

A Watershed Moment



Enabling Cost-Effective and Equitable
Regional Climate Resilience Planning in
the Mystic River Watershed

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This Policy Analysis Exercise reflects the views of the authors and should not be viewed as representing the views of the Resilient Mystic Collaborative, nor those of Harvard University or any of its faculty.

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Executive Summary

Executive Summary

Amidst a global effort to reduce greenhouse gas (GHG) emissions, climate change has — and will continue to have — substantial effects on people, infrastructure, and the environment. As the world warms, communities in Greater Boston face increased flooding, rising sea levels, extreme heat, and other adverse climate-driven impacts. This reality is of growing urgency to the over 600,000 residents living within the Mystic River Watershed, the most densely populated and urbanized watershed in New England.

In response, a coalition of cities and towns launched the Resilient Mystic Collaborative (RMC), which aims to protect the watershed and its residents from climate-intensified risks. The RMC convenes member municipalities whose priorities and climate vulnerabilities are mutually intertwined, advancing collaborative regional climate resilience measures that municipalities cannot effectively address on their own. Since its founding in 2018, the RMC has expanded to include 20 of the 21 municipalities in the watershed and has demonstrated an effective model for planning, funding, and implementing climate resilience at a regional scale.

In the coming decades, the Mystic River Watershed will require enormous investments in climate resilience to protect against the adverse impacts of climate change. Communities in the watershed will continue to rely heavily on state and federal funding — and while both the Commonwealth of Massachusetts and the U.S. federal government have made responding to climate change a high priority, barriers remain that prevent communities from advancing regional climate resilience planning in a cost-effective and equitable way. **This report aims to identify the changes that are needed at the local, state, and federal levels to ensure that municipalities in the Mystic River Watershed have the resources they need to meet their shared regional climate resilience goals.**

We initially hypothesized that inadequate funding was the primary barrier facing the Mystic River Watershed. Given the recent passage of the Infrastructure Investment and Jobs Act (IIJA) in 2021 and the Inflation Reduction Act (IRA) in 2022, both of which authorized significant new federal investments flowing to the local level, we sought to understand what support municipalities needed to make sense of this new funding environment. However, in the course of our research, we found that even with significantly expanded resources at the state and federal levels, municipalities still face a range of barriers to effectively accessing and using these resources.

Key Findings

Several key findings anchored our approach to developing policy recommendations. **First, our interviews revealed several underlying features that characterize climate resilience work in the Mystic River Watershed:**

- Climate resilience sits in various places across municipalities and levels of government.
- In the absence of formal regional governance, collaboration hinges on personal relationships.

- While municipalities use a mix of funding sources, many large-scale construction projects require federal funding.
- Municipalities facing budget constraints often stack or “braid” multiple grants together to fulfill matching requirements.
- Projects do not need to be “shovel-ready” to receive funding; in many cases, new projects emerge in response to funding opportunities.

Second, we identified several strengths that have contributed to the Mystic’s success:

- Municipalities have good visibility into the options available to fund their climate resilience projects.
- Municipalities have a baseline understanding of their climate risks and vulnerabilities.
- Municipalities have multiple forums to understand each other’s challenges and generate ideas for collaboration.
- The RMC provides dedicated capacity to coordinate climate resilience at the regional scale.

Despite these strengths, however, the Mystic still experiences significant limitations that constrain its work:

- Existing staff capacity is often insufficient for the administrative burden created by grant applications and management.
- Certain state regulations create friction for municipalities’ climate resilience objectives, even if underlying values are shared.
- Federal grants require municipalities to demonstrate cost-effectiveness, which is technically challenging, time-consuming, and expensive.
- Despite substantial state and federal funding opportunities, municipalities take on significant financial risk.
- Municipalities have limited visibility into future state and federal funding, constraining their ability to plan for the long term.

Recommendations

Building on these findings and on discussions with our client, this report recommends six major policy changes — grouped into three themes — that together present a compelling vision for more cost-effective and equitable climate resilience planning across the Commonwealth.

First, the Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA) can “grease the wheels” of state grant programs by:

- **Allocating resources to build municipal staff capacity.** Because grant funding requires significant capacity from communities and often cannot be used to pay full-time staff, municipalities could benefit from having additional project-based surge capacity. Specific policy interventions could include providing flexible funding to lower-resourced communities for operational expenses, assisting municipalities with meeting match requirements for federal grants, and providing additional technical support to municipalities.

- **Increasing operational flexibility for use of Municipal Vulnerability Preparedness (MVP) funds.** While the MVP program is highly valued by municipalities, the short time-lines imposed by MVP Action Grants — used to fund project implementation — introduce significant financial risk and uncertainty for municipalities. Specific policy interventions could include lengthening the grant period for MVP Action Grants to 3-5 years and formalizing the list of conditions under which MVP grant periods can be extended.

Second, the Governor’s Office can coordinate across the Commonwealth to strengthen the state’s role by:

- **Centralizing the process for finding and applying to state grants.** Municipalities in the Mystic River Watershed benefit from the RMC’s role in tracking upcoming grant opportunities, but they still struggle with burdensome application processes and limited visibility into future funding. Specific policy interventions could include developing a “common app” single application portal for municipalities to apply to a range of state grants simultaneously and assigning state “case managers” to provide end-to-end support for promising local and regional grant applications.
- **Strengthening state coordination of regional climate resilience work.** The MVP program has equipped communities with a strong baseline understanding of their climate risks, creating a further opportunity for the state to more fully integrate state-led climate priorities and locally- or regionally-led initiatives. Specific policy interventions could include developing a coordinating mechanism to identify individual and cascading climate risks across critical infrastructure, evolving Regional Planning Agencies (RPAs) from an advisory role to a coordination role, or creating a new state-level entity to coordinate climate resilience across local authorities.

Finally, state and federal leaders can untangle long-standing pain points by:

- **Revisiting state environmental regulations in the context of a changing climate.** Although environmental regulations play an important role in the conservation of the Commonwealth’s natural resources, they can also be updated to streamline the implementation of nature-based solutions that both benefit protected areas and advance climate resilience goals. Specific policy interventions could include allowing environmental regulations like the Wetlands Protection Act (WPA) to consider future harm to protected areas and providing additional incentives for municipalities to pursue nature-based solutions in areas with high climate risk.
- **Simplifying the process of applying to the Federal Emergency Management Agency (FEMA) Building Resilient Infrastructure and Communities (BRIC) program.** Municipalities rely on federal programs like BRIC to fund many large-scale construction projects, but BRIC funds have been difficult to access due to burdensome cost-effectiveness requirements, especially for lower-resourced communities. While improvements to the BRIC process are largely outside of the scope of this report, the program has been well-studied in recent literature. We add findings from the Mystic River Watershed to this ongoing conversation and leave specific recommendations as a topic for future research.

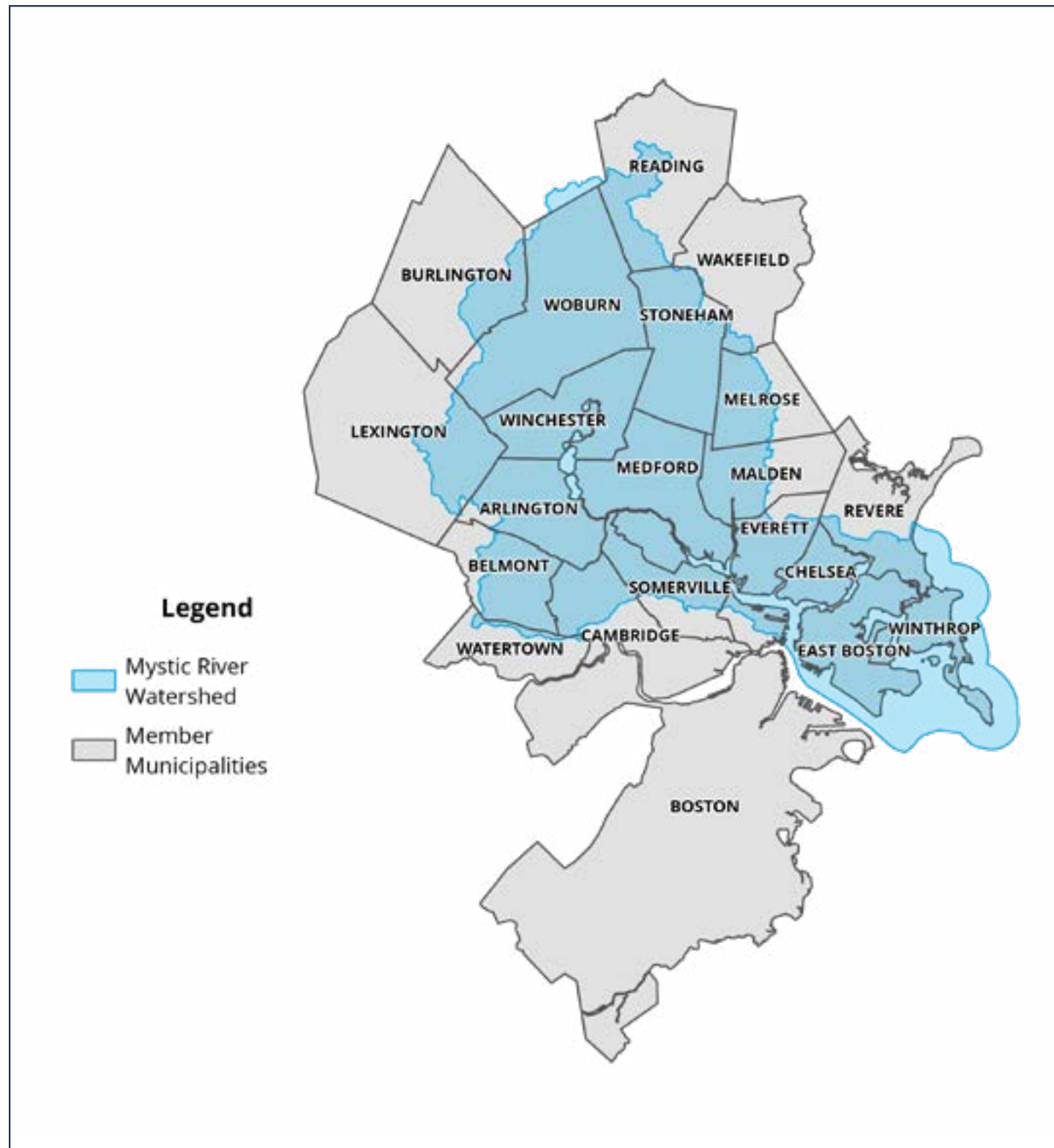


Figure 1 - The Mystic River Watershed and its member communities. Data source: MassGIS.

Introduction

1. Introduction

The Mystic River Watershed covers 21 towns and cities in Greater Boston, including all land area that drains into the Mystic River — from the Mystic Lakes through Arlington, Somerville, Medford, Everett, Chelsea, Charlestown, and East Boston to Boston Harbor. With a population of over 600,000 residents spread over 76 square miles, the Mystic River Watershed is the most densely populated and urbanized watershed in New England. The watershed contains the highest concentration of critical infrastructure in New England, including energy generation and storage, transportation, wastewater treatment, and food distribution.¹

The RMC is a partnership between the Mystic River Watershed Association (MyRWA), the Consensus Building Institute, and municipalities across the watershed that aims to catalyze climate resilience planning on a regional scale. Communities in the watershed are already experiencing the effects of climate change, including extreme heat, freshwater and coastal flooding, and severe weather events. While many of these communities have embarked on independent climate planning efforts, the RMC emerged as an informal governance arrangement to help municipalities collaborate on shared regional climate goals. Launched in 2018, the RMC convenes 20 cities and towns covering the majority of the Mystic River Watershed to address a range of climate resilience challenges, including coastal flooding, extreme heat, and precipitation-based flooding.²

In the absence of county government, collaboratives like the RMC are crucial for fostering collaboration. The communities in the Mystic River Watershed vary widely in size, demographic characteristics, forms of governance, and development patterns. The physical, social, and ecological risks of climate change are unevenly distributed, as is the capacity to develop and implement solutions.³ The RMC provides a voluntary informal governance structure that fulfills the urgent need for these communities to build relationships, trust, and a shared understanding of climate risks and solutions.⁴

In addition to fostering collaboration, the RMC enables municipalities to pool resources and expertise, broadening impact from the local to the regional level. Grant proposals are often more effective when done at the regional level: for example, Massachusetts has identified regional collaboration as a criterion for evaluating applications to the MVP program, the state's flagship climate resilience grant.⁵ Since its founding, the RMC has received a disproportionately large share of MVP competitive grant funding relative to the population size and land area it represents, providing evidence for the efficacy of its regional planning model.

This research has demonstrated that regional climate resilience planning can be effectively coordinated at the regional level. In interviews with RMC members, we heard substantial evidence supporting a regional approach. From technical expertise to grant-writing to advocacy efforts, the RMC has created enormous value for its members. Most member municipalities are

limited in their ability to focus on climate resilience because of constraints on staff capacity, municipal budget, and competing priorities. By providing dedicated capacity and coordinating regional efforts, the RMC ensures that all of its member communities are able to advance their climate resilience goals. As a result, climate resilience is not only a privilege that communities with time and resources can access, but rather is embedded in planning efforts across the region.

Stronger coordination is needed to ensure that municipalities have the resources to bring about a more climate-resilient future. Although the RMC is constrained by its position as a grant-funded nonprofit organization, it has demonstrated the benefits of regional collaboration. Despite its many strengths, however, the current system also has several key limitations that prevent the Mystic River Watershed from accessing the resources it needs to fully realize its climate resilience objectives. Our interviews surfaced numerous barriers that municipalities are facing, from regulatory obstacles to burdensome grant applications. The RMC can alleviate some, but not all, of these barriers. To scale resilience efforts, changes are needed at the state and federal levels.

This report presents a vision for more cost-effective and equitable regional climate resilience planning in the Mystic River Watershed. Our research has focused on the Mystic River Watershed because it has piloted a successful regional approach to climate resilience. However, a more resilient future requires scaling this model beyond the Mystic River Watershed. This challenge is not simply a question of funding; it touches all aspects of the planning process, from community engagement to permitting to budget cycles. Effective climate resilience work requires effective governance.

Research Question

What changes are needed at the local, state, and federal levels to ensure that municipalities in the Mystic River Watershed have the resources they need to meet their shared regional climate resilience goals?



