

**NARRAGANSETT BAY  
ESTUARY PROGRAM**



**BLACKSTONE RIVER WATERSHED  
NEEDS ASSESSMENT REPORT**

JULY 2021 DRAFT

## Preface

This Blackstone River Watershed Needs Assessment Report was created by the [Narragansett Bay Estuary Program](#). One of 28 [National Estuary Programs](#), the Narragansett Bay Estuary Program uses a voluntary, community-driven approach to enhance the water quality, wildlife, and quality of life in the Narragansett Bay, Little Narragansett Bay, Coastal Ponds, and their watersheds in Rhode Island, Massachusetts, and Connecticut.

The Blackstone River and its watershed spans the Massachusetts—Rhode Island border and are vital to the ecology, economy, history, and culture of the region. The Blackstone has been home to indigenous communities for millennia and is the birthplace of the American Industrial Revolution. The watershed provides significant freshwater to the Narragansett Bay downstream, hosts large intact forests and coldwater fisheries, and supports essential municipal, commercial, recreational, and traditional uses. Efforts since the 1970s have succeeded in reducing pollution from legacy industrial sites, large wastewater treatment plants, and new development, removing waterways from the impaired water list, opening upstream fish habitat, and fostering collaboration among diverse interests.

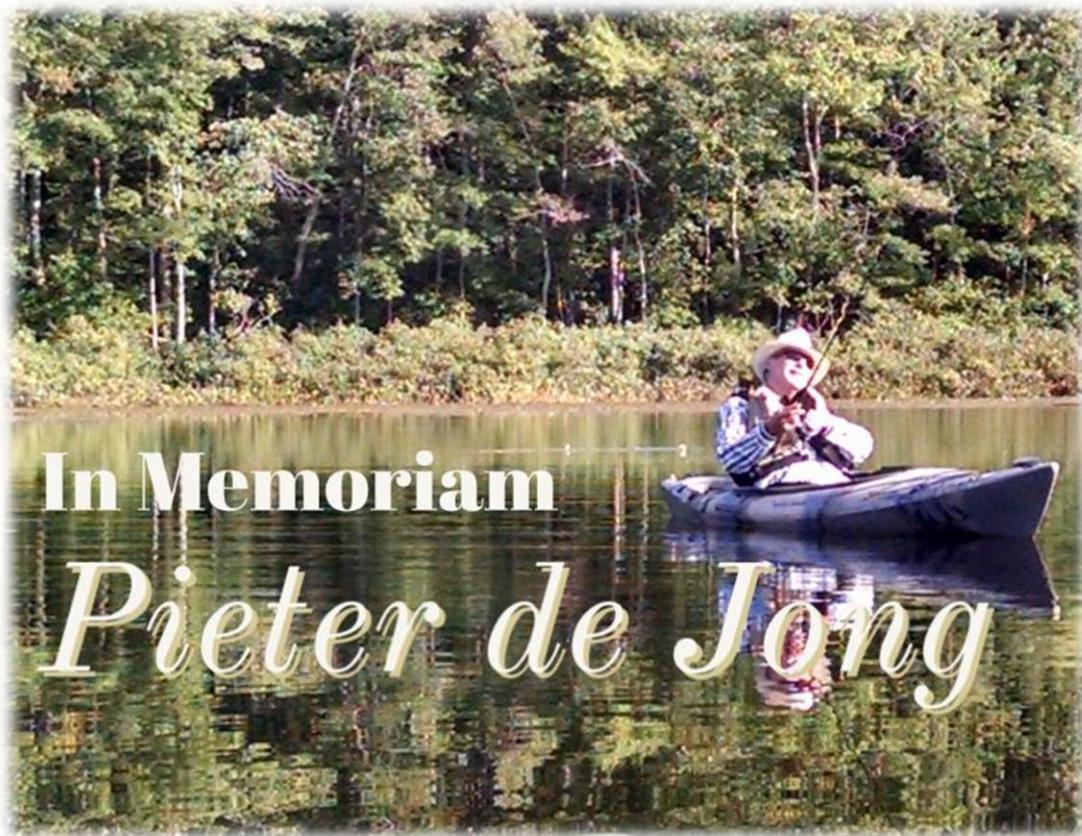
Despite progress, there is much more to do to assure a healthier and more resilient Blackstone River Watershed over the next 50 years to continue to address its industrial past, ongoing urbanization, and the impact of climate change. At Narragansett Bay Estuary Program's [State of the Blackstone River Watershed Workshop](#) held on April 29, 2019, the consensus among attendees was that a significant barrier to greater progress was that river advocates were faced with too many challenges and uncertain what to do next with limited human capacity and funding to act. Attendees at the workshop and in subsequent discussions felt a community-based process was necessary to gather regional interests to create an up-to-date list of prioritized needs and corresponding actions to address them.

With funding from EPA's Southeast New England Program, the Narragansett Bay Estuary Program's "[Blackstone River Watershed Needs Assessment Project](#)" filled this gap by convening a diverse group of watershed interests over a series of eight meetings from December 2019 to September 2021 to collaboratively develop a final needs assessment report that describes current high priority needs and 20 recommended actions that can be completed within roughly five years to help restore and sustain the Blackstone River Watershed in the face of urbanization, climate change, and other challenges.

NBEP is pleased with the results of this effort, with all promised outputs and outcomes achieved or exceeded. Further, this effort's inclusion of both needs and responsive actions, as well as its role as a catalyst for the hiring of a Blackstone Watershed Manager to coordinate future implementation of the recommended actions, is especially exciting and encouraging. This work provides a new, replicable model for creating the pre-conditions necessary to advance paired ecosystem and community health in the Blackstone and other large and complex watersheds in southeast New England.

## Acknowledgements

We offer our appreciation to the many and diverse participants in this work from across the Blackstone River Watershed and the greater region. A special thanks to the Blackstone Headwaters Coalition, Blackstone River Coalition, Blackstone River Watershed Council/Friends of the Blackstone, Blackstone Valley Tourism Council, Mass Audubon, and Blackstone River Watershed Association who provided vital targeted support. A list of participating organizations is provided in Figure 1 and a links to meeting materials that provide attendees at specific meetings is provided in Appendix 1. Project participant's intellect, endurance, and passion for the future of the Blackstone in the face of COVID-19 pandemic that struck during the heart of the project period was an inspiration and vital to the creation of this document. This effort was funded by agreement CE00A00393 awarded by EPA's [Southeast New England Program](#) to NEIWPC for the Narragansett Bay Estuary Program. Although the information in this document has been funded by the EPA, it has not undergone the EPA's publications review process and therefore, may not reflect the views of EPA and no official endorsement is inferred. The viewpoints expressed do not necessarily represent those of NEIWPC or EPA. Mention of trade names, commercial products, or causes do not constitute endorsement or recommendation for use.

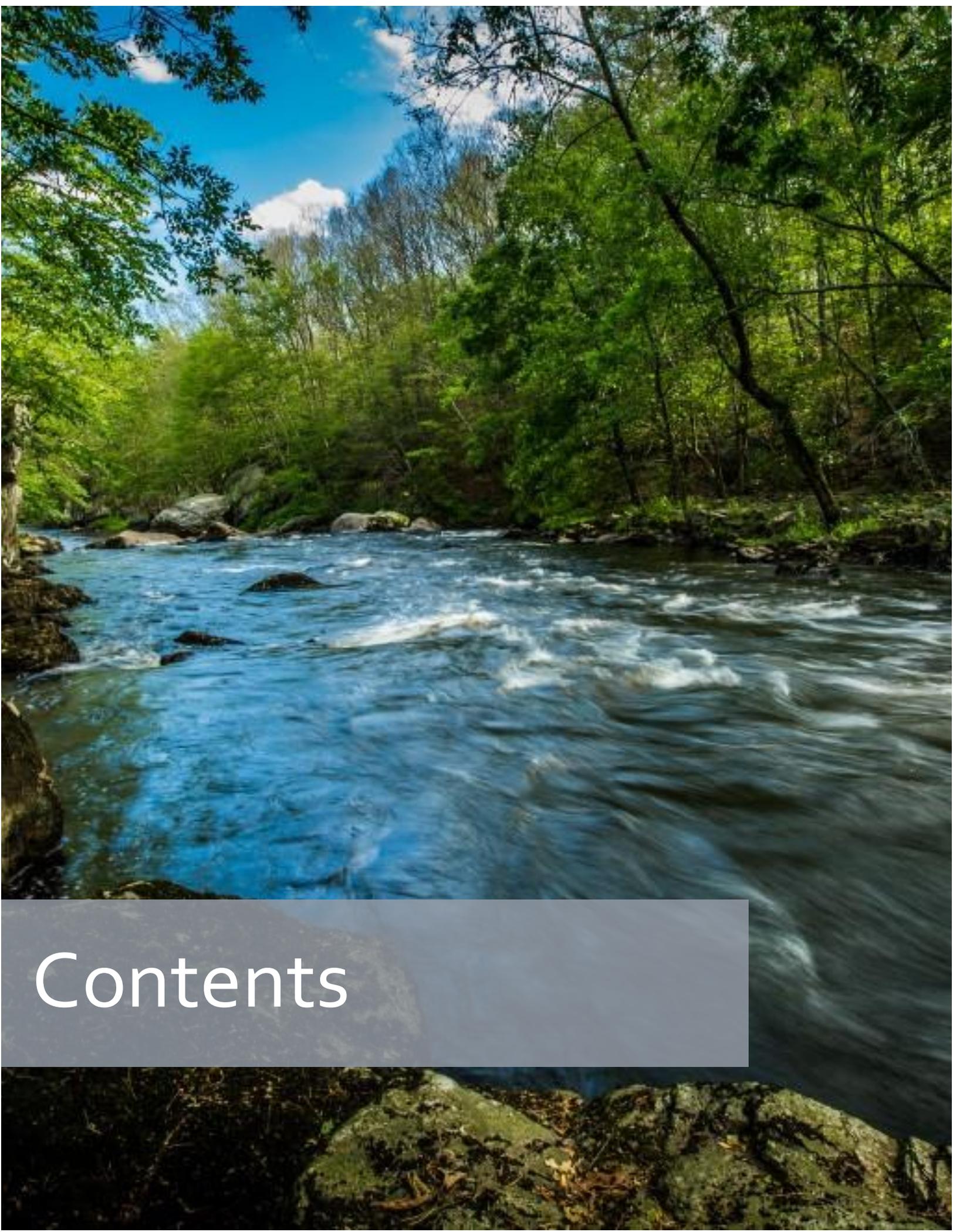


**NARRAGANSETT BAY  
ESTUARY PROGRAM**



**NEIWPC**





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# Project Overview

## A. Project Overview

The [Blackstone River Watershed Needs Assessment Project](#) (“Project”) reflects the outcome of the Narragansett Bay Estuary Program (“NBEP”) hosted *State of the [Blackstone River Watershed Workshop](#)* and the perspectives of those who have worked tirelessly to improve the health of Blackstone River Watershed (“Blackstone” or “Blackstone Watershed”). In September 2019, EPA’s Southeast New England Program (“SNEP”) awarded funding to NBEP to pursue the Project through September 2022. The Project brought together diverse regional interests over a series of eight meetings to identify and prioritize needs, and then develop specific actions that are responsive to these needs that can help improve water quality, habitat, and resilience of the Blackstone (NBEP, 2019). For this Project, the term ‘need’ is broadly defined, to include staff, data and tools, planning materials, projects, programs, and/or policies. This new need assessment is built on past regional planning efforts, especially the *2004 Blackstone River Watershed Five-Year Action Plan* (GeoSyntec, 2004). This broader Blackstone River Watershed Needs Assessment Project Report (“report”) incorporates a project overview, methods, background on the Blackstone, the results of the needs assessment, and 20 recommended actions that can respond to high priority needs within about five years. Further, SNEP funding was also made available to support participation by five small non-government organizations in the watershed and the hiring of a Blackstone Watershed Coordinator to help drive implementation of the recommended actions in this report. Results promised in NBEP’s proposal to SNEP included (NBEP, 2019):

### Outputs

1. At least six (6) meetings geographically distributed across the watershed.
2. List of participants.
3. Deliberate, stepwise process for conducting the Project.
4. Presentation materials and notes from each meeting,
5. Request for proposals, contracts, scopes of work, and final reports from those receiving financial support from the Project.
6. Deliverables from local nongovernment organizations awarded funds to support this project.
7. Awarded funds to an entity to complete one high priority recommended action.
8. Final report vetted by the project group and the public.

### Outcomes

1. A diverse, collaborative, and cohesive Project group made up of a people that span interests, expertise, geographies, and socioeconomic status and have the capacity to participate in the development of this report.
2. A final report that provides actionable information for pursuit of studies, development of plans, implementation of projects and policies, and pursuit of the recommend actions in this report.
3. Relationships, process, and a report that stimulates and informs new action.
4. New data that informs the Narragansett Bay Estuary Program’s new Comprehensive Conservation and Management Plan (CCMP) revision, called [Vision 2032](#).
5. A replicable model for development of community-driven and actionable needs assessments in southeast New England.



# Methods

## B. Methods

NBEP used an ‘iterative process’ for this Project. An iterative process is the practice of building, refining, and improving a project. It allows groups to create, test, and refine work until there is general agreement with the end results (Asana, 2021). NBEP systemically gathered feedback from a growing and evolving mix of interests, identified needs and responsive actions, provided seed funds to aid participation and report implementation, and offered learning and networking opportunities for participants. This Project differed from some other needs assessments by not only identifying needs, but also crafting recommended actions to address them and providing funding to help hire a person to help implement them. These actions represent a short-list of foundational actions that can deliver near-term tangible results and/or create the pre-conditions for addressing more complex needs in the longer-term. A similarly iterative approach was used to build this report, using a stepwise and collaborative approach to move through a series of distinct phases from scoping to listening to review to a final document over eight meetings. Figure 2 at the close of this section depicts the final Project process and timeline. Sections D and E of this report offer further details about steps and adjustments undertaken along the way to maximize progress and participant engagement.

Project meetings were open to anyone, and a “snowball” approach was used where participants were asked who else should be invited by NBEP and to also make invites themselves. Discussions of challenges facing the watershed were balanced by presentations from local people about past and ongoing successes for learning and encouragement. Ultimately, a mailing list of 140 people was developed that included a diverse mix of Blackstone interests, including government, nonprofits, community groups, academic institutions, indigenous people, and local activists. A total of eight meetings were conducted from December 2019 and September 2021, the first and last in-person and the others via Zoom due to the COVID-19 pandemic. Attendance at meetings was excellent, with an average of 33 people per meeting and 47 unique attendees across all meetings. The list of organizations that participated is provided in Figure 1. Appendix 1 provides information on individual meetings and links to meeting materials.



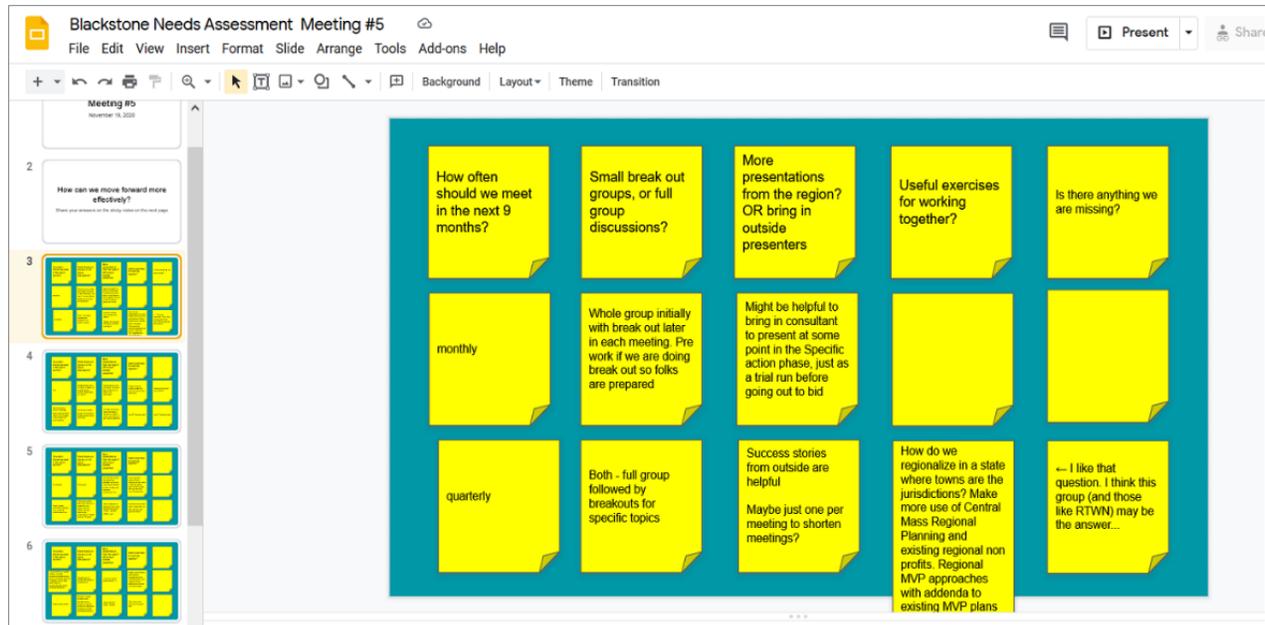
**Figure 1: Project Participants**

Auburn, MA	Mendon, MA
Blackstone Headwaters Coalition	Millbury, MA
Blackstone National Park	Narragansett Bay Commission
Blackstone River Coalition	Narragansett Bay Estuary Program
Blackstone River Valley National Historical Park	The Nature Conservancy - Rhode Island Chapter
Blackstone River Valley National Heritage Corridor	NEIWPCC
Blackstone River Watershed Association	Nipmuc Nation
Blackstone River Watershed Council/Friends of the Blackstone	Northbridge, MA
Blackstone Valley Tourism Council	Northern Rhode Island Conservation District
Central Falls, RI	Pawtucket, RI
Central MA Regional Planning Commission	Restore America’s Estuaries
Clark University	RI Department of Environmental Management
Devens, MA	RI Department of Transportation
Framingham, MA	RI School of Design
Greater Worcester Land Trust	Save The Bay
Hopkinton, MA	Shrewsbury, MA
Keep Blackstone Valley Beautiful	SNEP Network
Manchaug Foundation	SE Reg Planning & Economic Development Dist.
Mass Audubon	US Environmental Protection Agency
MA Department of Environmental Protection	UMASS Amherst
MA Department of Fish and Wildlife	Woonsocket, RI
MA Executive Office of Energy & Environmental Affairs	Worcester, MA
MA Department of Transportation	Worcester Polytechnic Institute
MA Rivers Alliance	

Meetings #1-#4 proceeded as planned, gathering information from past plans and an expanding number of watershed interests, compiling needs, and setting the stage for writing this report.

