel Felver, Chesapeake Bay Program Communications Director, Alliance for the Chesapeake Bay

When evaluating different channels to utilize, it is important to **tailor messaging and materials so that it can be shared through as many communication channels as possible** in order to reach diverse audiences and achieve the desired impact. Different communities and demographics may only have access to or feel comfortable interacting with certain communication channels. Therefore, informational materials may need to be adapted to different mediums in order to be effectively disseminated. It is also important to consider the attention span of the audience. Some interview participants highlighted the need of keeping the length of materials short, especially when sharing videos.

It is important to note that traditional mainstream media channels may not be the most effective because of their tendencies to inadequately cover issues in depth and to reach only a small audience of individuals who are already informed and engaged in the issue (Nisbet, 2009). This is further exacerbated by the growing fragmentation of polarization of news sources across the United States which can limit effective communication of important environmental issues (Nisbet, 2009). In addition, some interview participants mentioned that the general public often confuses the various organizations throughout the Bay and does not easily differentiate the work that they do. One interview participant further emphasized that the media is notorious for mixing up different Chesapeake Bay organizations which hurts brand awareness as different successes and failures are often attributed to the incorrect organization. Therefore, based on both the literature and the experiences of interview participants, it is recommended that the Chesapeake Bay Program and other organizations throughout the Bay avoid relying heavily on media channels like newspapers and television, yet it is important to acknowledge that these channels do possess the value of being accessible to many different demographics.

Regardless of which communication channel is utilized, some interview participants noted that they felt uncomfortable when "cold-calling" community members they had not previously engaged with. This is why it is important to build relationships within the community that the communicator will be working in by getting to know individuals outside of the issue first in order to learn about their concerns and values related to the work being done. This step will help increase understanding of how to frame future communication efforts with the targeted community based on important values and concerns.

Finally, it is essential that communicators collect feedback from the community on both the information presented on an issue and the distribution of the materials. It is important to **evaluate whether the selected communication channels achieve the intended purpose and goals of communication** (Economou, 2022). Feedback data could be collected through focus groups, community gatherings, town hall meetings, surveys, and further interviews. It can also be helpful to collect data on who is being reached through communication efforts and to analyze why selected communication channels may be preventing the communicator from reaching everyone that they are wanting to reach.

–Recommendations–

- Utilize existing community networks and relationships.
- Share materials at key community information hubs.
- Utilize as many communication channels as capacity allows while prioritizing channels that have proven to be more effective.
- Avoid cold-calling, instead focus on building relationships with the community before jumping in with a project.
- Collect feedback on the effectiveness of your communication efforts-learn which channels are effective for different audiences.

Engagement Strategy and Messaging Content Recommendations

Through the analysis of literature on environmental communication strategies, three primary goals emerge for effective communication. The first goal is to **find commonalities between organizational goals and the interests of the intended audience**. Drawing on the goals and outcomes listed in the 2014 Chesapeake Bay Watershed Agreement, stewardship appears to be an important goal involving the desire to increase the number of community members who are involved in supporting and carrying out conservation and restoration activities related to improving the health of the Bay (Hoyt, Summers & Cameron, 2017). Research in the region also points to a trend of community members who conduct citizen science feeling that their knowledge is undervalued by science professionals throughout the Bay (Webster & Dennison, 2022). Therefore, it is recommended that the CBP look for ways to **demonstrate how their actions as an organization can fulfill the needs and goals of local communities** where wetland restoration and conservation efforts are taking place.

The second goal of effective communication is to **improve the audience's understanding of relevant issues and promote behavior change to take action on these issues**. This involves the need to fill in gaps and address misconceptions in the audience's knowledge through the introduction of both declarative knowledge (facts, concepts, and information) and procedural knowledge (how to perform a specific skill or action) (Bruine de Bruin & Bostrom, 2013). This approach was mentioned as being successful by nearly a quarter of all participants as individuals need to understand the procedural knowledge of how to care for

a restored site in order for the site to be maintained long-term. Therefore, communication efforts need to go beyond providing declarative knowledge on the issues threatening wetlands and further provide procedural knowledge of how to perform actions individuals can take to support healthy wetlands like removing invasive species, reducing runoff, and planting trees. The CBP website is a great resource in terms of providing procedural knowledge for how people can take action at home and in their communities to support the various ecosystems of the Bay. However, when presented with too many options of actions to take, the audience may experience "choice overload" which is common with environmental issues and occurs when people feel overwhelmed with the amount of suggested actions they should take to help combat these issues. This can ultimately lead to decision avoidance and inaction (Bruine de Bruin & Bostrom, 2013). Therefore, it is good to provide procedural knowledge about specific actions community members can take to help the Bay, but it is recommended that the most impactful or "easiest to try" behaviors are highlighted somewhere in the materials. Another strategy is to pare down the information presented in the message in order to give weight to certain elements over others to understand the most important talking points about a specific issue (Nisbet, 2009). This would allow people to better understand which actions they should prioritize and can introduce them into these behaviors while allowing them to explore other behaviors at their own pace.

"We realized residents and community members were the ones that needed the tools to take action on their own landscapes and in their own neighborhoods and in their communities that they engage with to help make action for that cleaner water"
-Terryl Acker-Carter, Community Engagement Specialist, Anne Arundel County Watershed Stewards Academy

The third goal is to **empower the audience to become involved and take action**. This goal goes beyond just providing information and works to instill a desire to act in the audience. Similarly to the second goal, introducing procedural knowledge into messaging can lead to community members feeling more empowered to take action. As mentioned in the interviews, training community stewards can help develop leadership on these issues within communities that can serve as points of contact for other community members who want to engage further in issues surrounding wetlands. These community leaders are often more effective messengers since they are already *established* and *trusted* within the community and can lead to higher rates of community buy-in for environmental protection and restoration efforts. This helps ease the burden on capacity for organizations like the CBP who may struggle to maintain regular communication with all communities throughout the Bay.

"And so it's really valuable to be able to lean on those voices who understand their neighbors, who understand their priorities and what their concerns are, and then they can help us tailor messaging to what and how they need to hear it"
-Sally Albright, Education and Outreach Coordinator, AACo Bureau of Watershed Protection & Restoration

Beyond these three major goals, there are other important considerations when weighing which communication strategies and messaging to include. First, it is important to **get people involved early in the process and invite feedback**. For communities that an organization would like to build a relationship with and where future wetland restoration or conservation efforts may occur, it is essential that the communicator takes the time to introduce themselves and learn about what the community values. When an organization begins a project where a community

may be affected, they should involve the community early in the planning process to show that they value their input and that they care about hearing their concerns and answering their questions. About one third of participants from the interviews mentioned this as a successful strategy for engaging with new communities. By getting the community involved early and making them feel heard, community members are more likely to feel pride and ownership over the site which can encourage citizen-science efforts to monitor and upkeep the project in the future. Research has found that developing this sense of *pride* and *ownership* and learning about the benefits of wetland restoration and conservation projects is crucial in getting people involved and in helping the community understand the positive outcomes of their actions (Rossi et al., 2022).

The Chesapeake Bay region is made up of many diverse and unique communities that face different issues and hold different perspectives and beliefs related to environmental issues an organization may be working to address. Thus, it is important to make sure that **everyone in the community has representatives at the table** when discussing the issues that wetlands and the Bay more broadly face. When creating specific messages that an organization wants to share to the community, it is crucial that all of these different demographic and cultural identities are represented, included, and informed. It may be necessary to conduct formal or informal research to discover the preferred language and terms that people throughout the community use when talking about these issues (Bruine de Bruin & Bostrom, 2013). It is also recommended that communicators highlight local knowledge and community-led research, programs, and other efforts if applicable (Webster & Dennison, 2022). This will demonstrate the organization's commitment to learning more about the community and provide an opportunity for them to **celebrate and support community-led efforts to protect the Bay** which will benefit the relationship with the community going forward.

More broadly, the results of the interviews pointed to the idea that communicators must **frame their messaging around what is deemed important to the audience**. Over one third of participants mentioned the importance of connecting the frame of the message to the interests, opinions, beliefs, and hobbies of the target audience. In general, the audience will likely be more receptive to the message if the communicator is able to evoke an emotional response from them. This is something that is often overlooked by communicators and fails to take advantage of emotionally charged experiences and memories that community members may have associated with living in the Bay region (Martinez-Conde & Macknik, 2017). One way that this could be accomplished is by **connecting the message to cultural and economic symbols of the Bay**. This could involve tying the importance of healthy wetlands to impacts on well-known species like blue crabs, Black-eyed Susans, oysters, black ducks, and monarch butterflies. Another way of creating an emotional response in the audience is by connecting to known interests of the community and desired outcomes that community members would like to see. This was mentioned by about half of the interview participants through the lens of **highlighting environmental co-benefits of wetland restoration** including impacts on animals and wildlife, habitat health, flood mitigation, erosion control, and water quality. For example, if an organization is speaking with someone who is concerned about flooding, they can highlight the ability of wetlands to act as a sponge that stores excess water during heavy precipitation events. If an organization is speaking with someone who cares about recreational fishing, they could highlight how wetlands can be crucial in providing spawning and nursing habitats as well as their positive impacts on downstream water quality. Interestingly, a couple participants felt that it was highly important to highlight economic co-benefits (ecosystem services) that are provided by

healthy wetlands. While framing these benefits in economic terms may make benefit-cost analysis easier, utilizing an economic frame has been proven to reduce individuals' intrinsic appreciation for nature by replacing intrinsic motivation for protecting wetlands with an external reward, also known as "motivational crowding out" (Bekessy et al., 2018). Therefore, co-benefits of wetland restoration and conservation should be highlighted but it is important to avoid framing them in terms of economic outcomes.

"And also I cannot overstate it: figure out a way to connect water quality improvement to improvement in human quality of life"
-Leslie Grunden, Assistant Director of Planning, Caroline County MD Department of Planning and Codes

Similarly, it could prove beneficial to **utilize a narrative approach when attempting to explain the connection between wetland restoration and positive community and environmental outcomes**. A key aspect of this would be to **share success stories** from prior projects not only speaking in terms of outcomes for important ecosystems but also to showcase how the community was able to participate and the benefits that the community received from the project. Research has shown that using a positive frame focusing on these benefits of action is much more effective at engaging people than focusing on the negative effects of inaction. Many communicators make the mistake of taking a fatalistic approach when it comes to environmental issues as a way to try to engage skeptical or disengaged demographics. However, providing "horror stories" about the impacts of environmental issues has been shown to be ineffective in evoking action and often only reaches those already concerned about the issues (Bekessy et al., 2018).

Finally, communicators **should not underestimate the community's knowledge** of the issues in the Bay. While research and the experience of the participants suggests that it is important to utilize *simple*, *non-technical*, and *familiar* language, this does not mean that the communicator needs to "dumb down" their message. This idea rather suggests the need to avoid technical jargon and to utilize layman terminology (Economou, 2022). Based on what was learned about the culture of the Bay through the interviews, it appears that many people have lived in the Bay for most of their lives and possess local knowledge that is crucial to understanding these issues on a local scale. This is why it is important for communicators to **meet community members where they are at in terms of their knowledge** of the issue. Community members may disengage entirely if they feel that the communicator is belittling their knowledge and experience. When communicators make assumptions about the gaps in the community's knowledge, they can waste their time and effort producing materials that provide information that is already known by the community (Bruine de Bruin & Bostrom, 2013). Oftentimes, community members are aware and knowledgeable about issues, and may be already motivated to take action, but can lack the procedural knowledge of how to proceed (Bruine de Bruin & Bostrom, 2013). This is where it is important to consider the existing mental models that people have built that are representative of environmental issues in the Bay. In this case, it may be more beneficial to ask what they need or how the organization can support the community to take action rather than telling them what they need to be doing. As suggested in a few of the interviews, find out what is important to them and have a conversation about it. Sometimes, they may not be able to immediately identify what they need, which is where **"walking the land" can become a useful strategy to identify and talk through potential areas where an organization can collaborate with the community** to address issues. In conclusion, the key takeaways from this research suggest that the major themes of effective communication include connecting the

organization's vision with the goals of the community, providing both declarative and procedural knowledge, training community leaders/stewards, getting people involved in the organization's work early and often, striving to reach diverse groups, framing the message around community interests through the promotion of co-benefits, sharing success stories, and valuing community knowledge and community-led efforts.

-Recommendations-

- Find commonalities between the CBP's organizational goals and the goals of the target community.
- Go beyond providing declarative knowledge about the issues threatening wetlands, instead share procedural knowledge of how to perform actions that can support healthy wetlands.
    - Don't overwhelm the audience with too many options of actions to take, instead prioritize the most effective actions or easiest to try out.
- Pare down information so that people can understand the main talking points on an issue.
- Frame your message around what is important to the audience. Connect to their interests, beliefs, and hobbies; appeal to their emotional experiences and memories of the Bay; connect to cultural/economic symbols of the Bay; and connect to co-benefits that wetlands provide.
- Utilize a narrative approach when sharing success stories and include a positive frame of the information provided.
- Don't "dumb down" the message or underestimate the community's existing knowledge and ability to comprehend complex ideas, but avoid overly technical jargon.
    - People may disengage if they feel offended or belittled.
    - Many times people have a good understanding of declarative knowledge but lack procedural knowledge.
- Identify and train community leaders to act as liaisons in the community and continue to share your message and teach essential skills to others.
- Get people involved in the planning process early and invite feedback to show the community that their input is valued. Keep them involved throughout the project as this can lead to community pride and ownership of the project.
- Make sure that all groups and perspectives are represented at the table and make an effort to learn about demographic and cultural identities in the community.
- Value, support, and celebrate local knowledge and community-led research while including it into the dialogue around these issues, this will help with relationship building moving forward.
- Walk the land with community members to either highlight successful sites or learn more about their community.

Ideal Future

Oftentimes in environmental work, individuals focus their conversations on fears, frustrations, and doubts related to the state of the world and the progress that can actually be made (Meadows, 1994). These conversations emphasize information-based models and implementation of goals without taking the time to truly consider what future these efforts are working towards. It is often assumed that these goals are well-known and pre-established.

However, this mindset is one constrained by perceived barriers and limitations that ultimately detracts from what can truly be accomplished. In contrast, it is more difficult for individuals to come together to share their dreams with one another. The envisioning process allows individuals to **acknowledge potential constraints but not be crushed by them while sharing desires and clear goals with others** who are also interested in this work (Meadows, 1994). This collaboration can help establish a path forward to a socially shared desired future.

The "ideal future" envisioning exercise that was conducted at the end of each interview offered participants an opportunity to think expansively about the future of the Chesapeake Bay—free from the typical limitations imposed by budget constraints, regulatory hurdles, and institutional inertia. This exercise provided a valuable framework for exploring long-term possibilities and fostering creative problem-solving by encouraging participants to **imagine a world that they truly wanted rather than what they felt they could realistically achieve or what they were willing to settle for** (Meadows, 1994). In doing so, it opened a conceptual space for stakeholders to imagine what a *thriving*, *equitable*, and *ecologically resilient* Chesapeake Bay could look like if restoration efforts were not bounded by current political and financial realities.

Crucially, these idealized visions do not exist in isolation. When viewed alongside earlier findings—such as the lack of funding for long-term maintenance and monitoring of wetland projects, the regulatory uncertainty introduced by *Sackett v. EPA*, and the difficulty stakeholders face navigating a fragmented and inconsistent funding landscape—they underscore the scale of transformation required to achieve lasting ecological resilience and social equity in the region. Participants repeatedly cited barriers like the short-term nature of grant funding, insufficient organizational capacity, and a lack of follow-up after project implementation as major obstacles to meaningful progress. Others pointed to systemic gaps in coordination between federal, state, and local policies, especially in the context of narrowing federal protections for non-tidal wetlands.

These ideal futures, then, serve not merely as aspirational endpoints but as *benchmarks* against which to evaluate current strategies and identify areas for structural reform. By articulating a vision that includes *sustainable urban development*, *community-led restoration*, *enhanced environmental education*, and the *integration of science and policy*, participants highlighted the kinds of priorities that are often undervalued under existing funding and governance models. The emphasis on *community stewardship*, *equitable access to resources*, and *long-term ecological planning* reflects a shift away from short-term compliance-based thinking toward a more holistic, adaptive approach to environmental management.

Importantly, this exercise also revealed that **expanding the imagination beyond fiscal constraints can yield practical insights**. For example, participants envisioned more accessible funding mechanisms, stronger incentive structures for private landowners, and regionally tailored communication strategies—all of which might be implemented incrementally even within current limitations. In this way, the ideal future becomes a strategic tool: it **identifies gaps, inspires innovation, and fosters alignment between short-term actions and long-term goals**.