Background and Context

2. Background and Context

2.1 Climate resilience is an urgent priority for Greater Boston

Amidst a global effort to reduce GHG emissions, climate change has — and will continue to have — substantial effects on people, infrastructure, and the environment. As the world warms, Greater Boston faces increased flooding, rising sea levels, extreme heat, and other adverse climate-driven impacts. In a 2022 study, the Greater Boston Research Advisory Group projected that:

- The number of days with temperatures over 90°F could increase from 10 days per year to up to 80 days per year by 2100 depending on global GHG emissions, which would negatively impact human and economic health, particularly in already marginalized communities;
- Boston Harbor could experience a median sea-level rise of anywhere from 3.4 to 10 feet; and
- Daily precipitation intensity could increase by 10 to 20 percent by 2050, increasing nuisance flooding days from less than 15 days per year to over 180 days per year; among other impacts.⁶

In this context, *climate resilience* refers to actions taken “to prepare for and adjust to both the current and projected impacts of climate change,” as defined by the U.S. Environmental Protection Agency (EPA). Climate resilience is related to but distinct from *climate mitigation*, which refers to actions taken to limit the magnitude and rate of future climate change by reducing GHG emissions and/or advancing nature-based solutions.⁷ Climate resilience is also complementary with *climate adaptation*, which often proposes incremental solutions such as building sea walls that can help manage short-term disaster risks. However, the concept of resilience encompasses more broadly the ability to cope, adapt, and transform to a changing climate, and as such “tends to challenge the status quo and provoke the need for fundamental and system-level changes when incremental adaptation to climate change is insufficient.”⁸

Climate resilience has become a topic of increasing urgency and importance for Greater Boston. In 2012, Superstorm Sandy devastated communities across the Northeast; although Boston was spared the worst of the damage, the storm claimed a total of 147 lives, caused \$70 billion in damages, and marked a “turning point in how our nation experiences, prepares for, and responds to the impacts of a rapidly changing climate.”⁹ At the time, there were few national or international policy mandates to drive climate resilience and adaptation, leaving local governments to take a leading role.¹⁰ However, as events like Superstorm Sandy demonstrate, the impacts of climate change do not stop at the administrative boundaries of a city or town. As a result, strategies to address these climate risks “often need to occur at a metropolitan regional scale and/or at ecosystem/landscape scale (watersheds, coastlines), not just within a city’s jurisdiction.”¹¹ The importance of a regional approach to climate resilience has driven the formation of new partnerships and governance models in Greater Boston, including the Resilient Mystic Collaborative (RMC).

2.2 The Mystic River Watershed faces a range of climate risks and impacts

The Mystic River Watershed faces a range of risks and potential adverse impacts from climate change. The RMC approaches these climate risks in three categories: coastal flooding, extreme heat, and precipitation-based flooding.¹²

2.2.1 Coastal flooding

Coastal flooding events, such as storm surge inundation from hurricanes, are an area of key concern for RMC municipalities, especially communities in the Lower Mystic River Watershed. In November 2021, the RMC conducted the Lower Mystic Climate and Social Vulnerability Assessment in partnership with six cities and towns. The assessment simulated the impacts of an extreme winter Nor'easter occurring in 2050, finding that such a storm would likely flood harbor tunnels and Massachusetts Bay Transportation Authority (MBTA) subway tunnels. This damage would take “weeks to months” to recover from, with particularly severe negative impacts on socially vulnerable populations that rely on public transit. Furthermore, the report found that communities with the highest concentration of critical infrastructure also had the highest percentage of vulnerable residents — specifically East Boston, Chelsea, Everett, and Revere.¹³

These findings support the incorporation of social resilience factors into climate vulnerability assessments, rather than focusing solely on risks to critical infrastructure. The RMC also recommended that municipalities pursue preparedness measures to respond to extreme weather events, including prioritizing transportation corridors for essential workers, improving regional coordination, developing multilingual communications strategies to reach socially vulnerable populations, storm-hardening communications infrastructure, and increasing grid resilience.¹⁴ Today, upstream communities in the Mystic River Watershed are protected from coastal flooding by two key dams: the Amelia Earhart Dam and the Charles River Dam. However, as coastal storms increase in severity, these dams may become overwhelmed by floodwaters. To mitigate the most severe flood impacts, the RMC has developed a strategy in partnership with state and federal authorities to elevate both dams as well as locations along key flood pathways.¹⁵

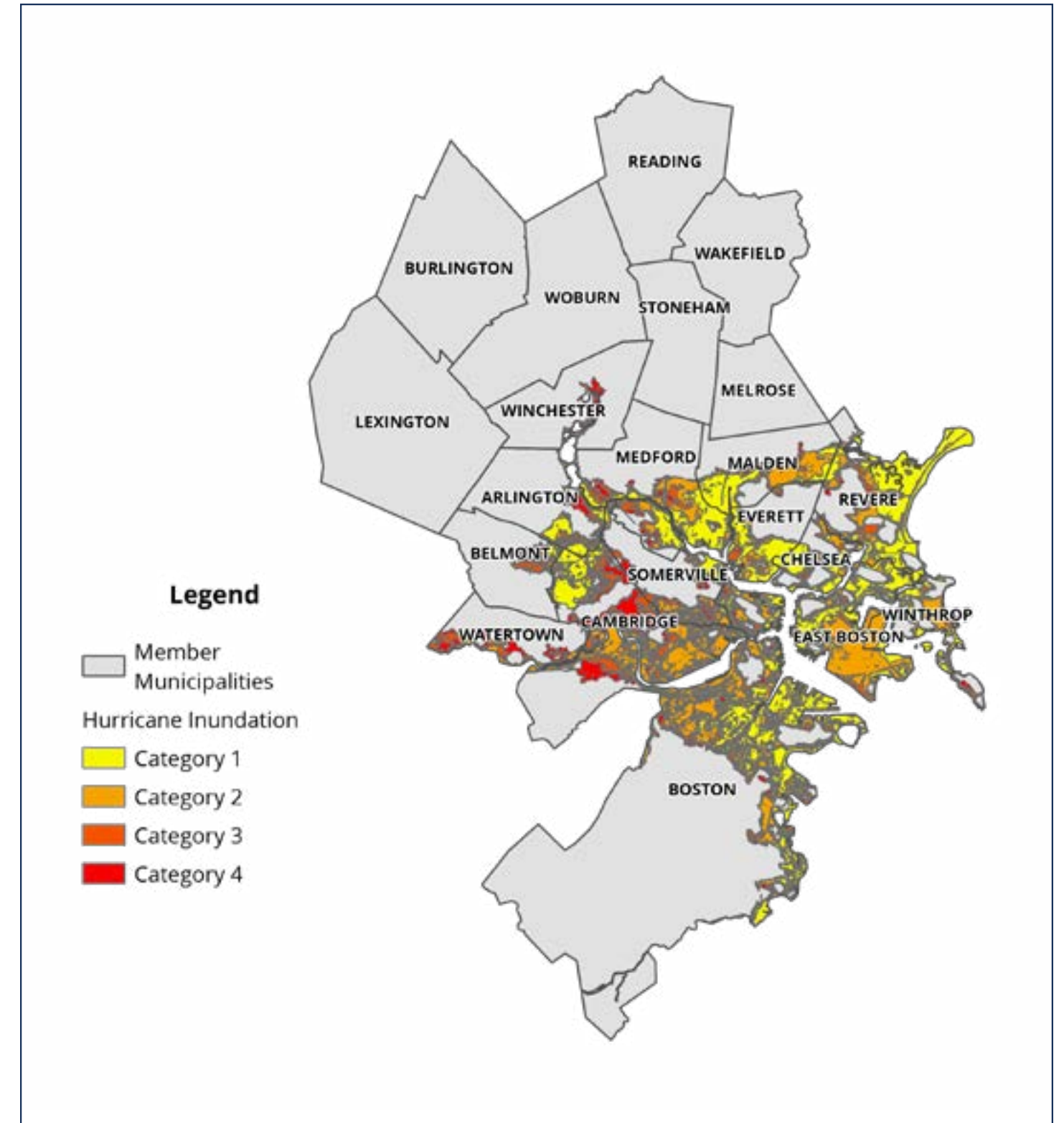


Figure 2 - Storm surge from hurricanes is likely to impact much of the Lower Mystic Watershed. The worst case scenario is a category 4 storm, which would cause municipalities as far north as Winchester to be inundated. Data source: MassGIS.

2.2.2 Extreme heat

Extreme heat causes more deaths in the U.S. than any other climate hazard today.¹⁶ Due to a history of discrimination in housing and zoning policy, the negative impacts of extreme heat are felt disproportionately by low-income communities of color in the Mystic River Watershed. As heat waves increase in severity due to climate change, protecting residents from these impacts is an urgent concern for the RMC.¹⁷

In August 2021, the RMC partnered with the Museum of Science, MyRWA, the Metropolitan Area Planning Council (MAPC), and almost a hundred volunteer citizen scientists to collect data on extreme heat in the watershed. The effort, christened “Wicked Hot Mystic,” identified three areas whose modeled temperatures were between 2.5 to 4.6°F warmer than the rest of the region on average.¹⁸ As a follow-on effort, the RMC has secured a two-year grant from the MVP program to engage communities in the Wicked Cool Mystic project, in which ambassadors from four target communities lead in the “designing, creating, and implementing community-specific cooling solutions.”¹⁹

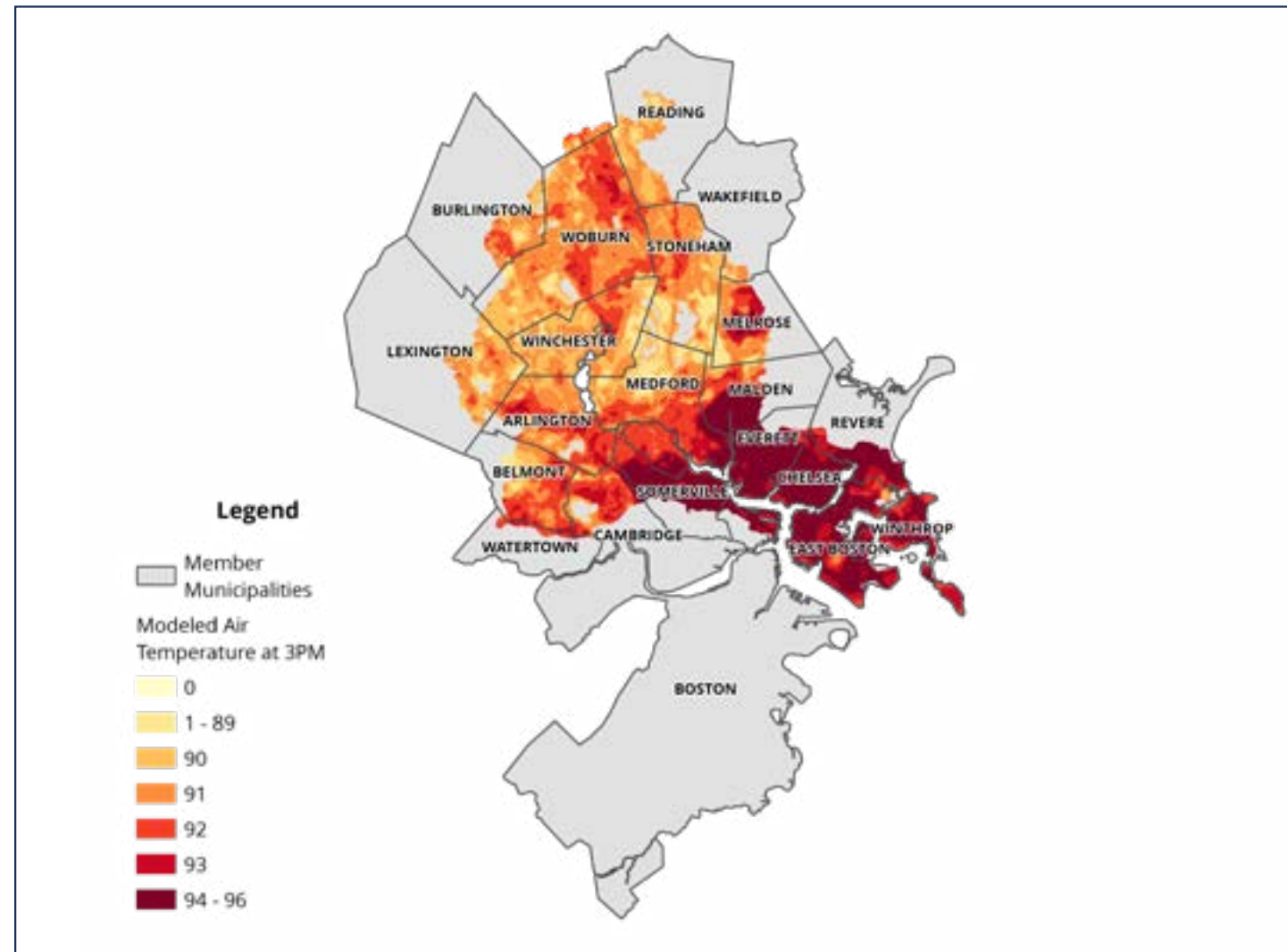


Figure 3 - The Wicked Hot Mystic Afternoon Heat Model shows modeled air temperatures at 3 PM across the watershed. Towns with more impervious surface — such as Everett, Chelsea, and East Boston — are forecast to reach temperatures well over 90 degrees. Data source: Mystic River Watershed Association.