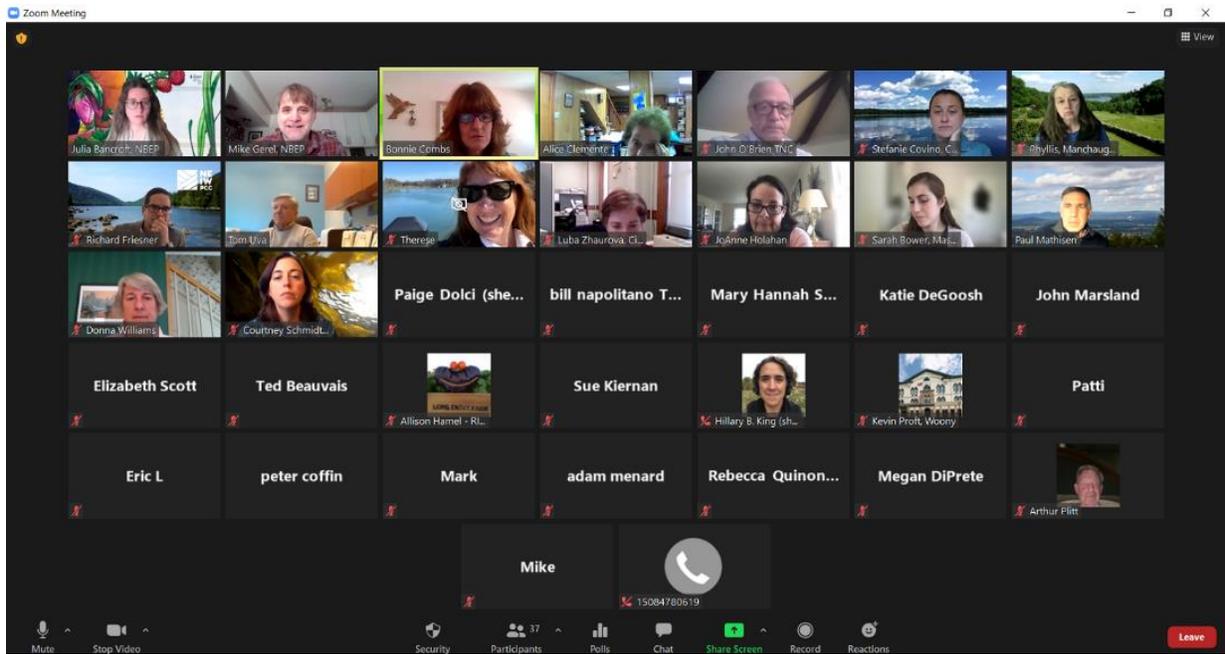
As the COVID-19 pandemic continued into fall 2020, the group completed a small group exercise at Meeting #5 to check-in on how to best avoid fatigue and maintain momentum moving forward. The Project process was slightly adjusted to reflect the following feedback:

- How often should the group meet via Zoom?—Break until spring, and then every other month.
- Preference for small or large group discussions?—Large for PowerPoints, small for discussions.
- More presentations from inside and/or outside the region?—Case studies from in/out of region.
- Who should do first draft of recommended actions?—NBEP to draft prior to next meeting.
- Suggestions for useful exercises?—Interactive is best, like use of participatory exercises.



The first draft of this report, which included needs and a NBEP staff's first cut at responding recommended actions, was released on March 15, 2021. Input before and after Meetings #6 and #7, including 33 written comments, were received on the first draft.

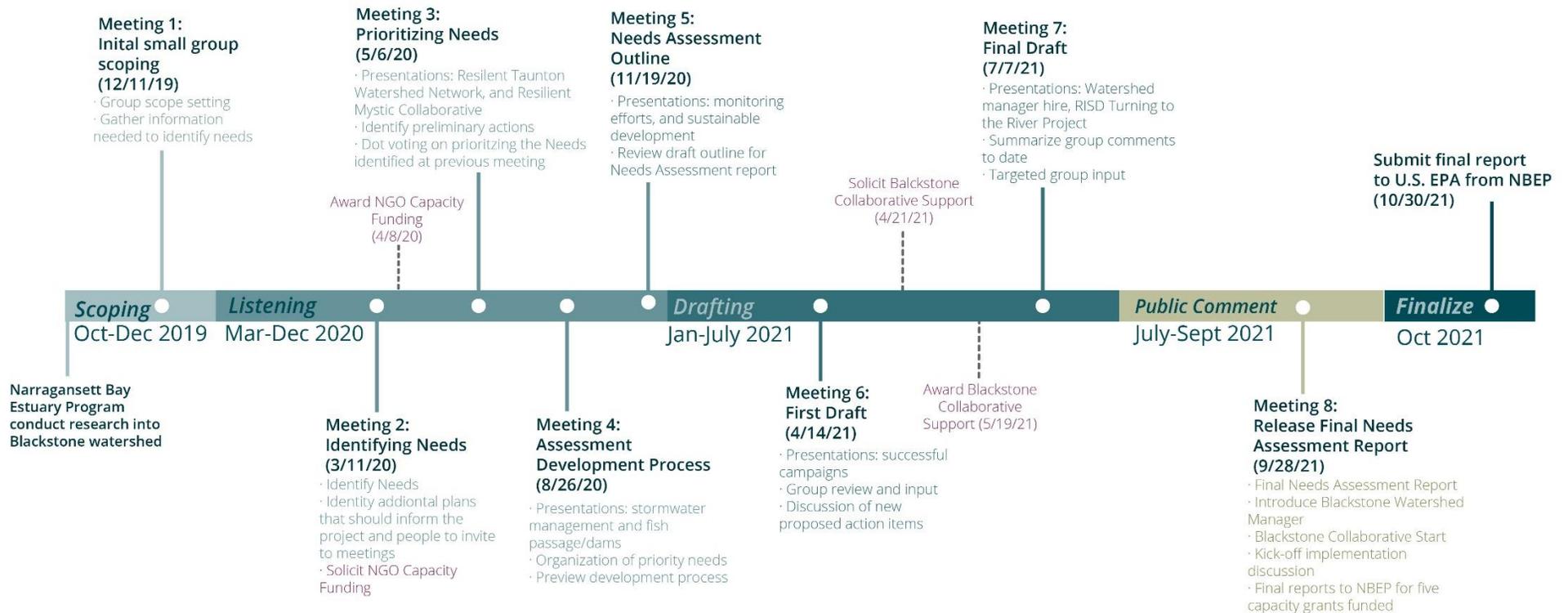
A final draft that reflected feedback to date was released on July 27, 2021. A public comment period on the final draft was open from July 27-September 3, 2021. The Blackstone River Coalition/Upper Blackstone River Headwaters Coalition, Blackstone River Watershed Association, and Blackstone Valley Tourism Council held public meetings on July 31<sup>st</sup>, August 5<sup>th</sup> and [date TBD], respectively, to present Project results and take feedback. A total of [TBD after comment period closes] comments were received in writing or at the public meetings on the final draft. Public comments were considered by NBEP staff, and this final report was presented at the last Project meeting on September 28, 2021. NBEP will submit a final report to SNEP by October 30, 2021 to close out the Project.



Along the way, NBEP also re-granted funds through NEIWPC to support development and future implementation of this report. A competitive process was used to award modest financial support to five watershed-based organizations in April 2020 with the ability to offer deeper assistance during the Project. Key tasks included identifying and inviting key interests, reviewing written materials, and hosting public meetings. Funded organizations included the Blackstone Headwaters Coalition, Blackstone River Coalition, Blackstone River Watershed Council, Blackstone Valley Tourism Council, and Mass Audubon. Additionally, seed funding was awarded to Clark University in July 2021 to help them hire a Blackstone Watershed Coordinator (consistent with Recommended Action #1 in this report) to help coordinate and drive actions consistent with this report and subsequent actions developed by Project participants.

Figure 2: Project Process and Timeline

**Blackstone Needs Process & Timeline**





# About the Blackstone

## C. About the Blackstone

### The Blackstone River Watershed

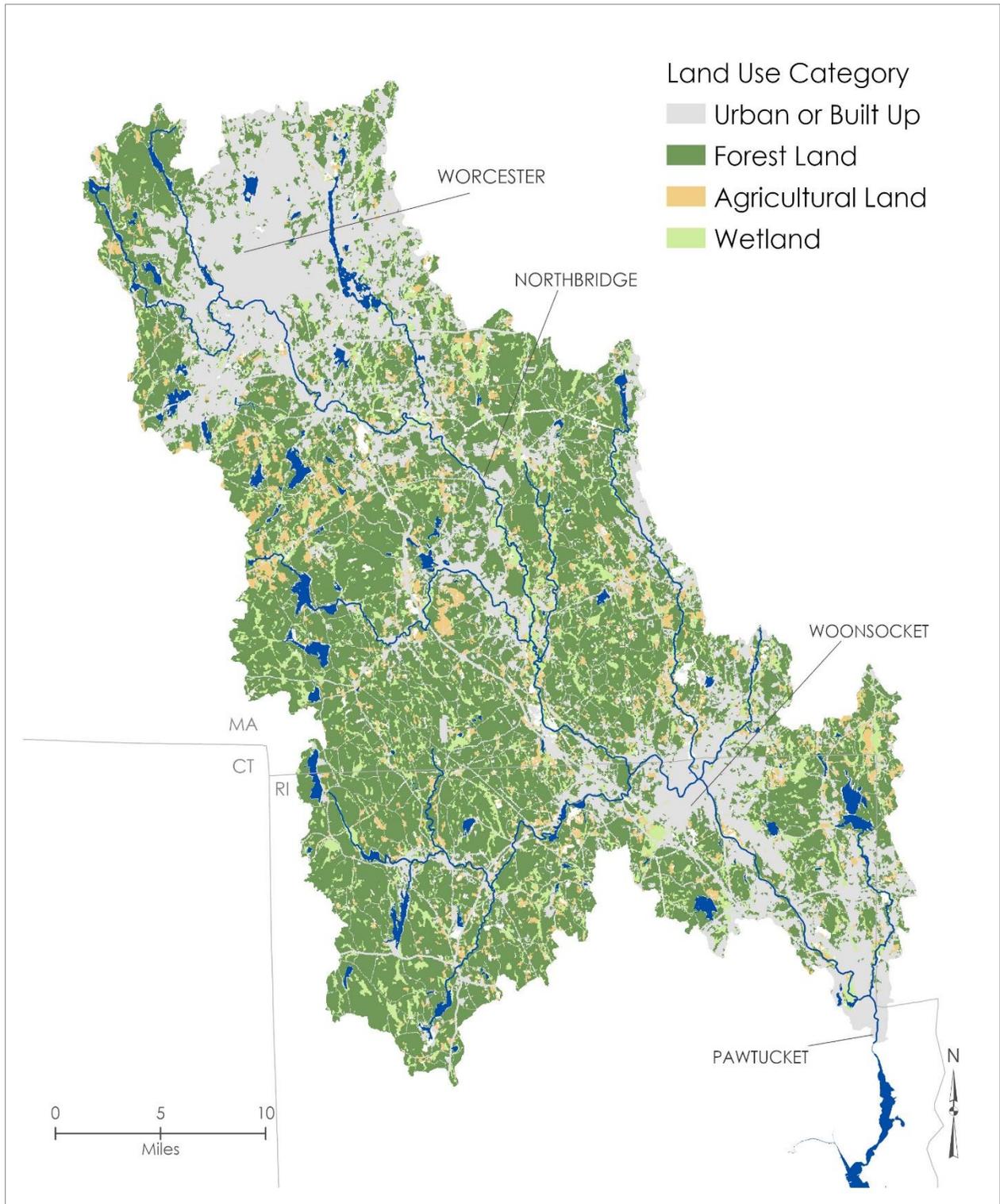
Beginning in the headwater streams in the hills above Worcester, the Blackstone River flows 48 miles south into Rhode Island. It drops 450 feet before reaching sea level where it becomes the tidal Seekonk River. From there, it flows to the Providence River (a northern arm of Narragansett Bay), before finally emptying to the Bay near Pawtucket, Rhode Island. The Blackstone River is the longest tributary Narragansett Bay and its second largest source of freshwater (NBEP, 2002; RIDEM, 2013). The Blackstone River Watershed comprises a total of 454 square miles, with 382 square miles located in south central Massachusetts and 258 square miles in northern Rhode Island (Geosyntec, 2004).

The length of the mainstem is evenly divided between Massachusetts and Rhode Island, with 24 river miles in each state (Geosyntec, 2004). There are 452 miles of river and perennial streams in the watershed (RIDEM, 2018). The headwater tributaries are Kettle Brook, Tatnuck Brook, Beaver Brook, Mill Brook, Middle River, and Broad Meadow Brook. The major tributaries of the Blackstone are the Quinsigamond, West, Mumford, Mill, and Peters Rivers in Massachusetts, and the Clear and Branch Rivers and Abbott Run in Rhode Island (Blackstone River Coalition (BRC), 2008). About 350 lakes, ponds, and reservoirs covering 1300 acres are located within the watershed, many of which were created as mill ponds during the 18<sup>th</sup> century or as drinking water reservoirs during the 20<sup>th</sup> (Geosyntec, 2004; NBEP, 2002). The watershed has over 100 dams, with 19 dams on the mainstem of the Blackstone (RIDEM, 2013).

Twenty-nine Massachusetts municipalities and ten Rhode Island municipalities are in the watershed (Geosyntec, 2004). The watershed includes heavily urbanized areas in Worcester, Woonsocket, Central Falls, and Pawtucket, with considerable forestland elsewhere. As of 2016, 29% of land was developed, 53% was forest, and 4% was agriculture (USGS, 2016). Figure 3 shows the municipalities and major tributaries in the watershed and Figure 4 shows watershed land use as of 2016 (BRC, 2008; NBEP, 2021a).



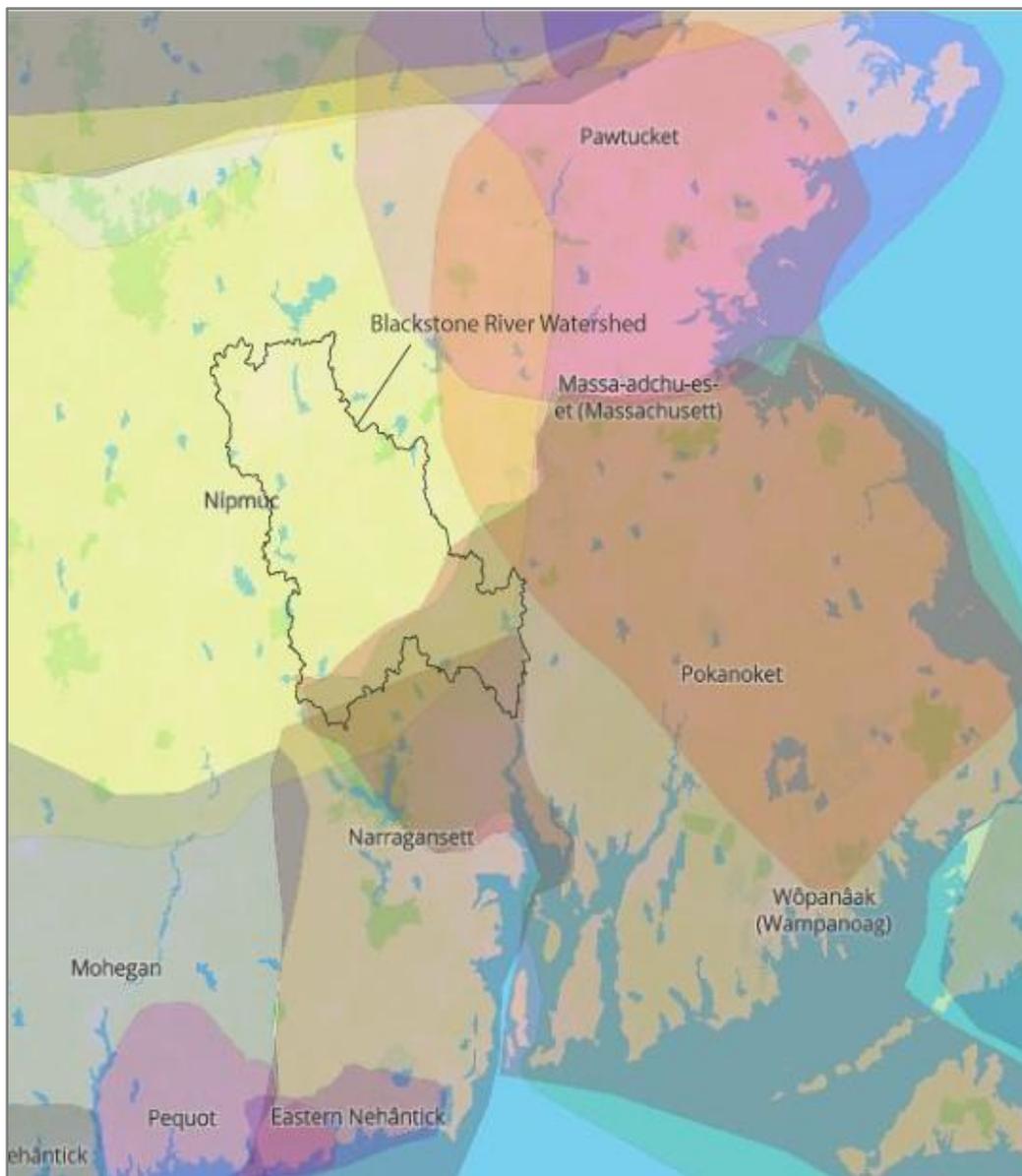
**Figure 4: Blackstone Watershed Land Use in 2016**



## Watershed History

This history of the Blackstone River Watershed must begin with acknowledgment of the indigenous peoples that have occupied the region from time immemorial. Nipmuc, Pokanoket, Wampanoag, and Narragansett Nation lands are in the watershed. These people lived in scattered villages throughout the area, with economic and subsistence cycles of hunting, gathering, planting, and harvesting (Nipmuc, 2021). Figure 5 offers a depiction of the territory of indigenous people in the Blackstone region (Native Land Digital, 2021). Despite the devastating impact of colonialism, these people and their culture continue to be part of the socioeconomic, historical, and political fabric of the region. It is the intention of this Project to listen, respect, and lift the voices and needs of indigenous people via this report and future actions (NPS, 2011).