Ultimately, this component of the study affirms the importance of future-oriented thinking in environmental governance. In the face of climate change, continued development, and institutional fragmentation, restoring and sustaining wetlands of the Chesapeake Bay will require not only persistence and collaboration, but also the courage to think beyond existing paradigms. The visions shared by participants offer a roadmap—**not just for what is possible, but for what is necessary.**

Taken together, these insights paint a compelling picture of an ideal future for the Chesapeake Bay—one in which ecological resilience is maintained through a combination of **strong policies, sustainable urban development, community-driven action, cutting-edge science, and widespread public engagement**. While challenges remain, participants were optimistic that with continued commitment and collaboration, this vision could become a reality. The path forward requires not only persistence but also innovation and adaptability in the face of evolving environmental pressures. By aligning conservation efforts with economic, social, and technological advancements, stakeholders can work toward a Chesapeake Bay that is not just surviving but thriving for generations to come.

LIMITATIONS TO RESEARCH

This study provides valuable insights into the current threats that non-tidal wetlands face, the legislative context for non-tidal wetlands protection, perception of non-tidal wetlands across the community, barriers and challenges to wetlands restoration and conservation, and effective communication channels and strategies for community engagement surrounding non-tidal wetlands. However, it is also necessary to address the limitations of this research and the methods utilized.

A common limitation that occurs throughout qualitative research, is the role that different biases can play in how responses are *collected*, *given*, and *interpreted*. **Social desirability bias** can occur when participants of a qualitative study respond in a manner that aligns with what society deems as socially acceptable while trying to be perceived favorably given this context. In some cases, this can deter participants from revealing their true opinions to researchers. This may have led to underreporting of information related to some of the research questions including, but not limited to: perceived effectiveness of current policies, policy gaps, and ineffective communication channels and strategies. Since participants were provided with the research goals prior to their interviews, there may have been attempts by participants to approach the interview focused on highlighting examples of success and promoting effective outreach and engagement efforts. In addition to social desirability bias, some participants appeared to feel uncomfortable or hesitant answering some of the questions in the interviews where they felt they might need to offer sensitive information in order to respond. There were a few instances where participants emphasized that their responses were their own and not representative of the beliefs and values of the organizations that they worked for. This led to more hesitancy since participants did not want to misrepresent their organization or speak badly of partners and other stakeholders.

It is important to acknowledge that another limitation of the research could include **interviewer bias** given that not every interview session was hosted by the same pair of researchers. Although there were attempts by the research team to standardize the interview process, ultimately, the interviews were given in a semi-structured format which allowed the interviewer to alter questions that were asked in each interview relative to the expertise of the participant and the flow of the interview. Each interviewer also varied in their approach and style

of interviewing. Some variations included asking more follow-up questions or using a more conversational tone. The results may also be impacted by **researcher interpretation bias** which can occur from the introduction of subjectivity by the researchers during the data analysis phase. In addition, the methods in which codes were used to sort the data may have led to instances of misinterpretation of what participants were truly saying.

In terms of the scope of the research, the **sample size** of the interviews consisted of 32 individuals. While this value exceeded the initial target sample size, it did not fully encompass the diverse composition of the Bay. The timeline of this research was limited which required a smaller scope focusing on certain stakeholder groups in certain regions of the Bay rather than being able to take a comprehensive look at the entire watershed. For example, the entirety of the states of New York, Delaware, and West Virginia were excluded from the study and there was very little representation from Pennsylvania and the District of Columbia. In addition to this, the sample was heavily skewed towards individuals from Maryland. This likely occurred due to the use of snowball sampling to recruit later participants based on recommendations given by earlier participants. Each of the six states in the Bay varies significantly in terms of how non-tidal wetlands are defined and protected. Therefore, the data collected from participants does not encompass the entire political context of the Bay. This limits the applicability of the findings of the study since the excluded and underrepresented states also contain non-tidal wetlands but there was little to no research conducted in these communities. In terms of the stakeholder groups that were targeted, it proved difficult to reach agricultural stakeholders and representatives of the private sector not already affiliated with the environmental sphere, which were groups that could have provided valuable insight into the research questions given their relative impacts on the watershed as a whole. The **reach of the sample** also may have been limited due to the virtual medium in which participants were contacted and in which the interviews were conducted. Given the high non-response rate of the initial outreach, it is likely that many individuals either ignored the request or never received it (i.e. if the email went to their spam folders). This suggests that outreach methods were a limitation of the sample that could have been recruited.

CONCLUSION

Summary of Findings

This research has been effective in revealing how the CBP fits into the broader efforts to restore the Bay, the current state of the health of non-tidal wetlands, the legislative and regulatory context in which organizations operate under, barriers and challenges to restoration work, the various perceptions that professionals and community members hold about the importance of restoration and conservation of non-tidal wetlands, communication channels that are utilized by organizations, and effective strategies for communicating with community stakeholders.

In terms of CBP purpose and goals, it was clear that the program's responsibilities surrounding restoration of the Bay are broad and encompass many types of work given the diverse backgrounds and affiliations that members of the program possess. Interview participants also identified a **need for more monitoring and follow-up with communities** from the CBP and other organizations specializing in restoration after projects are completed.

When evaluating the current state of the Chesapeake Bay and non-tidal wetlands, water quality, stormwater and agricultural runoff, and the total loss of wetlands were top concerns of interview participants. In addition, the most commonly mentioned major threats were climate change, habitat fragmentation, development, invasive species, and subsidence of land. While these ecological threats were easily identified, many professionals working in restoration face **challenges in the form of local community resistance to potential projects and high costs for projects**. This research found that communicating the benefits of wetland restoration to the community could be an effective outlet for getting people on board.

The legislative and regulatory context in which non-tidal wetland restoration occurs has been both crucial in restoring the Bay from poorer conditions in the 1980s but also **limited in its ability to address future threats that non-tidal wetlands will face in coming years** due to climate change. Interview participants identified uncertainty in federal protections moving forward and the need for state and local policies to fill in gaps at the federal level to protect non-tidal wetlands. There was also a stated need for better enforcement of legal protections for wetlands, yet many enforcement agencies cite a lack of capacity to do so. Interview participants suggested that federal officials should utilize funding from the CWA and other relevant policies to address this funding deficit.

For organizations conducting restoration and conservation work in the non-tidal wetlands realm, the **availability and accessibility of funding appears to be the largest barrier** that is preventing the desired scale of restoration. This lack of funding also contributes to the inability for organizations to conduct follow-up and long-term monitoring on completed projects. Personnel capacity was also identified as a major challenge for restoration and conservation organizations since many positions within these organizations are grant-funded. This lack of capacity on an organizational level ultimately leads to difficulty scaling up successful initiatives and maintaining frequent and authentic engagement with communities regularly. One solution to this capacity restraint involves **increasing collaboration and partnerships among local, state, and regional organizations** that are involved in similar work.

Public perception of the Chesapeake Bay more broadly was found to be mostly positive and largely rooted in the shared cultural identity of the Bay residents. This **shared identity results in widespread public support for protecting the Bay** a whole. Therefore, framing wetlands messaging around this identity and how individuals relate to the Bay appears to be a key strategy for calling people to action. Public perceptions of wetlands in the Bay appear to be less favorable given negative stereotypes of wetlands suggesting that they are valueless swamps and lack aesthetic value which has historically been used as an argument to fill and develop wetlands (*Why Are Wetlands Important,* 2016). Looking at the agricultural sector specifically, many negative perceptions of wetlands appear to stem from personal experiences of frustration when dealing with regulatory agencies and government programs. **Addressing these negative misconceptions of wetlands, connecting to the cultural identities of communities, and building long-term relationships** with communities will be key strategies for future communication efforts.

The ways in which information is shared can be a crucial element of effective communication. When sharing messaging, this research found that **utilizing as many communication channels as possible** appears to be the most effective in reaching as many different audiences and communities as possible given that people have access to information and news through different media. For distributing information, the use of key community hubs was identified as an effective strategy given that people may already share and seek out

information at these sites. Regardless of what channel of communication is chosen, it is important for communicators to **establish relationships with community members and avoid "cold-calling."** Another key finding regarding communication channels was the need to evaluate the effectiveness of these channels by **collecting feedback** from community members and making adjustments as needed.

Effective communication was deemed achievable by focusing on three clear goals. The first goal of communicating effectively is to **connect with community members on a personal level and tie these interests to wetlands**. Recommended strategies to achieve this connection included walking the land with community members, finding commonalities between community goals and organizational goals, involving community members early and often in the work of the organization, and ultimately, framing the message around what is deemed most important by the community. The second goal is to **improve the community's understanding of relevant issues while promoting behavior change**. Recommended strategies to achieve this included pairing both declarative and procedural knowledge in informational materials, paring down the amount of information provided in order to emphasize key points and actions that one can take, emphasizing co-benefits of wetland restoration, and utilizing a positive frame focusing on the benefits of action. The final goal is to **empower the community to become involved and take action**. This could be achieved by training community stewards and liaisons who can rally support and teach others, supporting and celebrating citizen-science efforts and community project upkeep, promoting community pride and ownership over completed restoration projects, avoiding underestimation of community knowledge, being inclusive of different cultures and local knowledge, and sharing success stories of past projects.

Finally, this research found that individuals throughout the Bay are hopeful that the work being done will lead to **an ecosystem that is self-sustaining and resilient** even in the context of climate change, urban expansion, and economic development. The collective desired future state of the Bay is one where **waterways are clean, native species thrive, and current levels of degradation are reversed**. Interview participants felt that this future could be achieved through both policy-driven and community-led efforts to plan and allocate funding towards conservation initiatives, investments in green infrastructure, education of Bay issues, and improved data collection and monitoring.

Summary of Recommendations

- Continue assessing public and stakeholder opinion of the CBP to properly manage outreach and communication.
- Maintain clear, transparent goals for the CBP.
- Note and celebrate successes within the organization.
- Facilitate collaboration across federal, state, and local governments to ensure large coverage of policies protecting wetlands.
- Increase accessibility of information on regulations and government funding opportunities on the CBP website.
- Establish a set data-metric standard for long-term monitoring of completed restoration projects to alleviate issues from lack of funding on the tail end of projects, providing a basis for which to compare environmental data collected at designated points after project completion.

- Provide a step-by-step guide to all relevant funding sources and programs within each jurisdiction, having them all in one, easy to access place to make it easier for stakeholders to fully utilize the available funding sources.
- Create a designated channel for increasing coordination and communication among local, state, and regional organizations to communicate about their current projects, procedures, and strategies, allowing each organization to leverage each other's work, reducing the need for additional capacity.
- Draw on a shared identity of the Chesapeake Bay watershed to better connect complex and often conflicting issues in an effective and universal way, to increase interest and engagement in projects.
- Expand education on the benefits and realities of wetland ecosystems to increase the public's knowledge base of non-tidal wetlands, leading to a more positive perception of these ecosystems.
- Implement community-based stewardship programs to build trust beyond the scope of a particular project, building a foundational relationship to create sustainable and long-term collaboration.
- Utilize existing community networks and relationships.
- Share materials at key community information hubs.
- Utilize as many communication channels as capacity allows while prioritizing channels that have proven to be more effective.
- Avoid cold-calling, instead focus on building relationships with the community before jumping in with a project.
- Collect feedback on the effectiveness of your communication efforts-learn which channels are effective for different audiences.
- Find commonalities between the CBP's organizational goals and the goals of the target community.
- Go beyond providing declarative knowledge about the issues threatening wetlands, instead share procedural knowledge of how to perform actions that can support healthy wetlands.
    - Don't overwhelm the audience with too many options of actions to take, instead prioritize the most effective actions or easiest to try out.
- Pare down information so that people can understand the main talking points on an issue.
- Frame your message around what is important to the audience. Connect to their interests, beliefs, and hobbies; appeal to their emotional experiences and memories of the Bay; connect to cultural/economic symbols of the Bay; and connect to co-benefits that wetlands provide.
- Utilize a narrative approach when sharing success stories and include a positive frame of the information provided.
- Don't "dumb down" the message or underestimate the community's existing knowledge and ability to comprehend complex ideas, but avoid overly technical jargon.
    - People may disengage if they feel offended or belittled.
    - Many times people have a good understanding of declarative knowledge but lack procedural knowledge.
- Identify and train community leaders to act as liaisons in the community and continue to share your message and teach essential skills to others.

- Get people involved in the planning process early and invite feedback to show the community that their input is valued. Keep them involved throughout the project as this can lead to community pride and ownership of the project.
- Make sure that all groups and perspectives are represented at the table and make an effort to learn about demographic and cultural identities in the community.
- Value, support, and celebrate local knowledge and community-led research while including it into the dialogue around these issues, this will help with relationship building moving forward.
- Walk the land with community members to either highlight successful sites or learn more about their community.

Next Steps and Broader Implications

While this research was successful in gathering different opinions and experiences of individuals throughout the Chesapeake Bay, there are still many communities that have not been heard. If future research is conducted relating to this topic, it is recommended that researchers collect data from the communities and demographics that this research was unable to reach. The insight of individuals in other Bay states such as Pennsylvania, West Virginia, Delaware, and New York is necessary to draw conclusions on local and regional perceptions of non-tidal wetlands and how best to communicate across the entire region. Similarly, future research should be conducted to better understand perceptions of non-tidal wetlands within farming communities and the private or corporate sector outside of the environmental sphere. These two groups and their practices may have significant impacts on the health of non-tidal wetlands and could prove to be valuable populations to form partnerships with long-term.

With the establishment of recommendations for how to best communicate with different stakeholders throughout the Bay, another recommendation is for the CBP and other Chesapeake-based organizations to incorporate these guidelines into their communication efforts and messaging materials. It is important to develop long-term relationships with key communities that can collaborate in efforts to protect non-tidal wetlands. If there is another opportunity for the CBP to partner with students from the University of Michigan or elsewhere, the creation of informational materials for distribution to local Bay communities or a model for community-driven stewardship programs could serve as possible research projects.

While the scope of this research was limited to non-tidal wetlands primarily in D.C., Virginia, and Maryland, the ecosystem of the Chesapeake Bay is highly interconnected and therefore suggests that efforts to better understand and collaborate with communities throughout the Bay on these issues should be occurring in all six Bay states. Many of the above recommendations related to communication strategies are sufficiently broad to apply to communication efforts for any type of environmental issues, meaning that these recommendations are not solely applicable to non-tidal wetlands. For an organization as multifaceted and interdisciplinary as the CBP, the recommendations from this report may prove useful to all workgroups in their efforts to engage with local communities.

Non-tidal wetlands are vital to the ecological integrity and climate resilience of the Chesapeake Bay watershed, yet they remain under-prioritized in policy frameworks, funding streams, and public narratives. This project sought to understand why—and to explore how that can shift. By combining a systematic literature review with qualitative interviews across government, nonprofit, and private sectors, we identified a number of persistent challenges: fragmented governance, inconsistent funding mechanisms, limited outreach capacity, and a

widespread disconnect between scientific knowledge and public perception. Importantly, this research also found strong, cross-sectoral consensus on the need for more inclusive, community-oriented approaches to wetland restoration. Stakeholders emphasized that the obstacles to progress are not only technical or financial, but also cultural and communicative—rooted in how to frame wetlands, who to engage, and which values to elevate in conservation planning.

The Chesapeake Bay Program and its Wetlands Workgroup are uniquely positioned to respond to these challenges by reimagining communication strategies, fostering sustained cross-sector collaboration, and prioritizing local relevance in outreach and restoration efforts. Doing so will require not just greater coordination and investment, but also a fundamental shift in how wetland value is articulated and enacted at the local level. The recommendations outlined in this report are intended to serve as a practical and adaptive framework to support that shift—informing future programs, messaging, and partnerships that better reflect the ecological and social complexity of the watershed. Elevating non-tidal wetlands is not a peripheral goal; it is central to achieving a more resilient, equitable, and ecologically sound future for the Chesapeake Bay and the communities that depend on it.

REFERENCES

Arnold, Richard R.; Dennison, William C.; Etgen, Louis A.; Goodwin Peter; Paolisso, Michael J.; Shenk, Gary; Swanson, Ann P.; Vargas-Nguyen, Vanessa (2021): Chesapeake Bay - A case study in resiliency and restoration. In: Hydrolink 2021/1. Madrid: International Association for Hydro-Environment Engineering and Research (IAHR). S. 25-28. https://www.iahr.org/library/info?pid=9095.

Andrews, Elizabeth Armistead. "Legal and Policy Challenges for Future Marsh Preservation in the Chesapeake Bay Region." *Wetlands* 40, no. 6 (December 2020): 1777–88. https://doi.org/10.1007/s13157-020-01389-z.

Bay Journal. "Nonprofits, States Scramble as Trump Administration Pauses Funding for Many Chesapeake Restoration Programs." Bay Journal, February 14, 2025. https://www.bayjournal.com/news/policy/nonprofits-states-scramble-as-trump-administration-pauses-funding-for-many-chesapeake-restoration-programs/article_b370ff74-eadb-11ef-9c61-1b4c7467ab26.html.

Bekessy, S.A., M.C. Runge, A.M. Kusmanoff, D.A. Keith, and B.A. Wintle. "Ask Not What Nature Can Do for You: A Critique of Ecosystem Services as a Communication Strategy." *Biological Conservation* 224 (August 2018): 71–74. https://doi.org/10.1016/j.biocon.2018.05.017.