2.2.3 Precipitation-based flooding

Precipitation in the Mystic River Watershed is projected to increase in the upcoming decades, exacerbating the risks of flooding across the watershed. These risks are of particular regional concern given the nature of precipitation-based flooding: rain that falls in one community may swell a river, pond, or lake that flows toward other communities downstream, meaning flood mitigation solutions cannot be effectively developed by municipalities in isolation.²⁰ To address this challenge, the RMC has embarked on a large-scale effort involving 17 communities to identify, prioritize, design, and construct stormwater wetlands that can absorb excess rainfall and prevent the worst impacts of flooding. Beginning in 2020, the RMC and its partners narrowed an initial pool of 425 potential project sites to six priority wetland areas, three of which have received design funding from the MVP program.²¹ More detail on these projects, particularly the Hurd Park constructed wetland project in Woburn, are provided in *Case Study #1: Building Climate Resilience at Hurd Park*. However, given resource constraints, the RMC has concluded that communities do not have the ability to create enough wetlands to fully protect against severe precipitation events (i.e., a storm with a 10 percent annual probability in 2070). As a result, they have focused their efforts on insulating people and property from flood damage, rather than preventing flooding itself.²²

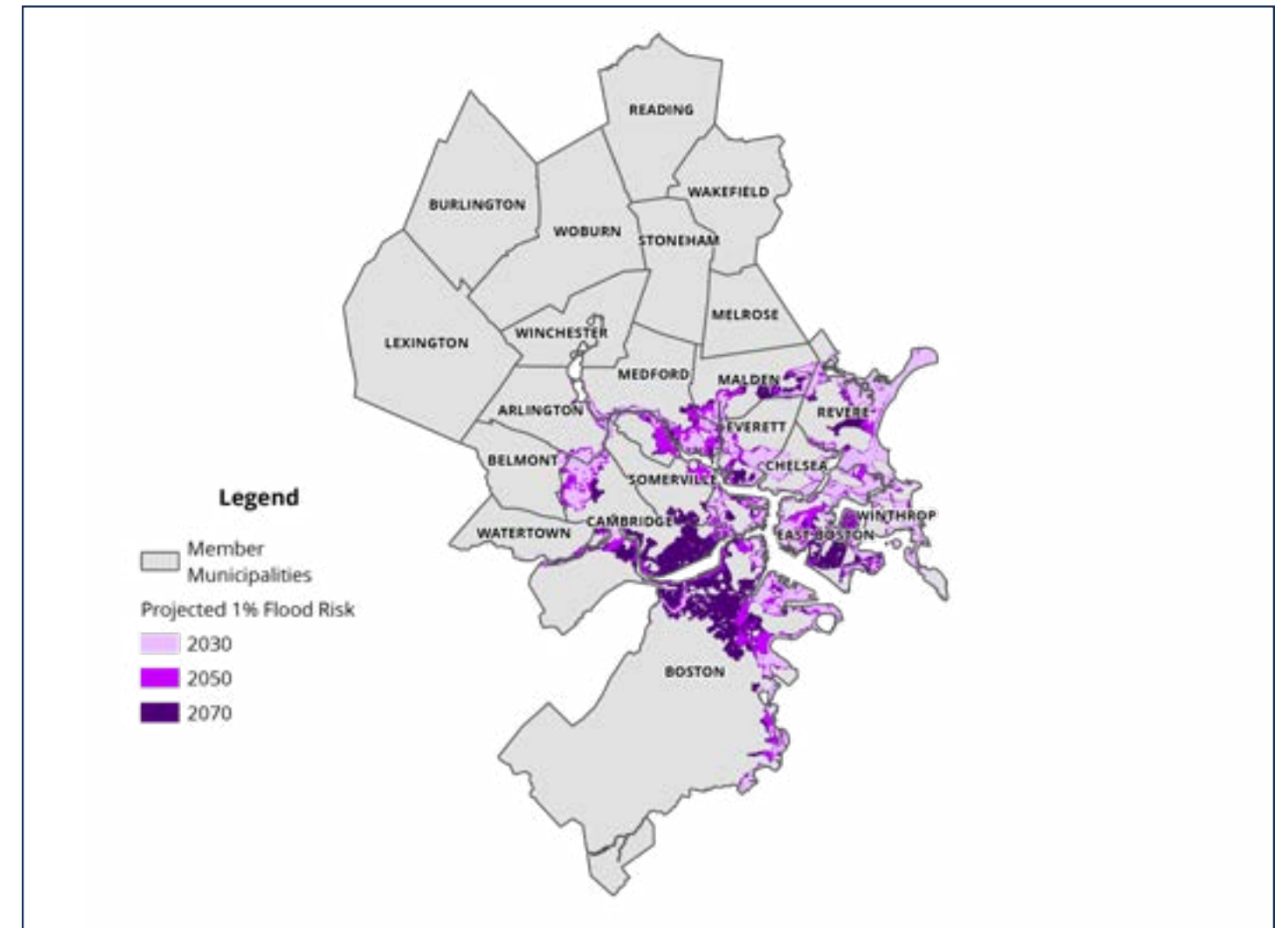


Figure 4 - The 1% annual chance flood (also known as the 100-year flood) has a 1 in 100 probability of being equaled or exceeded in any given year. FEMA’s Flood Insurance Rate Maps depict the 1% annual chance flood for 2030, 2050, and 2070. Data source: Massachusetts Office of Coastal Zone Management.

2.3 The RMC fills a regional climate governance need

In the early 1970s, a group of Tufts University graduate students collected water samples from the Mystic River that showed high levels of ammonia, which raised the alarm about pollution in the watershed. In response to these findings, MyRWA was created as a volunteer-led organization to focus on improving water quality, mitigation pollution, and restoring wetlands. Over the next five decades, MyRWA grew into a professional organization with an annual budget of over \$4 million, 15 paid staff members, 13 Board members, and thousands of volunteers. The scope of their mission grew as well, reflecting the changing environmental, social, and economic realities of the watershed.²³

In response to the impacts of climate change on the watershed, MyRWA launched the RMC in 2018. The mission of the RMC is to plan, finance, and implement regional climate resilience measures that municipalities cannot effectively address on their own.²⁴ Beginning with ten members, the RMC quickly expanded to include 20 of the 21 municipalities in the watershed. One of the key functions that the RMC serves is to convene member municipalities whose priorities and climate vulnerabilities are mutually intertwined. For example, property development in an upstream community can reduce the land's ability to absorb rainfall, exacerbating flood risk in communities downstream; likewise, mitigating flooding in one community might require better stormwater management outside of its jurisdiction. Another important function that the RMC serves is providing member municipalities with capacity and technical assistance to apply for state and federal grants.


Climate resilience governance in Greater Boston is shaped by the region's unique characteristics. In Massachusetts, counties exercise little political authority, and the two counties encompassing the Mystic River Watershed (Suffolk and Middlesex County) serve only as administrative divisions with no formal county government.²⁵ Instead, regional authority over resources and infrastructure

Municipal Vulnerability Preparedness (MVP)

The MVP program, managed under the Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA), is a competitive state-level grant program that "provides support for cities and towns in Massachusetts to begin the process of planning for climate change resiliency and implementing priority projects."³² The program is rooted in a community-driven planning process to "understand climate vulnerabilities and identify priority adaptation actions."³³ Municipalities begin the MVP process by applying for MVP Planning Grants, which assist them in identifying and evaluating their climate vulnerabilities. Communities that receive Planning Grants then become eligible for MVP Action Grants, which provide funding for implementing priority projects identified through the planning process.³⁴ For Action Grants, municipalities are required to provide 25 percent of the funding through matching funds. The MVP process is rooted in nine Core Principles, including strengthening outcomes for environmental justice (EJ) communities and employing nature-based solutions. The MVP program also prioritizes projects with regional benefits.³⁵ In FY23, the MVP program had \$1 million available for Planning Grants (\$15,000 to \$30,000 per grant) and at least \$20 million available for Action Grants (up to \$3 million per grant).³⁶

falls to a collection of public agencies, including the Massachusetts Water Resource Authority (MWRA), the MBTA, and the Massachusetts Port Authority.²⁶ To address the need for resilience planning at the regional level, the MAPC — the RPA responsible for serving the 101 cities and towns of Greater Boston — launched the Metro Mayors Climate Preparedness Taskforce in 2015 to coordinate across communities to address shared climate resilience priorities.²⁷ In a 2017 survey of regional climate collaboratives, Linda Shi found that the structure of the MAPC shaped climate regionalism in Greater Boston in several ways. First, the MAPC serves in a largely advisory role, placing an emphasis on direct coordination between municipalities. Second, because the MAPC lacks statutory authority, municipalities' participation and alignment with regional plans is voluntary. Finally, as a result of these dynamics, resilience efforts in Greater Boston are largely planned at the project level.²⁸

RMC share of total MVP grant dollars



17%

RMC share of MVP collaborative grant dollars



40%

Figure 5 - The RMC has been very successful in securing state grant funding relative to its size. Across all MVP Action Grants awarded between FY18 and FY22, the RMC has secured 17 percent of total funding. Across grants awarded to regional or collaborative projects, the RMC has secured 40 percent of total funding. Data source: Massachusetts Executive Office of Energy and Environmental Affairs.

While the RMC is neither the first nor the only effort to catalyze regional climate resilience planning in Greater Boston, its model of informal governance has seen notable success when compared with other watershed associations in the Greater Boston area. Since its founding in 2018, the RMC has secured over \$30 million in state and federal grant funding, including \$13 million from the state MVP program.²⁹ The latter figure represents approximately 18 percent of total MVP grant funding awarded in this five-year period, which vastly outstrips the Mystic River Watershed's share of the state's land area (0.7 percent) and population (9 percent).³⁰ In a 2022 study, Tuler and Choi found that MyRWA had significantly over-performed the neighboring Neponset River Watershed Association (NepRWA), which received only 2 percent of total MVP grant funding between 2018 and 2023.³¹ The Mystic and Neponset watersheds are of similar size, population, longevity, staff capacity, and organizational character; however, MyRWA is unique in having received \$1.8 million in foundation funding to launch the RMC, which has been a critical component of the watershed's outsized success in securing state funding.

2.4 A regional approach is supported by a growing evidence base

Although cities have been on the forefront of advancing climate action in the twenty-first century,³⁷ operating at the local scale is “increasingly seen as insufficient because it lacks economies of scale, authority over regional infrastructure and ecological systems, and control over the design of fiscal and regulatory systems.”³⁸ Because of these constraints, resilience planning limited to the local level can potentially overemphasize short-term solutions and shift climate risks to neighboring areas that have a lower capacity to adapt. In contrast, a regional approach allows cities to pool their collective resources, take a structural view of climate vulnerabilities, and pursue solutions that benefit multiple jurisdictions.³⁹ As early as 2010, the White House Council on Environmental Quality’s Interagency Climate Adaptation Task Force wrote that “the majority of effective adaptation strategies are implemented at the local to regional scale.”⁴⁰ At the time of this report, there were only three regional climate collaboratives in the United States. In the decade since, the Georgetown Climate Center’s Regional Collaboratives Forum counted at least 25 climate collaboratives among its members.⁴¹

Despite their success and increasing prominence, regional collaboration also suffers from several notable challenges. The Institute for Sustainable Communities (ISC) describes these challenges as aligning goals across disparate stakeholders, driving long-term strategies across electoral cycles, balancing regionalism with respect for local authority, and dealing with increased complexity and scale.⁴² The ISC also conducted an April 2019 study of 15 regional climate collaboratives to better understand their strengths and weaknesses, finding that collaboratives tended to achieve strong outcomes in several categories of activities (training and tools, stakeholder engagement, research and analysis) while lagging behind in others (federal advocacy, federal engagement).⁴³

2.5 The impacts of new federal legislation are not fully realized

Federal legislation has created unprecedented opportunities for cities and states to invest in climate mitigation and adaptation. In the past two years, congressional lawmakers have authorized over \$1.5 trillion in spending to improve the nation’s energy, water, and transportation systems, in addition to addressing a variety of climate needs.

In November 2021, President Joe Biden signed the IIJA into law, allocating an estimated \$1.2 trillion toward transportation (including roads and bridges; passenger and freight rail; airports, ports, and waterways; public transit; electric vehicles; safety; and reconnecting communities) and core infrastructure (which includes the power grid, broadband, water, environmental resilience, and environmental remediation). A majority of funds from the IIJA will be allocated to state and local governments. The Urban Institute calculated that local governments are eligible for \$287 billion in direct infrastructure funding through the IIJA.⁴⁴ They may also receive some “pass-through” funding from programs administered by state governments. State governments are directly eligible for \$697 billion in funding. These investments have already begun to flow to local governments. On the one-year anniversary of the bill’s passage, the White House announced that over \$185 billion in funding had already been allocated for 6,900 projects in over 4,000 communities across all 50 states, Washington, D.C. and U.S Territories.⁴⁵

The following July, Congress passed the IRA through budget reconciliation, which was signed into law by President Biden in August. The IRA authorizes \$369 billion toward expanding tax credits for clean energy and electric vehicles, boosting energy efficiency, establishing a national climate bank, supporting climate-smart agriculture, bolstering production of sustainable aviation fuel, reducing air pollution at ports, and more. According to a joint statement from Senate Majority Leader Chuck Schumer (D-NY) and Senator Joe Manchin (D-WV), the IRA is expected to reduce carbon emissions by roughly 40 percent by 2030.⁴⁶

It is too soon to evaluate the efficacy of these programs in advancing climate resilience at the state and local level. Much of the funding is intended to be distributed over a five- or ten-year period, giving communities ample time to plan, design, and implement projects. And while nearly half of the funding in the IIJA is allocated to existing programs, new programs take time to launch. Program administrators need to be hired and funding guidelines need to be developed before applications are made available. Previous stimulus bills have taken years to roll out: in an analysis of the American Recovery and Reinvestment Act, signed by President Obama in February 2009, researchers at Brookings found that “fast delivery tends to rely primarily on well-established programs; even then, there are limits to how quickly new funds can be absorbed.”⁴⁷ It is therefore possible that the funds from the IIJA and the IRA will not fundamentally change the nature of climate resilience work in Massachusetts. However, the policy interventions we propose in this report will better position the members of the RMC to take advantage of federal resources.

2.6 Massachusetts is making climate change a focus

Investments in climate resilience are not solely the purview of the federal government. Massachusetts Governor Maura Healey, elected in November 2022, has made climate change a focus of her administration since she took office. On the first full day of her administration, Governor Healey signed an executive order that created the nation’s first cabinet-level Climate Chief and appointed Melissa Hoffer, formerly the principal deputy general counsel for the EPA and chief of the Energy and Environment Bureau at the Massachusetts Attorney General’s Office, to serve in the role. Healey and Hoffer have vowed to take a whole-of-government approach to addressing climate change in Massachusetts and are expected to release initial recommendations by July 2023.⁴⁸

Climate Resilience and Equity

The Infrastructure Investment and Jobs Act (IIJA) and the Inflation Reduction Act (IRA) are intended to direct billions of dollars towards historically marginalized communities that have suffered as a result of environmental racism. During President Biden's first week in office, he signed an executive order that promised to put environmental justice at the front of his climate agenda. Most notably, the order established the Justice40 initiative, which asserts that disadvantaged communities will receive at least 40 percent of overall benefits from federal investments in climate and infrastructure. The executive order states that disadvantaged communities "have been historically marginalized and overburdened by pollution and underinvestment in housing, transportation, water and wastewater infrastructure, and health care."⁴⁹ As funding flows from the federal government, local governments have a critical role to play in ensuring that disadvantaged communities see the benefits of these investments.