**Figure 5: Blackstone Region Indigenous Lands ([www.native-land.ca/](http://www.native-land.ca/))**



The Blackstone Valley was the birthplace of America's industrial revolution in the early 19th Century. This legacy is important to the heritage of the region and the condition of the river today (NBEP, 2002). The Blackstone's history of intense industrial development dating to the 1600's left its waters polluted and its course altered (Geosyntec, 2004). Industrial activity and accompanying settlement degraded the river with untreated sewage, detergents, solvents, heavy metals, and other industrial wastes. By the late 1800's much of the rivers and many of its tributaries were either impounded by dams or channelized for transportation, urban development, and flood control (NBEP, 2002). In 1971, the Blackstone was labeled "one of America's most polluted rivers" by an article in *Audubon* magazine (RIDEM, 2013). The river was described as the "the most polluted river in the country with respect to toxic sediments" in 1990 (USEPA, 1990).

The Blackstone's water quality programs are typical of older, highly urbanized basins (Army Corp, 1997). Human infrastructure and loss of wetlands means that little remains of the watershed's natural hydrology (GeoSyntec, 2004). Fish, wildlife, their habitat, and regional biodiversity have been damaged by human activity on the Blackstone. The river once supported strong migrating fish runs that drew crowds of people, flocks of birds, and other wildlife to riverbanks (BRWC, 2021). Documented historic runs of anadromous fish, like Atlantic salmon, American shad, and river herring have been excluded from their historic range for centuries due to altered hydrology and waterway obstructions (BRC, 2008).

The decline of the textile industry in the early-mid 20<sup>th</sup> century along with urban flight in the post WWII era, created significant economic challenges in the region. Environmental Justice communities throughout the watershed continue to feel the brunt of historic decisions and ongoing problems, including municipalities along the river in Rhode Island that are among some of the most overburdened and untapped in New England. Figure 6 displays Environmental Justice communities identified using NBEP's [EJ Priority Areas Tool](#) [link will be added in final document] (NBEP, 2021b).

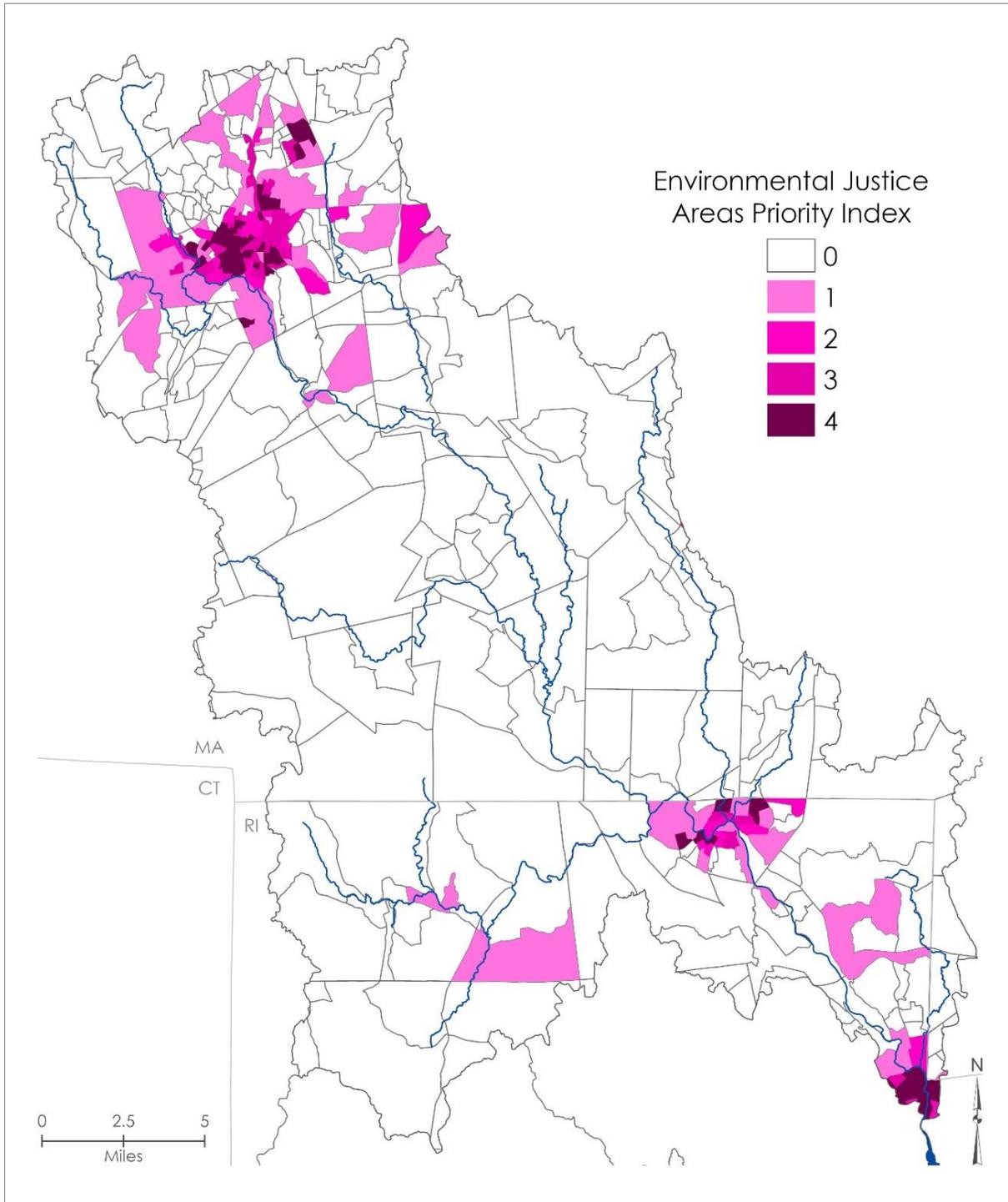
### A Comeback Story

Considerable environmental improvements have been achieved since the early 1970s due to the implementation of Clean Water Act programs at the federal and state level (e.g., water quality standards, National Pollution Discharge Elimination System permits, and Total Maximum Daily Loads), local regulations, and the tireless work of local watershed advocates. Water pollution is down in the watershed due to upgrades to large wastewater treatment plants, reduction of Combined Sewer Overflows, and installation of best management practices on agricultural and developed land to stem nonpoint source runoff (NBEP, 2002; BRC, 2018). For example, the Rhode Island Department of Environmental Management's (RIDEM) Clean Water Act 303(d) impaired waters report released in February 2021 indicates that Rhode Island portions of the river are no longer impaired for phosphorus and dissolved oxygen, likely due to treatment plan upgrades (RIDEM, 2021a).

The watershed continues to offer significant habitat value. It is home to 30 species of freshwater fish and estuarine species like striped bass, bluefish, and menhaden, and anadromous fish are found below the Main Street dam in Pawtucket, Rhode Island. It hosts one of the largest freshwater wetlands in Rhode Island, an important stop for migratory birds on the Eastern Flyway (NBEP, 2002). The Blackstone offers notable recreation opportunities for hiking, biking, fishing, paddling, and boating. Historical and heritage value also abounds. The Blackstone River Valley National Historical Park was

designated in 2014, joining several state parks along the river. The Blackstone became a part of the National Heritage Corridor system in 1986 and was designated as an American Heritage River in 1998 (Geosyntec, 2004).

**Figure 6: Blackstone Environmental Justice Communities**



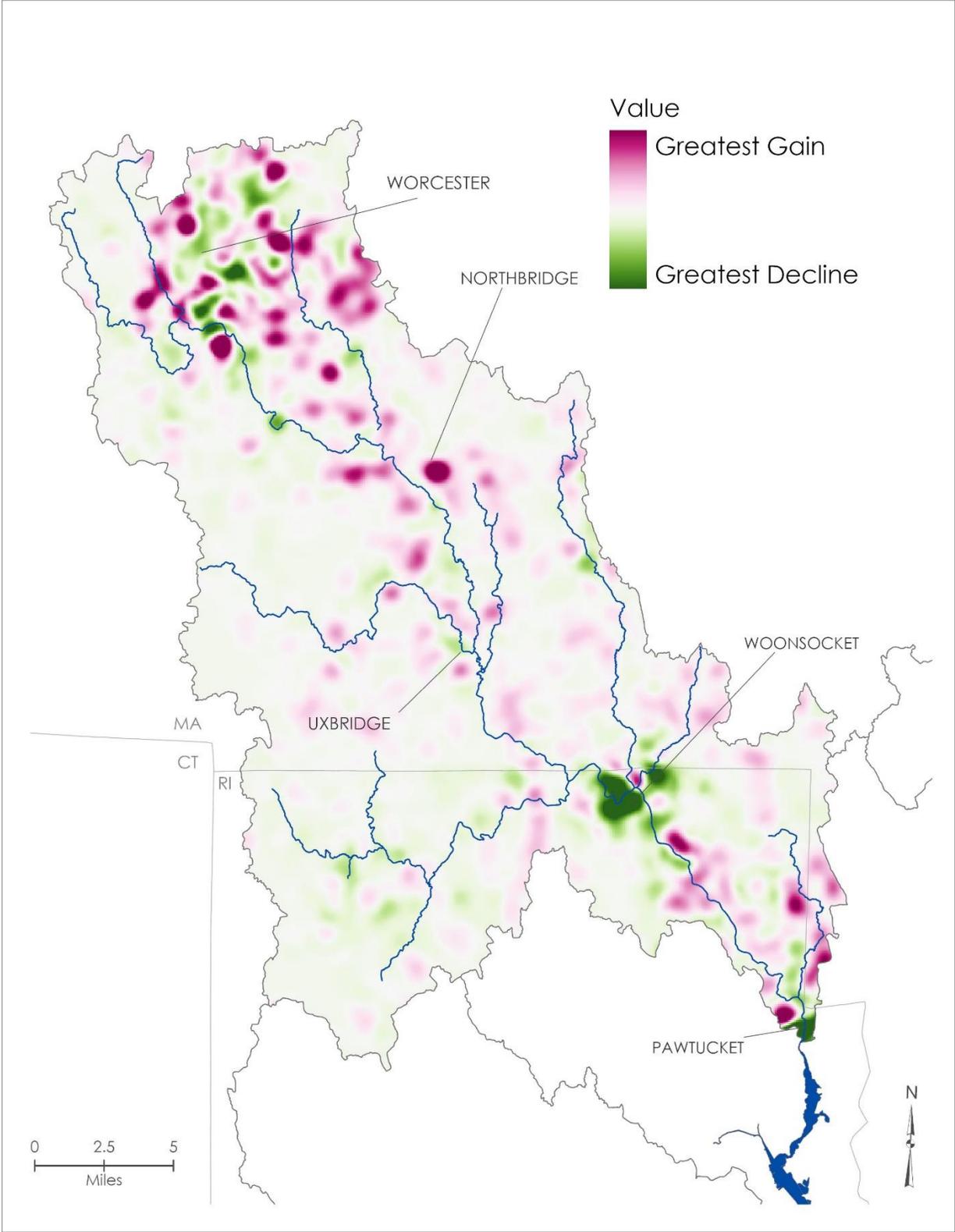
## The Future

The continued impact of historical industrialization and present-day urbanization means there is more to do to improve and sustain the health of the Blackstone. The Blackstone River Coalition noted in a 2008 report that, “the Blackstone is only as healthy as the land in its watershed, since water must flow over and through the land on its path to the river and then on to the Narragansett Bay and the Atlantic Ocean.” The river and the land that make up its watershed still need help to achieve a fully “fishable and swimmable” status under the Clean Water Act. Water quality concerns today include nutrients (while reduced), bacteria, turbidity, temperature, and toxics (BWRA, 2021). Major sources are stormwater runoff, smaller wastewater treatment plants and combined sewer systems that have not been upgraded, and contaminants that persist in bank and bottom sediments and accumulate in the aquatic food chain. (BRC, 2008). Areas of potential aquatic habitat are degraded or cannot be utilized because of fluctuations in water levels due to human activities, hardened riverbanks and degraded riparian areas, disconnected floodplains, passage barriers, and invasive plant species.

The watershed’s challenges are being amplified by climate change. Existing natural and built landscapes are not sufficiently resilient to withstand the higher temperatures, extreme weather, altered hydrology, and other impacts of climate change that are only expected to get worse in the future.

Development in the Narragansett Bay Watershed has sprawled beyond the industrial centers of Worcester and Providence, replacing forests and open space with impervious surfaces that generate more runoff (NBEP, 2017). Figure 7 shows watershed population change from 1990 to 2010 (NBEP, 2021c). Keeping pace with land development and its impacts in the face of a change is the greatest continuing threat to this watershed and its communities (BRC, 2008).

Figure 7: Blackstone Watershed Population Change 1990-2010 Heat Map





# Needs Assessment

## Needs Assessment Report Development

NBEP used an iterative process over a series of meetings to identify, prioritize, and refine the list of Blackstone Watershed needs included in this report. A simple “weight of the evidence” approach that captured participants perspectives was used to prioritize needs along the way. Adaptive management was pursued throughout to maximize the progress and fulfillment of the group. The subsections below build on one another to create a final list of high priority needs to be addressed by the recommended actions described in Section E of this report.

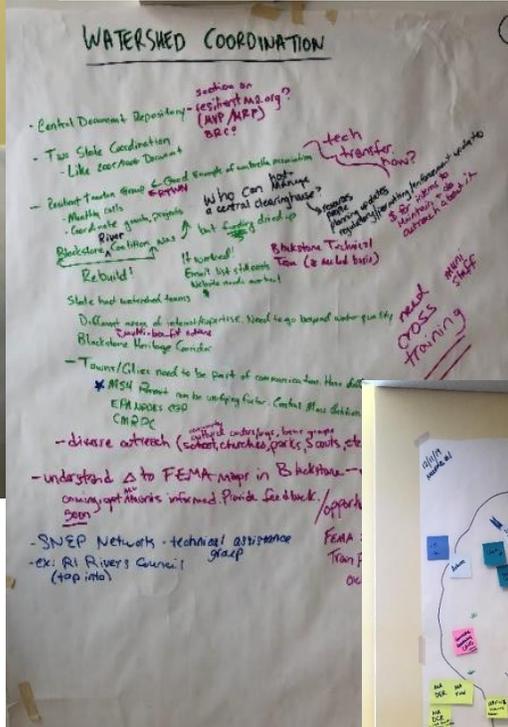
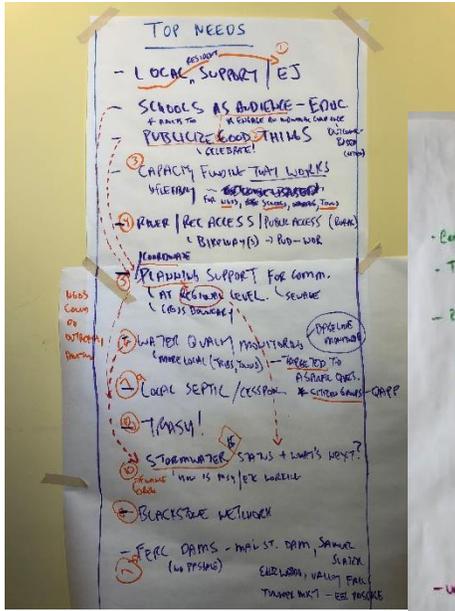
### Identification

Meeting #1 included an opening brainstorm by a small group of Blackstone partners. At Meeting #2, participants were given a table of needs from the 2004 *Blackstone River Watershed Five-Year Action Plan* (the most complete and current watershed planning document for the region), a list of current needs captured during Meeting #1, and a detailed crosswalk of “need subject areas” called out in both processes. Participants then broke into four subgroups and rotated through a station created for each need subject area to revise, replace, and add needs. Figure 8 lists the six needs subject areas included in this exercise. It is acknowledged that there is overlap across these subject areas. Appendix 2 provides the raw input slightly edited for clarity so the results of this exercise may be reconsidered in future planning work. Note that the color coding utilized below for each need subject area is maintained in the remainder of this report.