Bruine De Bruin, Wändi, and Ann Bostrom. "Assessing What to Address in Science Communication." *Proceedings of the National Academy of Sciences* 110, no. supplement_3 (August 20, 2013): 14062–68. https://doi.org/10.1073/pnas.1212729110.

Carey, John. "The Complex Case of Chesapeake Bay Restoration." *Proceedings of the National Academy of Sciences* 118, no. 25 (June 22, 2021): e2108734118. https://doi.org/10.1073/pnas.2108734118.

Chesapeake Bay Program. Chesapeake Bay Watershed Agreement. (Washington, DC: U.S. Environmental Protection Agency, 2014) Amended 2022. https://www.chesapeakebay.net/files/Chesapeake-Bay-Watershed-Agreement-Amended.pdf

Chesapeake Bay Program. "What Is a Watershed?" Chesapeake Bay Program. Chesapeake Bay Program, https://www.chesapeakebay.net/discover/watershed.

Ducks Unlimited. "Congress Approves Critical Funding for Wetlands and Waterfowl Conservation | Ducks Unlimited." Accessed April 18, 2025. https://www.ducks.org/newsroom/congress-approves-critical-funding-for-wetlands-and-waterfowl-conservation.

Economou, Kathryn. “Green Communications Toolkit,” 2022.

Federal Emergency Management Agency. 2019. National Preparedness Report. Washington, DC: FEMA. FEMA.gov

Fleming, Patrick M., Dorothy J. Merritts, and Robert C. Walter. “Legacy Sediment Erosion Hot Spots: A Cost-Effective Approach for Targeting Water Quality Improvements.” *Journal of Soil and Water Conservation* 74, no. 4 (2019): 67A-73A. https://doi.org/10.2489/jswc.74.4.67A.

Fox, R.J., T.R. Fisher, A.B. Gustafson, E.L. Koontz, M. Lepori-Bui, K.L. Kvalnes, D.E. Bunnell-Young, et al. “An Evaluation of the Chesapeake Bay Management Strategy to Improve Water Quality in Small Agricultural Watersheds.” *Journal of Environmental Management* 299 (December 2021): 113478. https://doi.org/10.1016/j.jenvman.2021.113478.

Galatowitsch, Susan, and Julia Bohnen. “Long-Term Recovery of a Restored Palustrine Wetland: The Role of Monitoring and Adaptive Management.” *Wetlands* 41, no. 6 (August 2021): 80. https://doi.org/10.1007/s13157-021-01478-7.

Ganju, Neil K., Katherine V. Ackerman, and Zafer Defne. “Using Geospatial Analysis to Guide Marsh Restoration in Chesapeake Bay and Beyond.” *Estuaries and Coasts* 47, no. 1 (January 1, 2024): 1–17. https://doi.org/10.1007/s12237-023-01275-x.

Goetz, Scott J, Claire A Jantz, Charles A Towe, and Nancy E Bockstael. “Modeling the Urbanization Process across Maryland in the Context of Chesapeake Bay Restoration,” 2007.

Goetz, Scott J., Claire A. Jantz, Stephen D. Prince, Andrew J. Smith, Dmitry Varlyguin, and Robb K. Wright. “Integrated Analysis of Ecosystem Interactions with Land Use Change: The Chesapeake Bay Watershed.” In *Geophysical Monograph Series*, edited by Ruth S. DeFries, Gregory P. Asner, and Richard A. Houghton, 153:263–75. Washington, D. C.: American Geophysical Union, 2004. https://doi.org/10.1029/153GM20.

Goldman, Margaret A., and Brian A. Needelman. “Wetland Restoration and Creation for Nitrogen Removal: Challenges to Developing a Watershed-Scale Approach in the Chesapeake Bay Coastal Plain.” In Advances in Agronomy, 132:1–38. Elsevier, 2015. https://doi.org/10.1016/bs.agron.2015.02.005.

Hassett, Brooke, Margaret Palmer, Emily Bernhardt, Sean Smith, and Jamie Carr. “Restoring Watersheds Project by Project: Trends in Chesapeake Bay Tributary Restoration.” *Frontiers in Ecology and the Environment* 3, no. 5 (June 2005): 259–67. https://doi.org/10.1890/1540-9295(2005)003[0259:RWPBPT]2.0.CO;2.

Hennessey, Timothy M. “Governance and Adaptive Management for Estuarine Ecosystems: The Case of Chesapeake Bay.” *Coastal Management* 22, no. 2 (January 1994): 119–45. https://doi.org/10.1080/08920759409362225.

Hettiarachchi, Missaka, Clive McALPINE, and T. H. Morrison. “Governing the Urban Wetlands: A Multiple Case-Study of Policy, Institutions and Reference Points.” *Environmental Conservation* 41, no. 3 (September 2014): 276–89. https://doi.org/10.1017/S0376892913000519.

Highfield, Wesley E. “Section 404 Permitting in Coastal Texas: A Longitudinal Analysis of the Relationship Between Peak Streamflow and Wetland Alteration.” *Environmental Management* 49, no. 4 (April 2012): 892–901. https://doi.org/10.1007/s00267-012-9832-7.

Hopkins, Kristina G., Jacqueline S. Welles, Emily J. Pindilli, Gregory B. Noe, Peter R. Claggett, Labeeb Ahmed, and Marina J. Metes. “Societal Benefits of Floodplains in the Chesapeake Bay and Delaware River Watersheds: Sediment, Nutrient, and Flood Regulation Ecosystem Services.” Journal of Environmental Management 345 (November 2023): 118747. https://doi.org/10.1016/j.jenvman.2023.118747.

Hoyt, Robert, Robert M. Summers, Diane Cameron. “Strategic Outreach Education Program for Local Elected Officials in the Chesapeake Bay Watershed August,” EcoLogix Group Project Team, Chesapeake Bay Trust. (August 2017).

Jantz, Claire A, Scott J Goetz, and Mary K Shelley. “Using the Sleuth Urban Growth Model to Simulate the Impacts of Future Policy Scenarios on Urban Land Use in the Baltimore-Washington Metropolitan Area.” *Environment and Planning B: Planning and Design* 31, no. 2 (April 2004): 251–71. https://doi.org/10.1068/b2983.

Jantz, Patrick, Scott Goetz, and Claire Jantz. “Urbanization and the Loss of Resource Lands in the Chesapeake Bay Watershed.” *Environmental Management* 36, no. 6 (December 2005): 808–25. https://doi.org/10.1007/s00267-004-0315-3.

Kiest, Kristina. “Global Sea Level Rise Scenarios for the United States National Climate Assessment.” Climate Program Office (blog), December 11, 2012. https://cpo.noaa.gov/global-sea-level-rise-scenarios-for-the-united-states-national-climate-assessment/

Kim, Hyun Woo, and Ming-Han Li. “Managing Stormwater for Urban Sustainability: An Evaluation of Local Comprehensive Plans in the Chesapeake Bay Watershed Region.” *Journal of Environmental Planning and Management* 60, no. 10 (October 3, 2017): 1702–25. https://doi.org/10.1080/09640568.2016.1251399.

Krauss, Ken W., Jamie A. Duberstein, Thomas W. Doyle, William H. Conner, Richard H. Day, L. Wayne Inabinette, and Julie L. Whitbeck. “Site Condition, Structure, and Growth of Baldcypress along Tidal/Non-Tidal Salinity Gradients.” *Wetlands* 29, no. 2 (June 2009): 505–19. https://doi.org/10.1672/08-77.1.

Lawal, Dede. UM-SEAS Master’s Project Proposal Submission Form: Chesapeake Bay Program Wetland Communication Strategy. September 2023. https://docs.google.com/document/d/1hzW42Jws3DWeey9pM-hg5uBDymUOtCkUusE_6rV2POU/edit?tab=t.0

Mainzer, Stephen, James Price Dillard, and Charles Andrew Cole. “Collective Identity: Making the Case for a Stage Model Approach to Addressing Water Quality in the Chesapeake Bay Watershed.” *Environmental Management* 74, no. 5 (November 2024): 886–94. https://doi.org/10.1007/s00267-024-02033-w.

Martin, David M., Amy D. Jacobs, Chase McLean, Michelle R. Canick, and Kathleen Boomer. “Using Structured Decision Making to Evaluate Wetland Restoration Opportunities in the Chesapeake Bay Watershed.” *Environmental Management* 70, no. 6 (December 1, 2022): 950–64. https://doi.org/10.1007/s00267-022-01725-5.

Martinez-Conde, Susana, and Stephen L. Macknik. “Finding the Plot in Science Storytelling in Hopes of Enhancing Science Communication.” *Proceedings of the National Academy of Sciences* 114, no. 31 (August 2017): 8127–29. https://doi.org/10.1073/pnas.1711790114.

Meadows, Donella. “Envisioning a Sustainable World”. Third Biennial Meeting of the International Society for Ecological Economics. (October 1994). https://donellameadows.org/archives/envisioning-a-sustainable-world/

Moore, Alex C, and Sumant Kumble. “Community-Based Conservation and Restoration in Coastal Wetlands: A Review,” *Wetland Conservation and Restoration* 44:62, (May 2024). https://doi.org/10.1007/s13157-024-01818-3.

Jon A. Mueller, "40 Years of Chesapeake Bay Restoration: Where We Failed and How to Change Course," Environmental Law Reporter 54, no. 6 (June 2024): 10470-10487

Nisbet, Matthew C. “Communicating Climate Change: Why Frames Matter for Public Engagement.” *Environment: Science and Policy for Sustainable Development* 51, no. 2 (March 2009): 12–23. https://doi.org/10.3200/envt.51.2.12-23.

Public Access Workgroup. “Public Access Research, Final Report”. Chesapeake Bay Program. October, 2022. https://www.chesapeakebay.net/files/documents/Public-Access-Research-Final-Report-081023-with-Appendices-min.pdf

Paolisso, M., J. Trombley, R. R. Hood, and K. G. Sellner. “Environmental Models and Public Stakeholders in the Chesapeake Bay Watershed.” *Estuaries and Coasts* 38, no. S1 (January 2015): 97–113. https://doi.org/10.1007/s12237-013-9650-z.

Portmann, Julia, and Bruce Wiggins. “Assessing Biological Condition of Restored Streams in an Agriculturally Impaired Chesapeake Bay Sub-Watershed.” *Ecological Restoration* 42, no. 1 (March 2024): 42–53. https://doi.org/10.3368/er.42.1.42.

Ringgold, Delaney. “Citizens’ Perceptions of Wetlands Before and During the Restoration of a Local Wetland,” Crop, Soil and Environmental Sciences, University of Arkansas, Fayetteville. (December, 2024).

Roberts, Allen D., Stephen D. Prince, Claire A. Jantz, and Scott J. Goetz. “Effects of Projected Future Urban Land Cover on Nitrogen and Phosphorus Runoff to Chesapeake Bay.” *Ecological Engineering* 35, no. 12 (December 2009): 1758–72. https://doi.org/10.1016/j.ecoleng.2009.09.001.

Rossi, Ryann, Carin Bisland, Leah Sharpe, Emily Trentacoste, Bo Williams, and Susan Yee. “Identifying and Aligning Ecosystem Services and Beneficiaries Associated with Best Management Practices in Chesapeake Bay Watershed.” *Environmental Management* 69, no. 2 (February 2022): 384–409. https://doi.org/10.1007/s00267-021-01561-z.

Staver, Lorie W., James T. Morris, Jeffrey C. Cornwell, J. Court Stevenson, William Nardin, Philippe Hensel, Michael S. Owens, and Amanda Schwark. “Elevation Changes in Restored Marshes at Poplar Island, Chesapeake Bay, MD: I. Trends and Drivers of Spatial Variability.” *Estuaries and Coasts* 47, no. 7 (November 1, 2024): 1784–98. https://doi.org/10.1007/s12237-023-01319-2.

Sudol, Taryn A., Gregory B. Noe, and Denise J. Reed. “Tidal Wetland Resilience to Increased Rates of Sea Level Rise in the Chesapeake Bay: Introduction to the Special Feature.” *Wetlands* 40, no. 6 (December 2020): 1667–71. https://doi.org/10.1007/s13157-020-01391-5.

Teodoro, Jose, and Bruce Nairn. “Understanding the Knowledge and Data Landscape of Climate Change Impacts and Adaptation in the Chesapeake Bay Region: A Systematic Review.” *Climate* 8, no. 4 (April 17, 2020): 58. https://doi.org/10.3390/cli8040058.

“Types of Wetlands.” Wetlands Work. Accessed April 20, 2025. https://www.wetlandswork.org/understanding-wetlands/types-of-wetlands#:~:text=Non%2Dtidal%20wetlands%20can%20be,in%20the%20Chesapeake%20Bay%20watershed.

US EPA. “Chesapeake Bay Total Maximum Daily Load for Nitrogen, Phosphorus and Sediment,” 2010.

US EPA, REG 03. “Frequent Questions about the Chesapeake Bay TMDL.” Overviews and Factsheets, January 5, 2015. https://www.epa.gov/chesapeake-bay-tmdl/frequent-questions-about-chesapeake-bay-tmdl.

Van Dolah, Elizabeth R., Christine D. Miller Hesed, and Michael J. Paolisso. “Marsh Migration, Climate Change, and Coastal Resilience: Human Dimensions Considerations for a Fair Path Forward.” *Wetlands* 40, no. 6 (December 2020): 1751–64. https://doi.org/10.1007/s13157-020-01388-0.

“Water Quality Improvement Efforts in the Chesapeake Bay Watershed to Benefit From $22.4 Million in Watershed Restoration Grants.” 2025. NFWF. https://www.nfwf.org/media-center/press-releases/water-quality-improvement-efforts-chesapeake-bay-watershed-benefit-22-4-million-watershed#:~:text=WASHINGTON%2C%20D.C.%20(June%2025%2C%202024)%20%E2%80%93%20The,in%20matching%20contributions%20to%20generate%20a%20total.

Webster, Suzanne E., and William C. Dennison. “Stakeholder Perspectives on the Roles of Science and Citizen Science in Chesapeake Bay Environmental Management.” *Estuaries and Coasts* 45, no. 8 (December 2022): 2310–26. https://doi.org/10.1007/s12237-022-01106-5.

Wetlands Watch. “The Impact of the Supreme Court’s Roll Back of Wetlands Protections.” Accessed April 18, 2025. https://www.wetlandswatch.org/directors-blog/the-impact-of-the-supreme-courts-roll-back-of-wetlands-protections.

“Wetlands Workgroup.” Chesapeake Bay Program, 2025. https://www.chesapeakebay.net/who/group/wetland-evaluation-taskgroup.

“Wetlands Logic and Action Plan 2023-2024.” Chesapeake Bay Program, 2023. https://www.chesapeakebay.net/what/publications/wetlands-logic-and-action-plan-2023-2024.

“Why Are Wetlands Important?”, Wetlands, U.S. National Park Service. (May, 2016). https://www.nps.gov/subjects/wetlands/why.htm#:~:text=opportunities%20for%20education-,Why%20Are%20Wetlands%20Important.

Wohlgemuth, Maryann. “Nontidal Wetland Functions And Values,” Virginia Institute of Marine Science, Wetlands Program. (August, 1991). https://doi.org/10.21220/M2-8TN1-DT03.

Zedler, Joy B., and John C. Callaway. “Tracking Wetland Restoration: Do Mitigation Sites Follow Desired Trajectories?” *Restoration Ecology* 7, no. 1 (March 1999): 69–73. https://doi.org/10.1046/j.1526-100X.1999.07108.x.

Zhang, Qian, Joel D. Blomquist, Rosemary M. Fanelli, Jennifer L. D. Keisman, Douglas L. Moyer, and Michael J. Langland. “Progress in Reducing Nutrient and Sediment Loads to Chesapeake Bay: Three Decades of Monitoring Data and Implications for Restoring Complex Ecosystems.” *WIREs Water* 10, no. 5 (September 2023): e1671. https://doi.org/10.1002/wat2.1671.

APPENDICES

Appendix A: Literature Review

Introduction

This literature review served as a critical foundation for research into improving communication strategies surrounding non-tidal wetland restoration and conservation in the Chesapeake Bay watershed. As the first phase of a multi-step methodology, the review explored and synthesized current academic knowledge, policy frameworks, and outreach strategies relevant to wetland protection. The review spanned multiple domains—including wetland ecology, environmental policy, stakeholder engagement, and science communication—to build a comprehensive understanding of the issues at play. This interdisciplinary lens was essential to address the complex ecological, social, and political systems that influence wetland health and restoration outcomes in the region.

First, the ecological roles of non-tidal wetlands were investigated. Non-tidal wetlands comprise approximately 86% of the Bay's wetland area yet remain underrepresented in both public discourse and restoration funding. Literature in this area emphasized the vital services these wetlands provide, including nutrient retention, flood mitigation, groundwater recharge, habitat provision, and carbon sequestration (*Types of Wetlands,* 2025). These ecosystem services position non-tidal wetlands as critical assets in the broader Chesapeake Bay restoration effort, especially in the face of climate change, increasing development pressure, and agricultural runoff.