The deeply embedded patterns caused by structural and institutional racism mean that climate change disproportionately harms low-income communities and communities of color. The legacy of racially discriminatory policies such as redlining have contributed to environmental inequities in cities today. In response to these harms, local governments are increasingly prioritizing equity, environmental justice, and social vulnerability into their climate resilience efforts.⁵⁰ A review of the literature makes it clear that engaging priority populations — that is, those who are disproportionately harmed by the causes and impacts of climate change — is challenging for many municipalities. Yet community engagement is often a "box to check" and not a meaningful, participatory process. Moving forward, it is critical that climate resilience projects integrate equity throughout the entire planning process.

This research has surfaced some of the ways that the current planning process exacerbates existing patterns of social, economic, and racial inequality. However, the challenge is much deeper than what we have been able to address in this report. Although this research aims to lower barriers to accessing funding — a goal set with equity in mind — more systemic changes are needed.



Key Findings

3. Key Findings

Based on initial conversations with our client, we hypothesized that municipalities' awareness of grant opportunities was the key barrier to bringing more funding into the watershed: that is to say, if municipalities had better visibility into the various state and federal programs available to them, they could unlock significantly more resources to pursue climate resilience projects. However, the reality was more complex.

To better understand the RMC communities and the unique context in which they operate, we interviewed over 30 stakeholders from municipal governments, state and federal agencies, non-profit organizations, and private firms. These interviews were conducted via video conference and shed light on the unique features, strengths, and limitations of the watershed's current climate resilience ecosystem. The full list of interviewees can be found in *Appendix A*.

Table 1: Summary of interview findings and analysis

<p>Features of the Mystic River Watershed's climate resilience work</p>	<ul style="list-style-type: none"> • Climate resilience sits in various places across municipalities and levels of government • In the absence of formal regional governance, collaboration hinges on personal relationships • While municipalities use a mix of funding sources, many large-scale construction projects require federal funding • Municipalities facing budget constraints often stack or "braid" multiple grants together to fulfill matching requirements • Projects do not need to be "shovel-ready" to receive funding; in many cases, new projects emerge in response to funding opportunities
<p>Strengths of the current system</p>	<ul style="list-style-type: none"> • Municipalities have good visibility into the options available to fund their climate resilience projects • Municipalities have a baseline understanding of their climate risks and vulnerabilities • Municipalities have multiple forums to understand each other's challenges and generate ideas for collaboration • The RMC provides dedicated capacity to coordinate climate resilience at the regional scale
<p>Limitations of the current system</p>	<ul style="list-style-type: none"> • Existing staff capacity is often insufficient for the administrative burden created by grant applications and management • Certain state regulations create friction for municipalities' climate resilience objectives, even if underlying values are shared • Federal grants require municipalities to demonstrate cost-effectiveness, which is technically challenging, time-consuming, and expensive • Despite substantial state and federal funding opportunities, municipalities take on significant financial risk • Municipalities have limited visibility into future state and federal funding, constraining their ability to plan for the long term

3.1 Features of the Mystic River Watershed's climate resilience work

The relationships between municipal governments, the RMC, and state and federal agencies create unique dynamics underlying climate resilience work in the Mystic River Watershed. These key features are described in the following section.

Climate resilience sits in various places across municipalities and levels of government.

Within the Mystic River Watershed, municipalities do not have a consistent practice for delegating climate resilience work. Depending on the organizational structure of each individual city or town, the responsibility for leading resilience projects falls variously to planners, engineers, conservationists, grant managers, and/or business developers, meaning municipalities each bring significantly different capabilities to the RMC as a whole. Although the RMC coordinates 20 of the 21 municipalities within the watershed, these municipalities do not comprise a cohesive region from the point of view of state agencies. For example, RMC communities extend across two separate administrative regions within the MVP program⁵¹, three subregions under the MAPC⁵², and two regions under the Office of Coastal Zone Management, from which some communities are eligible for grants.⁵³

In the absence of formal regional governance, collaboration hinges on personal relationships.

Many municipalities emphasized the importance of RMC staff in convening stakeholders, creating awareness of funding opportunities, and facilitating collaborations across municipalities. The RMC's work over the last several years has also strengthened informal relationships between staff in different municipalities who hold important institutional knowledge of ongoing projects, some of which may take many years to complete. Particularly in smaller communities, this institutional knowledge is highly concentrated among a small number of staff members. As a result, staff turnover in either these municipalities or at the RMC presents a potential risk.

While municipalities use a mix of funding sources, many large-scale construction projects require federal funding.

Municipalities have received funding from a variety of state agencies, federal agencies, legislative earmarks, and foundation grants. For initial planning and design, municipalities typically apply for less competitive state grants like the MVP Planning Grant. However, construction on large capital projects often requires funding in quantities only offered by larger, more competitive federal grants, particularly FEMA's BRIC program and the Hazard Mitigation Grant Program — by far the most common programs mentioned by municipalities we interviewed. For these grants, the Massachusetts Emergency Management Agency (MEMA) serves as an intermediary between the municipality and FEMA, meaning there is no direct engagement between the municipal and federal levels.

Municipalities facing budget constraints often stack or "braid" multiple grants together to fulfill matching requirements.

While an estimated two-thirds of residents in Greater Boston believe local officials should do more to address global warming,⁵⁴ the political will to invest in climate resilience projects is often lacking when compared to investments with an immediate payoff like renovating public schools or upgrading roads. As a result, grants that include a matching requirement from the municipality can be difficult to fund. Many municipalities we spoke to seek to avoid or minimize their projects' budgetary impact by applying to multiple grants simultaneously, which can be "braided" together to cost-effectively fulfill matching requirements. For example, MVP Action Grants require that municipalities contribute 25 percent of the total grant amount.⁵⁵ However, this municipal contribution can be fulfilled with another funding source,

such as a federal earmark, rather than funds from the municipality's own budget. For a detailed example of a project braiding multiple funding sources together, see *Case Study #1: Building Climate Resilience at Hurld Park*.

Projects do not need to be “shovel-ready” to receive funding; in many cases, new projects emerge in response to funding opportunities. The state provides funding for the planning and design of climate resilience projects, including the MVP Planning Grant which provided communities with \$1 million in available funding in FY23.⁵⁶ This allows municipalities to develop projects that closely align with the specific requirements and evaluation criteria of programs like the MVP rather than retroactively tailoring existing projects to compete for these grants. At the same time, some municipalities we spoke with also maintain projects in varying stages of maturity that are still awaiting funding. Because state grants like the MVP require municipalities to spend their funding soon after it is awarded, the most successful projects are those that take a phased approach with grants targeted to specific, modular pieces of work.

3.2 Strengths of the current system

The system that has emerged in the Mystic River Watershed, centered on the RMC as an informal governance structure for regional collaboration, has been successful in achieving its goals. The key strengths of the system as it currently exists are described in the following section.

Municipalities have good visibility into the options available to fund their climate resilience projects. Local climate resilience projects are typically funded through a handful of programs, principally the MVP and BRIC programs. Municipal staff have access to a variety of channels to receive information about upcoming grant opportunities, including direct communication from state agencies, RMC communications, and webinars. In interviews, most RMC members reported that these resources are sufficient for staying up-to-date on available grant opportunities.

Municipalities have a baseline understanding of their climate risks and vulnerabilities. Every RMC municipality has completed a Hazard Mitigation Plan with support from an MVP Planning Grant, which offers funding to municipalities that wish to assess their vulnerability to and prepare for climate change impacts, build community resilience, and receive designation as an MVP Community. Upon completing a Planning Grant, communities are eligible to apply for MVP Action Grants that support design and construction. As a result of these programs, RMC communities have a common framework for understanding climate vulnerabilities. The process ensures that communities develop their own road map and priorities while encouraging them to adhere to the program's core principles. The MVP process is rooted in nine Core Principles, including strengthening outcomes for environmental justice (EJ) communities and employing nature-based solutions. The MVP program also prioritizes projects with regional benefits.

Municipalities have multiple forums to understand each other's challenges and generate ideas for collaboration. RMC members meet at least four times annually, with participation from most if not all member municipalities. In its initial meetings in 2018 to 2019, the group provided a forum for RMC members to identify top regional resilience priorities, including a new pump for the Amelia Earhart Dam and developing a scenario-driven regional stormwater management model.⁵⁷ Municipalities also told us that the meetings allow them to raise concerns for their residents where

the solutions may lie outside their jurisdiction, providing the opportunity to identify areas for collaboration. The North Suffolk Office of Resilience and Sustainability (NSORS), an inter-municipal office between the communities of Revere, Chelsea, and Winthrop, also provides additional capacity and shared resources for advancing climate resilience projects. This work is complementary to the work of the Metro Mayors Climate Preparedness Taskforce, in part because it engages project staff as opposed to municipal executives.

The RMC provides dedicated capacity to coordinate climate resilience at the regional scale. In 2018, the Barr Foundation provided a \$115,000 grant to jump-start the creation of the RMC, allowing the RMC to hire full-time staff dedicated to advancing regional climate resilience initiatives.⁵⁸ Today, the RMC supports member municipalities in a variety of ways, including by facilitating working group meetings, coordinating letters of support across municipalities, providing assistance in grant applications and management, and centralizing information about upcoming grant opportunities. Unlike municipal staff, many of whom have competing day-to-day priorities ranging from sewer maintenance to roadway permitting, RMC staff are entirely focused on climate resilience. It also allows the region to avoid redundancies and achieve economies of scale: with the RMC as a hub, municipalities can avoid replicating tasks like tracking grants. Finally, the RMC's role allows it to share best practices across municipalities and coordinate joint projects, such as the tabletop exercise that resulted in the Lower Mystic Climate and Social Vulnerability Assessment.

3.3 Limitations of the current system

Despite its many strengths, the current system also has several key limitations that prevent the Mystic River Watershed from accessing the resources it needs to fully realize its climate resilience objectives. These limitations are described in the following section.

Existing staff capacity is often insufficient for the administrative burden created by grant applications and management. Applying for state and federal grants requires significant amounts of time, as well as specific expertise. While some municipalities in the RMC possess this capacity, many rely on RMC staff or external consultants to complete applications. However, while consultants do create additional capacity for many municipalities, there are limitations to relying on external support. For example, many grant programs prohibit municipalities from hiring the same consultant to support both the project application and project implementation. Most state and federal grants have strict reporting requirements, which adds to administrative responsibilities. Compounding this constraint is the fact that some funding sources are legally restricted for project costs and cannot be used flexibly to pay staff. As a result, some municipalities told us that they are unwilling to consider applying for certain grants (e.g., FEMA) because they are not adequately resourced to keep up with the reporting requirements.

Certain state regulations create friction for municipalities' climate resilience objectives, even if underlying values are shared. The RMC exists in part to help its member municipalities align their climate resilience priorities and act collectively toward shared goals. However, the RMC's collective priorities are in some cases imperfectly aligned with those of its state and federal funders. For example, one of the MVP program's Core Principles is the employment of nature-based solutions, which increases a project's likelihood of being funded.⁵⁹ Yet several

municipalities told us that the WPA does not allow wetlands to be altered for the purposes of stormwater management, which represents a roadblock to designing nature-based flood mitigation projects.⁶⁰ Despite the fact that RMC members are strongly in favor of maintaining pristine wetlands and restoring damaged ones, there is a consensus that state regulations create substantial roadblocks.

Federal grants require municipalities to demonstrate cost-effectiveness, which is technically challenging, time-consuming, and expensive. Although there are many federal programs that can be used to fund climate resilience projects, FEMA's BRIC program is one of the only grants of sufficient size to finance large capital projects. However, FEMA's history as a post-disaster response agency has created some barriers for using its funds for pre-disaster hazard mitigation work. Although the BRIC program is explicitly designed for hazard mitigation, rather than response, it requires communities to complete a resource-intensive benefit-cost analysis (BCA) — a requirement that does not apply to post-disaster recovery. Communities cited the BCA as a major obstacle to applying for BRIC grants, a finding that is supported by the literature. A recent study by the National Resources Defense Council found that higher-capacity jurisdictions are more likely to apply for BRIC and more likely to be awarded funding.⁶¹ Another study by the RAND Corporation found that although FEMA has attempted to ease the burden of conducting a BCA, it continues to be prohibitive for less well-resourced communities.⁶²

Despite substantial state and federal funding opportunities, municipalities take on significant financial risk. Municipalities often have to invest in significant planning and design work to even apply for some grant programs, particularly for larger federal grants. For example, completing a BCA requires hiring consultants for tens to hundred of thousands of dollars per project. In addition to having to “spend money to get money,” municipalities often have to wait for months to years to find out the results of their grant applications, which complicates long-term planning and budgeting efforts. At the state level, municipalities expressed concerns that the MVP program only funds grants in 1-2 year timelines, which means that grant applicants have limited time to spend the money that they have been allocated. If municipalities face any delays (e.g., construction), they may lose access to MVP funding and be forced to tap into their own budget to complete the project.

Municipalities have limited visibility into future state and federal funding, constraining their ability to plan for the long term. Moving projects from planning to construction requires sequencing multiple grants over a period of years. Because most construction grants require that a project has reached 75 percent design before awarding additional funds, communities need to develop projects that can be scaled down if funds do not materialize. At the state level, the timeline constraints of the MVP program mean that municipalities must complete one step before they have any certainty that they will be able to proceed. Similarly, we heard experiences from multiple municipalities that had to wait several years after submitting their BRIC applications only to hear that their applications had been rejected, leading to substantial delays with no project at the end. In addition, federal programs continue to evolve, decreasing certainty that funding will continue to be available in the future. For example, BRIC replaced FEMA's Pre-Disaster Mitigation (PDM) program, which had previously been the vehicle for resilience funding. While these changes typically come with expanded funding opportunities, their impermanence does create some risk for long-term planning efforts.