**Figure 8: Need Subject Areas**

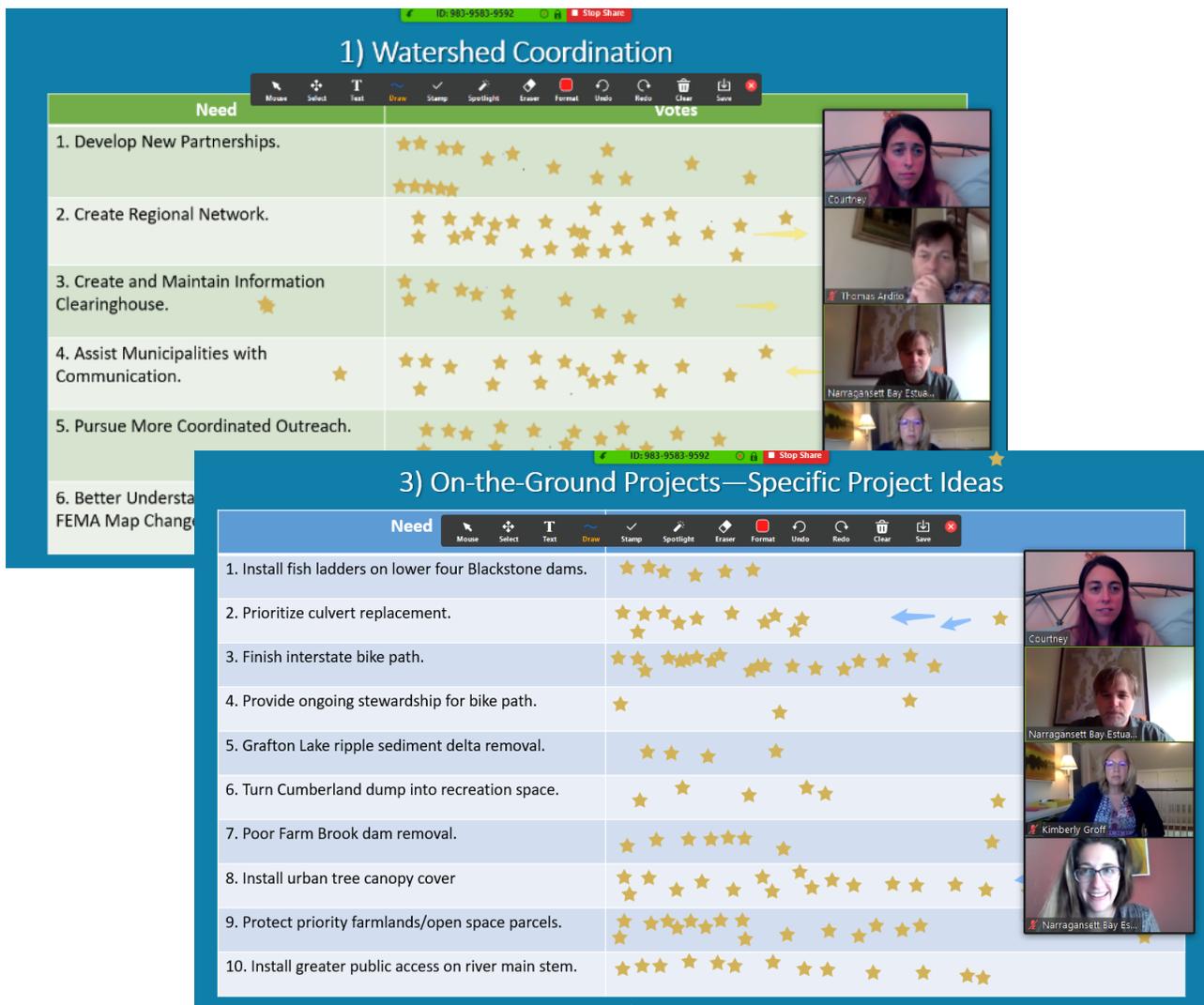
1. Watershed Coordination
2. On-the Ground Projects
3. Capacity-building
4. Sustainable Development
5. Monitoring
6. Outreach





## Prioritization

At Meeting #3 voting was used to prioritize needs identified by the Project group to date. Participants were asked to vote for the needs they felt were most important to address based on their view of their cumulative impact on ecological health, cost, regional capacity to implement, and public support. Note this initial prioritization was completed by those that participated in this single meeting, providing a “snapshot in time” and do not represent a consensus of those that have participated in the Project. The results of the prioritization are provided by need subject area in Figure 9. A seventh need subject area was created by separating On-the-Ground Projects into those that involve ‘Project Planning’ or ‘Project Installation.’ Ranking of high priority needs (those that received at least 20 votes) across all subject areas is provided in Figure 10. To preclude redundancy, needs that addressed generally the same issue or were viewed as similar were combined and reworded as one need in the high priority list provided Figure 10.



**Figure 9: Prioritization of Needs by Need Subject Area**

Need	Votes	Rank
<b>1. Watershed Coordination</b>		
Create regional network/collaborative.	31	1
Assist municipalities with communications.	20	2
Pursue more coordinated outreach.	19	3
Develop new partnerships.	17	4
Create and maintain information clearinghouse.	16	5
Better understand and respond to FEMA map changes.	7	6
<b>2. On-the-Ground Projects: <u>Project Planning</u></b>		
Acquire more project funding.	44	1
Prioritize projects on an ongoing basis.	30	2
Identify and compile project ideas.	27	3
Address permitting barriers.	10	4
Revise regulations.	7	5
<b>3. On-the-Ground Projects—<u>Project Installation</u></b>		
Culvert replacement, stream continuity	20	1
Install urban tree canopy cover.	20	1
Reduce impervious cover.	20	1
Finish and steward interstate bike path.	20	1
Protect priority farmland and open space.	18	2
Install greater public access on main river stem.	15	3
Remove Poor Farm dam.	9	4
Achieve fish passage through the lower four Blackstone River dams.	7	5
Turn Cumberland dump into recreation space.	6	6
Grafton Lake ripple sediment delta removal.	4	7
<b>4. Capacity-Building</b>		
More reliable long-term capacity funding for all entities.	28	1
Greater technical assistance to municipalities.	28	1
More staff at (or available to) municipalities.	24	2
Re-energize all those who care about the Blackstone to create new champions.	24	2
More operational staff at NGOs.	19	3
Maximize existing capacity through training, etc.	18	4

**Figure 9: Prioritization of Needs by Need Subject Area**

Need	Votes	Rank
<b>5. Sustainable Development</b>		
Support natural solutions to water and habitat issues.	36	1
Pursue local ordinance reform.	24	2
Maintain existing stormwater infrastructure.	14	3
Offer recognition for smart design/development.	13	4
Pursue Brownfields redevelopment (using design standards and equity).	11	5
Maximize implementation of MVP/MRP programs.	9	6
Encourage composting plans/programs that address creation to use.	8	7
More effective transportation planning.	7	8
Ensure responsible renewable energy siting.	7	8
Enforce erosion and sediment control on active projects.	5	9
Access existing wastewater capacity.	4	10
Create more sustainable water supply.	4	10
Address affordable housing shortage.	2	11
<b>6. Monitoring</b>		
Increase the quality and quantity of external data sharing.	44	1
Increase public awareness of results/watershed conditions.	32	2
Obtain more funding for volunteer monitoring programs.	24	3
Prioritize monitoring that can inform local actions and decisions.	23	4
Address specific known monitoring gaps.	17	4
Increase state and federal monitoring efforts.	17	5
<b>7. Outreach</b>		
Release more compelling and inspiring messaging.	72	1
Install simple educational signage.	32	2
Augment existing youth education.	23	3
Target expanded outreach to new interests.	16	4
Empower greater community participation in decision-making.	15	5

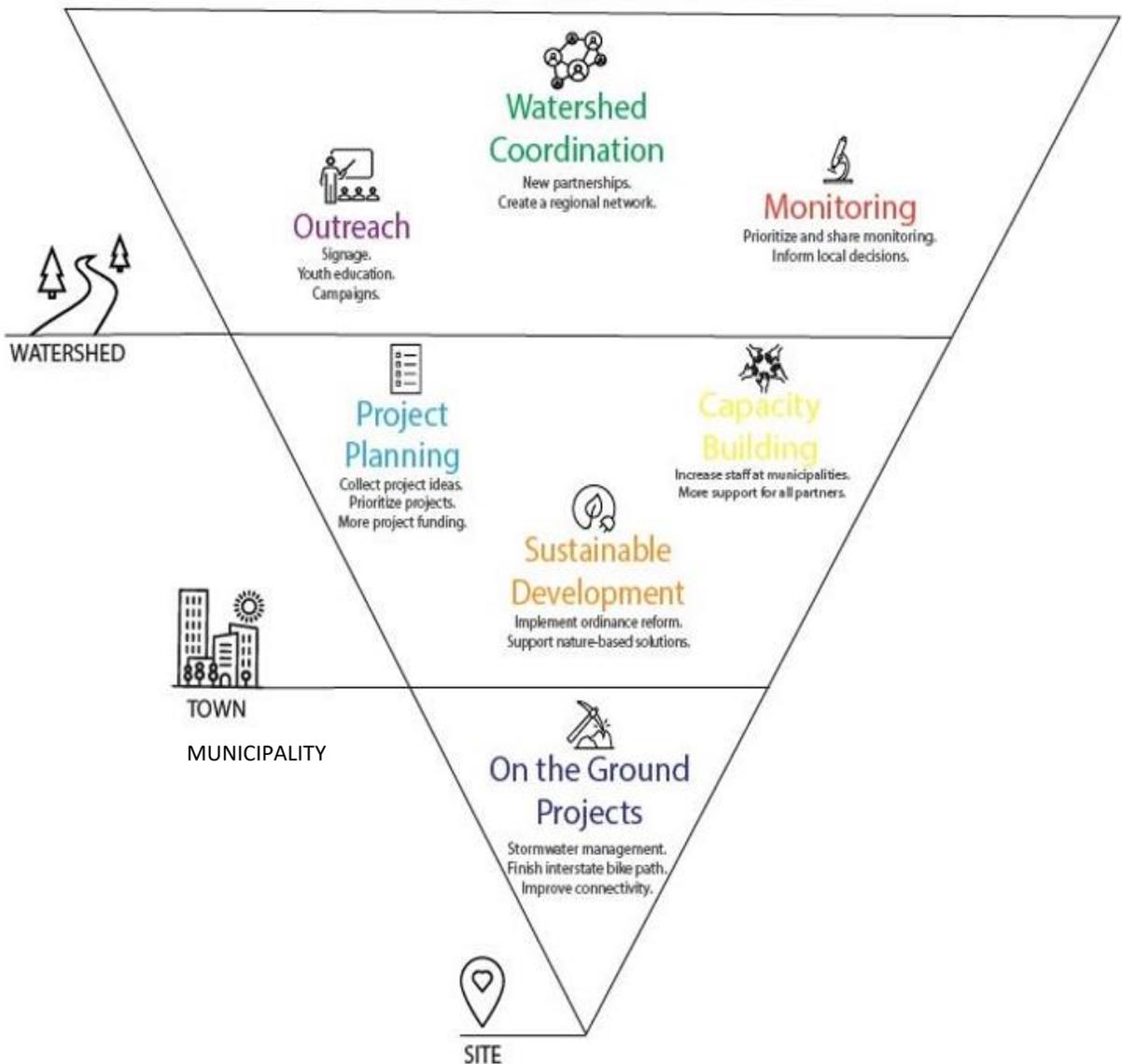
**Figure 10: High Priority Needs—March 2021 List**

Need Subject Area	Specific Need	Votes	Rank
Outreach	Release more compelling and inspiring messaging.	72	1
Monitoring	Increase the quality and quantity of external data sharing.	44	2
Project Planning	Acquire more project funding.	44	2
Sustainable Development	Enable nature-based solutions (low impact development and permanent land protection) to water and habitat issues.	36	3
Outreach	Increase public awareness of watershed conditions.	32	4
Outreach	Install educational signage.	32	4
Watershed Coordination	Hire person to create regional network/collaborative.	31	5
Project Planning	Prioritize projects on an ongoing basis.	30	6
Capacity-building	More reliable long-term capacity funding for all entities.	28	7
Capacity-building	Greater technical assistance to municipalities.	28	7
Project Planning	Identify and compile project ideas.	27	8
Sustainable Development	Pursue local ordinance reform.	24	9
Capacity-building	Obtain more funding for volunteer monitoring programs.	24	9
Capacity-building	More staff at municipalities.	24	9
Outreach	Re-energize those who care about the Blackstone to create new champions.	24	9
Monitoring	Prioritize monitoring that can inform local actions and decisions.	23	10
Outreach	Augment existing youth education.	23	11
Watershed Coordination	Assist municipalities with communications.	20	12
Project Installation	Culvert replacement/passage improvement from headwaters to sea.	20	12
Project Installation	Reduce impervious surfaces (urban tree planting).	20	12
Project Installation	Finish interstate bike path.	20	12

## Framework

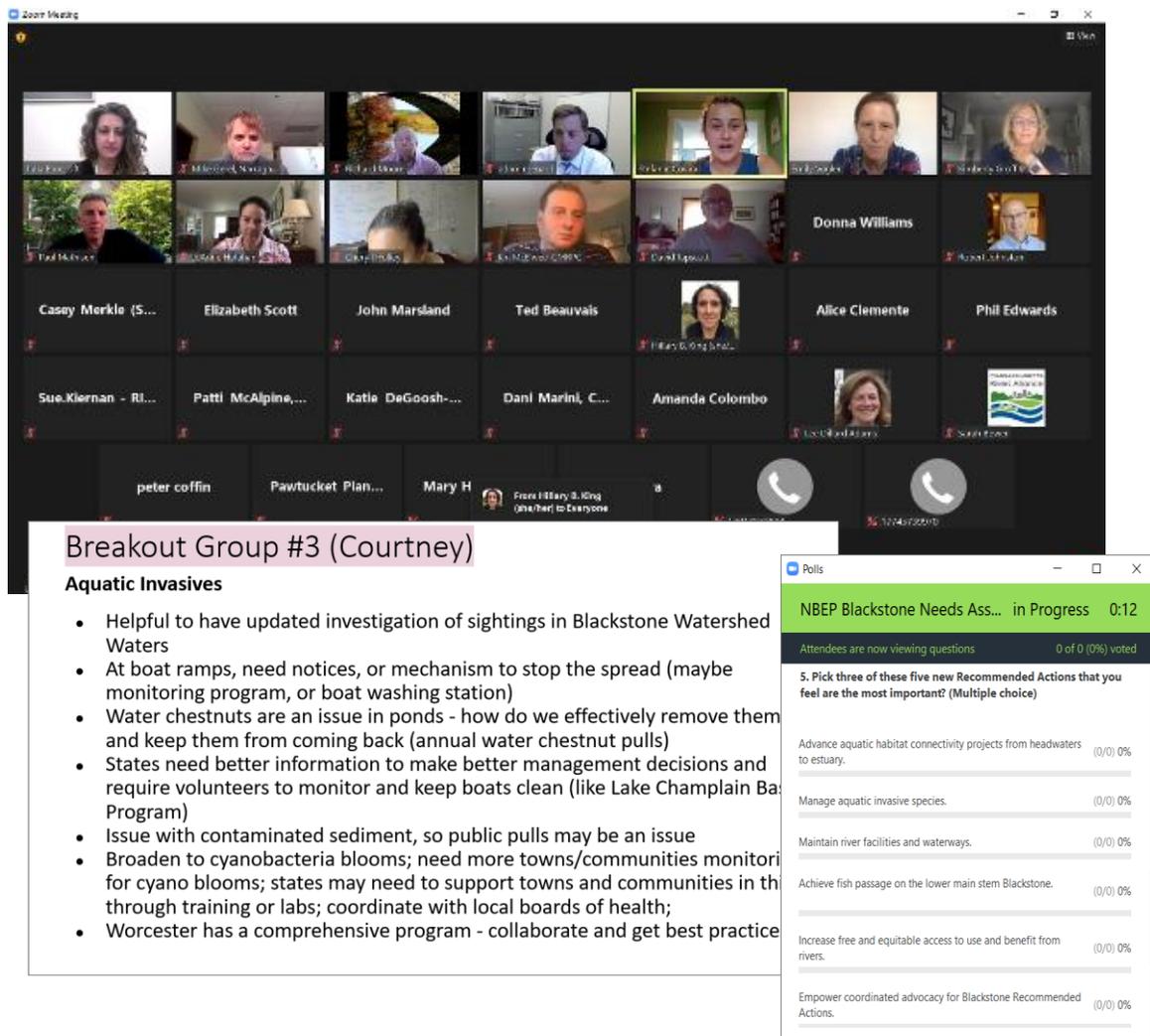
A framework was created for Meeting #4 to organize and frame the different needs and needs subject areas by the geographic scale where they predominately operate. This was done to aid needs prioritization and identification of recommended actions. Scales include watershed, town, or site level. Note that the need subject areas listed at the Watershed and Town level likely operate at both levels depending on the circumstances. Figure 11 below offers the framework with the need subject areas positioned by scale with a few example needs that fall within each subject area. Figure 15 in Section E builds upon this graphic to depict recommended actions that respond to needs.