Second, the policy and regulatory landscape affecting wetlands across the watershed was explored. This included examining federal frameworks like the CWA, state-level permitting structures, and recent Supreme Court decisions that have reshaped the definition of protected wetlands. The literature revealed inconsistencies in regulatory enforcement and highlighted the need for better alignment between jurisdictional authorities, as well as the importance of long-term monitoring and adaptive management.

Third, the review involved an investigation into community-based conservation and restoration (CBCR) models, analyzing their potential to generate more durable and context-sensitive outcomes. Studies emphasized the value of local engagement, particularly when community members are given decision-making power and supported with adequate resources and technical assistance. These insights were particularly useful in helping frame the stakeholder mapping approach and design targeted interview questions.

Finally, the literature review assessed the effectiveness of communication strategies used in environmental outreach, focusing on common pitfalls—such as over-reliance on scientific jargon or fatalistic messaging—and alternative approaches that empower and mobilize audiences. Research in this domain emphasized the need to tailor communication strategies to different stakeholder groups, use narrative and emotion in addition to data, and embed feedback loops into engagement processes.

Together, these research threads created a foundation that directly informed the stakeholder engagement strategy and the broader recommendations in this report.

Environmental Context and Current State of the Chesapeake Bay

The Critical Role of Non-Tidal Wetlands in the Chesapeake Bay Ecosystem

Wetlands are among the most productive ecosystems on Earth, providing a wide range of essential ecosystem services, including nutrient filtration, flood control, carbon sequestration, habitat provision, and more. These services are critical not only for maintaining ecological balance but also for enhancing community resilience in the face of environmental pressures. In the Chesapeake Bay watershed, both tidal and non-tidal wetlands are vital for sustaining water quality, mitigating flood risks, and supporting biodiversity. However, increasing challenges such as sea-level rise, urbanization, and agricultural pressures threaten these vital ecosystems. Comprehensive and targeted restoration and conservation efforts, particularly in the context of a rapidly changing climate, are essential to ensure the continued delivery of these services.

Non-tidal wetlands are integral to the health of the Chesapeake Bay watershed. These wetlands, which include forested swamps, wet meadows, bogs, and marshes, are regulated by groundwater inputs, precipitation, and surface runoff, in contrast to tidal wetlands, which are influenced by tides and salinity fluctuations. There are many different types of non-tidal wetlands, all with carrying hydrologic regimes, degree of ecosystem services, and biogeochemical cycling. Non-tidal wetlands provide a multitude of ecosystem services, including nutrient filtration, flood mitigation, groundwater recharge, carbon sequestration, and habitat provision. They are particularly effective at trapping and retaining nutrients from agricultural and urban runoff, thus preventing excessive nitrogen and phosphorus from reaching downstream water bodies and contributing to eutrophication in the Chesapeake Bay. The study by Krauss et al. (2009) provides critical insights into the structure and function of non-tidal wetlands under various hydrological conditions. The findings emphasize that water table fluctuations in these wetlands directly impact tree health, nutrient cycling, and organic matter decomposition. Maintaining wet conditions is essential to support the unique vegetation and diverse wildlife, including amphibians, birds, and invertebrates, that depend on these ecosystems. Hydrological changes, such as drainage for agriculture or increased salinity from sea level rise, can degrade non-tidal wetlands, resulting in reduced ecosystem services. Therefore, preserving these hydrological regimes is crucial for maintaining their ecological integrity and functionality.

Quantifying Ecosystem Services Provided by Non-Tidal Wetlands

Quantifying the benefits of wetland restoration and conservation is crucial for demonstrating the value of these ecosystems and prioritizing restoration efforts. In particular, non-tidal wetlands play a significant role in nutrient retention, carbon sequestration, flood control, and habitat provision, making very valuable ecosystems (Rossi et al., 2022). In terms of nutrient retention, non-tidal wetlands are highly effective at intercepting and retaining nitrogen and phosphorus from agricultural runoff before it reaches downstream water bodies. This is particularly important in reducing the nutrient load in the Chesapeake Bay, where excessive nutrient inputs have led to harmful algal blooms and hypoxic zones (Zhang et al., 2023). Non-tidal wetlands also serve as ‘carbon sinks’, and can store and sequester large amounts of carbon in its vegetation and soils (Rossi et al., 2022). In the context of climate change, this

means that non-tidal wetlands could be a viable pathway in taking excess carbon dioxide out of the air. Furthermore, non-tidal wetlands contribute to groundwater recharge, particularly in upland areas where groundwater is a major source of drinking water. Restoring these wetlands can enhance groundwater infiltration, reduce surface runoff, and maintain stream base flows during dry periods. This function is especially critical in regions experiencing increasing drought frequency due to climate change.

Tidal and non-tidal wetlands alike are a breeding ground for species diversity, and significantly contribute to critical habitat for many plant and animal species. Non-tidal wetlands are most known for housing many species of duck, birds, and other waterfowl, and provide a spawning ground for many fish and aquatic species (Wohlgemuth, 1991). This increases biodiversity, and contributes to a healthy ecosystem. Habitat provision also provides benefits to humans, as many people who enjoy hunting or birding often have the best luck in a non-tidal wetland.

Flood mitigation is another key function of non-tidal wetlands, and provides numerous economic benefits. Located in low-lying areas, these wetlands act as natural sponges, absorbing excess rainwater and surface runoff, thereby reducing flood risks for downstream communities. This function is becoming increasingly important in the context of climate change, which is expected to increase rainfall intensity and frequency in many regions, including the Chesapeake Bay Watershed. This places greater pressure on the watershed's flood management infrastructure, underscoring the critical role non-tidal wetlands play in protecting natural and built infrastructure. Protecting and restoring non-tidal wetlands in flood-prone regions can enhance resilience to extreme weather events, providing both ecological and socio-economic benefits (Hopkins et al., 2023).

Challenges for Non-Tidal Wetlands

Nonpoint source pollution, particularly from agricultural runoff, continues to be a significant challenge for wetland conservation in the Chesapeake Bay watershed. Conventional mitigation strategies, such as using cover crops and establishing riparian buffers, have not delivered the expected reductions in pollution levels. In response, legacy sediment (LS) mitigation has emerged as a more effective solution. Legacy sediment is soil that has been eroded from the landscape over centuries, often deposited in waterways during historical land-clearing and agricultural activities. When disturbed, LS releases stored nutrients and sediments into water bodies, exacerbating pollution problems. When combined with conventional methods, LS can significantly improve water quality and help meet TMDL goals for nutrient reductions (Fleming et al., 2019). By addressing both current sources of pollution and legacy sediments, land managers can achieve greater reductions in nitrogen and phosphorus levels in the watershed, thereby improving the health of wetlands and downstream water bodies.

Maintaining the correct elevation in restored wetlands is another crucial aspect in maintaining the long-term sustainability of non-tidal wetland ecosystems. Elevation plays a critical role in determining the hydrological conditions of wetlands, which in turn affect vegetation, nutrient cycling, and overall ecosystem health. Maintaining the correct elevation helps ensure that the wetland remains in a saturated state, which is necessary for effective nutrient cycling and habitat provision. Restoration projects must consider both the initial elevation of the wetland and the ongoing availability of sediments and nutrients to support accretion over time. This is particularly important in areas where land use changes, such as drainage for agriculture, have altered natural hydrological regimes (Staver et al. 2024).

As climate change exacerbates sea level rise, many low-lying coastal areas will experience something called marsh migration. Marsh migration refers to a process where tidal wetlands gradually move further inland as sea levels rise and the influence of the tides is increased. This means that many areas which are currently occupied by non-tidal wetlands will most likely become tidal wetlands in the coming decades. The Chesapeake Bay Watershed has some of the highest rates of sea level rise in the United States, presenting a real problem for both tidal and non-tidal wetlands in the region (Sudal, Noe, and Reed, 2020).

Restoration Techniques and Opportunities

Restoration efforts often focus on short-term outcomes, but long-term monitoring is crucial for assessing the sustainability of these efforts. Portman and Wiggins (2024) emphasize the importance of extended monitoring to track the success of wetland and stream restoration efforts over time. Their research shows that passive restoration techniques, which involve allowing natural processes to restore degraded ecosystems without intensive human intervention, can lead to significant improvements in stream and wetland health over the long term and minimizing the overall cost of a project. However, these improvements may take years to fully manifest, underscoring the need for patience and continued observation.

Geospatial analysis has emerged as a powerful tool for identifying and prioritizing areas for wetland restoration. Ganju et al. (2024) introduced a decision matrix that uses geospatial metrics, such as the unvegetated-vegetated ratio (UVVR) and elevation capital, to evaluate wetland vulnerability and restoration needs. While this framework was initially developed for tidal wetlands, it can be adapted for non-tidal wetlands by incorporating additional factors such as hydrological connectivity, land-use patterns, and proximity to pollution sources. By integrating data on elevation, land use, and nutrient inputs, geospatial analysis helps land managers identify high-priority areas for restoration. This approach is particularly useful for targeting non-tidal wetlands in headwater regions, where nutrient retention and flood mitigation are critical for protecting downstream water bodies. Additionally, geospatial tools can help visualize hydrological connections between wetlands and other landscape features, making a compelling case for strategic restoration efforts that maximize ecosystem service delivery.

Community-Based Conservation and Restoration (CBCR)

Community-based conservation and restoration (CBCR) of wetlands emphasize locally driven efforts where community participation is central to success. Historically, conservation efforts have often followed a top-down approach, with limited local involvement. However, CBCR models, which involve local communities, policymakers, and private stakeholders in restoration efforts, have shown to be more sustainable and context-appropriate (Moore & Kumble, 2024). Successful CBCR projects focus on tailoring restoration strategies to local environmental contexts, allowing for solutions that benefit both the ecosystem and local communities. Equitable engagement in CBCR is essential for long-term success. Community members play a key role in land-use planning, restoration activities such as vegetation planting, and the management of restored areas. These efforts not only enhance the health of the wetland ecosystems but also generate economic benefits for the communities involved, such as through eco-tourism, sustainable agriculture, and improved fisheries. When community members are engaged in decision-making and management processes, the likelihood of long-term project sustainability increases significantly.

Structured decision-making (SDM) frameworks have become essential tools for prioritizing wetland restoration strategies. These frameworks evaluate restoration opportunities by balancing multiple objectives, such as nutrient load reduction, flood mitigation, habitat provision, and climate resilience (Martin et al., 2022). SDM is particularly relevant for non-tidal wetlands, which are geographically dispersed across a wide range of land-use contexts, including agricultural landscapes, urban areas, and forested regions. These diverse settings require tailored restoration strategies to maximize the ecosystem services provided by non-tidal wetlands. SDM frameworks help land managers and stakeholders make informed decisions by weighing the trade-offs between different restoration goals. For example, restoring wetlands in agricultural areas may prioritize nutrient retention to help farmers meet regulatory nutrient reduction targets, while restoration in urban settings may focus on flood risk reduction. By involving local stakeholders in the decision-making process, SDM ensures that restoration strategies align with the social, economic, and environmental needs of the community.

Community Engagement and Adaptive Management in Wetland Conservation

Involving local stakeholders in the planning and implementation of wetland restoration efforts is essential for ensuring long-term success. Arnold et al. (2021) demonstrate that community-led initiatives, particularly in non-tidal wetlands located on private lands, can lead to more successful restoration outcomes. By engaging landowners, local governments, and conservation organizations in the restoration process, communities can achieve dual benefits: improved environmental health and economic incentives, such as increased property values, improved water quality, and enhanced recreational opportunities. Adaptive management, which involves continuously monitoring restoration outcomes and making adjustments as needed, is critical for ensuring that restoration projects can adapt to changing environmental conditions and community needs. By fostering collaboration among stakeholders and using data-driven decision-making, adaptive management helps ensure that wetland conservation efforts are sustainable and effective in the long term.

Non-tidal wetlands are critical for nutrient retention, flood mitigation, carbon sequestration, groundwater recharge, and habitat provision in the Chesapeake Bay watershed. Their restoration and conservation are essential for maintaining the health and resilience of the watershed, particularly in upland and headwater areas that contribute to downstream water quality. By integrating community-based conservation efforts, structured decision-making frameworks, long-term monitoring, and geospatial analysis, restoration projects can maximize ecological benefits and adapt to the challenges posed by climate change. Ultimately, the success of wetland restoration in the Chesapeake Bay watershed depends on a multifaceted approach that combines scientific research, local knowledge, and stakeholder engagement to protect these valuable ecosystems for future generations.

Policy Implementation and Stakeholder Management

Challenges Managing Stakeholders/Jurisdictions

Introduction

The Chesapeake Bay Watershed covers over 40 million acres: parts of six states and the District of Columbia. The stakeholders within this area are extremely diverse, with varying interests, power, and jurisdictions. Stakeholders can range from individual citizens and residents

to whole communities, nonprofits, government agencies, and coalitions. Some stakeholders care only about their backyards, while others oversee entire counties or states. Managing and coordinating all of the interests is an incredibly difficult task. This remains the single largest hurdle to overcome when considering the future of the Bay. Protection and restoration efforts rely on the alignment of stakeholder interest. This section lays out some distinct challenges with managing stakeholder interests and collaborating across jurisdictions, with some suggestions for finding solutions.

Stakeholders with Many Interests

In any given stream watershed, many different stakeholders exist, each with varying degrees of interest and power in controlling the use and restoration of the resource. City governments, neighborhood communities, recreational groups, and park-goers all may desire a clean watershed, but support different avenues for protection. Neighborhood communities could want water access limited to private owners, while fishers might prefer public access and a well-stocked stream. Consideration also must be given to the stakeholders farther downstream, all the way to the Atlantic Ocean. Runoff, sedimentation, dams, and other disturbances can have impactful effects on downstream stakeholders, who have no real say in upstream activity.

Of the many different stakeholders within one stream reach or in the Bay as a whole, marginalized communities often have the least amount of power and recognition when it comes to management decisions about Bay resources. Many of these communities aren't sufficiently informed about the economic, social, or cultural value of the watershed. Andrews (2020) found that informed citizens are better positioned to safeguard themselves and their families by swaying public policy to prioritize funding for resilience projects like marsh preservation or wetlands migration planning.

Another challenge is the difficulty in planning ahead for climate impacts, human migration, and land use change. Human nature is to focus on present issues such as education programs, public safety, and transportation (Andrews, 2020). According to Andrews, these tasks tend to take priority over environmental protection or climate change preparedness until urgent need for action is obvious. This challenge is further compounded by the inherent nature of politics, where elected officials are rewarded by their constituents for short-term, tangible benefits. Allocating money to prevent forward-looking, projected problems typically fails to garner constituent support at the same magnitude as responding to immediate challenges. As a result, policy-makers may prefer to approach environmental challenges with a wait-and-see mindset (Andrews, 2020).

While collaboration and negotiation over Chesapeake Bay restoration and protection may be difficult, it is a necessary task. There is significant value in hearing as many voices as possible, bringing many parties to the table. The Chesapeake Bay Program (CBP) is a prime example of collaboration across multiple stakeholder groups where common ground between these policy-makers and stakeholders can be found. It is particularly important for organizations such as the CBP to maintain continuous engagement between stakeholders, as each party's priorities shift over time, sometimes as a result of collaboration (Webster et al., 2022).

Watersheds vs Jurisdictions

A very common general issue with managing watersheds is the existence of boundaries and jurisdictions. More often than not, watersheds do not fit within the human-imposed boundaries for states, municipalities, or property ownership. As a result, different regions of the

same watershed can take various approaches to management. Similarly, the budgets allotted to Chesapeake Bay protection and restoration could vary significantly depending on the stakeholder or policymaker and their constituency. In fact, many of the Chesapeake Bay Watershed projects are small in scope, with a median size 1,500 feet of stream length (Hassett et al., 2005). Hassett and colleagues are concerned that this patchwork approach of numerous small projects may not be as effective if they are not coordinated from the scope of the watershed at large. Given that the water itself has no political boundaries and some of the most effective adaptation measures will be too expensive for individual communities to afford, the need for regional solutions is paramount (Andrews, 2020). Likewise, streams requiring load reductions under the EPA's TMDL regulations frequently cross multiple county boundaries, requiring multi-county and municipality cooperation for watershed-wide implementation. This is rarely accomplished due to the challenges in working across governments with different decision-making processes and infrastructure, as well as complex political priorities (Paolisso et al., 2015). Consequently, full-watershed management requires coordination and collaboration across borders and among multiple stakeholders, despite this being difficult to achieve due to the complex human framework of legal jurisdiction and government structures.

Additionally, the focus of restoration and preservation has resided on tidal wetlands and coastline, but recent studies have documented the benefits of upland stream restoration (Hassett et al., 2005). This indicates that the development of a coordinated stream and river restoration program would be beneficial. To do so, common criteria for tributary strategies within the same watershed and the linkage of these strategies across state lines is essential (Hassett et al., 2005).