Building Resilient Infrastructure and Communities (BRIC)

The Federal Emergency Management Agency's (FEMA) Building Resilient Infrastructure and Communities (BRIC) program is a new nationally competitive annual grant opportunity that replaces the existing Pre-Disaster Management (PDM) program. BRIC grants are administered through a partnership between FEMA and Massachusetts Emergency Management Agency (MEMA). BRIC grants are available to states, state agencies, tribes, and local jurisdictions in order to “support proactive investment in community resilience and risk reduction from natural hazards.”⁶³ In FY22, FEMA will distribute up to \$2.3 billion for the BRIC program. As a result of the Infrastructure Investments and Jobs Act (IIJA), the total available funding for BRIC was more than doubled between 2021 and 2022. In FY22, competitive applicants are eligible for up to \$50 million in funding, with a required cost share of 75 percent federal and 25 percent non-federal.⁶⁴

Case Study #1: Building Climate Resilience at Hurd Park

In June 2021, the City of Woburn held its first public meeting to present a vision for Hurd Park and the neighboring Hurd Elementary School, which closed in 2018. Located on an 11.6-acre plot in the center of the city, the existing park and former school grounds will become the site of a climate-resilient community gathering space. In addition to a pavilion, play area, walking paths, and other amenities, the new Hurd Park will include a restored stream, wetland, and floodplain to help the city manage precipitation-based flooding.⁶⁵

Why Hurd Park?

Mitigating flood damage is a key priority for the RMC, one of Woburn's key collaborators on the Hurd Park project. Among the proven nature-based solutions for managing flooding are constructed wetlands, which remove pollutants from stormwater runoff through vegetation and provide storage for excess runoff. Successful stormwater wetlands have been constructed throughout the Mystic River Watershed, including a 3.4-acre wetland in the Alewife Brook Reservation in Cambridge.



Figure 6 - The property is currently home to an elementary school that has been unoccupied since 2018. © Andrew Wei (CC-BY-NC)

After a watershed-wide flood model demonstrated that building stormwater wetlands in the Upper Mystic would alleviate downstream flood impacts, the RMC evaluated 425 open space parcels across the watershed as candidates for constructed wetland projects. The project team collaborated with the Horsley Witten Group to evaluate these sites on a range of physical, equity, and feasibility characteristics, ultimately selecting six candidates to advance to the design phase. In September 2020, the RMC secured a \$670,000 MVP Action Grant to move forward with three of the six candidates: Lexington, Reading, and Woburn's Hurd Park — the latter of which benefited from being on land legally owned by the city, containing an existing wetland, and being of sufficient size to potentially have a regional impact.⁶⁶

Hurd Park exemplifies the strengths and limitations of the current funding system

After speaking with MyRWA staff about the project in March 2023, we visited Woburn to learn more about Hurd Park from the project team. The team plans to finance the project with a mix of state and federal funding, including a roughly \$300,000 state earmark, a \$262,500 federal

earmark, and a \$279,000 MVP Action Grant. Also in progress are applications for a \$2.9 million FEMA BRIC earmark, a further MVP Action Grant for \$250,000 annually over two years, a \$400,000 DCR PARC grant, and a MassTrails grant. Several of these funding sources, including the federal earmark and MVP grants, were secured with the partnership of the RMC, which has also assisted in coordinating letters of support across the participating communities.

While many grant programs require matching funds from the municipality, Woburn has been strategic about "daisy-chaining" (or braiding) grants together to minimize the impact on its budget. For example, the MVP Action Grant requires a 25 percent match, which the city is paying using funds from its federal earmark. This earmark in turn requires a 25 percent match, which is being fulfilled by funds from the state earmark. The project team hopes to match this state earmark with funds from a BRIC grant it has applied for, although meeting the requirements of the BCA remains a challenge.

Community engagement efforts for the Hurd Park project have included a lunch-and-learn, several public meetings, and an ongoing survey that has received over 700 responses from residents. However, deeper engagement has been difficult to achieve on the short timeline permitted by the MVP program that is funding these efforts. The team also shared that the Commonwealth's environmental regulations have also forced them to scale back their plans for a more extensive wetland restoration. Despite these barriers, the project has received positive local press and will move forward with the permitting by June 2023, paving the way for construction to begin on the new park.⁶⁷



Figure 7 - The site is home to an existing wetland that does not have any public access. © Andrew Wei (CC-BY-NC)

Potential Policy Options

4. Potential Policy Options

4.1 Generating policy options

Through our interviews, we identified over 100 potential policy ideas that could build on the strengths of the current system, address its limitations, or both. Before assessing these ideas, we first organized them into six categories that grouped together similar ideas addressing the same policy need. Next, we pressure-tested these categories with client input, removing ideas that were duplicative or outside of the scope of our research question.

The results of this exercise are summarized in *Table 2*. The six categories are presented as broad policy levers, within which are potential policy interventions that flow from the ideas generated in interviews. The table also proposes the key stakeholders for whom each policy lever is most relevant, i.e., which entities have the power and resources to take action. At this stage, these policy interventions are meant to represent possible options, rather than a comprehensive set of recommendations. Neither are the interventions mutually exclusive in all cases; some are mutually reinforcing and could be enacted together as policy packages.

4.2 Evaluating policy levers

Strengthening regional climate resilience in the Mystic River Watershed is a complex challenge that will require changes in strategic, operational, regulatory, and administrative practices across multiple levels of government. To address this challenge, we evaluated the six policy levers outlined in the previous section to better understand how they addressed the strengths and limitations identified in our interviews. The strengths of the current system, as described in *Chapter 3: Findings and Analysis*, are good visibility into funding options, a baseline understanding of climate risks and vulnerabilities, multiple forums for collaboration, and the dedicated capacity provided by the RMC. However, the system is limited by insufficient staff capacity, friction with state regulations, burdensome cost-effectiveness requirements for federal grants, financial risk taken on by municipalities, and limited visibility into future funding.

Table 3 presents an analysis of the strengths and/or limitations addressed by each proposed policy lever. This approach was chosen to ensure that our recommendations respond directly to the needs that we identified in interviews and to provide a structured framework to guide qualitative discussions with our client. Because these policy levers are interrelated and in many cases reinforce one another, we sought to avoid the false precision of assigning numerical scores and rank-ordering different options. Instead, mapping the focus of each policy lever in the context of the system's strengths and limitations offers a simple and systematic way to understand the unique character of each lever while also illustrating how different levers relate to one other.

Table 2: Policy levers and potential policy interventions

Policy lever	Potential policy interventions	Stakeholders
Allocate resources to build municipal staff capacity	<ul style="list-style-type: none"> Provide flexible funding to lower-resourced communities for operational expenses (e.g., project-based staff) Fund a state bond dedicated to assisting municipalities with meeting federal match requirements Provide additional technical support to municipalities (e.g., braiding funding, navigating the BCA) 	State
Centralize the process for finding and applying to state grants	<ul style="list-style-type: none"> Develop a “common app” single application portal for municipalities to apply to a range of state grants simultaneously Assign state “case managers” to provide end-to-end support for promising local and regional grant applications 	State
Increase operational flexibility for use of MVP funds	<ul style="list-style-type: none"> Lengthen the grant period for MVP Action Grants to 3-5 years Formalize the list of conditions under which MVP grant periods can be extended (e.g., supply chain issues, permitting delays, need for additional community engagement) 	State
Revisit state environmental regulations in the context of a changing climate	<ul style="list-style-type: none"> Allow environmental regulations (e.g., WPA) to consider future harm to protected areas Provide additional incentives for municipalities to pursue nature-based solutions in areas with high climate risk 	State
Strengthen state coordination of regional climate resilience work	<ul style="list-style-type: none"> Develop a coordinating mechanism to identify individual and cascading climate risks across life-critical infrastructure Evolve RPAs from an advisory role to a coordination role Create a new state-level entity to coordinate climate resilience across local authorities 	State
Simplify the process of applying to the FEMA BRIC program	<ul style="list-style-type: none"> Allow municipalities to submit an EOI through the state (e.g., MEMA) and receive feedback before investing in the full application process Investigate alternatives to the BCA for evaluating cost-effectiveness Waive the BCA for priority projects such as those in low-income areas and/or EJ communities Lower or eliminate the BCA discount rate for climate resilience projects Increase predictability around timelines and transparency for applications under review Increase consistency across FEMA regions to ensure equitable and effective implementation of grant programs 	Federal

Table 3: Mapping of policy levers across the strengths and limitations of the current system

Policy lever	Builds on strengths				Addresses limitations				
	Good visibility into funding options	Baseline understanding of climate risks	Multiple forums for collaboration	Dedicated capacity provided by the RMC	Insufficient staff capacity	Friction with state regulations	Burdensome cost-effectiveness requirements	Financial risk taken on by municipalities	Limited visibility into future funding
Allocate resources to build municipal staff capacity				◆	◆				◆
Centralize the process for finding and applying to state grants	◆			◆	◆		◆	◆	◆
Increase operational flexibility for use of MVP funds		◆						◆	◆
Revisit state environmental regulations in the context of a changing climate						◆			
Strengthen state coordination of regional climate resilience work		◆	◆	◆	◆	◆	◆	◆	◆
Simplify the process of applying to FEMA BRIC							◆		

Recommendations

5. Recommendations

Taken together, the six policy levers for strengthening regional climate resilience in the Mystic River Watershed present a compelling vision for more effective and more sustainable climate resilience planning across the Commonwealth of Massachusetts. Recognizing that these levers differ in timeline, scale, and implementation feasibility, we have grouped them into three distinct themes: **“greasing the wheels” of state grant programs, strengthening the state’s role, and untangling long-standing pain points.**

Table 4: Summary of recommendations

Theme	Characteristics	Policy levers
“Grease the wheels” of state grant programs	<ul style="list-style-type: none"> • Scale: State • Timeline: Short-term • Key stakeholders: EOEEA 	Allocate resources to build municipal staff capacity
		Increase operational flexibility for use of MVP funds
Strengthen the state’s role	<ul style="list-style-type: none"> • Scale: State • Timeline: Short- to medium-term • Key stakeholders: Governor’s Office, EOEEA, RPAs 	Centralize the process for finding and applying to state grants
		Strengthen state coordination of regional climate resilience work
Untangle long-standing pain points	<ul style="list-style-type: none"> • Scale: State to federal • Timeline: Medium- to long-term • Key stakeholders: EOEEA, Department of Environmental Protection (DEP), MEMA, FEMA 	Revisit state environmental regulations in the context of a changing climate
		Simplify the process of applying to the FEMA BRIC program

The following sections present further details on the six policy levers supported by literature, established practice, or interview findings where appropriate. Within each policy lever, the proposed policy interventions represent a menu of options for enacting the goals of the lever.

5.1 “Grease the wheels” of state grant programs

When mapping policy levers against the strengths and limitations of the current system, the first theme that emerged was a set of short-term policy changes enacted at the state level, primarily under the auspices of EOEEA. These proposed changes aim to remove the most important barriers that municipalities face in applying for and managing state grant funds, but are also fairly tactical in nature, involve only a limited set of stakeholders, and do not require broader system-level change.

5.1.1 Allocate resources to build municipal staff capacity

While the expanded capacity that the RMC offers to municipalities is a strength of the current system, our interviews found that most municipalities still do not have the resources to apply for and manage numerous grants. Specifically, many municipalities expressed a need for project managers and grant managers that could be brought on as surge capacity for the duration of a project. In the ISC’s research on regional climate collaboratives, a majority of surveyed collaboratives “cited additional staffing resources or staff time as the biggest capacity need,” indicating that this limitation is consistent across multiple geographies beyond Greater Boston.⁶⁸

Providing flexible funding to lower-resourced communities for operational expenses, such as project-based staff, could help unlock additional resources as municipalities become more well-equipped to apply for and manage grant funding. Today, programs like the MVP do not allow for funds to be spent on staff, requiring municipalities to rely on consultants or the RMC instead. However, investing in staff could serve as a multiplier: using NepRWA as a counterfactual for MyRWA, Tuler and Choi found that the Barr Foundation’s \$1.8 million grant to the RMC led to an over 25-fold return on investment in terms of additional grant funding.⁶⁹

Funding a state bond dedicated to assisting municipalities with meeting federal match requirements could remove a key barrier for lower-resourced communities that lack either the budget to contribute matching funds or the expertise to braid multiple funding sources together. In August 2022, Massachusetts passed an \$11.3 billion transportation bond bill, which authorized significant state funding to help communities “compete for and capitalize on investment opportunities provided by the federal \$1.2 trillion Bipartisan Infrastructure Law.”⁷⁰ Expanding this bonding approach to climate resilience could potentially serve as a multiplier for communities to unlock pools of otherwise inaccessible federal funding.

Providing additional technical support to municipalities on topics such as braiding funding and navigating the BCA could help augment the capabilities of existing staff at relatively low cost. Because municipalities already receive technical support from regional entities like the RMC, NSORS, and MAPC, as well as program-specific support from the state, there is an opportunity for further partnership to equip communities with the expertise and support they need.

5.1.2 Increase operational flexibility for use of MVP funds

A consistent interview finding was that municipalities value the MVP program’s role in funding a range of climate resilience projects. However, the short timelines imposed by MVP Action Grants — typically 1-2 years for construction — introduce significant financial risk and uncertainty for

municipalities. In one of the largest studies of its kind, Liebman and Mahoney found that time-limited, “use-it-or-lose-it” federal budgets result in wasteful year-end spending as agencies “rush to spend their money even when that results in funding lower quality projects.” However, they also found that allowing agencies to roll over even a portion of their budgets avoided this disproportionate spending at the end of the fiscal year and raised the quality of projects funded by federal spending.⁷¹

Lengthening the grant period for MVP Action Grants to 3-5 years could reduce the risk taken on by municipalities and increase the quality of MVP-funded initiatives, especially since lengthy permitting processes mean that municipalities often have only a fraction of their one- or two-year grant period to complete construction. Municipalities that are unable to spend MVP funds by the deadline due to unexpected delays may be required to spend their own budgets to complete construction, or, failing that, to put the project on hold until additional funding is secured. Although the BRIC program is significantly more difficult for municipalities to access, it offers a three-year grant period in which communities can spend their funds.⁷²

Formalizing the list of conditions under which MVP grant periods can be extended could serve as a substitute for lengthening the grant period by giving grantees a predictable mechanism for addressing unexpected delays. These conditions could potentially include supply chain issues, permitting delays, and/or the need for additional community engagement, among other challenges identified by communities.