**Figure 11: Needs Framework**



## Refinement

Based on input at Meetings #6, voting by attendees at Meeting #7, and participant review of the [Blackstone River Watershed Needs Assessment Report First Draft, March 15, 2021](#), the additional highest priority needs (that that received at least 10 votes) were identified and ranked in Figure 12. New participants joined the effort in summer 2021 that brought some new expertise and views. Note that the “Enable Nature-based Solution” need from Figure 10 was separated into two needs in Figure 12: low impact development and permanent land protection. Further, an eighth need subject area of “Advocacy” was created for Figure 12. A roll-up of all 33 high priority needs compiled in this report are provided by needs subject area in Figure 13. All needs were included to respect the input provided in March and July. While the specific votes/rankings across Figures 10 and 12 are not comparable because they represent feedback from different people at different times, together, they represent a reasonable approximation of perspectives across participants. Public comment on the Blackstone River Watershed Needs Assessment Report Final Draft, July 27, 2021 **[TBD final changes/outcomes based on comment]**. The recommended actions in Section E below will seek to respond to these needs.



The image shows a Zoom meeting interface. The main window displays a grid of 24 participant video thumbnails. Some thumbnails are labeled with names like 'Donna Williams', 'Alice Clemente', and 'Phil Edwards'. At the bottom of the Zoom window, there is a poll window titled 'NBEP Blackstone Needs Ass...' which is currently 'in Progress' and has a timer of 0:12. The poll question is: '5. Pick three of these five new Recommended Actions that you feel are the most important? (Multiple choice)'. The poll options and their current vote counts are:

Recommended Action	Count	Percentage
Advance aquatic habitat connectivity projects from headwaters to estuary.	0/0	0%
Manage aquatic invasive species.	0/0	0%
Maintain river facilities and waterways.	0/0	0%
Achieve fish passage on the lower main stem Blackstone.	0/0	0%
Increase free and equitable access to use and benefit from rivers.	0/0	0%
Empower coordinated advocacy for Blackstone Recommended Actions.	0/0	0%

Overlaid on the bottom left of the Zoom window is a document titled 'Breakout Group #3 (Courtney)'. The document contains the following text:

**Aquatic Invasives**

- Helpful to have updated investigation of sightings in Blackstone Watershed Waters
- At boat ramps, need notices, or mechanism to stop the spread (maybe monitoring program, or boat washing station)
- Water chestnuts are an issue in ponds - how do we effectively remove them and keep them from coming back (annual water chestnut pulls)
- States need better information to make better management decisions and require volunteers to monitor and keep boats clean (like Lake Champlain Boat Program)
- Issue with contaminated sediment, so public pulls may be an issue
- Broaden to cyanobacteria blooms; need more towns/communities monitoring for cyano blooms; states may need to support towns and communities in this through training or labs; coordinate with local boards of health;
- Worcester has a comprehensive program - collaborate and get best practice

**Figure 12: Additional High Priority Needs—July 2021 List**

Need Subject Area	Specific Need	Votes	Rank
Monitoring	Identify and address current and future flow-degraded areas.	17	1
Project Planning	Riverine wetland restoration strategy is outdated.	15	2
Capacity-building	Natural resource maintenance job training program.	15	3
Project Installation	Four dams on lower main stem Blackstone block fish passage.	13	3
Outreach	More meaningfully engage and better address concerns of environmental justice, indigenous, and other marginalized areas.	13	3
Advocacy	Waterways lack adequate free and equitable access.	13	3
Advocacy	More coordinated advocacy for policies that benefit watershed.	13	3
Project Installation	Aquatic invasive species (e.g., water chestnut).	12	4
Capacity-building	Lack of bridge funding to enable municipalities to protect natural areas more quickly.	12	4
Sustainable Development	Incentive/recognition program for developers “doing the right thing.”	10	5
Project Installation	Maintenance to address trees, debris, trash, sediment in waterways.	8	6
Project Planning	Target certain areas for action, including impaired waters, wetlands, habitat corridors, and historically overburdened communities.	n/a*	
Sustainable Development	Accelerate planning and installation of low impact development.	n/a*	
Sustainable Development	Accelerate execution of permanent land protection.	n/a*	

\*Voting on these needs was not completed at Meeting #7.

**Figure 13: High Priority Needs—Final List**

Need Subject Area	Specific Need
Watershed Coordination	Designated person to create and operate regional network/collaborative.
Watershed Coordination	Assist municipalities with communications.
Watershed Coordination	Acquire more and coordinated project fundraising.
Project Planning	Identify and compile project ideas.
Project Planning	Prioritize projects on an ongoing basis.
Project Planning	Outdated riverine wetland restoration strategy.
Project Installation	Culvert replacement/passage improvement from headwaters to estuary.
Project Installation	Reduce impervious surfaces.
Project Installation	Finish interstate bike path.
Project Installation	Four dams on lower main stem Blackstone block fish passage.
Project Installation	Manage aquatic invasive species (e.g., water chestnut).
Project Installation	Maintenance to address trees, debris, trash, sediment in waterways.
Capacity-building	More reliable long-term capacity funding for all entities.
Capacity-building	Greater technical assistance to municipalities.
Capacity-building	Obtain more funding for volunteer monitoring programs.
Capacity-building	More staff at municipalities.
Capacity-building	Natural resource maintenance job training program.
Sustainable Development	Accelerate local planning and installation of low impact development.
Sustainable Development	Accelerate local execution of permanent land protection.
Sustainable Development	Bridge funding to enable municipalities to protect natural areas quickly.
Sustainable Development	Pursue local ordinance reform to enable more nature-based solutions.
Sustainable Development	Incentive/recognition program for developers that “do the right thing.”
Monitoring	Increase the quality and quantity of external data sharing.
Monitoring	Monitoring that can inform local actions and decisions.
Monitoring	Address current and future flow-degraded areas.
Outreach	Release more compelling and inspiring messaging.
Outreach	Increase public awareness of watershed conditions.
Outreach	Install educational signage.
Outreach	Re-energize those who care about the Blackstone to create new champions.
Outreach	Augment existing youth education.
Outreach	More meaningfully engage and better address concerns of environmental justice, indigenous, and other overburdened areas.
Advocacy	Waterways lack adequate free and equitable access.
Advocacy	More coordinated advocacy for policies that benefit watershed.



# Recommended Actions

## E. Recommended Actions

Many of the needs identified in this report have existed for decades, if not centuries. Instead of attempting to call out means to address all needs in the Blackstone River Watershed, this section describes a suite of foundational recommended actions which, with the coordination and focus of watershed interests, can be completed within roughly the next five years. NBEP's intent was to differentiate this report from plans that can be overly ambitious, vague, and outdated by the time they are completed. To that end, based on the high priority needs in Section D, a suite of detailed recommended actions was developed that can be completed within roughly five years. This term represents a time horizon that NBEP felt was necessary to accomplish the recommendations and within which they would remain current and relevant. These actions adhere to "SMART" criteria as possible, in other words, that they are specific, measurable, attainable, relevant, and time bound. SMART criteria are intended to clarify ideas, focus efforts, use time productively, and increase chances of completing the actions.

For each action, a standard format is used to capture as much SMART information as readily available, potential action participants and funding, and an outlook for successfully executing each action (rated: Excellent, Good, Average, Fair, or Poor). Note that this information is not intended to provide a comprehensive background or description of tactics. It is offered to stimulate thinking and further work by those interested in a particular action. Moving forward, interests should continue the iterative and adaptative process used to create this report to ensure actions remain current. Note that each recommended actions seeks to address needs directly and through the lenses of climate resilience and environmental justice, two overriding issues that impact achievement of lasting ecosystem and socioeconomic health in the Blackstone. Further, the included actions are big picture or specific, operate at the watershed to the site scale, or span these specificities and scales. NBEP felt providing this mix of actions was both useful and reflective of the range of local feedback and priorities shared over the life of the Project.

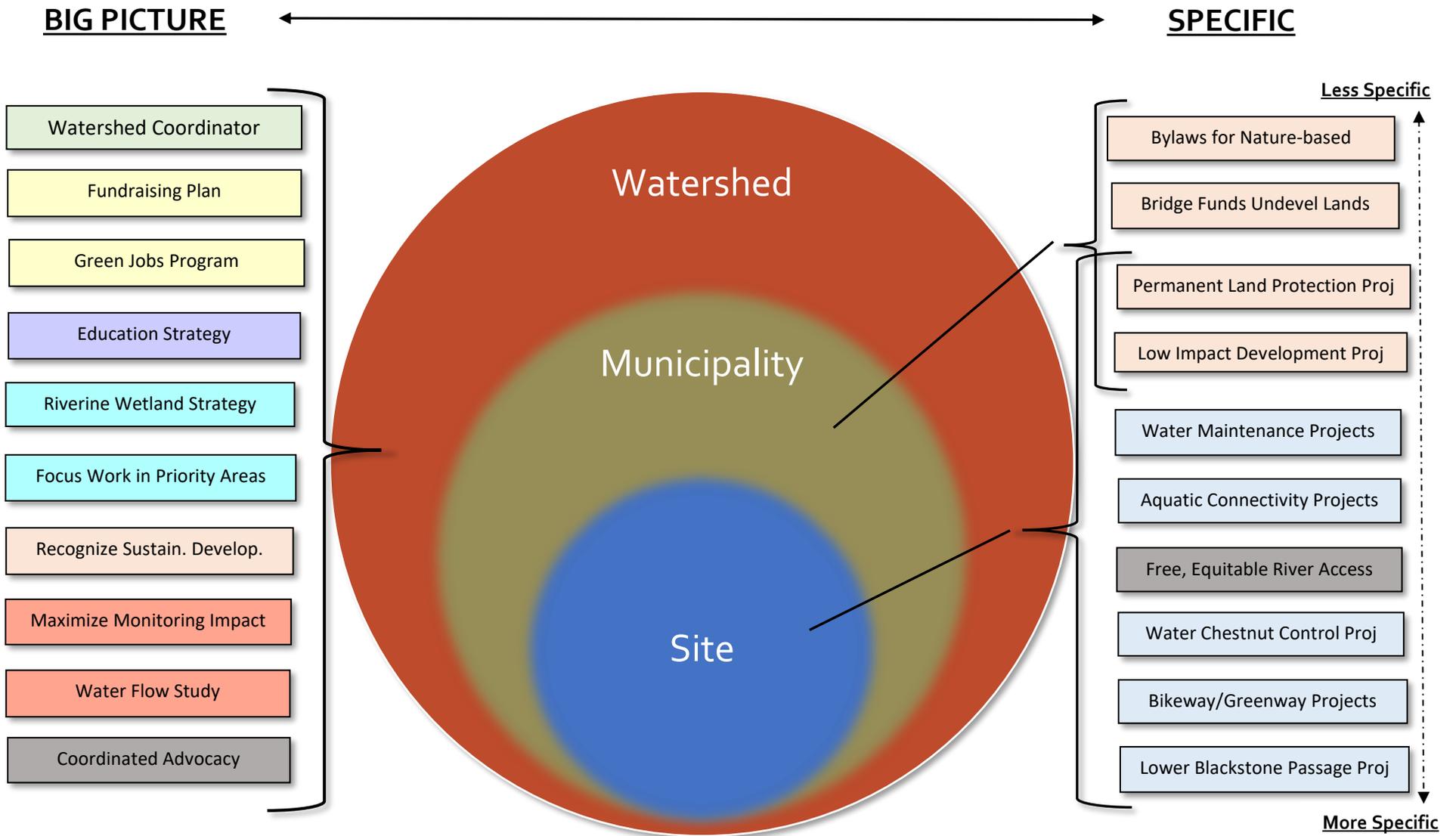
On March 15, 2021, a first draft of this report that included 12 recommended action was released for Project participant comment. Based on further participant input through July, 20 recommended actions were included in the final draft of the report released for formal public comment on July 27, 2021. Figure 14 lists the 20 actions included in this final report based on feedback from the comment period that closed on September 3, 2021. Figure 15 builds on the needs framework in Figure 11 to depict the overlapping scales (e.g., sites are nested within municipalities, which are nested within the watershed) and degree of specificity (e.g., big picture to very specific) at which the recommended actions would typically apply. While provided as means to organize and frame the actions, most of the actions could arise and/or have impact at the watershed, municipality, or site scale.

NBEP finds that implementation of these actions will deliver progress on some needs near-term, create the pre-conditions for fully addressing more involved needs down the road, and otherwise advance regional capacity, planning, projects, and policies necessary to measurably improve the health and resilience of the Blackstone and all it supports by 2026.

### Figure 14: Recommended Actions

1. Hire a Watershed Coordinator to establish and maintain a Blackstone Collaborative.
2. Develop a coordinated watershed-wide fundraising plan to increase and diversify funding coming to the watershed.
3. Establish a green jobs program with an initial focus on maintenance.
4. Create an education strategy that informs and energizes the public.
5. Develop a new wetland restoration strategy for the Blackstone.
6. Target projects that meet specific criteria for coordinated action at watershed scale.
7. Maximize effectiveness of existing monitoring programs to influence action.
8. Study surface water to identify existing and future flow-challenged areas.
9. Update local regulations that enable implementation of nature-based solutions.
10. Create bridge funding program to help municipalities more quickly protect undeveloped lands.
11. Increase support for permanent land protection.
12. Increase support for planning for and installation of low impact development practices.
13. Accelerate management of water chestnut to support habitat and recreation.
14. Create the pre-conditions for achieving fish passage on the four dams on the lower main stem Blackstone.
15. Advance aquatic connectively projects from headwaters to estuary.
16. Complete new sections of the Blackstone River Bikeway/Greenway.
17. Increase maintenance of waterway for wildlife, recreation, and safety.
18. Create program to recognize developers and communities that execute sustainable development.
19. Increase free and equitable access to use and benefit from waterways.
20. Pursue coordinated advocacy to advance these recommended actions.

Figure 15: Recommended Action Matrix



# 1

## Hire a Watershed Coordinator to establish and maintain a Blackstone Collaborative.

*Subject Area Need:* Watershed Coordination

*Primary Scale:* Watershed

*Short Description:* Hire a Blackstone Watershed Coordinator to create and operate a “Blackstone Collaborative” that will drive pursuit of these recommended actions.

*Implementation Timeline:* October 2021—September 2026.

*Justification:* Partners across the Blackstone have made incredible progress improving the health of the Blackstone over the last 50 years. However, too little human capacity has increasing necessitated a reactive, triage-based approach focused on addressing permit requirements or emergent problems (e.g., visible pollution, nuisance flooding, closed recreation areas). State, municipal, and nongovernmental organizations (NGO) staff are chronically over-booked, many leaders in the volunteer network are retiring, and new “local champions” are not materializing fast-enough. Further, most coordination is hyper-local, with planning and projects at the municipality or site scale, knowledge-sharing typically informal and occurring post-project, and too little funding coming into the region from the outside. Discussions and goals in regional plans have been broader and more aspirational in nature. A new approach is needed as the watershed looks toward the 50<sup>th</sup> Anniversary of Zap the Blackstone in 2022.

Literature and experience over the last decade show that a collaborative, holistic approach is the best means to undertake and sustain restoration of large landscapes like the Blackstone (Bixler, 2016; Imperial et al, 2016; Sabatier et al, 2005; Santa Cruz Mountain Stewardship Network, 2017; Sawyer, 2016; Scarlett, 2016; Sonoran Institute, 2012; Wyborn et al, 2013). Two local examples of regional networks that pursue this approach are the Resilient Taunton Watershed Network (RTWN) (<https://srpedd.org/comprehensive-planning/environment/watershed-planning/resilient-taunton-watershed-network-rtwn/>) and the Resilient Mystic Collaborative (<https://mysticriver.org/climate-resilience>) were presented at Meeting #3 of this Project. Thus, a pivotal next step for the Blackstone is securing funding and an in-watershed entity willing to hire a Watershed Coordinator. This person is expected to expand on the work of the Project by forming a new Blackstone Collaborative by the end of 2021 to offer new capacity, tools, and momentum for pursuing the recommended actions in this report and others to be developed. The hire would ideally be from the area, well-versed in local issues, and trusted by watershed interests. This action is listed first as it was unanimously supported by Project participants and is the precursor to addressing most high priority needs in Figure 13 and corresponding actions in Figure 14. The right person, funding, and nurturing can accomplish a lot. In sum, the combination of a dedicated person and a future collaborative working from the watershed scale is viewed as the single best pathway to implementing the finding of this report.

*Lead:* Clark University.

Outputs: 5 years of funding for an FTE new Blackstone Watershed Coordinator hire, formation of a Blackstone Collaborative or equivalent entity, 24 meetings (every month) and materials, and measurable advancement of recommended actions called for in this report and others conceived by the future Blackstone Collaborative

Outcomes: More new relationships, communication of success and technology transfer, simple and actionable plans and strategies, standardized tools, cooperative fundraising, purpose-driven monitoring, and inspiring messaging that attracts new advocates, more funding coming to watershed, educated decision-makers, new programs and policies that support completion of recommended actions.

Cost: ~\$500,000 to cover five years of salary and overhead.

Funding Ideas: NBEP and Clark University have secured funding for Year 1 of this position. The SNEP Network is also discussing funding this position. For Year 2 and beyond, the various SNEP funding programs, MADER's Partnership Program, local community foundations, and major donors that reside or vacation in the watershed are all viable options. For example, The Restore America's Estuaries has funded RTWN with SNEP funds for several years. The expectation is that by Year 2 the Watershed Coordinator, with the support of the future Blackstone Collaborative, would obtain funds to sustain the position moving forward. Note that other funding ideas may arise from the plan envisioned under Recommended Action 2 of this report.