Policy Barriers and Pathways

Over the 40 year history of the Chesapeake Bay Program, there have been a multitude of policies, constituting rules, actions, and plans for restoration and resilience. These policies guide municipalities, localities, and states on how to manage the watershed and its resources. However, policies can also act as a barrier to achieve restoration and resilience in the Chesapeake Bay. Through internal mismanagement, failed agreements, a lack of sufficient data, and external resistance, the Chesapeake Bay Program has consistently failed to meet their restoration and resilience goals. However, policies and regulations can be used to the Chesapeake Bay Program's advantage to ensure that they fulfill the goals prescribed in the Chesapeake Bay Watershed Agreement.

Failure to Meet Goals

After the Clean Water Act, in 1973, the U.S. government has been attempting to manage the Bay and many tributaries suffering from poor water quality and harmed natural resources. Formal legal action did not occur until 1983, where between that year and 2000, the EPA and the Bay jurisdictions signed three Chesapeake Bay Agreements pledging to reduce discharge of pollutants so that they could remove the Bay from the CWA list of impaired waters. All of these agreements failed (Mueller, 2024). In 2010, compelled by an executive order and litigation, the EPA issued a TMDL to reduce pollution discharges and restore Bay water quality. (Mueller, 2024). The order sets 2025 as the deadline for Bay jurisdictions to undertake actions that will attain sufficient restoration of the Bay in order to remove it from the CWA list of impaired waters. The order also requires that the Bay jurisdictions meet two-year interim goals, and if a jurisdiction fails to meet those goals, the EPA would use its CWA authorities to take one or more of eight "backstop" actions (EPA, 2010). Courts and legal scholars have upheld the Bay TMDL.

However, the Bay TMDL will fail to meet its objective. In May 2023, the Chesapeake Bay Program revealed that the 2025 deadline will not be met and the Bay will not be restored if new approaches to curbing pollution and runoff are not taken (Mueller, 2024).

Internal Structure and Accountability

The Chesapeake Bay Program was designed to guide overall management of the Bay and provide useful measures of restoration progress. The program's ultimate measure of success was set to be the responses of living resources throughout the Bay (Hennessy, 1994). The Chesapeake Bay Program is a partnership that includes not only the signatory representatives, but the broad array of local governments, businesses, watershed organizations and other nongovernmental organizations (NGOs) and community and university representatives who participate in the different levels of the organization and in the development and implementation of the Management Strategies (Chesapeake Bay Program, 2022). This is a decentralized, cooperative system based on negotiation and compromise of decision makers at federal, state, and local government levels (Hennessy, 1994). This system encouraged a dynamic, creative relationship between and among scientists, citizens, managers, and elected officials. This approach fostered an organizational learning capacity that in turn led to a phased process of adjustment of programs and structures to changing circumstances and new information. Although this policy and planning process served to reduce the complexity of the bay system for policy purposes, the requirement that policies be implemented required an implementation system consisting of an administrative imperative and agency responsibility. Moreover, each policy required the assembling of a number of programs, projects, regulations, and standard operating procedures (Hennessey, 1994). Many attribute the poor water quality of the bay to the complex management efforts and interstate agreements going back to the 1980s (Fox, 2021). The current approach to improve water quality is found to not be sufficient to make widespread, detectable improvements in the water quality of the Chesapeake Bay (Fox, 2021).

A major issue of the failure to meet restoration goals is accountability. There is a lack of accountability for performance (Carey, 2021). The Bay TMDL contains a "Reasonable Assurance and Accountability Framework" There, EPA identified two features that were not part of the TMDL itself, but were self-imposed obligations designed to ensure Bay restoration. One, "Reasonable Assurance," is an EPA policy applied to TMDLs nationwide. EPA evaluates all TMDLs to ensure they will reduce pollution sufficiently to lead to restored water quality in the impaired body of water. Here, EPA focuses on whether "nonpoint source controls will achieve expected load reductions" (Mueller, 2024). EPA examines nonpoint sources because it presumes that point source pollution dischargers will meet the enforceable limits of their permits. The other, "Accountability," is unique to the Bay TMDL and was drafted to show EPA meant business: either the jurisdictions would meet their interim obligations or EPA would use its CWA authorities to compel reductions. EPA identified eight specific actions it could take if a jurisdiction failed to upload their agreements. The two features were to ensure the Bay TMDL would achieve its goals by 2025. However, EPA has not utilized either of them and the Program will fail to meet its 2025 goals (Mueller, 2024). Additionally, each Chesapeake Bay Agreement signatory state has unique strategies that are based on different endpoints and different assessment tools, which hinders progress to meet those goals (Hassett et al., 2005).

EPA has emphasized on several occasions that it has legal backstop authorities it could use to further Bay restoration, yet it has failed to use them effectively. Why EPA has not used them to ensure Bay restoration is unclear. The Agency claims that it alone has the discretion to

decide when to utilize the backstops and which ones to use. If EPA refuses to constructively direct recalcitrant states, then the TMDL is of little utility, as citizens cannot enforce its terms and a state legal challenge would be a roll of the dice. Ultimately, EPA must be clear in its intentions or the Bay Partnership is sure to collapse. Some partners have already expressed hesitation at signing another Bay Agreement (Mueller, 2024).

To address this, EPA should use the tools granted by Congress in the CWA to reduce pollution, and for the Bay jurisdictions to sign a binding and enforceable Bay agreement to ensure accountability (Mueller, 2024). If CWA authorities and other legal mechanisms are fully utilized, they can achieve Bay restoration (Mueller, 2024). Additionally, regional solutions are needed, since water knows no political boundaries and some adaptation measures will be too expensive for individual communities to afford (Andrews, 2021).

Complex Data and Lack of Data

A multitude of data related to climate change, but a lack of specific data related to the pollution and restoration of the Bay prohibits effective agreements and policies. Data is essential for the Chesapeake Bay Program to implement restoration and resilience policies. Restoration in the Chesapeake Bay Watershed is similar to many other locations in the US, in that it has been tightly linked to regulatory programs. Incentives to restore were tied to administrative mandates for permits and funding sources linked to mitigation projects, most of which can be traced back to highway agencies and developers (Hassett et al., 2005). In addition, improving the data collection capabilities of environmental changes at different geographic scales and providing collaborative opportunities for stakeholders will likely empower decision-makers and managers with important information. (Teodoro and Nairn, 2020).

Multiple sources of data concerning climate change impacts, as well as data that is predictive and presented in ranges, can make it more difficult for policy makers to establish specific standards to address sea level rise and to convince citizens of the need for such policies (Kiest, 2012). Yet far from being a future problem, increased flooding in the Chesapeake Bay region is happening today, and often when there is not even a storm present; high tides and wind-driven surges from offshore storms can bring what is called “sunny day,” “nuisance” or “high tide” flooding, terms too innocuous for water levels that can block roads and impede vital access to jobs, schools and medical care (Andrews, 2021).

Also concerning is the fact that Federal Emergency Management Agency (FEMA) flood hazard maps, which determine who is required to purchase federal flood insurance under the National Flood Insurance Program (NFIP), are based on historical data and models reflecting existing conditions rather than predicted increased storm frequency and flooding levels (FEMA, 2019). The discussion is made even more confusing by the use of the term “100 year” flood zone for these maps, which does not mean that flooding will occur once every 100 years, but rather that there is a 1 in 100 (or 1%) chance of flooding at that level or greater occurring there in any year, based on historical data. With increasing precipitation and storm surges predicted due to climate change, the 100-year flood zone based on past flood events is an insufficient indicator of risk. There also is a need for more tide and stream gauges to provide additional observational flooding data. Scenarios do not predict future changes, but describe future potential conditions in a manner that supports decision-making under conditions of uncertainty. Scenarios are used to develop and test decisions under a variety of plausible futures. These steps would help citizens and local governments make sound decisions that do not encourage development in predicted

flooding areas, thereby keeping residents out of harm's way and creating an opportunity for wetland preservation there instead (Andrews, 2021).

There is also a lack of proper data for the CBP to be able to carry out their decisions. The number of stream restoration projects per river mile in the Chesapeake Bay Watershed has been the highest in the US since 1990, with an estimated expenditure of $426 million (Hassett et al., 2005). There are a large number of projects in the Chesapeake Bay Watershed (CBW) focused on restoration, though these projects are effective at achieving their stated goals. Yet, Only 5.4% of projects have some type of monitoring performed (Hassett et al., 2005). Because of the decentralized nature of the management system, several major project databases do not track monitoring activity or that monitoring information is not always tied to specific projects (Hassett et al., 2005). Therefore, assessment and monitoring of a large fraction of CBW restoration projects are lagging behind many regions of the country. Additionally, Many of the CBW projects are quite small. This raises the concern that the numerous small projects may not be very effective if they are not coordinated using a watershed perspective (Hassett et al., 2005).

Recommendations to rectify this include using agencies working within the CBW can provide a progressive example of truly integrated watershed management and restoration. This requires a centralized tracking system for stream restoration that includes activities associated with rehabilitating ecological function. Optimally, tracking should involve: (1) cataloging project location data; (2) implementing consistent project performance evaluations; and (3) analyzing data from individual project monitoring (Hassett et al., 2005). Additionally, to provide cost-effective management solutions, literature recommends that a centralized tracking system should be developed that includes restoration projects associated with both tidal and non-tidal waterways, along with a substantial increase in investment in the comprehensive monitoring of individual projects following implementation (Hassett et al., 2005). Finally, While there has been a historical focus on restoring tidal waters and shorelines along the Chesapeake Bay, emerging science documenting the benefits of upland restoration indicates that the development of a coordinated stream and river restoration program would be beneficial. In particular, Hassett et al. (2005) recommends efforts to encourage common criteria for tributary strategies and to encourage the linkage of strategies across state lines.

External Resistance

Implementing regulations and restoration policies can create resistance from residents of the watershed. A classic clash between short-term commercial interests and long-term ecological—and even economic—health exists within the Bay.Farmers, the poultry industry, and developers, worried about expenses, have sometimes been reluctant to adopt, or have resisted, measures such as stream buffers or stormwater containment systems that cost money now but bring long-term improvements. Meanwhile, there's widespread agreement that many current regulatory requirements and incentive programs, such as requiring or paying for winter cover crops that reduce nutrient runoff, are less effective than they could be—because they're voluntary and often lack sufficient inspections and oversight (Carey, 2021). Issues between environmental and economic concerns have led to responses including a small army of activists suing polluters and lax government regulators, challenging permits, trying to enforce zoning restrictions, and more.

Additionally, the American political system features short terms in office, forcing elected officials to run for office frequently, catering repeatedly to voters' current interests. Consequently, there is high policy turn over in tandem with leadership change. Flooding

adaptation and mitigation measures are very expensive for today's taxpayers, with payoffs that will occur over years to come, so they are harder to "sell" politically. Furthermore, it is difficult for a policy maker to justify tax increases and expenditures when there are a lack of cost estimates to compare risk mitigation with the status quo. These factors can deter long-term planning by elected officials, including planning for wetland preservation and upland migration as waters rise (Andrews, 2020).

Another complication is that local governments often rely heavily upon real property tax revenue to fund government services, with insufficient alternatives to address long-term challenges. Communities thus can be reluctant to discuss retreating from flood-prone areas and converting them to wetlands as flooding buffers, with the attendant loss of tax revenue and potential gain in maintenance costs. This is particularly true when coastal areas consist of large homes representing the highest value real estate in a jurisdiction. In Virginia, such reliance on real property tax revenue has translated into few localities adopting ordinances to provide tax exemptions for wetlands, riparian areas, and living shorelines as authorized by statute. So tax exemptions alone have proven insufficient to steer development away from flooding areas and preserve them as forests and wetlands (Andrews, 2020).

That is why stakeholder education on the importance of restoration is crucial for progressive restoration policies to be implemented. Informed citizens are better positioned to safeguard themselves and their families, and to sway public policy by prioritizing funding of resilience efforts that include marsh preservation and planning for wetlands migration. It is also important to remember that ecological processes should not be considered in isolation from social processes (Andrews, 2020).

Science and Social Aspect

Urban-Focused Policies

Urbanization is a primary form of land cover/land use (LC/LU) change that is accelerating and has significant influence on watershed-wide environmental conditions. Urbanization converts croplands, forests, grasslands, pastures, wetlands, and other cover types to, in particular, residential and transportation, but also commercial and industrial uses, increasing areas of impervious surfaces (Roberts et al., 2009). Wetlands are rapidly urbanizing, making them highly vulnerable to biodiversity loss, biological invasion and climate change (Hettiarachchi, 2014). In the Chesapeake Bay, the contemporary pattern of urbanization is increasingly taking the form of low density, decentralized residential and commercial development. These dispersed development patterns have been linked to loss of agricultural and forest lands and resulted in degraded water quality (Goetz, 2007). Within the watershed, between 1990 and 2000 alone, there was a 61% increase in developed land (from 5,177 to 8,363 km^2). Most of this new development (64%) occurred on agricultural and grasslands, whereas 33% occurred on forested land. Some smaller municipalities lost as much as 17% of their forest lands and 36% of their agricultural lands to development, although in the outlying counties losses ranged from 0% to 1.4% for forests and 0% to 2.6% for agriculture (Jantz, 2004).. Fast-growing urban areas surrounded by forested land experienced the most loss of forest to impervious surfaces (Jantz, 2005).

A result of the urbanization is that there is increases in impervious surface areas that may contribute more nitrogen and phosphorus to the Chesapeake Bay as a result of increases in leaf litter, vehicle emissions, residential and roadside landscaping (fertilizers), urban wildlife and

pets, construction, and infrastructure (Minton 2002). Stormwater runoff in particular has caused damage to the Chesapeake Bay watershed due to the transport of a significant amount of phosphorus (32%), nitrogen(16%), and sediment loads (28%) into the bay (USEPA, 2015). Because the impacts of urbanization derive from both social and scientific factors, those must be considered in policy decisions related to the restoration of the Bay. "Researchers and activists both say that the Chesapeake Bay Program and the states are still failing to tackle the big remaining problems: sediment and nutrient pollution and stormwater runoff" (Carey, 2021). Addressing these issues requires addressing both the scientific and social factors.

The Program is currently focused on regulations to try to minimize the pollution and runoff issues. They are steadfast in its commitment to inspecting facilities and taking appropriate actions to ensure compliance with environmental laws and regulations (Carey, 2021). However, studies have found that inspection and monitoring programs of pollution are significantly smaller in urban areas (Hassett et al., 2005). Studies have also found that local governments within the Chesapeake Bay watershed had not sufficiently integrated the principles of sustainable stormwater management into their comprehensive plans (Kim et al., 2017). This may be due to the fact that developing assessing progress needs stakeholder buy-in and requires credit programs to incentivize companies to comply with inspections and regulations. Also due to the fact that although all CBP partners have agreed to the TMDL watershed allocations, implementing the necessary land use practices to reduce contaminants in each jurisdiction will be hugely expensive, with storm water reductions in urban and suburban areas requiring perhaps ten times the costs for each pound of contaminant (Paolisso, 2015).

To address these issues, Jurisdictions should expand both structural and non-structural planning toolkits containing more directive and specific strategies toward stormwater management. Green buildings have been identified that minimize the amount of stormwater runoff, such as the construction of green roofs and rainwater harvesting systems (Kim et al., 2017). Also, cost-effective traditional measures such as constructed wetlands and detention/retention ponds have been continuously adopted by a number of localities due to the efficiency of these measures. In particular, several studies identified that wetlands are effective and aesthetically pleasing stormwater treatment systems and that protecting these natural resources may play a significant role in reducing peak runoff (Highfield, 2012). Thus, in the literature local planners are recommended to adopt all of the planning approaches available and link them to planning policies.

With regard to non-structural measures, current local plans rely heavily on traditional land-use regulations and acquisition tools such as setbacks, buffer zones, land-use restrictions, open space preservation, and conservation easements for managing stormwater. Newly emerging approaches (e.g.innovative design for new and re-development projects, water efficient building codes) as well as regulations directly related to controlling stormwater quantity and quality (e.g.TMDL, minimum pipe size, pest control) are not fully considered in local plans. Since these tools allow stakeholders to voluntarily put the principles of sustainable stormwater management into practice, local jurisdictions should pay more attention to employing newly emerging tools (e.g. stormwater impact fees and stormwater utility fees) rather than relying solely on the conventional tools (e.g. clustering development and transfer/purchase of development rights). In addition, although awareness tools have been relatively well mentioned in local plans, duties for trans-boundary stormwater issues lack clarity. There is a lack of national commitment to control stormwater discharges. By providing more incentives and financial support, higher levels of government could encourage localities to be prepared for damage associated with stormwater

runoff and to integrate sustainable stormwater management principles into local action strategies (Kim et al., 2017).