5.2 Strengthen the state’s role

The second theme that emerged from the mapping exercise was a set of policy levers cutting across almost all of the limitations we identified in interviews. These short- to medium-term policy changes aim to help the state take a stronger role in coordinating climate resilience initiatives led by local and regional authorities. Compared to the other policy levers, these changes are more systemic and would likely require decisions made at the highest levels of the Massachusetts government.

5.2.1 Centralize the process for finding and applying to state grants

Given constraints on municipal staff capacity, the RMC provides communities with valuable updates on grant opportunities. However, this support does not address many of the limitations identified in interviews, including burdensome application processes and limited visibility into future funding. The following policy interventions comprise an interrelated set of proposals for how the state could streamline the grant application process and provide greater support to municipalities.

Developing a “common app” single application portal for municipalities to apply to a range of state grants simultaneously could significantly reduce staff time spent on grant applications and more effectively target state grant resources. This model is currently used by the Community One Stop for Growth, a single application portal for 12 community development programs in Massachusetts.⁷³ The One Stop reduces redundancy, allows communities to receive early feedback

before committing to a full grant application, gives the state an opportunity to refer applicants to other programs, and provides a more holistic view of community priorities, among other benefits. However, such a model does not currently exist for climate projects in Massachusetts, which draw from a variety of state grants such as the MVP, the Department of Conservation and Recreation's (DCR) Parkland Acquisitions and Renovations for Communities (PARC) program, and MassTrails. In interviews, many municipalities expressed a desire for a "one-stop shop" to help them determine the best funding source(s) for prospective projects and reduce time spent on duplicative applications.

Assigning state "case managers" to provide end-to-end support for promising local and regional grant applications could serve many of the same objectives by strengthening the state's relationship with municipal applicants and providing the state with greater visibility into community-led initiatives. The MVP program currently includes an optional, rolling Expression of Interest (EOI) process that allows communities to submit a brief project proposal for feedback in advance of a formal grant application.⁷⁴ EOIs could serve as a mechanism for the early identification of promising projects, after which state case managers could be paired with grantees to provide individualized grant management support through the planning, design, permitting, and construction phases.

5.2.2 Strengthen state coordination of regional climate resilience work

Communities' strong baseline understanding of their climate risks is a strength of the current system, which interviewees largely credited to the MVP Planning Grant process. While the MVP program's Core Principles formalize a set of standard criteria by which applications are evaluated, they also emphasize the importance of allowing implementation actions to be driven by communities.⁷⁵ Climate Chief Hoffer is expected to present recommendations to the Governor by July of this year, creating a powerful opportunity to more fully integrate state-led climate priorities and locally- or regionally-led initiatives.⁷⁶

Developing a coordinating mechanism to identify individual and cascading climate risks across critical infrastructure could provide the state with a holistic approach to supporting regional climate resilience initiatives. As the head of the Office of Climate Innovation and Resilience, Climate Chief Hoffer could lead this effort to engage local and regional partners. Of the three policy interventions presented in this section, this option requires the smallest departure from the Governor's currently announced plans for statewide climate policy.

Evolving RPAs from an advisory role to a coordination role could be an alternative option to strengthen regional collaboration across communities within an existing institutional framework. Today, RPAs like the MAPC provide municipalities with technical assistance on a range of topics, including climate resilience. However, this role is distinct from that played by organizations like the RMC and the NSORS, which more directly facilitate (and in some cases lead) regional-scale projects that involve multiple local authorities. The ISC's research on regional climate collaboration demonstrates that "directly co-creating regional solutions through joint production" results in significantly increased efficacy and outcomes, providing evidence that institutionalizing this coordination role within RPAs could benefit communities across the state.⁷⁷

Creating a new state-level entity to coordinate climate resilience across local authorities, with its own budget, regulatory authority, and bonding authority, could formalize the role played by organizations like the RMC across the state. This model is currently employed by the MWRA, which provides wholesale water and sewage services across Greater Boston.⁷⁸ In a similar fashion, a new state agency could coordinate with local authorities to manage coastal and precipitation-based flood mitigation efforts, reducing communities' reliance on informal partnerships and competitive grants to fund their initiatives.

5.3 Untangle long-standing pain points

The third and final theme highlighted by the mapping exercise was a set of medium- to long-term policy changes enacted at the state and federal levels. These proposed changes, while fairly distinct from one another, each address a single limitation identified in interviews that currently creates a barrier to municipalities efficiently and cost-effectively funding their climate resilience initiatives. However, these changes would also require the involvement of a large set of stakeholders and do not directly build on the strengths of the current system, meaning they may be more difficult to enact in the short-term.

5.3.1 Revisit state environmental regulations in the context of a changing climate

Municipalities repeatedly shared frustrations with state environmental regulations, particularly as they relate to constructing and restoring stormwater wetlands for flood mitigation. While the MVP program incentivizes nature-based solutions, regulations like the WPA make it difficult to modify protected areas. These regulations continue to play an important role in the conservation of the Commonwealth's natural resources. However, there remains an opportunity to further align the state's regulatory posture with its policy goals around climate change.

Allowing environmental regulations like the WPA to consider future harm to protected areas could help restore natural habitats as well as streamline the process of approving municipalities to pursue nature-based solutions. The WPA, as currently written by DEP, prohibits disturbances to protected wetlands that exceed a footprint of 5,000 square feet.⁷⁹ Although many climate resilience projects being advanced by communities involve expanding and/or restoring wetlands for the purposes of stormwater management, they remain subject to a lengthy permitting process under the WPA. Climate change represents an intensifying risk to existing ecosystems, including wetlands⁸⁰ — environmental regulations should account for these impacts in addition to the impacts of project-related construction. Amending the WPA could help municipalities more easily implement nature-based solutions that benefit wetlands and reduce permitting delays that put grant funding at risk.

Providing additional incentives for municipalities to pursue nature-based solutions in areas with high climate risk could help advance environmental protection goals while further integrating state priorities and local and regional initiatives. In December 2022, EOEEA released the Massachusetts Climate Change Assessment, which examined anticipated climate risks and hazards through 2100.⁸¹ Using this data, the state could target funding for nature-based solutions

in areas that will experience the most significant adverse impacts, helping to restore damaged ecosystems while also addressing climate change.

5.3.2 Simplify the process of applying to the FEMA BRIC program

We heard consistently that municipalities face significant barriers to applying for and winning federal grants, particularly the BCA requirement of the FEMA BRIC program. While changes to the BCA process are outside the scope of this report, FEMA and other organizations have attempted to reduce the burden of applying. In March of this year, FEMA commissioned the RAND Corporation to investigate how the BCA process could be simplified to be more inclusive of lower-resourced communities. Researchers interviewed officials from FEMA and other federal agencies to compare approaches to demonstrating cost effectiveness and found that FEMA’s approach to BCA differs from other federal entities. Researchers proposed nine recommendations, which we have listed here in their entirety. We also include the recommendations generated through our interviews, many of which complement the recommendations made by RAND.

Table 5: Comparison of BCA recommendations

Recommendations from RAND	Recommendations from interviews
<ul style="list-style-type: none"> • Replace the BCA with a simpler measure of cost-effectiveness • Establish a minimum cost threshold or other criteria for a full BCA • Allow applicants to include alternative discount rates • Consider broader types of benefits • Apply distributional weights to benefit and cost calculations • Incorporate BCA and ratios more clearly into the award decision • Change FEMA large project notification reporting practices • Precisely specify benefiting areas • Encourage applicants to solicit sub-applications from disadvantaged communities 	<ul style="list-style-type: none"> • Allow municipalities to submit an EOI through the state (e.g., MEMA) and receive feedback before investing in the full application process • Investigate alternatives to the BCA for evaluating cost-effectiveness • Waive the BCA for priority projects such as those in low-income areas and/or EJ communities • Lower or eliminate the BCA discount rate for climate resilience projects • Increase predictability around timelines and transparency for applications under review • Increase consistency across FEMA regions to ensure equitable and effective implementation of grant programs

Background and Implications of the Benefit-Cost Analysis (BCA)

While cost-effectiveness requirements for federal programs can be traced to the Flood Control Act of 1936, the Federal Emergency Management Agency’s (FEMA) use of the BCA is the result of a 1992 Office of Management and Budget Circular. Circular A-94 “provides general guidance for conducting benefit-cost and cost-effectiveness analysis” and “specific guidance on discount rates to be used in evaluating Federal programs whose benefits and costs are distributed over time.”⁸² Circular A-94 also specifies that agencies must use a 7 percent discount rate when evaluating the future value presented by grant applicants. However, a recent study by the RAND Corporation argues that “Circular A-94 by its own terms does not require that FEMA use a BCA and a 7 percent discount rate for the evaluation of grant applications.” On the contrary, FEMA has some flexibility to interpret the meaning of cost-effectiveness, the BCA requirements, and the 7 percent discount rate.

FEMA is well-aware of the challenges posed by the BCA. Previous efforts to streamline the BCA process have included developing a BCA toolkit that includes precalculated project benefits at the 7 percent discount rate. In October 2022, FEMA also announced that for the FY22 BRIC application cycle, the threshold for mitigation projects to be considered cost-effective would be lowered: “A mitigation project may be considered cost-effective if, when using the 7% discount rate, the BCR [benefit-cost ratio] is at least 0.75 or greater, and if at the 3% discount rate the BCR is at least 1.0 or greater, and the mitigation activity benefits disadvantaged communities, addresses climate change impacts, has hard to quantify benefits, and/or is subject to higher costs due to the use of low carbon building materials or compliance with the Federal Flood Risk Management Standard.”⁸³ Whether this change will meaningfully reduce the barriers to applying remains to be seen, but the update demonstrates FEMA’s understanding of the challenges facing municipalities and other sub-applicants.

The challenges posed by the BCA are well-supported through qualitative and quantitative research. Multiple interviewees stated that the BCA is a significant barrier to applying for BRIC grants, with some municipalities stating that FEMA’s application process is so onerous that it discourages them from applying altogether. This poses serious equity challenges in Massachusetts and beyond. Although FEMA has made efforts to direct more funding to low income communities, communities of color, and others disproportionately impacted by the effects of climate change, a recent analysis by the Natural Resources Defense Council found that “the lowest-capacity localities are less likely to even apply for funding, meaning they will have no chance of receiving grants.”⁸⁴ Capacity constraints further divide the resilient from the vulnerable.

Case Study #2: Regional Collaboration in New Orleans

New Orleans residents are accustomed to living with water

A combination of low elevations, sea level rise, and extreme weather events makes New Orleans one of the most climate-vulnerable cities in North America.⁸⁵ Hurricane Katrina, which flooded nearly 80 percent of the city, demonstrated the extent of that vulnerability. Hurricane Katrina had devastating impacts on New Orleans. More than 1,800 people lost their lives as a result of the hurricane, making Katrina the third-deadliest hurricane in U.S. history. More than 800,000 housing units were damaged or destroyed, leaving many residents homeless or unable to return to the city.

But as environmental historian Neil Smith notes, “there is no such thing as a natural disaster.”⁸⁶ While a catastrophic storm such as Hurricane Katrina is expected to cause major flooding and damage, the impacts were exacerbated by engineering and engineering-policy failures.⁸⁷ Furthermore, the impacts of the storm were highly concentrated in low-income, majority Black parts of the city. In the immediate aftermath of the storm, countless citizens suffered because of slow and inadequate federal disaster response. Engineering policy, social policy, and disaster response policy all failed the citizens of New Orleans before, during, and after Hurricane Katrina. The disaster catalyzed a new understanding of the risks created by climate change, but there are no quick fixes for problems of this complexity.

Louisiana is planning for floods at a watershed scale

Surrounded by rivers, lakes, and bayous, New Orleans is a city that is used to living with water. In August 2016, 11 years after Hurricane Katrina, New Orleans flooded again. A heavy storm dumped three times as much water on Louisiana as Hurricane Katrina, damaging over 150,000 homes. Two years after these floods, Governor John Bel Edwards signed an executive order to create the Council on Watershed Management in recognition of the need to coordinate flood risk management at a regional scale.⁸⁸ The Council subsequently launched the Louisiana Watershed Initiative (LWI), which created nine regional watershed management entities. The Louisiana Watershed Initiative comprises five state agencies working together to provide funding, technical support, data and resources for flood risk reduction. Additionally, each region is represented by a steering committee made up of municipal staff, nonprofit organizations, and community members.

This governance structure deviates from the historical approach to floodplain management in Louisiana. Before the LWI, flood mitigation was managed within political jurisdictions, often without the mechanisms to consider the effects on other jurisdictions or the surrounding watershed. The LWI aims to build consistency across the state, without imposing top-down regulations that take a one-size-fits-all approach to watershed management. The proposed model is “standards set by the state, customized by regions.”⁸⁹

To support this approach, LWI has invested in growing capacity at the local, regional, and state levels through a three-year Regional Capacity Grant Program. In the first phase of project



Figure 8 - Critical infrastructure in New Orleans is built to withstand the impact of water. © Wikimedia Commons

funding, the LWI provided \$400,000 in grants to each region to support the formation of temporary regional steering committees, which developed work plans and made recommendations for long-term watershed coalitions. In the second phase, \$800,000 grants will support regions in implementing long-term watershed coalitions, developing regional flood risk reduction strategies, implementing resilience standards and coordinating project funds to advance steering committee recommendations.

Lessons for the Mystic River Watershed and beyond

Describing the watershed management model of the LWI, Governor John Bel Edwards remarked that “It’s harder. It requires more work. It’s politically risky, but it is the right thing to do.” Harder because implementing new governance approaches is politically challenging. More work because it requires building capacity, improving data and science, and coordinating across jurisdictions and agencies. And the right thing to do because it has the highest potential to mitigate damages from flooding and extreme weather.⁹⁰ After decades of being caught in a disaster-recovery cycle, state leadership recognized an urgent need for change.

Massachusetts has not experienced the same climate impacts as Louisiana, but many of the lessons of managing risk at the watershed scale can be applied. For one thing, Louisiana has demonstrated that a stronger state role does not mean a loss of local leadership. The LWI makes clear that there is no “one-size-fits-all” approach to climate resilience. The regional steering committees have engaged local nonprofits, community representatives, and other grassroots stakeholders from the beginning, proving that state-led planning processes do not preclude meaningful community engagement.⁹¹ This model presents strong evidence that a watershed-based approach to climate resilience can be effective.