Outlook: **EXCELLENT.** NBEP used a competitive process to award \$95,000 to Clark University on May 19, 2021 to help fund this position. Clark is providing the remainder of the funding to cover Year 1. A candidate has been selected and is expected to start in September 2021. Fundraising is ongoing to secure Year 2 and to otherwise make this position largely self-sustaining. With meaningful contributions by the Watershed Coordinator, s/he's own fundraising work, and support of Project participants, the outlook for securing funding for the entire five year implementation period of this plan is excellent.

# 2

## Develop a coordinated fundraising plan to increase and diversify funding coming to the watershed.

Subject Area Need: Capacity-building

Primary Scale: Watershed

Short Description: Create a simple plan to guide cooperative and coordinated fundraising that includes a list of funding sources, when applications are due, what actions are to be funded, and which organization(s)/people will compose and submit applications.

Implementation Timeline: October 2021-April 2022.

Justification: The biggest need for virtually all watershed restoration efforts is more funding. To do the job well, adequate funding is required for staff and overhead, planning, project installation, monitoring, enforcement, adaptive management, and other tasks. Supporting necessary municipal and NGO staff and fully funding the existing Voluntary Water Quality Monitoring Program are long-standing local priorities. Balancing need and what is realistically attainable must remain a key consideration. The term 'investment' is most accurate as funding conservation work has been repeatedly documented that the cost to prevent environmental and community degradation is vastly cheaper than repairing or remediating it. Yet, just saying more investment is needed without a realistic plan for attaining it is of little use. A simple tabular plan is suggested that offers a matrix of needs, funding options, and partner leads, which will not take significant time to complete and update. The goal is to spend less time planning to fundraise, and more time fundraising.

In terms of roles, NGOs would likely take the lead in calling out future funding sources, municipalities would identify on-the-ground project ideas, municipalities and NGOs would develop reasonable new capacity goals, and the Watershed Coordinator would collaborate with a subset of interests with experience and the ability to fundraise to draft the plan and proposals and seek support from local officials and/or the community.

Establishing a "ready-response" committee that can efficiently get more proposals submitted would also be prudent. The world of options should be considered, ranging from existing private and public grants that offer smaller short-term investment to address immediate needs to new law, bonds, or municipal enterprise funds/utility fees that can bring in substantial sustaining investment to support longer-term endeavors.

Recommended Action #10 (Bridge Funding for Undeveloped Lands) discusses a new funding for municipalities to quickly protect undeveloped lands vulnerable to development.

Potential Participants: Blackstone Watershed Coordinator, Blackstone River Coalition, Blackstone River Valley National Heritage Corridor, Central Massachusetts Regional Planning Commission, Clark University, Mass Audubon, Massachusetts Rivers Alliance, Save The Bay, and The Nature Conservancy, Blackstone Collaborative (*when established*).

Outputs: Fundraising plan.

Outcomes: Simpler and proactive process for pursuing funding opportunities, strong relationships with funders, and more investment in the watershed.

Cost: In-kind time from potential leads.

Funding Ideas: No outside funding is necessary. Local interests will cooperatively develop, implement, and update this plan.

Outlook: **EXCELLENT.** The demonstrated need, motivation, and funding being left on the table that could come to the watershed makes crafting of the simple, adaptable plan mentioned here a priority action for all who care for the watershed.

# 3

## Establish green jobs program with an initial focus on maintenance.

*Subject Area Need:* Capacity-building

*Primary Scale:* Watershed

*Short Description:* Establish a new green jobs program with an initial focus on maintenance of nature-based solutions.

*Completion Timeline:* January 2023—December 2026.

*Justification:* Most nature-based solutions require ongoing maintenance on both public and private lands to ensure they work as promised for their design life. The terms 'nature-based solutions' and 'green infrastructure' are used interchangeably in some circles. The Nature Conservancy defines nature-based solutions as the sustainable management and use of nature for tackling challenges such as climate change, water and food security, biodiversity protection, human health, and disaster risk management (The Nature Conservancy, 2021). For the purposes of this report, nature-based solutions are divided into two types: low impact development (LID) practices at the site level and land protection at a larger scale (but neither exclusively operate at each scale). Bioretention areas, rain barrels, filter strips, vegetated outfalls, tree boxes, soil amendments, pervious pavers, preservation of existing green space, and land protection are examples. These practices require emptying, watering, weeding, or replacement; sediment and trash removal; and/or inspection to ensure they are still present, effective, and safe. As more of these practices are installed, necessary plans, trained staff, equipment, and dedicated funding for maintenance are falling behind need. While some communities require maintenance funding upfront from developers via a bond, this is historically not a common practice for nature-based solutions. Most of the maintenance typically falls to municipal public works programs or private landowners, who may not have the knowledge, time, authority, and/or funding to assure they are maintained. In the Blackstone, peer-to-peer training of public work staff by nature-based solutions manufacturers and installers (Devens, MA used this model) and education programs for private landowners (Mass Audubon's Shaping Climate Resilient Communities program: [www.massaudubon.org/our-conservation-work/advocacy/shaping-climate-resilient-communities](http://www.massaudubon.org/our-conservation-work/advocacy/shaping-climate-resilient-communities)) have been successful in this space. The fundamental limiting factor to maintenance of green practices appears to be trained and funded staff.

Creating a green jobs program that offers specialized training for people to provide these services to public and private landowners on their own or as a component of existing landscaping, street cleaning, waste removal, and/or similar businesses would be fruitful. The National Green Infrastructure Certification (NGIC) program offers a model to follow ([www.ecolandscaping.org/event/class-ngicp-december-2020/](http://www.ecolandscaping.org/event/class-ngicp-december-2020/)). Such training could be offered by practice manufacturers and built into existing municipal, community colleges, or vocational school curricula. Municipalities, developers, practice manufacturers, and businesses that would benefit from such a program could help with funding via a range of mechanisms. Note that it will be crucial that municipalities require and enforce maintenance standards to maintain sufficient demand for this type of program.

A pilot program in a municipality would be wise before thinking about expanding watershed wide. Once established, the job program could expand to include other areas that require similar skills and deliver similar community benefits (e.g., erosion and sediment control inspection and repair, waterway maintenance, aquatic plant species removal, debris disposal, composting, recycling). Further, a career pathways program, which offers summer jobs as part of a “Green Team,” should be considered to launch and sustain future workers in the field of natural resources.

Potential Participants: Municipal governments, green-oriented builders, nature-based solution manufacturers and installers, landscaping businesses, educational institutions, Groundwork RI/MA, Blackstone Collaborative (when established).

Outputs: Nature-based solutions maintenance curriculum, trainers and training hosts, agreement between municipalities and service providers, 5 new jobs created and sustained for the completion timeline.

Outcomes: More effective stormwater quality and quantity management by existing nature-based solutions, expanded application of these practices, new jobs, new relationships across municipalities, maintenance providers, and educational institutions.

Cost: ~\$25,000 for pilot in a single municipality; \$100,000 to expand.

Funding Ideas: State, federal, and foundation grants at the outset, followed by more sustaining support from municipal stormwater fees or similar.

Outlook: **GOOD.** There was very strong support for this action among Project participants. The initial barrier is seed funding to start-up such a new initiative. Next, ensuring maintenance requirements are in place is vital to sustaining any funding, jobs, or businesses tied to the work. Finally, a sustainable source, including stormwater fees (perhaps based on amount impervious surface) could be used to support staffing to operate such program long term. Cross-training for other maintenance would also be beneficial. The outlook is likely stronger if it pairs a municipality that has had success with nature-based solutions with a tech transfer effort by a future Blackstone Collaborative to share results, case studies, and ideas for funding and adapting the program for a broader roll-out.

# 4

## Create an education strategy to engage new watershed advocates.

Subject Area Need: Outreach

Scale: Watershed

Short Description: Develop an inspiring new communications campaign to engage, inform, and energize new watershed advocates.

Implementation Timeline: January 2022—July 2022.

Justification: Over the years there have been many successful watershed-wide programs, education campaigns, and designations that built knowledge about, publicly celebrated, and spawned advocates for the Blackstone. Some notable efforts include the following:

- Zap the Blackstone in 1972 (<https://youtu.be/dpYtjdfAYro>).
- Blackstone designation as a National Heritage Corridor in 1986
- Blackstone Valley Tourism Council launched the Explorer 1993 and began River Classroom in 1994.
- Blackstone designated an American Heritage River in 1998.
- Expedition 2000 took place in 2000.
- Initiation of the Blackstone River Coalition’s “Fishable/Swimmable Campaign” in 2003.
- Great American Clean-up that led to creation of Keep Blackstone Valley Beautiful and its national certification in 2008.
- Initiative of Blackstone River Coalition’s *Clean by 2015* in 2008.
- Creation of the Blackstone Valley National Historical Park in 2014.

Education can stimulate increased understanding of what individuals stand to gain from a healthy watershed (whether it be as a source of drinking water, livelihood, recreation, or cultural identity) and how it may impact them negatively if not managed (e.g., lack of enough clean water, heat and flooding due to climate change, swimming and fishing prohibition). It can also cultivate local champions, more knowledgeable local officials, and new programs and investment in watershed health. In fact, based on initial prioritization completed for this Project in March 2021 the need “release of compelling and inspiring messaging” received nearly twice as many votes as any other, showing that educating the public is of highest priority.

The first draft of this report included three recommended actions related to education, including creating a communications strategy, expanding youth education, and growing signage. Consistent input on the first draft was to roll-up all education-related action into a simple watershed-wide education strategy that identifies gaps and strategic improvements to address them. Such a strategy would include specific objectives and the corresponding audience (e.g., youth, developers, elected officials were most noted), communications channels (e.g., field trips, workshops, tabling at local events, on-line), media (e.g., fact sheets, case studies,

curricula, signage, water quality reports, art installations, press releases, swag, social media), timing (day, weekend), expected outputs and outcomes, and a lead educator(s). A compelling message, underlain by a signature new campaign, project, and/or slogan that ties the plan together would be beneficial, especially to reach new audiences that are stuck in old patterns of viewing the land, water, and environment as solely a good to utilize. Such messaging should be concise and powerful, connecting to people's values, life experience and sense of place, celebrates the Blackstone's past successes, and designed to inspire actions that can leave a healthier place for the next generation.

*Potential Participants:* Blackstone Watershed Coordinator, US National Park Service, state and local environmental/historic resource, transportation, recreation departments, Blackstone Valley National Heritage Corridor, Blackstone Valley Tourism Council, Keep Blackstone Valley Beautiful, Groundwork Rhode Island, Tower Hill Botanical Gardens, Worcester Tree Initiative, Massachusetts Environmental Education Society, Rhode Island Environmental Education Association, local outdoors businesses, Blackstone Collaborative (*when established*).

*Outputs:* Education Strategy, with new signature projects(s), messaging and communicators.

*Outcomes:* More awareness of the value of healthy natural resources and greater sense of place that creates new watershed advocates and investment in the region.

*Cost:* In-kind time of Blackstone Watershed Coordinator to develop strategy; \$25,000 for sign materials, communication/design consulting, and/or media printing.

*Funding Ideas:* Grants from public sources and private foundations, donations from outdoors businesses, and in-kind time from consultants, design schools, and partners with expertise for communications events and materials; in-kind time from transportation departments for sign materials and installation in the right-of-way.

*Outlook:* **EXCELLENT.** There is an opportunity with the 50-year anniversary of Zap the Blackstone in 2022 to develop a campaign as a "re-call to action" for the next five decades of work on the river. With the passion for education shared by Project participants and the next-in-a-generation nature of this effort, this action is sure to draw volunteers and funders to make it happen. Specific tactics favored by participants included highly visible signage (see Specifications—Blackstone Environmental Graphics Program [Blackstone River Valley National Heritage Corridor, 2022]), peer-to-peer training and case studies for developers, creative "call to action" media (e.g., bumper stickers, t-shirts, short videos for social media), and standard curricula that can be deployed. Signs at river/watershed crossing and public recreation spots are especially good at passively conveying complex information simply and repeatedly to many people. With continuing urbanization in the watershed, youth and land developers are viewed as key audiences. Noted as strong examples to emulate were peer-to-peer training for developers in Devens, MA and the NGIC program noted in Recommended Action #3, local youth education such as that offered by Blackstone groups (e.g., Blackstone River Watershed Association's "Water and Us" program [[www.thebrwa.org/education.htm](http://www.thebrwa.org/education.htm)], RIDEM ([www.dem.ri.gov/learning/](http://www.dem.ri.gov/learning/)), Groundwork RI's (<https://groundworkri.org/>), and Massachusetts Environmental Education Society (<http://massmees.org/>). Further, reaching into overburdened communities (e.g., Woonasquatucket River Watershed's "New Voices at the Water Table" program: <https://www.provcomlib.org/news-events/calendar/2020/new-voices-water-table-nuevas-voces-en-la-capafre%C3%A1tica>) was noted as a priority based on the proximity of these areas to the river system and disproportionate impact they feel from environmental degradation.

# 5

## Develop a new riverine wetland restoration strategy for the Blackstone.

Subject Area Need: Monitoring

Scale: Watershed

Short Description: Develop a new riverine wetland restoration strategy for the watershed.

Completion Timeline: January 2023—December 2023.

Justification: One key limiting factors for water quality in the Blackstone River system is the lack of riverine wetlands. The majority were removed by historic filling. Healthy wetlands act to filter pollutants, help attenuate flooding, and provide specialized habitat for aquatic and terrestrial life. To identify the location of historic riverine wetlands that have restoration potential the Army Corps of Engineers studied the main stem Blackstone River and the State of Massachusetts evaluated the Upper Blackstone River Watershed (USACOE, 1994; MAEOEEA, 2003). The Blackstone would greatly benefit from an updated strategy that prioritized potential areas for wetland restoration and protection. Such a strategy could build on and consider lessons learned from past work, identify and prioritize current options, and include as much specific actionable information as funding allows, including locations and required studies, design materials, permits, and costs. Such a strategy could be used to influence local development/open space planning and approvals, selection of wetland restoration and protection projects, and the success of bringing in funding for wetland projects.

Potential Participants: US Army Corp of Engineers, USDA Natural Resources Conservation Service, Massachusetts Division of Ecological Restoration, RIDEM, Blackstone River Valley National Heritage Corridor.

Outputs: New Blackstone riverine wetland restoration strategy.

Outcomes: More riverine wetlands restored and protected, more funding for wetland restoration coming to basin, improved water quality, new riverine habitat.

Cost: [Cost TBD based on comment]

Funding Ideas: In-kind time of federal, state, and NGO staff; start-up funding from a public grant to stimulate effort.

Outlook: **AVERAGE.** Some potential reasons the existing plans are 20 years old are short government staffing and funders preference for project implementation over project planning. A pilot that focuses on a section of the watershed expected to harbor many ready projects may be an option. Outreach and advocacy before agency heads and elected officials described further under Recommended Action #20 will be important to securing the funds and staff commitments needed to complete a new strategy.

# 6

## Target projects that meet specific criteria for coordinated action at the watershed scale.

Subject Area Need: Project Planning

Scale: Watershed

Short Description: Target priority project types and geographies for coordinated action at the watershed scale.

Timeline: October 2021—September 2026.

Justification: Watershed restoration project selection tends to be reactive to opportunity, expediency, funding, or the loudest voice. Determining the next project to pursue can be challenging when faced with disconnected and ever-changing factors, such as regulatory requirements, funding shortages, funder constraints, emergent problems, and politics. More systematic, informed approaches that vet and select potential projects against a set of standardized criteria has a better chance of meeting desired goals. Prioritization already takes place to varying degrees at the municipal (e.g., master, open space, hazard plans), project type (e.g., local stormwater, statewide culvert removal), and species levels (e.g., wildlife stock and endangered species planning). Existing prioritization tools operating at the watershed level can be exceptionally complex, costly, data heavy, and of questionable utility when resources are already very tight and necessity, not tools, are mostly driving project selection. These sentiments were almost universally shared when creation of a new project prioritization tool for the Blackstone River Watershed was proposed in the draft of this report. Instead, project participants supported—as a watershed community—identifying a reasonably narrow list of priority project qualities and geographies, or “priority criteria,” that would be advanced if pursued at the watershed scale. Priority project qualities included those that offer multiple benefits (e.g., environmental, economic, educational, cultural) or are strongly supported by the public (e.g., public access, public health). Priority geographies included impaired waterways, important habitats (e.g., wetlands, climate-vulnerable areas), overburdened communities (e.g., Environmental Justice, historically untapped), and locations already prioritized locally. The most likely coordinated actions would be fundraising, permitting, and monitoring at scale.

Potential Participants: Blackstone Watershed Coordinator, Central Massachusetts Regional Planning Commission, government agencies, Blackstone Collaborative (*when established*).

Outputs: Document that lists priority project criteria, 10 watershed scale grants submitted for targets.

Outcomes: More and new funding to watershed, implementation of more projects that meet criteria.

Cost: In-kind time from the Blackstone Watershed Coordinator, regional planning staff, and other members of a future Blackstone Collaborative.

*Funding Ideas:* Funding sources noted in Recommendation #1 for the Blackstone Watershed Coordinator and existing staff capacity funding used by regional planning entities.

*Outlook:* **EXCELLENT.** It will be relatively straightforward to develop a list of priority criteria for targeting efforts from the watershed perspective. The main consideration will be whether these criteria impact project selection or aid fundraising. Picking the right criteria, committing to them, and selling the importance of completing qualifying projects will be essential for this effort to be additive long-term.

# 7

## Maximize effectiveness of existing monitoring programs to influence action.

Subject Area Need: Monitoring

Scale: Watershed

Short Description: Maximize effectiveness of existing monitoring programs to influence actions that advance local water quality goals.

Implementation Timeline: September 2021—September 2026.