Rural-Focused Policies

Rural communities are an oft-overlooked component to policy-making. Due to the lower concentration of wealth and people, combined with less access to educational programs, rural communities tend to have little political power (Van Dolah et al., 2020). With regards to the human aspect of Chesapeake Bay Watershed management, urban resilience receives the lion's share of attention. There are fewer political pathways to meet rural needs, which exacerbates the injustices and disparities highlighting rural vulnerabilities (Van Dolah et al., 2020).

Within this same scope, environmental management and protection policies in rural regions are often implemented without consideration towards the human and social impacts these actions will cause. Lack of political representation exacerbates this issue, meaning the affected voices aren't heard or don't have a seat at the table. Importantly, rural areas with ecosystem potential for marsh migration (the inland shift of vegetation due to sea level rise) are also important human landscapes. These rural communities have ties to the land that may be overlooked by planners and policy-makers. Agriculture, kinship networks of family and friends, and cultural identity markers both tangible and intangible all tie the people to the landscape. Moving or changing one's way of life as a result of climate change and/or the resulting policy implementation is difficult and sometimes unrecognized (Van Dolah et al., 2020).

Effective Communication Strategies

This section of the literature review explores the goals of effective communication, misconceptions within current communication efforts, and provides a framework for how to achieve effective communication surrounding environmental issues. This section ends with an evaluation of current communication strategies utilized in the Chesapeake Bay region with the goal of engaging community stakeholders and communicating the importance of wetland protection and restoration.

Goals of Effective Communication

Through analysis of relevant literature on environmental communication strategies, three primary goals emerge for environmental communicators. The first goal is to find commonalities between organizational goals and interests and those of their intended audience. By aligning these goals and interests, the audience is more likely to engage in the communicator's mission. The second goal of effective communication is to improve the audience's understanding of relevant issues, and if needed, promote behavior change to take action on these issues. It is the responsibility of the communicator to fill in gaps and fix misconceptions in the audience's knowledge while building on existing beliefs that they hold (Bruine de Bruin & Bostrom, 2013). The third goal of effective communication is to call attention to issues while simultaneously empowering the audience to become involved in decision making and action. It is not enough just to inform the audience; an effective communicator also needs to instill a desire in their audience to take action on these issues.

Misconceptions in Current Communication Efforts

Issue #1: Focusing on Increased News/Media Coverage

It is not surprising that communicators jump to the belief that in order to have their message reach more people, it is essential to increase the amount of media coverage of relevant issues. However, this approach is ineffective because it assumes that the disconnect between communicators and their audience is due to an overall lack of information being provided by communicators. It also falsely assumes that the audience is fully understanding all of the information that they are already receiving from these media sources and that they are able to connect this information to its significance in a broader setting (Nisbet, 2009). Unfortunately, many news outlets fail to adequately cover these issues in depth and can leave the audience with many unanswered questions. Oftentimes, media outlets that provide quality news coverage are those of a smaller scale that only reach a small audience of already informed and engaged citizens (Nisbet, 2009). Further exacerbating this issue, the US media system is becoming increasingly fragmented and polarized which can prevent effective communication of important environmental issues (Nisbet, 2009).

Issue #2: Focusing on Providing More Information & Ignoring Emotional Appeals

Similar to the issue above, many communicators falsely assume that providing more facts and information about the science behind environmental issues will increase engagement in the audience. While information is necessary to provide, the average members of the audience might not care to learn more about the complex technical and scientific phenomena related to the target issues if it does not evoke some sort of emotion in them (Martinez-Conde & Macknik, 2017). Members of the audience likely have a variety of experiences with the target environment and its corresponding issues. These experiences can be emotionally charged and prime motivators for how an audience member interacts with the natural environment. However, this is something that communicators often overlook when developing their communication materials resulting in weaker, uninteresting messages being conveyed. It is also important to be conscious of who is serving as the communicator and how this individual or organization is viewed by the audience. This can greatly affect how the message is perceived depending on the political and social contexts that exist in this relationship (Martinez-Conde & Macknik, 2017).

Issue #3: Underestimating the Audience's Existing Knowledge

When communicators make assumptions about what gaps in information their audience members possess, they may waste their time and energy providing knowledge that their audience already has (Bruine de Bruin & Bostrom, 2013). This approach may even have a negative effect by leading the audience to become further disengaged from the issues if they feel that the communicator's outreach efforts are not beneficial or informative to them. Too often, communicators assume that the audience members doubt the science behind environmental issues or find the issues unimportant (Bruine de Bruin & Bostrom, 2013). From this assumption, communicators structure their communication efforts around convincing the audience of the science and why they should care about the issues. This can sometimes be a helpful approach for those in the audience who are characterized as "non-believers" but the approach fails to meet the informational needs of the majority who are already motivated to take action but are unsure how to proceed (Bruine de Bruin & Bostrom, 2013).

Issue #4: Using Fellow Experts as the Audience

Miscommunications are more likely to occur when communicators draft their communication materials as though they are speaking to fellow experts (Bruine de Bruin & Bostrom, 2013). Experts often forget that the specialized knowledge they possess is not commonplace among their audience members. This leads experts to utilize specific terminology that has become central to the way that they communicate with other experts but cannot be easily understood by non-experts (Bruine de Bruin & Bostrom, 2013). Experts can also present needlessly complex information that they find to be the most important and interesting to provide even if this interest is not shared with their audience (Bruine de Bruin & Bostrom, 2013). This approach arises from a failure to understand the audience's perception of the issues. It also fails to account what non-experts may care about which leads to further disengagement from the audience.

Issue #5: Utilizing the Fatalism Approach

A common error that communicators make when relaying information about environmental issues is taking a fatalistic approach. This approach has commonly been used to try to convince skeptical audience members of the need for action especially in issues of climate change and biodiversity loss. However, providing "horror stories" about the trajectory of these issues has not been effective in evoking action and has been shown to only impact those who are already concerned about the issues (Bekessy et al., 2018). This can also affect concerned audience members if communicators fail to provide specific recommendations about how the audience can respond to and take action on these issues (Nisbet, 2009). This approach should be avoided by communicators as it can leave the audience feeling helpless which further encourages inaction regarding these issues.

Issue #6: Utilizing an Ecosystem Services Framework

Since the 1970s, communicators have been advocating for the protection of nature due to the benefits that healthy ecosystems can provide to humans (Bekessy et al., 2018). Some examples of these ecosystem services include clean air through carbon sequestration in trees, clean water through soil filtration, natural pollination of crops by bees, and more. Through this approach, different services are evaluated based upon quantitative data which demonstrates the economic benefits they can provide. While this framework makes direct cost-benefit analysis easier for decision makers, it draws on the audience's extrinsic motivation for pro-environmental behavior while simultaneously diminishing their intrinsic appreciation for nature (Bekessy et al., 2018). This phenomenon is called "motivational crowding out" and occurs when intrinsic motivation for certain behaviors is replaced by extrinsic motivations when an external reward, often money, is offered for the behavior (Bekessy et al., 2018). This framework is problematic because it provides a false sense of security that "nature will find a way" to continue to provide beneficial services even if the ecosystems are damaged or if biodiversity is threatened (Bekessy et al., 2018).

Issue #7: Overwhelming the Audience with Choices

As previously discussed, it can be harmful to over inform and scare the audience about issues without providing any suggested actions that can be taken to combat these issues. On the other hand, it can also be detrimental to provide a laundry list of actions for the audience to take without differentiating which actions are more effective or would have a larger impact towards

progress on the relevant issues (Bruine de Bruin & Bostrom, 2013). This approach to communication can lead to choice overload and can ultimately result in decision avoidance in the audience (Bruine de Bruin & Bostrom, 2013). It is important to provide context of the impacts of these action items so that audience members can individually weigh their options and choose to participate in more effective behaviors.

Issue #8: Failure to Include Audience Feedback

The final issue commonly seen in communication strategies is the failure to continuously evaluate and adapt communication efforts based on feedback from the audience. Most communicators understand the importance of understanding informational needs of the audience when originally drafting their materials. Because of this, audience members are often invited to participate in conversations about the relevant issues so that communicators can better understand their points of view (Webster & Dennison, 2022). These conversations can be long and individuals may put in a lot of effort to make sure that they are heard, yet these dialogs do not always have the desired impact on subsequent communication efforts and policy. Beyond this, many communicators fail to follow-up with audience members to discover if these materials are achieving the desired impact on the audience, again, resulting in a disengaged audience.

How to Achieve Effective Communication

Recommendation #1: Frame the Issues Around What Is Important to the Audience

In order to compel the audience to learn more and take action, it is important for communicators to frame the issues that they are trying to convey in a way that leads individuals to become engaged on a personal level. The literature suggests that this can be approached by following these three steps. First, communicators must take time to consider what values and concerns are important to their audience as well as what services are needed and who the beneficiaries of these services would be (Rossi et al., 2022). Through this exploration process, it is essential for communicators to explore indirect, intangible, abstract, and cultural values that may be important to the audience surrounding both the people involved and the land where the issues take place. The next step is to pare down information that the communicator plans to provide and to give greater weight to certain elements of the message over others (Nisbet, 2009). The audience wants to know what the most important talking points are surrounding the issue at hand. Once they are interested in the issue, they want to know what the most effective actions are for them to take. It is recommended that a single communication effort highlights three to five key topics or pieces of information that are based upon audience interest in order to send a clear and empowering message (Economou, 2022). Finally, the communicator's message can be strengthened by demonstrating how the audience's goals and values align with the communicator's organization. It is important for a communicator to emphasize what their organization can deliver to the audience in a clear, comprehensive, and concise manner (Economou, 2022). This can be achieved, first, through the inclusion of the organization's vision statement and a depiction of what the future may look like. It can also be helpful to provide broad goals and more detailed supporting messages that direct the audience towards supplementary resources and action steps to help reach these goals (Economou, 2022).

Recommendation #2: Meet Individuals Where They Are At

To avoid confusing or overwhelming the audience, it is important to meet individuals where they are at in terms of their perspectives of the community and their perception of the issues at hand. Broadly, this can be done by using common layman terminology, providing definitions of any technical jargon, and conveying the benefits that will come from action (Economou, 2022). Ultimately, it is recommended that communicators take a "mental models" approach when developing a communication strategy. A mental model is an individual's representation of their knowledge of a specific topic or issue that is built based on past experiences. Individuals use mental models to help understand and navigate new information relating to specific topics. A communicator's goal should be to build upon these existing mental models by identifying what the audience already knows about the issues and providing information that allows individuals to make informed decisions (Bruine de Bruin & Bostrom, 2013). This information could easily be collected through interviews and survey methods which can help provide an initial picture of the audience's beliefs as well as what wording they prefer to use when talking about the issues (Bruine de Bruin & Bostrom, 2013). After this information is collected, the communicator can compare the mental models of experts with those of non-experts to reveal differences in how each group thinks about the issues and help illuminate information that is missing from the audience's mental models (Bruine de Bruin & Bostrom, 2013).

Recommendation #3: Structure the Message to Reach Diverse Audiences

Environmental issues are often trans-boundary on both geographical and political scales. Because of this, the larger target audience is likely to be made up of smaller, diverse communities that may require communication materials to be structured in different ways and to be delivered through different communication channels. First, it is important for the communicator to make sure that all residents are represented, included, and informed during the information exploration phase of developing the communication strategy (Economou, 2022). As mentioned above, individuals have different belief systems that can color their interpretation of scientifically neutral information (Martinez-Conde & Macknik, 2017). It is essential that these differences are identified before beginning to draft the key messages. When crafting communication materials, these individual differences can be addressed by adapting messages towards specific audiences by using their preferred language surrounding the issues (Bruine de Bruin & Bostrom, 2013). Communicators can also choose to highlight the audience's expertise in the message by pairing expert-based science alongside local knowledge and community-based participatory research (Webster & Dennison, 2022). The final consideration to reach everyone in the target audience is to be aware of differences in familiarity and access to different types of communication channels across different demographic groups.

Recommendation #4: Evoke a Duty to Act in the Audience

Oftentimes, communicators want to do more than merely educate their audience on important issues. They may also want to encourage audience members to take action or change their current behaviors. By involving the community in the planning process for tackling the issues at hand, they feel that the communicator values their input and is sufficiently considering the impacts of different actions on the community. For environmental issues that occur on large geographic scales, it can be helpful for the communicator's organization to encourage citizen science throughout the affected region to complement data collection and monitoring done by experts (Webster & Dennison, 2022). Along with making the audience members feel included, it is important to help the audience understand how suggested actions will benefit their community.

Research has shown that individuals are more likely to participate in action plans if they know what the explicit benefits of those actions will be (Rossi et al., 2022). Thus, it is recommended that communicators seek out action opportunities that resonate with the specific audience they are targeting to craft an action plan that optimizes benefits and provides the most value to the community (Rossi et al., 2022). Finally, more information alone is not a strong enough motivator to encourage action. Therefore, it is important for communicators to appeal to the emotions of the audience by drawing on the various backgrounds and experiences of the community. One way to do this is to utilize a narrative approach when conveying scientific information in order to generate emotions in the audience that can lead them to want to learn more about the topic (Martinez-Conde & Macknik, 2017). When doing this, it is also important to make sure that the communicator frames the message in a positive light that emphasizes the benefits that can come from action rather than focusing on the negative effects of inaction relating to the issues at hand. Taking this approach has been shown to be more effective at convincing science skeptics to take action by crafting an appeal to childlike wonder and fascination about nature and animals (Bekessy et al., 2018). Focusing on aesthetic, cultural, and spiritual rewards that come from a healthy ecosystem with high biodiversity make it much more likely that public interest in nature will increase when compared to message frames that focus on ecosystem services (Bekessy et al., 2018).

Recommendation #5: Evaluate What is Successful

When originally discussing the goals and objectives of the desired communication strategy, the communicator should develop time frames and metrics of success to evaluate the progress of the strategy in the future. After creating and distributing communication materials, the communicator should collect data on participation rates and community feedback relating to their materials and distribution methods. This process should begin with the communicator reflecting on the strategy's initial intentions, goals, and desired outcomes (Economou, 2022). Next, the communicator can collect feedback from the audience through focus groups, community gatherings, town hall meetings, interviews, and surveys. This feedback can be regarding whether or not the audience feels they are being heard by the organization as well as if they feel the actions that are being taken are helping to address community needs and improve both personal and environmental well-being. It may also be helpful to evaluate the effectiveness of chosen communication channels in engaging target audiences to subsequently reveal any gaps or shortcomings in the current strategy (Economou, 2022). Ultimately, this feedback should be used to continuously adapt and improve the strategy's reach and effectiveness.

Current Communication Strategies by the Chesapeake Bay Program

Communications Context

The Chesapeake Bay Program (CBP) acknowledges that they are currently behind in their 2025 goals and outcomes that have been laid out in the Chesapeake Bay Watershed Agreement. One of the major goals specifically centers around stewardship. In this context, stewardship refers to increasing the number of local community members who are involved in supporting and carrying out conservation and restoration activities that improve the health of the Bay (Hoyt, Summers & Cameron, 2017). Stakeholders in the area who participate in citizen science currently feel that their knowledge is undervalued (Webster & Dennison, 2022). As an attempt to increase progress towards these goals, the CBP is looking for ways to demonstrate how their

actions as an organization may fulfill needs and desires of local communities where wetland restoration and conservation efforts are taking place.

Recent Research

In recent years, the CBP has partnered with researchers from the EPA and from the University of Maryland to conduct studies to better understand the context of the communities that they are working in. The first study, done by Rossi et al. in 2022, focused on identifying and aligning ecosystem services and beneficiaries of these services that were associated with best management practices in the Chesapeake Bay. This study found that identifying local priorities helped decision makers make trade-offs when it came to implementing best management practices. The second study, performed by Webster & Dennison in 2022, explores different stakeholder perspectives on the roles of citizen science in environmental management in the Chesapeake Bay. The researchers found that citizen science can play an important role in helping reach protection goals by not only helping to fill in data gaps, but also by engaging more community members. Both of these studies were conducted very recently which suggests that the results of the studies have not yet been able to be incorporated into the CBP's communication strategy. By improving communications between the CBP and local stakeholders, the CBP is hoping to increase public awareness and engagement with many of the issues currently plaguing the Bay.

A third study was conducted by EcoLogix on behalf of the Chesapeake Bay Trust with the purpose of identifying ways for Chesapeake Bay Program partners to reach the Watershed Agreement goal of Stewardship and the outcome of Local Leadership (Hoyt, Summers & Cameron, 2017). The study produced five key recommendations for the CBP related to what content needs to be conveyed to local elected officials, what informational programs and delivery mechanisms exist, the best way to coordinate and focus programs across different levels of government, estimates of how much the program will cost and funding sources, and the best ways to measure progress towards goals and milestones (Hoyt, Summers & Cameron, 2017). More specifically, the researchers recommend that the CBP needs to communicate the opportunities for action where local priorities intersect with broader watershed goals in order to further engage local elected officials.