Concluding Remarks

6. Concluding Remarks

In conducting this research, we aimed to better understand the current state of climate resilience work in the Mystic River Watershed and have recommended steps to equip municipalities in the watershed with the resources they need. What we found was a largely informal yet robust system of regional coordination enabled by the RMC, which has helped Mystic River communities collaborate to attract significant state and federal funding. While the RMC fills a niche for regional climate governance, its reach is ultimately limited to one watershed, and the relational model it employs is neither easily scalable nor sustainable in the long-term.

“On the one hand, the RMC has been very successful. On the other hand, relying on a small nonprofit funded through competitive grants is a recipe for failure.”

Julie Wormser, Senior Policy Advisor, MyRWA

As climate resilience efforts accelerate across the nation, cities and towns are continuing to take a leadership role under challenging resource constraints. Although the state has traditionally left the management of local and regional climate initiatives to municipalities, we found that the state is also well positioned to address many of the limitations that communities face. As the Healey-Driscoll administration and Climate Chief Hoffer craft recommendations for a whole-of-government response to climate change, the approach piloted in the Mystic River Watershed offers an important set of lessons for scaling effective regional collaboration across the Commonwealth.

In the coming decades, climate change will have a dramatic impact on Greater Boston and beyond. Protecting people, infrastructure, and the environment from these climate risks will require significant investments in climate resilience. As the federal government commits unprecedented amounts of funding to addressing climate change, it is even more critical for governments at all levels to partner seamlessly to ensure communities have the resources they need.

Appendix

Appendix A: List of Interviews

	Date	Name	Role	Organization
1	1/16/23	Tom Philbin	Conservation Agent	Everett
		Katherine Jenkins-Sullivan	Sustainability Planner	
2	1/17/23	Rachel Kelly	Director of Planning and Development	Winthrop
3	1/17/23	Alex Rozycki	Senior Civil Engineer	Reading
		Andrew MacNichol	Community Development Director	
4	1/17/23	John Livsey	Town Engineer	Lexington
5	1/17/23	Catherine McCandless	Climate Change & Environmental Planning Project Manager	Boston
6	1/17/23	Darya Mattes	Resilience Manager	North Suffolk Office of Resilience and Sustainability
7	1/17/23	Jay Coy	Deputy City Engineer	Melrose
8	1/17/23	Julie Wood	Deputy Director	Charles River Watershed Association
9	1/18/23	Emily Granoff	Grants Manager	Malden
10	1/18/23	John Keeley	Conservation Administrator	Burlington
11	1/18/23	Ken Pruitt	Sustainability Director	Winchester
12	1/18/23	Alicia Hunt	Director of Planning, Development, and Sustainability	Medford
13	1/18/23	Catherine Woodbury	Senior Project Manager	Cambridge
14	1/18/23	Chris Busch	Assistant Deputy Director for Climate Change & Environmental Planning	Boston Planning & Development Agency

	Date	Name	Role	Organization
15	1/19/23	Bill Renault	Town Engineer	Wakefield
16	1/19/23	Leila Mekias	Environmental Planner	Cambridge
17	1/20/23	David Morgan	Environmental Planner & Conservation Agent	Arlington
18	1/20/23	Christine Blais	Director, Office of Sustainability and Environment	Somerville
		Emily Sullivan	Climate Change Program Manager	
19	1/20/23	Yve Torrie	Director of Climate, Energy & Resilience	A Better City
20	1/27/23	Carolyn Meklenburg	MVP Regional Program Coordinator	Massachusetts Executive Office of Energy and Environmental Affairs
21	1/27/23	Jay Corey	City Engineer	Woburn
22	1/31/23	Joe Christo	Managing Director	Stone Living Lab
23	2/9/23	Shelly O'Toole	Hazard Mitigation Grants Coordinator	Massachusetts Emergency Management Agency
24	2/14/23	Simon Van Leeuwen	Assistant Director for Recovery and Mitigation	Massachusetts Emergency Management Agency
25	2/15/23	Laura O'Connell-Calton	Program Analyst, Guidance Development Office	Federal Emergency Management Agency
26	3/9/23	Catherine Pedemonti	Ecological Resilience Project Manager	Mystic River Watershed Association
27	3/20/23	Sasha Shyduroff	Clean Energy and Climate Planner	Metropolitan Area Planning Council
28	3/22/23	Nasser Brahim	Senior Climate Resiliency Specialist	Woods Hole Group
29	3/27/23	Jay Corey	City Engineer	Woburn
		Matt Barrett	GIS Coordinator, Engineering Department	

Appendix B: Semi-structured Interview Protocol

RMC member municipalities:

1. What are the highest priority climate resilience goals in your municipality? How did you choose those priorities?
2. How do you find out about available grants?
3. How do you decide which grants are right for you / which projects are right for the available grants?
4. What are some of the things that make you successful in applying for grants?
5. What are the barriers to utilizing available state/federal resources for climate resilience projects? How has your municipality addressed those barriers?
6. What investments are needed to ensure climate resilience in the Mystic River Watershed for the next 50 years? What are the barriers preventing you from realizing those investments?

Nonprofits and peer organizations:

1. What are the highest priority climate resilience goals in Greater Boston? How did you choose those priorities?
2. What is the role of nonprofits in advancing these goals? How does your organization operate within this system?
3. How do you currently collaborate with governments (municipal, state, and/or federal) on climate resilience projects in Greater Boston? What do partnerships look like in your organization?
4. How can nonprofit organizations best support regional climate resilience efforts? What are the conditions for effective partnerships between nonprofits and different levels of government?
5. What investments are needed to ensure climate resilience in Greater Boston for the next 50 years? What are the barriers preventing you from realizing those investments?

State and federal agencies:

1. How do you develop priorities that are broadly relevant to the municipalities you are funding?
2. What opportunities do you have to hear from communities and what do you think their key challenges are?
3. From your perspective, what is the process for applying for grants? Once grants have been awarded, how do you supervise the administration?
4. What is your process for evaluating applications?
5. What is your process for evaluating the efficacy of the grant program? What are the criteria you consider?

Appendix C: List of Acronyms

- BCA:** Benefit-cost analysis
- BRIC:** Building Resilient Infrastructure and Communities
- DCR:** Department of Conservation and Recreation
- DEP:** Department of Environmental Protection
- EJ:** Environmental justice
- EOEEA:** Executive Office of Energy and Environmental Affairs
- EOI:** Expression of Interest
- EPA:** Environmental Protection Agency
- FEMA:** Federal Emergency Management Agency
- GHG:** Greenhouse gas
- IJA:** Infrastructure Investment and Jobs Act
- IRA:** Inflation Reduction Act
- ISC:** Institute for Sustainable Communities
- LWI:** Louisiana Watershed Initiative
- MAPC:** Metropolitan Area Planning Council
- MBTA:** Massachusetts Bay Transportation Authority
- MEMA:** Massachusetts Emergency Management Agency
- MVP:** Municipal Vulnerability Preparedness
- MWRA:** Massachusetts Water Resources Authority
- MyRWA:** Mystic River Watershed Association
- NepRWA:** Neponset River Watershed Association
- NSORS:** North Suffolk Office of Resilience and Sustainability
- PARC:** Parkland Acquisitions and Renovations for Communities
- PDM:** Pre-Disaster Mitigation
- RMC:** Resilient Mystic Collaborative
- RPA:** Regional planning Agency
- WPA:** Wetlands Protection Act

Appendix D: Municipalities in the Mystic River Watershed

Municipality	Population	Total area (mi ²)	Governance
Boston	654,776	89.6	Strong mayor-council
Cambridge	117,090	7.1	Council-manager
Somerville	79,815	4.2	Mayor-council
Malden	65,074	5.1	Mayor-council
Medford	62,098	8.7	Mayor-council
Revere	59,075	10.1	Mayor-council
Everett	48,557	3.7	Mayor-council
Arlington	45,617	5.5	Representative town meeting
Woburn	41,056	12.9	Mayor-council
Chelsea	38,889	2.5	Council-manager
Watertown	35,149	4.1	Council-manager
Lexington	34,071	16.5	Representative town meeting
Melrose	29,312	4.8	Mayor-council
Wakefield	27,104	7.9	Open town meeting
Belmont	26,838	4.7	Representative town meeting
Burlington	25,989	11.9	Representative town meeting
Reading	25,223	9.9	Representative town meeting
Wilmington*	23,012	17.2	Open town meeting
Stoneham	22,877	6.7	Open town meeting
Winchester	22,662	6.3	Representative town meeting
Winthrop	18,505	8.3	Council-manager

* Wilmington is part of the Mystic River Watershed, but is not a member of the RMC.
Data source: U.S. Census Bureau American Community Survey 2021.

Notes

- 1 “Resilient Mystic Collaborative Narrative,” *Mystic River Watershed Association*, 2019, <https://static1.squarespace.com/static/5e3c156ca5f464358d25a06e/t/5e56806c3a3ac32ca38db40c/1582727276548/Resilient+Mystic+Collaborative+narrative+May+2019.pdf>.
- 2 “About — Resilient Mystic Collaborative,” *Resilient Mystic Collaborative*, <https://resilient.mysticriver.org/about>.
- 3 Ann Rappaport, “Mystic River: A Quest for Climate Equity,” *Lincoln Institute for Land Policy*, 2019, https://static1.squarespace.com/static/5e3c156ca5f464358d25a06e/t/60249b84e9fc95777244b4ae/1613011854866/Rappaport_2019_Inquiry_Mystic_River.pdf.
- 4 Nina Mascarenhas, “Collaborative Governance in Regional Climate Planning: A Case Study of the Resilient Mystic Collaborative,” Massachusetts Institute of Technology, Department of Urban Studies and Planning, 2020.
- 5 “Municipal Vulnerability Preparedness (MVP) Program Core Principles,” *Commonwealth of Massachusetts*, <https://www.mass.gov/doc/mvp-core-principles/download>.
- 6 Ellen Douglas and Paul Kirshen, “Climate Change Impacts and Projections for the Greater Boston Area,” *Greater Boston Research Advisory Group*, 2022.
- 7 “Climate Adaptation and EPA’s Role,” *Environmental Protection Agency*, <https://www.epa.gov/climate-adaptation/climate-adaptation-and-epas-role>.
- 8 “What is the difference between climate change adaptation and resilience?” *London School of Economics*, 2022, <https://www.lse.ac.uk/granthaminstitute/explainers/what-is-the-difference-between-climate-change-adaptation-and-resilience/>
- 9 “White House: We Can’t Prevent Another Superstorm Sandy but We Can Prepare for the next One: Opinion,” *NJ.com*, February 16, 2023, <https://www.nj.com/opinion/2022/10/white-house-we-cant-prevent-another-superstorm-sandy-but-we-can-prepare-for-the-next-one-opinion.html>.
- 10 Isabella Anguelovski and JoAnn Carmin, “Something borrowed, everything new: innovation and institutionalization in urban climate governance,” *Current Opinion in Environmental Sustainability*, No. 3, Issue 3 (2011), 169-175.
- 11 “Essential Capacities for Urban Climate Adaptation: A Framework for Cities,” *The Innovation Network for Communities*, 2017, <https://in4c.net/download/essential-capacities-urban-climate-adaptation/>.
- 12 “What We Do: Protecting Our People and Places from Harm,” *Resilient Mystic Collaborative*, <https://resilient.mysticriver.org/our-work>.
- 13 “Lower Mystic Regional Climate Assessment: Centering Social Equity in Preparing Critical Infrastructure for Extreme Storms,” *Resilient Mystic Collaborative*, September 2021, <https://resilient.mysticriver.org/lower-mystic-vulnerability-assessments>.
- 14 Ibid.
- 15 “Regional Coastal Flood Resilience Strategy,” *Resilient Mystic Collaborative*, <https://resilient.mysticriver.org/s/Coastal-Flood-Resilience-Strategy.pdf>.
- 16 Denise Chow, “Heat kills more in U.S. each year than any other extreme weather event,” *NBC*, August 22, 2022, <https://www.nbcnews.com/health/health-news/heat-waves-deadliest-weather-event-united-states-rcna411>.
- 17 “Wicked Hot Mystic Executive Summary,” *Mystic River Watershed Association*, https://drive.google.com/file/d/1chFf-grV-nH7_NahqMBc4noZaiRcZ5Lj6/view.
- 18 Ibid.
- 19 “Residents and Community Groups Join Forces to Fight Extreme Heat,” *Mystic River Watershed Association*, February 28, 2023, <https://mysticriver.org/news/2023/2/28/residents-and-community-groups-join-forces-to-fight-extreme-heat-lets-make-the-mystic-wicked-cool>.
- 20 “Stormwater Flood Resilience,” *Resilient Mystic Collaborative*, <https://resilient.mysticriver.org/stormwater-flood-resilience>.
- 21 “Stormwater Wetlands,” *Resilient Mystic Collaborative*, <https://resilient.mysticriver.org/stormwater-wetlands>.
- 22 “Stormwater Flood Resilience,” *Resilient Mystic Collaborative*, <https://resilient.mysticriver.org/stormwater-flood-resilience>.
- 23 “MyRWA: 50 Years of History,” *Mystic River Watershed Association*, 2022, <https://mysticriver.org/news/2022/8/15/myrwa>.

wa-50-years-of-history.

24 “About — Resilient Mystic Collaborative,” *Resilient Mystic Collaborative*, <https://resilient.mysticriver.org/about>.

25 “Massachusetts Government Structure,” *Commonwealth of Massachusetts*, <https://budget.digital.mass.gov/bb/h1/fy10h1/prnt10/exec10/pbuddevstructure.htm>.

26 Ann Rappaport, “Mystic River: A Quest for Climate Equity,” *Lincoln Institute for Land Policy*, 2019, https://static1.squarespace.com/static/5e3c156ca5f464358d25a06e/t/60249b84e9fc95777244b4ae/1613011854866/Rappaport_2019_Inquiry_Mystic_River.pdf.

27 “Metro Mayors Climate Preparedness Taskforce,” *Metropolitan Area Planning Council*, <https://www.mapc.org/our-work-expertise-climate-mmcc/>.