Justification: The Blackstone River Coalition has coordinated a Volunteer Water Quality Monitoring Program on the main stem and major tributaries since 2003, which includes a network of 75 sites and over 100 volunteers. The Blackstone Headwaters Coalition, the Blackstone River Watershed Association, and the Blackstone River Watershed Council each sponsor a monitoring team. Data is collected on aesthetics, water/air temperature, dissolved oxygen (DO), turbidity, conductivity, nitrate, orthophosphate, and bacteria. Select information is summarized in an annual Blackstone Watershed Water Quality Report Card. Mass Audubon also created an interactive on-line map that allows users to view sampling locations and monitoring data from 2004-2008 ([http://zaptheblackstone.org/interactive\\_map/index.php](http://zaptheblackstone.org/interactive_map/index.php)), with remaining data held by the sponsoring organizations. Additionally, wastewater treatment operators [Upper Blackstone Clean Water](#) and the [Narragansett Bay Commission](#) conduct monitoring for pollutants like nutrients, chlorophyll a, temperature, and dissolved oxygen on the river to assess the system's response to facility upgrades. (See this link for information on Upper Blackstone Clean Water's 2019 efforts: <https://storymaps.arcgis.com/stories/d18fd5872f8e4fb7b358668969fd2348>). Local river and community groups also conduct ad hoc monitoring and trash clean-ups in waterways across the watershed.

When it comes to the Volunteer Water Quality Monitoring Program specifically, Project participants consistently stated that it remains a valuable effort that has evolved from a regularly funded program to one that scrambles for funds and staffing to stay operative. Further, state water quality staff have noted that this program needs to update its Quality Assurance Project Plan (QAPP), improve documentation and organization of data. A proposal included in the first draft of this report to create a "data hub" to manage data collected in the region was viewed by commentators as premature based on the issues noted above. It is suggested here that the Blackstone Watershed Coordinator lead a discussion among those collecting water quality data in the region that takes a step back and systematically considers the objectives of data collection, evaluates data currently collected, and then drafts a program document that aligns monitoring procedure to address shortcomings/gaps to best meet objectives. Five potential objectives based on past discussions include:

- Solidify the funding and capacity of the Volunteer Water Quality Program,
- Statistically analyze existing volunteer data to detect trends and inform further work,
- Improve the scientific rigor of data collected,

- More coordination and integration between the volunteer program and others collecting data, and
- Target and coordinate monitoring to maximize its ability to influence decisions and alert people to hazards. Targets could include areas with existing water quality problems, areas downstream of conservation practice installation to document improvements, and or priority areas arising from Recommended Action #6.

Potential Participants: Blackstone Watershed Coordinator, Blackstone River Coalition-coordinated Volunteer Water Quality Monitoring Program, Narragansett Bay Commission, Upper Blackstone Clean Water, Massachusetts Department of Environmental Protection (Mass DEP), RIDEM, river and community-based groups, Blackstone Collaborative (*when established*).

Outputs: Several meetings to discuss monitoring approach, amended purpose-driven monitoring approach, and updated QAPP and funding proposals for the Voluntary Water Quality Monitoring Program.

Outcomes: Water quality data collected in the watershed is further documented and able to influence decisions and actions.

Cost: In-kind time of potential leads.

Funding Ideas: To stabilize and secure the Volunteer Water Quality Program, a future Blackstone Collaborative could cooperate to pursue federal/state grants community foundations, partnerships with wastewater treatment plants, and support from river-reliant businesses.

Outlook: **GOOD.** The Voluntary Water Quality Monitoring Program and efforts by wastewater treatment plants in the region remain robust and useful. It is not uncommon for volunteer monitoring programs to find themselves short of funding and disconnected from clear end goals for their hard work. However, based on the long history of these monitoring efforts, strong support from local champions, and the promise of new collective fundraising via a future Blackstone Collaborative, the chance of drafting and implementing a more coordinated and purpose-driven approach are high.

# 8

## Study surface waters to identify existing and future flow-challenged areas.

Subject Area Need: Monitoring

Scale: Watershed

Short Description: Study surface water flows to identify current and future flow/supply-challenged area.

Implementation Timeline: January 2024-December 2026.

Justification: Ensuring sufficient water quantity to meet designated uses is vital for any watershed and its communities. Water used for domestic water supply, protection and propagation of fish, shellfish, and wildlife, recreation, and agricultural, industrial, and navigational purposes are “designated uses” under the Federal Clean Water Act. The states of Rhode Island and Massachusetts encode similar designated uses for surface water, and also specifies uses for fish consumption, hydropower, and aesthetics. Further, both states authorize surface water withdrawals for certain uses above specified thresholds. The Massachusetts Sustainable Water Management Initiative (SWMI) brought a new focus to water withdrawals beginning nearly a decade ago in that part of the watershed. The Federal Energy Regulatory Commission’s (FERC) manages river flows as part of the permitting process for hydropower-generating dams. With climate change driving more frequent and extreme drought and flooding, urbanization increasing population, and new hydropower planned for the region, ensuring the amount, rate, quality, and timing of water for designated uses is important. Existing supply/flow-degraded areas, needs to meet designated uses, and planned withdrawals and flow alterations and their impacts are not well known or studied in the Blackstone. Project participants supported a study to identify current and potential flow-degraded areas under climate change, anticipate water supply, withdrawals, and alterations, and explore alternatives that comply with regulatory requirements and best meet needs.

Potential Participants: Massachusetts Executive Office of Energy and Environmental Affairs (MAEOEEA), RIDEM, FERC, US Army Corp of Engineers, US Fish and Wildlife Service, Massachusetts River Alliance, regional and local planning agencies.

Outputs: Water supply study for Blackstone River system.

Outcomes: Better knowledge of current and future water supplies and needs.

Cost: In-kind time of government and NGO staff.

Funding Ideas: Public and private grants to support NGO and planning agency involvement.

Outlook: **GOOD.** Completing this study is important to state agencies and local river advocates. Ensuring sufficient qualified staff time to pursue this work is included in state budgets is paramount for the success of this study. This action is planned for later in the five-year active life of this report to allow time for government and NGOs to assure such commitments are in place.

# 9

## Update local regulations that enable implementation of nature-based solutions.

*Subject Area Need:* Sustainable Development

*Scale:* Municipality

*Short Description:* Create a standardized list of local ordinances, bylaws, and guidance that enable use of nature-based solutions and assist municipalities with necessary revisions.

*Implementation Timeline:* September 2021—September 2026.

*Justification:* Nature-based solutions use natural systems, mimic natural processes, or work in tandem with traditional approaches to address natural hazards like flooding, erosion, drought, and heat islands (The Nature Conservancy, 2020). Awareness of their utility is growing, especially with climate change, and many municipalities have installed nature-based solutions, demonstrating their effectiveness in terms of site feasibility, performance, and life-cycle cost. As noted in Recommended Action #3, nature-based solutions are broken down into installation of LID and permanent land protection in this report. In Massachusetts, municipalities with municipal separate storm sewer (MS<sub>4</sub>) permits were required to review regulations by June 2021 to assure compliance with state policy, including installing LID to the maximum extent practicable. In Rhode Island, LID has been adopted as state policy, is integrated into existing MS<sub>4</sub> permits to the maximum extent practical, and is a required element of the state stormwater design manual. In the Blackstone, presentations during Project meetings described successful implementation of these practices in Millbury, Devens, and Framingham, Massachusetts. Barriers to local adoption of nature-based solutions do exist, including lack of authorization or legal constraints in municipal ordinances and bylaws (“regulations”). Regulations including zoning, subdivision, site plan review, subdivision, erosion and sediment control, flooding, open space, buffers, illicit discharges, source waters protection, water reuse, solar siting, and others that may be outside environmental/land use realm can impact the use nature-based solutions. Regulations specifically designed to address climate resilience are also being adopted (a useful example from Colorado: <https://planningforhazards.com/models-and-commentary>).

Experience has shown that it will be easier for municipalities to make necessary changes if they start with a pre-written set of model regulations that can be adapted as necessary and presented to decision-makers. The Blackstone Watershed Coordinator could work with a future Blackstone Collaborative to come up with a list of regulations that typically impact the ability to use nature-based solutions and craft models for each. EPA provides some guidance and example regulations from around the nation here: [https://19january2017snapshot.epa.gov/nps/urban-runoff-model-ordinances-prevent-and-control-nonpoint-source-pollution\\_.html](https://19january2017snapshot.epa.gov/nps/urban-runoff-model-ordinances-prevent-and-control-nonpoint-source-pollution_.html). Further, Mass Audubon’s Shaping the Future of Your Community Program provides an Excel-based Bylaw Review Tool ([www.massaudubon.org/our-conservation-work/advocacy/shaping-the-future-of-your-community/publications-community-resources/bylaw-review](http://www.massaudubon.org/our-conservation-work/advocacy/shaping-the-future-of-your-community/publications-community-resources/bylaw-review)). Free assistance is also available from Massachusetts regional planning commissions/councils and University of Rhode Island Nonpoint Education for Municipal Officials (NEMO) program (<https://web.uri.edu/nemo/>). There are also grant

programs that can pay for this regulation updates like the MAEOEEA Planning Assistance Grants ([www.mass.gov/service-details/planning-assistance-grants](http://www.mass.gov/service-details/planning-assistance-grants)), MAEOEEA Municipal Vulnerability Preparedness (MVP) Program action grants (<https://resilientma.org/mvp/>), and the SNEP Network. Additionally, offering technical assistance to municipalities that have fully adopted nature-based solutions to assist proper execution.

Based on their demonstrated effectiveness, ability/necessity to meet regulatory requirements, availability of technical and financial support, and the development and climate-related challenges facing the Blackstone, creating the conditions for greater implementation of nature-based solutions is a priority at this time.

*Potential Participants:* Blackstone Watershed Coordinator, municipalities regularly using nature-based solutions, Rhode Island Green Infrastructure Coalition, The Nature Conservancy, Mass Audubon, Audubon Society of Rhode Island, Central Massachusetts Regional Planning Commission, Metropolitan Area Planning Council, local river groups, Blackstone Collaborative (*when established*).

*Outputs:* Suite of example regulations necessary to fully enable nature-based solutions, short case studies from other communities, canned presentations for elected officials, 5 sets of regulations updated.

*Outcomes:* More municipalities adopt and enforce use of nature-based solutions.

*Cost:* In-kind staff time from potential participants.

*Funding Ideas:* Existing funding programs utilized by potential leads to support their staff.

*Outlook:* **GOOD.** The outlook for achieving this action is very positive with implementation of nature-based solutions successfully occurring in the region, well-established programs in place that offer technical and financial support for regulation review and revision, and a passion for these approaches in Southern New England. However, revising regulations and attendant documents is not an easy task. It takes time for municipal planning staff to draft revisions and build acceptance in their departments. It also takes the right mix of education and advocacy to urge local officials that approve them, and other municipal departments embrace them. Thus, the model ordinances, cases studies, and presentations listed as outputs above are key to aid the process. For example, using specific case studies that compare traditional structural and nature-based solutions (including documented effectiveness and life-cycle costs) will be key to building support among developers and local public works departments that are constantly balancing effectiveness, time, and cost. Direct advocacy to decision-makers by local NGOs and river champions to drive greater adoption and compliance with nature-based requirements will also be vital to assure the time and effort to change regulations is worthwhile. Recommended Actions #4 (Education Plan), #10 (Bridge Funding for Undeveloped Lands), #11 (Permanent Land Protection), #12 (LID Installation), and #20 (Advocacy) in this align with this action.

# 10

## Create bridge funding program to help municipalities more quickly protect undeveloped lands.

Subject Area Need: Sustainable Development

Scale: Municipality

Short Description: Support a bridge funding program to enable municipalities to quickly protect undeveloped lands that are vulnerable to development.

Implementation Timeline: January 2022 – December 31, 2026.

Justification: Protection of forest, farms, and open spaces (“undeveloped lands”) offers a wide range of co-benefits. These lands support clean water, wildlife habitat, food and fiber, recreation, and rural character. Most high-quality water and habitats are generated by undisturbed lands. Care for these lands is especially important in the headwaters of watersheds where water resources for the watershed begin their journey to the estuary. Many municipalities have plans and policies in place designed to preserve these lands and community partners in place to assist the effort. The federal and state government offer a variety of programs that offer tax breaks for landowners willing to keep their land undeveloped. Under the Chapter 61 program in Massachusetts, if enrolled undeveloped lands are to be sold or converted to residential, commercial, or industrial use, municipalities have the “right of first refusal” to purchase the land and maintain the undeveloped condition (<https://www.mass.gov/service-details/forest-tax-program-chapter-61>). However, this option must be exercised, and land acquired within tight deadlines (i.e., months). Note that Rhode Island does not have a right of first refusal for municipalities, but it does have the Farm, Forest, and Open Space Act that also offers tax incentives for undeveloped lands, which are subject to a land use change tax if the enrolled land is sold to owners who chose not to continue in the program ([www.dem.ri.gov/programs/agriculture/ffosa.php](http://www.dem.ri.gov/programs/agriculture/ffosa.php)).

Municipalities often do not have ready funds on hand for land purchases with competing priorities. Creating a program that offers bridge funding (e.g., grants, loans) specifically to secure undeveloped lands while final funding arrangements are completed under programs like Chapter 61 in Massachusetts would be very beneficial. Perhaps municipalities that have adopted open space and recreation plans that specifically authorize this option would be eligible for state funds set aside for this purpose. Also, regional and national land trusts may be willing to partner in advance with municipalities that have proactively identified parcels vulnerable to conversion. Rhode Island has used state bonds for open space protection. Further details on how to fund this program could be included in the fundraising plan described in Recommended Action #2 (Fundraising Plan) in this report and necessary local regulation changes could be pursued in line with Recommended Action #9 (Enable Nature-Based Solutions).

Potential Participants: Rhode Island League of Cities and Towns, Massachusetts Municipal Association, municipalities, State of Massachusetts, State of Rhode Island, MAEOEEA, RIDEM, Rhode Island Infrastructure Bank, Audubon Society of Rhode Island, The Nature Conservancy, Manchaug Foundation, Rhode Island Lant

Trust Council, local land trusts, local river and community groups, Blackstone Collaborative (*when established*).

Outputs: Statement of Need for this idea, outreach materials for program, program in place for at least 3 municipalities in the watershed.

Outcomes: Revised existing or new program that offers bridge funding for preserving undeveloped lands.

Cost: In-kind time from potential leads.

Funding Ideas: State budgets, state bonds, public and private grants, local fees.

Outlook: **AVERAGE**. While this idea has been discussed for some time, any novel program that requires new monies—especially sustained monies for a new program—faces challenges. Significant education and advocacy will be necessary to establish this new program. Beginning with a pilot effort in one state, tapping into existing funding programs to support that pilot, and documenting success would be good first step to raise the possibility that a new, yet very important, program like this can rise above other needs and obtain necessary funding.

# 11

## Increase support for permanent land protection.

*Subject Area Need:* Sustainable Development, Project Planning, Project Installation

*Scale:* Municipality, Site.

*Short Description:* Assure more technical and financial support to increase execution of permanent land protection of undeveloped lands.

*Implementation Timeline:* January 2022 – December 31, 2026.

*Justification:* Permanent protection of forests, farms, open space, important habitats, and other undeveloped lands from the rural to urban landscape is vital to the health of our watersheds. These lands support clean water, contiguous wildlife habitat, food and fiber, recreation, public health, and rural character. The Nature Conservancy and others have used different versions of the sentiment, “protect the best and improve the rest.” Improving that which is already developed and/or is not protected can be accomplished via LID, habitat restoration, and other tactics highlighted in this report. Land protection especially important in a watershed like the Blackstone that is experiencing urbanization via density shifts to formally undeveloped areas. Permanent protection generally takes place via fee simple purchase or easement. Note that urban Environmental Justice communities generally have a disproportionately small acreage of open space. The Community Preservation Act (CPA) ([www.communitypreservation.org/](http://www.communitypreservation.org/)) in Massachusetts allows municipalities to approve a small surcharge on local property tax to protect open space and preserve historic resources. Thirteen communities in the Blackstone Watershed currently participate in this program. Additionally, Rhode Island provides bond funding for protection of farmlands, parks, and green/open space (2016: <http://dem.ri.gov/growgreenri/2016bond.php>; 2021: <http://dem.ri.gov/greenclean/#lrec>).

Land protection is already taking place across the region. However, Project participants felt it was vital to increase protection efforts to preserve the benefits provided by undeveloped lands for local communities and the Narragansett Bay downstream. This action would harness the time of the Blackstone Watershed Coordinator and a future Blackstone Collaborative to help accelerate land protection by connecting municipalities to existing technical support (e.g., completing open space plans, ensuring protection is best use for community), encouraging their participation in existing support programs (e.g., regional planners, CPA adoption, MVP/MRP program) and advocating for new funding (e.g., state bonds). Focusing the Coordinator and Collaborative’s work on a short list of municipalities that are not as active in this space. Assistance with local open space planning to identify and prioritize targets for protection and land stewardship/maintenance to retain values and address fire were noted as specific challenges to be addressed. This action should be dovetailed with this report’s Recommended Actions #3 (Green Maintenance Jobs) #4 (Education Strategy), #9 (Bylaws for Nature-based Solutions) and #12 (Support LID), as well as with regional partners that offer assistance for land protection.

Potential Participants: Blackstone Watershed Coordinator, Rhode Island League of Cities and Towns, Massachusetts Municipal Association, municipalities, State of Massachusetts, State of Rhode Island, MAEOEEA, RIDEM, Rhode Island Infrastructure Bank, Central Massachusetts Regional Planning Commission, Audubon Society of Rhode Island, The Nature Conservancy, Trust for Public Land, Land Trust Alliance, Manchaug Foundation, Rhode Island Land Trust Council, local land trusts, local river and community groups, Blackstone Collaborative (*when established*).