Current Outreach Efforts

The following is an evaluation of CBP communication efforts conducted through an examination of online outlets. It appears that most information that is distributed by the CBP comes from their website and their newsletter. In a section titled "In the News," on their website, the CBP highlights different stories from the Program, partners, and community members who are involved in the Chesapeake Bay. These stories are categorized based on content to fall into Chesapeake Stewardship, Partnership News, Restoration Spotlight, Travel, Recreation, and Culture, Watershed Science, and Wildlife. This part of the website appears to be extremely informative for community members looking for recent news regarding the region and who are familiar with the CBP. However, unless an individual already possesses this initial interest in the CBP, they will be unlikely to find these stories. Similarly, the CBP newsletter sends out weekly email updates with important headlines but these might not reach individuals who are not already engaged with the Program.

In terms of information about wetlands and wetland science, the CBP provides many videos and articles that help explain very technical science in a way that is understandable to

non-experts. These sources introduce what wetlands are, why they are important, how they are threatened, and how they are currently being restored which is helpful for introducing the audience to the issues that the CBP is working to tackle. In the section of their website titled "Take Action," the CBP lists over 100 actions that individuals can take to help protect the Bay. While it is beneficial to highlight the multitude of ways that community members can make a difference in the wetlands, the way that these actions are presented can leave the audience feeling overwhelmed and confused. Some of the actions listed provide links that can lead the reader to learn more about an action and its impact while others simply describe how to do the action without connecting it back to the impact on the Bay. To truly evoke action in community members, the CBP could instead provide a smaller and more detailed list of effective and impactful actions to give individuals a starting point.

Conclusion

The findings of this literature review underscore the ecological urgency, regulatory complexity, and communication challenges surrounding non-tidal wetland conservation in the Chesapeake Bay watershed. Ecologically, the literature affirms that non-tidal wetlands play a disproportionately important role in delivering ecosystem services relative to the attention they receive in restoration planning and funding allocations. Their capacity to filter nutrients, absorb stormwater, store carbon, and support biodiversity makes them indispensable to both watershed health and climate resilience. However, these wetlands face mounting threats from land-use change, hydrological modification, and policy gaps that reduce their protection and functionality.

From a policy perspective, the literature reveals that while important tools such as the CWA, TMDL regulations, and conservation funding mechanisms exist, they are unevenly enforced and often undercut by jurisdictional fragmentation and unclear guidance. Case studies showed that many successful restoration efforts rely not only on legal mandates, but also on strong inter-agency collaboration, consistent long-term monitoring, and localized, adaptive implementation.

Perhaps most critically, the review illuminated the central role of public engagement and communication in achieving wetland conservation goals. Much of the literature critiques traditional communication approaches that prioritize information transmission over emotional resonance or local relevance. The most effective strategies are those that build trust, appeal to shared values, and involve community members in the co-creation of solutions. These approaches shift the role of the public from passive recipients of information to active participants in conservation work.

This review ultimately served as more than a background exercise—it actively shaped the design and direction of the project's research. It informed understanding of ecological processes and restoration techniques, clarified the policy frameworks interviewees would be working within, and helped identify gaps in engagement strategies that were later explored through qualitative interviews. This literature review serves not only as a record of existing scholarship, but as a strategic framework for ongoing and future efforts to elevate the visibility and protection of non-tidal wetlands throughout the Chesapeake Bay region.

Appendix B: List of Interview Questions

Background

- What is your job title and what do you do in your current role?
- What is your professional relationship with wetlands in the region?
- What is your personal relationship with wetlands in the region?

CBP Context

- Are you familiar with or affiliated with the Chesapeake Bay Program?
- Have you ever worked with the Chesapeake Bay Program?
- What do you think is the purpose of the Chesapeake Bay Program?
- What are the primary goals of the Chesapeake Bay Program?
- What goals are being prioritized right now?
- How has the Chesapeake Bay Program been successful in advocating for wetland restoration and conservation?

Current State of the Bay

- What is your perception of the current health of wetlands and the broader ecosystem of the Bay?
- Why are healthy wetlands important for the health of the Bay overall?
- What are some key issues that you have noticed in your region/state related to wetlands, ecosystems, and water quality?
- How do you ensure that non-tidal wetlands are receiving adequate attention in your work?
- What are the largest/most significant threats to non-tidal wetlands in the Chesapeake Bay?
- What types of restoration techniques are you familiar with/do you use in your work?
- How do you prioritize different ecosystem services when planning a restoration/conservation project?

Legislative Background and Government

- What policies or regulations do you feel are most important for protecting the Chesapeake Bay wetlands and broader ecosystems?
- Do you see any policy gaps for the legal protection of non-tidal wetlands?
- What types of data are critical for informed decision making?
- How do you receive funding for your projects?

Barriers and Challenges

- What are some limitations/barriers/challenges that are preventing effective and urgent action in restoring and conserving wetlands?
    - How do you approach tackling these challenges in your role or as an organization as a whole?

Successes and Progress

- Can you talk about a time where you felt that a restoration/conservation was successful?

    - What about this project made it successful?
- How do you assess or measure the long-term success of a restoration/conservation project?

Engagement and Outreach

- What role does the community currently play in wetland protection/conservation/restoration?
- What is the biggest barrier that is preventing local community members from becoming more engaged in conservation and restoration efforts?
- Do you feel that there is a disconnect between scientists in terms of acknowledging the importance of wetlands?
    - If so, how can this be addressed?
- What information about wetlands is most important to provide to community members?
- Are there any groups of people that you feel are underrepresented or left out of the conversation in the watershed?
- What is your (or your organization's) approach to outreach and engagement with local communities?
- Who do you engage with most frequently in your work?
- What strategies/tactics do you use to help coordinate collaborative efforts for restoration/conservation with different organizations/partners?
    - Who do you frequently collaborate with?
- What engagement strategies have you found to be most effective for engaging the public in your work?
    - What are the best ways to connect with different audiences?
    - How do you engage people who aren't as interested in the Bay/aren't aware of the ecological issues?
- How do you communicate complex scientific information to the public?
    - How do you avoid overwhelming community members?
- What communication channels do you (or your organization) utilize in your work?
- Where do community members go to find information about wetland restoration/conservation?

Envisioning

- In a world with unlimited resources and funding, what would your ideal vision for the future of the Chesapeake Bay be, and what are some actions that would need to be taken to get there?

Conclusion, Follow-up, and Participant Recruitment

- Is there anything that you would like to add that you were not asked about in relation to wetlands or the overall health of the Chesapeake Bay?
- Is there anyone else that you would recommend to participate in these interviews?
- Would you be okay with being contacted after this interview if there are any further questions about your answers?

Appendix C: Sample Interview Guide*

Introduction:
Thank you for agreeing to be interviewed today. My name is [Interviewer's Name] and I am a student from the University of Michigan working with a team of 4 other students to complete our Master's Capstone Project. [Notetaker's Name], from my team, will also be joining us today as an observer and will be jotting down some notes as we go. As part of our research, we are conducting interviews with local stakeholders throughout the Chesapeake Bay region to help uncover community perceptions of the Chesapeake Bay and, more specifically, perception of wetlands in the region. Our research is sponsored by the Chesapeake Bay Program who would like to understand ways to improve public outreach and engagement efforts in wetland restoration and conservation projects. We are also hoping to learn more about the effectiveness of communications by scientists and policymakers in the region regarding information pertinent to environmental issues in the Chesapeake Bay. We would also like to hear from you about your vision for the future of the Chesapeake Bay and your evaluation of the current health of the Chesapeake Bay. In place of written consent, we are collecting verbal consent from each interviewee to participate in these interviews. If you wish to withdraw your consent at any time during this study, you are able to do so and we will delete any materials related to this interview. We will be transcribing this interview for the purpose of analysis and crafting our recommendations to the Chesapeake Bay Program, however, we will use a pseudonym for you so that your identity remains anonymous and the data from this interview will not be shared outside the context of our report. After our project is completed, we will delete the recordings and transcripts from these interviews. Given this, would you be okay with us recording this interview for the purpose of transcribing it later? [Wait for response]. Great! We will go ahead and begin the interview now.

Background:
First, I'd like to hear a little bit about you and your relationship to the Chesapeake Bay:

1. Can you describe your current role at your organization/company?
2. How would you describe your (or your community's) relationship with wetlands in the region?

Current State of the Bay:
Thank you for sharing that. I am also interested in hearing your views on the current state of non-tidal wetlands in the Chesapeake Bay as well as how wetlands restoration and conservation plays a role in your work.

1. First, what is your perception of wetlands in the Chesapeake Bay? Why do you feel that healthy wetlands are important for the health of the Chesapeake Bay watershed overall?
2. What are some key issues that you have noticed in your region/state related to wetlands and/or water quality (streams, rivers, etc)?

Legislative Context:

1. What policies or regulations do you feel are most important for protecting the Chesapeake Bay and ecosystem?
    a. Followup: Are those policies effective? Why or why not? How could they be improved?
2. What policy gaps do you see for the legal protection of wetlands moving forward?

Barriers and Challenges:
Now that you've talked a bit about your perception of the state of wetlands throughout the Bay, I was wondering what types of barriers and challenges you face in your line of work.

1. In general, what do you see as the biggest challenges facing wetland restoration and conservation in the Chesapeake Bay watershed over the next decade?

Successes and Progress:
Thank you for that insight. After hearing about some of these barriers and challenges, I'm interested in hearing about a time when you might have participated in or heard about a successful community-based conservation or restoration effort.

1. What aspects of this project made it successful?
2. How do you think this model of success could be replicated in other areas or in other projects?
3. In general, how do you assess or measure the long-term success of wetland conservation or restoration projects/outreach and engagement efforts?

Public Outreach and Engagement:
To our understanding, there appears to be a disconnect between wetland scientists and the broader public when it comes to wetland restoration efforts.

1. What role do local communities play in your wetland restoration and conservation efforts, particularly in non-tidal areas?
2. What are some effective strategies that you would recommend to increase community engagement in restoration and conservation efforts?
    a. Follow-up: What information or resources could the Chesapeake Bay Program provide that would help members of the public become more engaged in these efforts?
    b. Follow-up: What strategies or communication channels have you found to be ineffective?

One Shot Question/Final Question: (5 min)
Thank you for sharing your thoughts on the role of community members in wetland restoration. I would like to wrap up our interview with one final question.

1. In a world with unlimited resources and funding, what would your ideal vision for the future of the Chesapeake Bay be and what are some of the actions that would be taken to get there?

Wrap up: (5 min)

1. Before we finish, is there anything else you'd like to add to your interview that I haven't asked about in relation to the Chesapeake Bay, wetlands restoration or health, or overall environmental health?
2. Also, is there anyone else you can think of that we should reach out to about participating in an interview?

Great! Thank you again for taking the time to meet with me/us today and for helping us improve our understanding of your perception of restoration and conservation of non-tidal wetlands in the Chesapeake Bay. If we have any follow up questions, would you be okay with us reaching out to you with those?_____ Great! Do you have any questions for me about the interview or our research project?

*Note: Not all participants were asked all of these questions and some participants were asked questions that are not listed in this sample guide. This guide merely provides an example of the types of questions that were asked in the interviews. Because the interviews were conducted in a semi-structured format, many questions that were asked were done spontaneously which led to some interviews only focusing on some of the broad categories that are laid out in the sample guide.

Appendix D: Codebook

The preview codebook below can be better viewed using the link provided here.

Codes & Subcodes	Description of Codes	Example of Responses
1. Background	Who is the participant? What do they do in their line of work?	Perform wetland delineations, Develop communication materials, Run a small-scale farm
1.1 Role Description	What is their current job title? What do they do in their job?	Community Engagement Specialist for an NGO, Watershed Restoration Specialist for a State Government Agency
1.2 Relationship to Wetlands	How are they connected to wetlands in their work and in their personal lives?	Wetlands make up a good portion of their daily lifestyles and work
1.2.1 Personal Relationship	How are wetlands relevant in their daily life as an individual? Why do they care about wetlands?	Participant grew up next to a wetland in Virginia
1.2.2 Organizational & Professional Relationship	How does their job/organization relate to or work with wetlands?	Participant works on wetland restoration projects in their job; Their organizations work with wetlands regularly
2. CBP Context	How does the CBP provide context for this research?	The CBP has a Wetlands Workgroup that brings together stakeholders to collaborate on wetlands-related issues
2.1 Purpose of CBP	Why does the CBP exist? What services do they provide? What needs to they fulfill?	The CBP exists to protect and restore natural resources and ecosystems throughout the Chesapeake Bay
2.2 Goals of CBP	What are the goals of the CBP? What are they hoping to accomplish in the next few years?	The CBP's goals very closely align with goal targets that are laid out in the most recent edition of the Chesapeake Bay Watershed Agreement
3. Current State of the Bay	What does the Bay look like ecologically? What is going on in the ecosystems of the Bay?	A crisis of population migration, sea level rise, shrinking land mass, resiliency issues
3.1 Perception of Healthy Wetlands	Does the participant perceive wetlands as being healthy currently?	Many non-tidal wetlands have been filled or destroyed over the last 100 years; many wetlands are now remnants
3.1.1 Importance of Healthy Wetlands	Why is it important to heave healthy wetlands when looking at the watershed as a whole?	Wetlands are the border between land and water; they filter nutrients and pollutants out
3.2 Key Wetland & Watershed Issues	What are some key issues related to wetlands and water quality in the region?	There is a need to focus on stormwater abatement in order to protect communities
3.2.1 Significant Threats	What are the biggest threats to the future of wetlands?	The biggest threat to wetlands is development; Lack of funding restricts needed restoration and protection
3.2.2 Recommended Strategies	What does the participant recommend to address the above mentioned threats?	There is a need to change people's attitudes and refocus on long-term goals
3.3 Types of Restoration Techniques	What restoration techniques are used in restoration work?	Riparian buffers; Legacy sediment removal; Vernal pools
3.4 Wetland Ecosystem Services	What ecosystem services to wetlands provide?	Carbon storage; Flood control; Support habitats
3.4.1 Prioritizing Ecosystem Services	How are ecosystem services prioritized in a restoration project?	Participant prioritizes stormwater and flood abatement due their high value to nearby communities
3.5 Agricultural Management Techniques	What sort of techniques are used in agricultural practices?	No pesticides; Companion crops; Rotational farming

Codes & Subcodes	Description of Codes	Example of Responses
4. Legislative Background & Government	What is the political context of wetlands protection and collaboration among government stakeholders?	Federal level protections are less consistent given recent Supreme Court decisions
4.1 Important Protection Policies	What policies are important for protecting wetlands?	Section 404 of the CWA; River and Harbors Act; Magnuson Stevens Act
4.1.1 Effectiveness of Policies	Are these policies effective at protecting wetlands?	There are stronger protections for tidal wetlands than non-tidal wetlands at the federal level
4.1.2 Suggested Policy Changes	How can/should these policies be improved or changed?	There is a need to increase the standards for different protection measures
4.2 Policy Gaps	What gaps exist in current policy to protect wetlands?	Some states do not have extensive protections for non-tidal wetlands
4.3 Collaboration with Other Parties	How do participants collaborate with other localities and stakeholders?	State and local government collaborate to buy property to prevent development on it
5. Barriers and Challenges	What are the major barriers and challenges in restoration work?	The biggest barrier to restoration work is lack of funding
5.1 Restoration & Conservation Challenges	What are the major barriers and challenges that are preventing effective restoration & conservation?	Topsoil loss; Invasive species; Private land
5.2 Disconnect Between Stakeholders	Do participants notice a disconnect between scientists and the public in acknowledging the importance of wetlands?	Scientific articles are too dense and use too much jargon to be understood by the general public
6. Successes and Progress	What stories of success have participants heard? How has progress been made towards wetlands goals?	Working with landowners rather than just farmers has been more successful recently
6.1 Aspects of Success in a Project	What makes a project successful? What elements are needed for a successful project?	A project is successful when a community can rally around it
6.2 Replicating Models of Success	How can examples of success be replicated in other areas with different communities?	Find a site that is a community resource and include local stakeholders in the process
6.3 Measuring Long-Term Success	How is the long-term success of a project measured or tracked?	There are no requirements for long-term monitoring so it is not done very often
6.3.1 Data Collection & Monitoring	How often is data collected to track the long-term success of a project? Who collects this data?	Participant collects groundwater samples for 5 years after a project is completed
7. Engagement and Outreach	What does effective engagement and outreach look like in wetlands restoration and conservation?	There is a need to increase societal desire to protect wetlands rather than trying to force it upon the public
7.1 Role of Communities in Projects	What role do community members play in the planning & implementation of restoration & conservation projects?	It is up to community members to upkeep projects after they are completed
7.1.1 Perception of Community's Understanding of Issues	Do participants perceive that members of the community have a good understanding of wetlands-related issues?	People throughout the Bay tend to be very supportive of restoration and protection efforts to improve water quality and support species
7.2 Current Communication Channels & Strategies	What channels and strategies do participants use to reach community members?	Educational events; Newsletters; Email; Social Media
7.2.1 Effective Channels & Strategies	What channels and strategies have been effective?	It is important to celebrate successes and convey this before delving into problems that still need to be addressed
7.2.2 Ineffective Channels & Strategies	What channels and strategies have been ineffective?	Surveys can be ineffective tools if sufficient follow-up is not conducted with participants
7.3 Recommended Engagement & Outreach Strategies	What strategies do they recommend to reach different community members & stakeholders?	Organizations should produce one-pagers and short videos that appeal to different audiences
7.4 Important Information about Wetlands	What information about wetlands is important to share with community members who may be less informed?	It is important to connect the health of wetlands with other co-benefits to society
7.5 Information Gaps	What information gaps exist across the community in terms of their knowledge about wetlands?	There needs to be a centralized location where people can go to get information about wetlands
7.6 Interest in Involvement in Projects	Are community members interested in learning more about wetlands and interested in participating in projects?	People are most interested in wetlands restoration because of the financial incentive that exists for them
7.7 Underrepresented Groups	Are there any groups that are underrepresented or left out of the conversation surrounding wetlands?	Tribal governments often have trouble accessing grant money to do restoration on their lands
8. Envisioning	What would participants like to see change in the future?	Participant would like to see a healthy ecosystem where community members are actively trying to improve the Bay
8.1 Ideal Future	What would they want to see happen if there was unlimited resources & funding? What steps are needed to get there?	Participant would provide larger financial incentives to landowners who participate in restoration
9. Project Examples	What project examples do participants provide when answering other interview questions?	Participant referenced a project to remove legacy sediment removal in a river in Virginia

Appendix E: Results Matrix

The preview results mapping matrix below can be better viewed using the link provided. Due to the size and format of the sector-ordered matrix, interested readers should opt to view the original scrollable document at the link provided here.