28 Linda Shi, “A new climate for regionalism: metropolitan experiments in climate change adaptation,” Massachusetts Institute of Technology, Department of Urban Studies and Planning, 2017, <https://dspace.mit.edu/handle/1721.1/111370>.

29 “Climate Grant Viewer,” *Massachusetts Executive Office of Energy and Environmental Affairs*, <https://mass-eoea.maps.arcgis.com/apps/MapSeries/index.html?appid=ec4964fe203d41219b2e74170c0dc96c>.

30 Seth Tuler and Eugena Choi, “Measuring the Impact of Investing in Regional Capacity on Securing State Climate Resilience Funding in the Mystic and Neponset River Watersheds,” Worcester Polytechnic Institute, Department of Integrative and Global Studies, 2022.

31 Ibid.

32 “Municipal Vulnerability Preparedness (MVP) program.” *Commonwealth of Massachusetts*. <https://www.mass.gov/municipal-vulnerability-preparedness-mvp-program>

33 “Municipal Vulnerability Preparedness Program FY23 Pre-Request for Responses Webinar - March 2022.” *Massachusetts Executive Office of Energy and Environmental Affairs*. March 9, 2022. <https://www.youtube.com/watch?v=M-leT7wvy3wg>

34 “Municipal Vulnerability Preparedness Program.” *Resilient MA*. <https://resilientma.mass.gov/mvp/>

35 “Municipal Vulnerability Preparedness (MVP) Program Core Principles.” *Commonwealth of Massachusetts*. <https://www.mass.gov/doc/mvp-core-principles/download>

36 “Municipal Vulnerability Preparedness Program FY23 Pre-Request for Responses Webinar - March 2022.” *Massachusetts Executive Office of Energy and Environmental Affairs*. March 9, 2022. <https://www.youtube.com/watch?v=M-leT7wvy3wg>

37 Isabella Anguelovski and JoAnn Carmin, “Something borrowed, everything new: innovation and institutionalization in urban climate governance,” *Current Opinion in Environmental Sustainability*, No. 3, Issue 3 (2011), 169-175.

38 Linda Shi, “A new climate for regionalism: metropolitan experiments in climate change adaptation,” Massachusetts Institute of Technology, Department of Urban Studies and Planning, 2017, <https://dspace.mit.edu/handle/1721.1/111370>.

39 Ibid.

40 “Progress Report of the Interagency Climate Change Adaptation Task Force: Recommended Actions in Support of a National Climate Change Adaptation Strategy,” *Environmental Protection Agency*, 2015, <https://www.epa.gov/sites/production/files/2015-12/documents/interagency-climate-change-adaptation-progress-report.pdf>.

41 “Regional Collaboratives Forum,” *Georgetown Climate Center*, https://www.georgetownclimate.org/adaptation/regional_collaboratives_forum.html.

42 “Regional Resilience Primer,” *Institute for Sustainable Communities*, 2015, <https://us.sustain.org/resource/regional-resilience-primer/>.

43 Steve Adams and Karina French, “Regional Collaboratives for Climate Change — A State of the Art,” *Institute for Sustainable Communities*, April 2019, <https://us.sustain.org/wp-content/uploads/2019/11/Regional-Collaboratives-for-Climate-Change-FINAL.pdf>.

44 Nikhita Airi, “Understanding How Infrastructure Bill Dollars Affect Your Community,” *Urban Institute*, 2022, <https://www.urban.org/sites/default/files/2022-09/Understanding%20How%20Infrastructure%20Bill%20Dollars%20Affect%20Your%20Community.pdf>.

45 Jeffrey Meyers, “The Bipartisan Infrastructure Law (BIL) One Year In,” *Guidehouse*, 2023, <https://guidehouse.com/insights/state-and-local-government/2023/the-bil-one-year-in?lang=en>.

46 “Joint Statement From Leader Schumer And Senator Manchin Announcing Agreement To Add The Inflation Reduction Act Of 2022 To The FY2022 Budget Reconciliation Bill And Vote In Senate Next Week,” *Senate Democrats*, July 27,

2022, <https://www.democrats.senate.gov/newsroom/press-releases/senate-majority-leader-chuck-schumer-d-ny-and-sen-joe-manchin-d-wv-on-wednesday-announced-that-they-have-struck-a-long-awaited-deal-on-legislation-that-aims-to-reform-the-tax-code-fight-climate-change-and-cut-health-care-costs>.

47 Shoshana Lew and John D. Porcari, “Eight Years Later: What the Recovery Act Taught Us about Investing in Transportation,” *Brookings*, February 22, 2017. <https://www.brookings.edu/blog/the-avenue/2017/02/22/eight-years-later-what-the-recovery-act-taught-us/>.

48 Governor Maura Healy, “Executive Order No. 604: Establishing the Office Of Climate Innovation and Resilience Within the Office Of the Governor,” *Commonwealth of Massachusetts*, January 6, 2023, <https://www.mass.gov/executive-orders/no-604-establishing-the-office-of-climate-innovation-and-resilience-within-the-office-of-the-governor>.

49 “Executive Order 13985: Advancing Racial Equity and Support for Underserved Communities Through the Federal Government,” *Executive Office of the President*, January 20, 2021, <https://www.federalregister.gov/documents/2021/01/25/2021-01753/advancing-racial-equity-and-support-for-underserved-communities-through-the-federal-government>.

50 “Equitable Adaptation Legal & Policy Toolkit,” *Georgetown Climate Center*, <https://www.georgetownclimate.org/adaptation/toolkits/equitable-adaptation-toolkit/introduction.html>.

51 Dominique Pahlavan, “MVP regions,” *Resilient MA Maps and Data Center*, December 7, 2022, https://resilient-ma-mapcenter-mass-eoea.hub.arcgis.com/datasets/05e667dd224e4338a43462228b05fa6_0/explore

52 “Subregions,” Metropolitan Area Planning Council, <https://www.mapc.org/get-involved/subregions>.

53 “CZM Regions, Coastal Communities, and Coastal Zone Boundary,” *Commonwealth of Massachusetts*, <https://www.mass.gov/service-details/czm-regions-coastal-communities-and-coastal-zone-boundary>.

54 Jennifer Marlon, et al., “Yale Climate Opinion Maps 2021,” *Yale Program on Climate Change Communication*, February 23, 2022, <https://climatecommunication.yale.edu/visualizations-data/ycom-us/>.

55 “MVP Action Grant,” *Commonwealth of Massachusetts*, <https://www.mass.gov/service-details/mvp-action-grant>.

56 “Municipal Vulnerability Preparedness Program FY23 Pre-Request for Responses Webinar - March 2022,” *Massachusetts Executive Office of Energy and Environmental Affairs*, March 9, 2022, <https://www.youtube.com/watch?v=MleT7wvy3wg>.

57 Carolyn Meklenburg, “Collaborating for Climate Change Adaptation Planning at the Watershed Scale: A Case Study of the Resilient Mystic Collaborative,” Tufts University, Department of Urban and Environmental Policy and Planning, May 2019, https://resilient.mysticriver.org/s/Meklenburg_Carolyn_Thesis_May2019.pdf

58 “Our Grants,” Barr Foundation, <https://www.barrfoundation.org/grantmaking/grants>.

59 “Municipal Vulnerability Preparedness (MVP) Program Core Principles,” *Commonwealth of Massachusetts*, <https://www.mass.gov/doc/mvp-core-principles/download>.

60 “310 CMR 10.00: Wetlands Protection Act Regulations,” *Commonwealth of Massachusetts*, October 4, 2017, <https://www.mass.gov/regulations/310-CMR-1000-wetlands-protection-act-regulations>.

61 Anna Weber, “The BRIC Wall: Capacity Gaps Put FEMA Grants out of Reach,” *NRDC*, February 8, 2023, <https://www.nrdc.org/bio/anna-weber/bric-wall-capacity-gaps-put-fema-grants-out-reach>.

62 Benjamin M. Miller, et al., “The Cost of Cost Effectiveness: Expanding Equity in Federal Emergency Management Agency Hazard Mitigation Assistance Grants,” *RAND Corporation*, 2023, https://www.rand.org/pubs/research_reports/RRA2171-1.html

63 “Building Resilient Infrastructure and Communities (BRIC) & Flood Mitigation Assistance (FMA) Grant Programs,” *Commonwealth of Massachusetts*, <https://www.mass.gov/service-details/building-resilient-infrastructure-and-communities-bric-flood-mitigation-assistance-fma-grant-programs>

64 “Notice of Funding Opportunity (NOFO): FY 2022 Building Resilient Infrastructure and Communities (BRIC),” *Massachusetts Emergency Management Agency*, September 12, 2022, <https://www.mass.gov/doc/mema-mitigation-state-notice-of-funding-opportunity-nofo-for-bric-fy2022/download>.

65 “Hurld Park Vision,” *City of Woburn*, <https://www.woburnma.gov/government/recreation/hurld-park-vision/>.

66 “Stormwater Wetlands,” *Resilient Mystic Collaborative*, <https://resilient.mysticriver.org/stormwater-wetlands>.

67 Pat Blais, “New Hurld Park highlights Woburn’s blossoming conservation movement,” *Middlesex East*, September 2, 2022, https://homenewshere.com/middlesex_east/article_60dea69a-2aca-11ed-998f-a730125fe836.html.

68 Steve Adams and Karina French, “Regional Collaboratives for Climate Change — A State of the Art,” *Institute for Sus-*

tainable Communities, April 2019, <https://us.sustain.org/wp-content/uploads/2019/11/Regional-Collaboratives-for-Climate-Change-FINAL.pdf>.

69 Seth Tuler and Eugena Choi, “Measuring the Impact of Investing in Regional Capacity on Securing State Climate Resilience Funding in the Mystic and Neponset River Watersheds,” Worcester Polytechnic Institute, Department of Integrative and Global Studies, 2022.

70 “Legislature sends infrastructure bond bill to governor,” Massachusetts Municipal Association, August 2, 2022, <https://www.mma.org/legislature-sends-infrastructure-bond-bill-to-governor/>.

71 Jeffrey B. Liebman and Neale Mahoney, “Do Expiring Budgets Lead to Wasteful Year-End Spending? Evidence from Federal Procurement,” *NBER*, September 2013, <https://www.nber.org/papers/w19481>.

72 “After You Apply for Building Resilient Infrastructure and Communities (BRIC) Funds,” *FEMA*, <https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities/after-apply>.

73 “Community One Stop for Growth,” *Commonwealth of Massachusetts*, <https://www.mass.gov/guides/community-one-stop-for-growth>.

74 “Rolling Expression of Interest (EOI) for MVP FY24 Action Grant,” *Town of West Newbury*, https://www.wnewbury.org/sites/g/files/vyhlf1436/f/uploads/final_fy24_mvp_eoi_01-09-23.pdf.

75 “Municipal Vulnerability Preparedness (MVP) Program Core Principles,” *Commonwealth of Massachusetts*, <https://www.mass.gov/doc/mvp-core-principles/download>.

76 Governor Maura Healey and Lt. Governor Kim Driscoll, “Governor Healey Signs Executive Order Creating Massachusetts’ First Ever Climate Chief,” *Commonwealth of Massachusetts*, January 6, 2023, <https://www.mass.gov/news/governor-healey-signs-executive-order-creating-massachusetts-first-ever-climate-chief>.

77 Steve Adams and Karina French, “Regional Collaboratives for Climate Change — A State of the Art,” *Institute for Sustainable Communities*, April 2019, <https://us.sustain.org/wp-content/uploads/2019/11/Regional-Collaboratives-for-Climate-Change-FINAL.pdf>.

78 “About MWRA,” *Massachusetts Water Resource Authority*, <https://www.mwra.com/02org/html/whatis.htm>.

79 “310 CMR 10.00: Wetlands Protection Act Regulations,” *Commonwealth of Massachusetts*, October 4, 2017, <https://www.mass.gov/regulations/310-CMR-1000-wetlands-protection-act-regulations>.

80 Shokoufeh Salimi, Suhad A. A. N. Almuhtar, and Miklas Scholz, “Impact of climate change on wetland ecosystems: A critical review of experimental wetlands,” *Journal of Environmental Management*, No. 286, May 15, 2021, <https://pubmed.ncbi.nlm.nih.gov/33611067>.

81 “Massachusetts Climate Change Assessment,” *Commonwealth of Massachusetts*, <https://www.mass.gov/info-details/massachusetts-climate-change-assessment>.

82 “Circular A-94: Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs,” *Office of Management and Budget*, 1992, https://www.whitehouse.gov/wp-content/uploads/legacy_drupal_files/omb/circulars/A94/a094.pdf.

83 “Alternative Cost-Effectiveness Methodology for Fiscal Year 2022 BRIC and FMA Application Cycle,” *FEMA*, October 6, 2022, https://www.fema.gov/sites/default/files/documents/fema_alternative-cost-effectiveness-methodology_102022.pdf.

84 Anna Weber, “The BRIC Wall: Capacity Gaps Put FEMA Grants out of Reach,” *NRDC*, February 8, 2023, <https://www.nrdc.org/bio/anna-weber/bric-wall-capacity-gaps-put-fema-grants-out-reach>.

85 Michelle Mehta, “Water Facts: New Orleans, Louisiana: Identifying and Becoming More Resilient to Impacts of Climate Change,” *NRDC*, July 2011, https://www.nrdc.org/sites/default/files/ClimateWaterFS_NewOrleansLA.pdf.

86 Neil Smith, “There’s No Such Thing as a Natural Disaster,” *Social Science Research Council*, June 11, 2006, <https://items.ssrc.org/understanding-katrina/theres-no-such-thing-as-a-natural-disaster/>.

87 American Society of Civil Engineers Hurricane Katrina External Review Panel, “The New Orleans Hurricane Protection System: What Went Wrong and Why,” *American Society of Civil Engineers*, 2007, <https://biotech.law.lsu.edu/katrina/reports/erpreport.pdf>.

88 “About LWI,” *Louisiana Watershed Initiative*, <https://watershed.la.gov/about>.

89 “Regional Capacity Building Grant Program,” *Louisiana Watershed Initiative*, <https://watershed.la.gov/rcbg-program>.

90 “How nature is taming policy: a watershed approach to flood risk management,” *Center for Planning Excellence*, <https://www.openenvironmentaldata.org/storytelling/how-nature-is-taming-policy>.