Sector-Ordered Matrix	Current State of the Bay	Legislative and Regulatory Background	Barriers and Challenges	Current Public Perceptions	Ideal Future

Federal Government
n=3; 12.5%
(R9, R10, R11, R21)
	• Restoration techniques
	  ○ focus stream and wetland restoration for species habitat creation
	• Issues
	  ○ drainage of water
	  ○ non-point pollution
	  ○ historic practices/loss of wetlands
	  ○ Sea level rise causing marsh migration and saltwater intrusion
	  ○ invasive species
	• Ecosystem Services
	  ○ bird habitat restoration and island creation
		• Important Policies
		  ○ For wetland protection
		  ■ Clean Water Act
		  ■ Magnuson Stevens Act
		  ■ Endangered species Act
		  ■ Native Species Act
		  ■ Zone Management Act
		  ○ For funding
		  ■ IRA
		  ■ Farm Bill
		• Collaboration
		  ○ with property and landowners
		  ○ between state and federal government
		  ■ Importance of working with the federal government for technical assistance
		• Issues
		  ○ Sackett
		  ○ Lack of regulation/enforcement among government staff with particular emphasis on a lack of coordination
			• Funding
			  ○ data monitoring/ collection / long term maintenance
			  ○ implementation and design of projects/ technical expertise
			  ○ complicated funding processes
			  ○ funding not getting fully utilized
			  ○ Limited funding for post-restoration maintenance
			• Underrepresented communities
			  ○ urban communities or those with less access
			• Organizational
			  ○ Capacity
			  ○ misinformation of restoration practices and their impacts
			• Regulatory
			  ○ private lands being harder to restore/conserve
			  ○ land value for wetlands is not competitive for farmers landowners
			  ○ bureaucracy/ time to implementation
			  ○ Conflict between land development and conservation
				• Perceptions
				  ○ wetlands don't meet peoples aesthetic desires
				  ○ land owners do not like wetlands and need incentives for wetland restoration
				  ○ People have a range of opinions of wetlands based on level of knowledge of wetlands
				  ■ NIMBY
				• Interest in Projects
				  ○ Financial incentives increase interest
				  ○ Relationship/trust building incentive increases interest
					• Need for a proactive approach to climate resilience and adaptation
					• Need for continued investment in wetland and habitat restoration
					• Vision for a self-sustaining Chesapeake Bay ecosystem
					• Advancements in environmental monitoring and adaptive management

State/Local Government
n=13; 40%
(R1, R2, R3, R4, R6, R8, R13, R18, R22, R28, R29, R31, R32)
	• Restoration Techniques
	  ○ Stream and wetland restoration
	  ○ Shoreline stabilization and living shorelines
	  ○ Legacy sediment removal
	  ○ stormwater and watershed planning strategies
	  ○ Policy-driven restoration planning
	  ○ Use of predictive modeling for nutrient and sediment reduction
	• Issues
	  ○ Water quality
	  ■ metrics for measuring water quality, especially nitrogen, phosphorus, and total suspended solids
	  ■ stormwater/ flooding
	  ○ downstream location inheriting upstream pollution/ problems
	  ○ Agriculture practices/ land conversion to agriculture
	  ○ historic practices/loss of wetlands
	  ○ Development
	  ○ Sea level rise causing marsh migration and saltwater intrusion
	  ○ higher temperatures
	  ○ habitat fragmentation
	  ○ invasive species
		• Important Policies
		  ○ For wetland protection
		  ■ Clean Water Act
		  ■ State or local policies
		• Collaboration
		  ○ between state and local governments
		• Issues
		  ○ Uncertainty of regulatory policy
		  ○ Sackett in general
		  ■ and causing difficulty with wetland protection
		  ○ Current regulations are not effective
		  ■ Compliance of regulation can vary greatly depending on local/state government
		  ■ Specific difficulty in having multiple agencies enforcing regulations
		  ○ Need for state management rather than top down/ federal
		  ○ Lack of regulation/enforcement among government staff with particular emphasis on lack of vision/motivations/incentives to implement restoration
		  ○ Outdated policies
		• Successes
		  ○ Conservation easements and land protection supporting long-term success
		  ○ Current regulations are effective
			• Funding
			  ○ data monitoring/ collection / long term maintenance
			  ○ implementation and design of projects/ technical expertise
			  ○ inconsistent funding sources throughout the Bay (different states prioritize conservation at very different levels)
			  ○ current funding/ restoration programs are clunky/ hard to navigate
			  ○ Less funding for non-private restoration
			  ○ difficulty with match funding
			  ○ difficulty doing projects in underrepresented or more urban areas because there are less water quality improvements
			  ○ Need for more comprehensive long-term success metrics
			  ○ Lack of funding for long-term monitoring and maintenance
			  ○ Limitations of short-term vs. long-term monitoring
			• Underrepped comms
			  ○ urban communities or those with less access
			  ○ underserved areas not having enough resources
			  ○ Native communities
			  ○ communities of color
			• Organizational
			  ○ Capacity
			• Regulatory
			  ○ mitigation is not a 1-to-1 process
			  ○ private lands being harder to restore/conserve
			  ○ Sackett ruling/ definition of a wetland
				• Relationship to wetlands
				  ○ proximity to the Bay as important to people's understanding of the importance of the environment
				  ○ people may not know what a wetland is, but are in support of protecting the Bay
				  ○ land owners can see the benefits of wetlands to their land complicated relationship between community and wetlands
				• Perceptions
				  ○ Negative
				  ■ negative perception of wetlands because they are swamps with no value
				  ■ overall community dislike of wetlands
				  ■ conflict between land and farming practices and ecosystem restoration practices
				  ■ People have fear that natural areas can reduce safety and bring crime
				  ○ Neutral/Complex
				  ■ no negative perception of wetlands
				  ■ mixed feelings about wetlands because of views of them as unproductive valueless swamps
				  ○ Positive
				  ■ positive reaction to wetland restoration
				  ○ Lack of context/interest
				  ■ many don't know what a wetland is or the benefits
					• Need for a proactive approach to climate resilience and adaptation
					• Role of policy changes in achieving long-term environmental goals
					• Influence of scientific advancements in shaping future restoration strategies
					• Recognition of the Chesapeake Bay as a national environmental priority
					• Policy and funding mechanisms to support long-term conservation
					• Expansion of green infrastructure and sustainable urban development
					• Need for stronger environmental education programs to foster stewardship

Non-profit
n=10; 31.25%
(R7, R12, R16, R17, R20, R23, R24, R25, R26, R30)
	• Restoration Techniques
	  ○ Ag management techniques
	  ■ Organic and rotational farming
	  ■ Resistance to shifting from traditional farming methods
	  ○ Stream and wetland restoration
	  ○ Policy-driven restoration planning
	  ○ Habitat and biodiversity management
	• Issues
	  ○ Water Quality
	  ■ drainage of water/ non-point pollution
	  ○ farming practices causing pollution
	  ○ Development
	  ○ Sea level rise causing marsh migration and saltwater intrusion
	• Ecosystem Services
	  ○ carbon sequestration
	  ○ specific ES that is prioritized is dictated by the project/ client
	  ○ flood attenuation / stormwater abatement
	  ○ Habitat
	  ○ Recreation
	  ○ water quality services
	  ○ Erosion Control
	  ○ Economic Benefit
		• Important Policies
		  ○ For wetland protection
		  ■ State or local policies
		  ○ For funding
		  ■ Farm Bill
		  ■ IIJA
		• Collaboration
		  ○ between state and local governments
		  ○ between state and federal government
		• Issues
		  ○ Uncertainty of regulatory policy
		  ○ Sackett causing difficulty with wetland protection
		  ○ Difficulty working or communicating with policymakers/legislators
		  ○ Conflict when working with the federal government
		  ○ Current regulations are not effective
		  ■ Compliance of regulation can vary greatly depending on local/state government
		  ■ Different laws conflict with one another
		  ○ Lack of regulation/enforcement among government staff with particular emphasis on lack of vision/motivations/incentives to implement restoration
		  ○ Outdated policies
		  ○ Issues with permitting
		• Successes
		  ○ Conservation easements and land protection supporting long-term success
		  ○ Current regulations are effective
			• Funding
			  ○ implementation and design of projects/ technical expertise
			  ○ inconsistent funding sources throughout the Bay (different states prioritize conservation at very different levels)
			  ○ funding is all based on water quality improvements
			  ○ complicated funding processes
			  ○ struggle between what's best for Bay (water quality) vs helping underserved communities, in terms of small pool of funding getting split into even smaller pieces
			  ○ Need for more comprehensive long-term success metrics
			  ○ Lack of funding for long-term monitoring and maintenance
			  ○ Limited funding for post-restoration maintenance
			  ○ Limitations of short-term vs. long-term monitoring
			• Organizational
			  ○ Capacity
			  ○ lack of outreach
			  ○ quantifying data
			  ○ silos: people creating information that are already out there
			  ○ Engineering and site suitability limitations
			  ○ Limited access to conservation decision-support tools
			• Regulatory
			  ○ mitigation is not a 1-to-1 process
			  ○ private lands being harder to restore/conserve
			  ○ Sackett ruling/ definition of a wetland
			  ○ power of regulators/ regulations differing based on stakeholder (mom and pop vs Big ag)
			  ○ land value for wetlands is not competitive for farmers landowners
			  ○ bureaucracy/ time to implementation
			  ○ changing administrations/ political will
			  ○ Permitting and regulatory barriers
			  ○ Regulatory monitoring requirements often limited to structural assessments
			  ○ Challenges in tracking biological and ecological improvements
			  ○ Complexity of wetland crediting systems
				• Relationship to wetlands
				  ○ mentioned the importance of the Bay to their community identity
				  ○ proximity to the Bay as important to people's understanding of the importance of the environment
				  ○ people may not know what a wetland is, but are in support of protecting the Bay
				  ○ generation difference between who cares about the Bay with the older generation being in support
				• Perceptions
				  ○ Negative
				  ■ restoration construction practices creating negative public perceptions
				  ■ public has negative perception of wetlands in general and because they see them as swamps with no value
				  ■ overall community dislike of wetlands
				  ■ land owners do not like wetlands
				  ■ farmers do not like wetlands
				  ○ Neutral/ Complex
				  ■ often friction between outside non-ag organizations and farmers
				  ○ Positive
				  ■ positive reaction to wetland restoration
				  ○ Lack of context/ interest
				  ■ understanding of benefits of wetlands for habitats and water quality
				  ■ many don't know what a wetland is or the benefits
				  ■ support if people knew the benefits to the Bay
				  ■ people don't support what they don't see
				  ■ people that aren't educated about wetlands don't understand the benefits
				  ■ lack of interest in wetlands
				  ■ a range of opinions of wetlands based on level of knowledge of wetlands
				• Interest in Projects
				  ○ changing people's perceptions/ making them value the Bay
				  ○ Financial incentives increase interest
				  ○ People only want to continue to volunteer/be involved if they have a pleasant (fun) experience
				  ○ Need to understand and increase societal desire to protect wetlands
					• Need for a proactive approach to climate resilience and adaptation
					• Challenges in balancing economic growth with conservation efforts
					• Growing importance of public engagement and education in environmental planning
					• Policy and funding mechanisms to support long-term conservation
					• Increased integration of community-driven restoration models

Private
n=5; 15.63%
(R5, R14, R15, R19, R27)
	• Restoration Techniques
	  ○ Stream and wetland restoration
	  ○ Use of predictive modeling for nutrient and sediment reduction
	  ○ Stormwater and watershed planning strategies
	• Issues
	  ○ Water Quality
	  ■ metrics for measuring water quality, especially nitrogen, phosphorus, and total suspended solids
	  ■ drainage of water/ non-point pollution
	  ○ farming practices causing pollution
	  ○ suburban use of fertilizer
	  ○ Development
	  ○ Sea level rise causing marsh migration and saltwater intrusion
	• ES
	  ○ flood attenuation / stormwater abatement
	  ○ property protection
	  ○ Habitat
	  ○ Recreation
	  ○ water quality services
	  ○ carbon sequestration
	• Solutions
	  ○ importance of targeting the health of upstream ecosystems before the wetlands (ex. Stream health)
		• Important Policies
		  ○ For wetland protection
		  ■ Clean Water Act
		  ○ For funding
		  ■ Farm Bill
		• Collaboration
		  ○ between state and local governments
		  ○ with property and landowners
		• Issues
		  ○ Difficulty working or communicating with policymakers/legislators
		  ○ Current regulations are not effective
		  ○ CBP goals are insufficient
		  ○ Lack of regulation/enforcement among government staff with particular emphasis on lack of vision/motivations/incentives to implement restoration
		  ○ Ineffective action from EPA/ fed gov
		  ○ Ineffective action from CBP to meet wetland restoration goals
		• Successes
		  ○ Conservation easements and land protection supporting long-term success
		  ○ Current regulations are effective
			• Funding
			  ○ inconsistent funding sources throughout the Bay (different states prioritize conservation at very different levels)
			  ○ current funding/ restoration programs are clunky/ hard to navigate
			  ○ funding is all based on water quality improvements
			  ○ mentioned that funding programs are helpful, but flawed (slow, not flexible, restrictive)
			  ○ Need for more comprehensive long-term success metrics
			  ○ Lack of funding for long-term monitoring and maintenance
			  ○ Limitations of short-term vs. long-term monitoring
			• Organizational
			  ○ Capacity
			  ○ lack of outreach
			  ○ Engineering and site suitability limitations
			  ○ Challenges in sustaining and scaling up successful initiatives
			• Regulatory
			  ○ mitigation is not a 1-to-1 process
			  ○ private lands being harder to restore/conserve
			  ○ Sackett/ definition of a wetland
			  ○ power of regulators/ regulations differing based on stakeholder (mom and pop vs Big ag)
			  ○ land value for wetlands is not competitive for farmers landowners
			  ○ regulatory agency lack of vision
			  ○ lack of consistency among regulatory agencies
			  ○ grant distribution policy for water quality improvements is crude
			  ○ Regulatory monitoring requirements often limited to structural assessments
			  ○ Complexity of wetland crediting systems
				• Relationship to wetlands
				  ○ proximity to the Bay as important to people's understanding of the importance of the environment
				  ○ mentioned that land owners can see the benefits of wetlands to the land
				• Perceptions
				  ○ Negative
				  ■ restoration construction practices creating negative public perceptions
				  ■ public has negative perception of wetlands
				  ■ negative perception of wetlands because they are swamps with no value
				  ■ land owners do not like wetlands
				  ■ farmers do not like wetlands
				  ○ Neutral/Complex
				  ■ disconnect between farmers and landowners that own the farm
				  ■ farmers being wary of government funding
				  ■ often friction between outside non-ag organizations and farmers
				  ■ disconnected community perceptions
				  ■ People are hesitant to put themselves out there for fear of monitoring/violations
				  ○ Lack of context/ interest
				  ■ understanding of benefits of wetlands for habitats and water quality
				  ■ people that aren't educated about wetlands don't understand the benefits
				  ■ lack of interest in wetlands
				  ■ a range of opinions of wetlands based on level of knowledge of wetlands
				• Interest in projects
				  ○ Changing people's minds
				  ○ Financial incentives increase interest
				  ○ Relationship/trust building incentive increases interest
					• Importance of integrating ecosystem restoration with urban planning
					• Vision for a self-sustaining Chesapeake Bay ecosystem