Outputs: 25 referrals for assistance, 5 municipalities increase protected acres compared to the last five-year period, [Funding TBD based on comment] land protection projects completed.

Outcomes: Pre-conditions are in place for execution of more land protection in communities that currently do not do so regularly and protection of additional important parcels.

Cost: In-kind time of the Blackstone Watershed Coordinator and members a future Blackstone Collaborative for referrals and advocacy; [Funding TBD based on comment] from federal, state, local programs for land protection planning and execution.

Funding Ideas: Federal Land and Water Conservation Fund, US Department of Agriculture Farm Bill programs, North American Wetlands Conservation Act, Forest Legacy Program, state budgets, state bonds, Massachusetts Community Preservation Trust Fund, Massachusetts Local Acquisitions for Natural Diversity (LAND) Grant Program, RIDEM Green Space Program, private grants, local fees.

Outlook. **GOOD**. Robust programs for undeveloped land protection are available and utilized in both states. Funding shortages for staff capacity, planning, and acquisition continue to be an issue locally. Further, some communities have not supported adoption of plans or programs due to opposition to new fees or lost tax revenue from new development of undeveloped lands. Nonetheless, with a mix of the targeted education and coordinated advocacy described here, the outlook for advancing this action in carefully targeted communities is positive.

# 12

## Increase support for planning and installation of low impact development practices.

*Subject Area Need:* Sustainable Development, Project Planning, Project Installation

*Scale:* Municipality, Site.

*Short Description:* Assure more technical and financial support to increase planning and installation of low impact development (LID) practices for new development, retrofit, and redevelopment projects.

*Implementation Timeline:* October 2021—September 2026.

*Justification:* EPA defines LID as practices that use or mimic natural processes that result in the infiltration, evapotranspiration, or use of stormwater to maintain or restore water quality, hydrology, and ecological functions. As noted earlier, nature-based solutions are categorized as LID practice installation and permanent land protection for the purposes of this report. LID aims to work with nature to manage stormwater as close to its source as possible (USEPA, 2021). These practices can be more resilient than traditional structural practices if designed with appropriate capacity, especially in the face of more frequent and extreme weather and attendant runoff brought on by climate change. LID may be applied to both new development and redevelopment projects. Examples of LID practices include bioretention facilities, depaving, rain gardens, vegetated rooftops, rain barrels, and permeable pavements (MADEP, 2021; RIDEM, 2021b; Mass Audubon, 2021). LID practices must be used to the maximum extent practicable for new development and redevelopment subject to Clean Water Act requirements in Massachusetts and Rhode Island. Retrofit of existing stormwater practices that are undersized, poorly maintained, or otherwise do not offer sufficient water quality treatment can also be replaced or enhanced with these practices.

LID is currently installed with success across the watershed. However, Project participants felt accelerated implementation is necessary to achieve better compliance with existing requirements, tackle outdated infrastructure that is failing, and ultimately reduce pollution to the watershed. Like Recommended Action #11 (Permanent Land Protection), this action would harness the time of the Blackstone Watershed Coordinator and members of a future Blackstone Collaborative to help overcome barriers to expanding LID implementation by connecting municipalities to existing technical and financial support and advocating for new regulations and funding for specific activities as needed. For example, obtaining funding for pre-installation work for public projects (e.g., project prioritization and selection, feasibility studies, mapping grey infrastructure, stormwater plans, designs, permitting) were noted as barriers to greater implementation. Further, as noted in Recommended Action #4 (Green Jobs) LID practice operation and maintenance poses unique challenges on public and private lands that could be addressed through new rules, educational programming, and jobs training. Focusing the Blackstone Watershed Coordinator and Blackstone Collaborative's efforts on a short list of municipalities where LID is not widely used and/or simple LID practices at the outset would be a way assess needs and test tools before expanding to the entire watershed and pursuing advocacy for new

programs. This action should be dovetailed with this report's Recommended Actions #3 (Green Maintenance Jobs) #4 (Education Strategy), #9 (Bylaws for Nature-based Solutions), #10 (Support Land Protection), as well as with regional partners that offer assistance for LID.

Potential Participants: Municipalities, MAEOEEA, MassDEP, RIDEM, Rhode Island Infrastructure Bank, RI Green Infrastructure Coalition, Mass Audubon, Audubon Society of Rhode Island, The Nature Conservancy, Central Massachusetts Regional Planning Commission, Central Mass Stormwater Coalition, Massachusetts Ecosystem Climate Adaptation Network, RI NEMO, SNEP Network, Chambers of Commerce, developers, builders, architects, local businesses, elected officials.

Outputs: 30 referrals for assistance, 5 later-adopting municipalities increase LID installation compared to the last five-year period, [Number/percent increase in installation TBD based on comment] LID practices installed in these communities.

Outcomes: Pre-conditions are in place for installation of more LID practices in later-adopting communities and increased installation in those communities.

Cost: In-kind time of the Blackstone Watershed Coordinator and members of a future Blackstone Collaborative for education materials, referrals, and advocacy; [Funding TBD based on comment] from funders for planning and installation of LID.

Funding Ideas: EPA/NBEP SNEP, SNEP Network, State Clean Water Act Section 319 Nonpoint Source Pollution Grant Program funds, MAEOEEA's Municipal Vulnerability Preparedness (MVP) Program, Rhode Island Infrastructure Bank's Municipal Reliance Program (MRP), stormwater fees (in Bellingham and Shrewsbury, MA and others if they adopt them).

Outlook: **GOOD.** Perhaps thousands of individual LID practices are currently operating in the Blackstone. These practices are required in both states when operating under federal permits, design and maintenance specifications are in place, and substantial technical assistance is available. However, reluctance by some local developers, engineers, and municipal staff, and short funding for LID site planning and design are barriers. Further, funds to retrofit outdated infrastructure and maintain traditional and LID practices on public and private lands is a significant problem in the absence of a dedicated and sustained local funding source to pay for this work. Nonetheless, with a mix of the targeted education and advocacy described here to bring new knowledge and dedicated funding to bear, the prospects for continuing to grow implementation of LID in the Blackstone region is good.

# 13

## Accelerate management of water chestnut to support healthy habitat and recreation.

Subject Area Need: Project Installation

Scale: Site

Short Description: Accelerate management of water chestnut to support healthy habitat and safe recreation.

Implementation Timeline: January 2022-December 2026.

Justification: Aquatic invasive plant species are significant problem in rivers, ponds, and reservoirs in the Blackstone. Aquatic invasive plants are non-native species that can disrupt the ecosystem and recreational water use. Under the right conditions, invasive plants can thrive and out-compete beneficial native plants that are naturally part of our aquatic ecosystems. Once invasive plants become well established, the density of plant growth not only degrades the native habitat, but often interferes with human enjoyment of water bodies by limiting recreational uses such as swimming, fishing, and boating (RIDEM, 2021c).

Water chestnut is a freshwater aquatic invasive plant that is a special challenge because of its ability to spread and reestablish quickly. Water chestnut has become a problem in the Blackstone Watershed, having invaded many waterbodies, including Valley Falls Pond, Sylvestre Pond, Lake Quinisigamond, Coes Reservoir, Silver Lake, Lake Ripple, Whitins Pond, West River, and Mumford River. It was also found along the mainstem river in Rhode Island for the first time in summer 2021. Despite its propensity to spread, it can be eradicated if it is addressed early. Since it is visible and can be removed via physical pulling (or chemical treatment for large acreage) it can be addressed by volunteers with basic knowledge. State and resource managers view this as the one of the watershed's highest habitat stewardship priorities. Immediate strategic intervention is needed to prevent further uncontrolled spread and loss of important habitat in the region. Priority needs near-term include mapping its extent in Massachusetts, community education and boat greeters to drive early detection, volunteers to assist with removal, streamlined permitting, and implementation of removal projects. Longer-term ensuring current proactive lake aquatic species management plans that map out ready response to future invasions are beneficial for qualifying for and attracting funding. Success with water chestnut could open up these efforts to addressing other pervasive aquatic invasive plants like milfoil and wort species.

Potential Participants: MassDEP, RIDEM, colleges, local watershed groups, community volunteers.

Outputs: Distribution of simple education materials on water chestnut, mapping of water chestnut in Massachusetts, volunteer or paid monitors/greeters, plant pullers, and at least 25 removal projects/events completed.

Outcomes: Communities are more aware of the water chestnut problem, programs are in place to quickly address it, and the acreage of this invasive plant is reduced.

Cost: In-kind time from watershed groups and state/local resource agencies; \$15,000 for local watershed groups to pay for monitors/boat greeters/event organizers, and tipping fees for disposal.

Funding Ideas: Public and private grants, National Fish & Wildlife Foundation, outdoor business sponsors.

Outlook: **GOOD.** Despite the challenges posed by water chestnut, with the priority nature of this effort for resources agencies and local watershed groups history of success marshalling volunteers the outlook for getting ahead of this problem is good.

# 14

## Create pre-conditions for achieving fish passage on the four dams on the lower main stem Blackstone.

Subject Area Need: Project installation

Scale: Site

Short Description: Obtain studies, plans, permits, funding, and other advance activities for construction of fish passage through the four dams on the lower main stem Blackstone.

Implementation Timeline: October 2022-September 2026.

Justification: Fish species have been unable to reach historic habitat in the lower Blackstone River in Rhode Island since the construction of the Slater Mill Dam in 1793. Three additional dams constructed since—the Main Street Dam, Elizabeth Webbing Falls Dam, and Valley Falls Dam—similarly lack passage so they block fish migration to spawning areas (such as the recently restored Lonsdale Marsh) that would help expand healthy populations in the river and Narragansett Bay. Fish species that would benefit from the passage include diadromous fish such as American shad, river herring including alewife and blueback herring, and Atlantic salmon, and American eel. Other migratory and local resident warm and coldwater fish would also benefit (USACOE, 1997). Further, two of Rhode Island’s most overburdened communities—Pawtucket and Central Falls—are home to these dams. In addition to environmental benefits, fish passage can deliver co-benefits to all who live along or visit the river in the form of recreation, economic development, and community pride. The Main Street and Valley Falls Dams have active hydropower operations and thus are regulated by the FERC, which requires them to participate in fish passage discussions as a part of their permits. Note that a notice appeared in the *Federal Register* on October 2020 that an application for a preliminary permit was filed to restart hydropower production at the Elizabeth Webbing Falls Dam.

Thoughtful scientific and community-based efforts have been underway for decades to realize fish passage past these dams (termed “Phase 1”) and access to over 200 acres of habitat, while maintaining existing hydrological operations and heritage needs at the dam sites (USDA, 2008; NBEP, 2002). Project complexity and cost has so far stymied this work. A careful balance between environmental, economic, community, heritage, and cultural interests must be reached for this project to succeed. In summer 2021, RIDEM and NBEP have initiated a new effort to reconvene key interests to explore means to achieve fish passage. Attaining passage would be a seminal and signature accomplishment for Blackstone advocates, the state, and the region. It would represent the second largest fish passage project in Rhode Island and the largest in the Blackstone watershed. The return of federal earmarks, ongoing negotiations over a federal infrastructure package, and availability state bond monies makes acting near-term important. Cooperative planning, fundraising, and advocacy by a long list of interests will be necessary over the next five-years to create the pre-conditions for fish passage, such as site surveys, feasibility studies, land control, engineering designs, permits, and funding. Further, if circumstances align, construction *could* be initiated by December 2026.

Potential Participants: RIDEM, US Army Corp of Engineers, US Fish & Wildlife Service, USDA Natural Resources Conservation Service, US National Park Service, The Nature Conservancy, local watershed groups,

dam owners, Old Slater Mill Association, City of Pawtucket, City of Central Falls, NBEP, Save The Bay, tribal nations, engineering consulting firms, elected officials.

Outputs: Agreement among key interests on a path forward; cost estimate for studies, planning, and construction; surveys and studies; land control documents; fish passage engineering designs; permits; identification of funding sources; meetings with key elected officials.

Outcomes: All pre-conditions completed to enable construction of fish passage on the four dams.

Cost: Cost for studies, planning, and construction will be determined through the outputs noted above.

Funding Ideas: Federal budget and/or legislative appropriations, USDA Natural Resources Conservation Service, Army Corp of Engineers, SNEP, state bonds, dam owners, public and private grants for NGO involvement.

Outlook: **GOOD.** Study and discussion of this action have been pursued for quite some time. Significant information is available to support future efforts. However, both sustained human (e.g., new relationships, trust, written agreements) and financial capital (e.g., funding for study, planning, and construction) will be necessary to navigate the complexity and cost of this action. With the new commitment from RIDEM and long-standing interests' willingness to reengage, new federal funding sources and the strength of Rhode Island Congressional Delegation, and the ground-breaking nature of this action, makes the time right to set the stage for future fish passage installation.

# 15

## Advance aquatic connectivity projects from headwaters to estuary.

*Subject Area Need:* Project installation

*Scale:* Site

*Short Description:* Pursue removal, repair, and/or passage through dams, culverts, and other barriers to achieving improved connectivity between and within freshwater and estuarine habitats.

*Timeline:* October 2021—September 2026

*Justification:* Dating to the Industrial Revolution, the hydrology of the watershed and the health of its aquatic systems has been significantly degraded by human activities. The Blackstone Watershed hosts over 100 dams, perhaps thousands of culverts—many undersized, perched, or otherwise ineffective—and river course diversions and impoundments. These conditions can impede natural floodplain and riverine processes, cause flooding, alter flow patterns, degrade wetlands, and ultimately reduce habitat connectivity necessary to support aquatic life. The problems posed by these barriers are only expected to get worse as urbanization and climate change increase the combination of impervious surfaces and rainfall that generate more stormwater runoff and flooding, alter hydrology, and create safety hazards. State and local governments and NGOs have pursued many aquatic connectivity projects to date. Projects include those that connect freshwater and estuarine waters for diadromous fish to complete their life cycles, as well as those on smaller freshwater streams that create and connect rivers, wetlands, and other habitats that nurture resident fish (e.g., wild brook trout), mussels, and macroinvertebrates. Also, removing impoundments that raise temperatures and harm aquatic life can improve conditions downstream. Project location, size, and type are chiefly selected based on the objectives of the program supporting the project (e.g., lead agency and/or funding source) and/or proximity to other connectivity work up/downstream. Projects follow the money. Sometimes projects address one barrier; it is best when projects can work up a waterway/shed in succession.

Both planning (survey, study, design) and installing aquatic connectivity projects were ranked as high priority needs by project participants. This action would marshal the capacity and expertise of the members of a future Blackstone Collaborative (such as the Central Massachusetts Regional Planning Commission) to help accelerate identification, prioritization, planning, and construction of connectivity projects in the watershed. Potential projects could come from existing lists and new mapping of priority corridors. The UMass-Amherst North Atlantic Aquatic Connectivity (NAACC) (<https://streamcontinuity.org/>) site offers prioritization tools applicable to the region from the Massachusetts Division of Ecological Restoration and The Nature Conservancy. The outputs of these tools, existing state/local priority lists, projects that are ready to go/connect to completed/ongoing projects, those that align with open funding opportunities, and/or the those located in priority areas targeted per Recommended Action #6 (Target Projects), can be assembled into an annually updated list. Using an informal weight of the evidence approach to compile this list based on the factors above is favored to further complex regional prioritization. Project partners can then coordinate to develop and submit proposals for planning and construction of projects that align with their individual needs

and missions on the list. Finding non-federal match will be an important task during the proposal development stage as it is often hard to come by. Impact on aquatic life productivity and riverside communities, over numbers of projects will be emphasized under this action.

Potential Partners: Massachusetts Department of Fish & Wildlife—Division of Ecological Restoration, RIDEM, US Fish & Wildlife Service, US Army Corps of Engineers, USDA Natural Resources Conservation Service, Central Massachusetts Regional Planning Commission, The Nature Conservancy, Blackstone River Watershed Council, Blackstone River Watershed Association, UMass-Amherst, municipalities, engineering consulting firms.

Outputs: Annual short list of priority connectivity projects, 15 proposals developed and submitted (3 per year over 5-year period).

Outcomes: More projects ready to be installed, more habitat opened in the watershed compared to the previous 5-year period.

Cost: In-kind time of members of a future Blackstone Collaborative for project identification and prioritization; \$750,000 for project planning (\$50,000 per project) and [Funding TBD based on comment] for project installation.

Funding Ideas: Federal budget/legislative appropriations, USDA Natural Resources Conservation Service, US Army Corps of Engineers, USEPA—SNEP, NBEP, MAEOEEA's Massachusetts Municipal Vulnerability Preparedness (MVP) Program, Rhode Island Infrastructure Bank's Municipal Reliance Program (MRP), Rhode Island Habitat Restoration Trust Fund, Massachusetts Culvert Replacement Municipal Assistance Grant Program, RIDEM/state bonds, angler associations.

Outlook: **AVERAGE.** Improving connectivity in the Blackstone is crucial to restoring and sustaining the health of important aquatic life that rely on the river system and/or Narragansett Bay. Many dam removals, culvert replacement, and flow restoration projects that improved aquatic connectivity have been completed across southeast New England. Expertise and passionate advocates are in place in the Blackstone. The most significant hurdle to connectivity projects is funding—for planning and construction. Construction for larger projects reaches into the millions. Some other factors like dam and landowner willingness to support a project if not required to do so, ability for federal entities to fund projects on private lands, the shortage of non-federal match, and design and permitting complexities also pose challenges. Using a straightforward process to match available funding with needs to expeditiously create a short list of projects that deliver the greatest benefits is a viable approach. Note that new federal funding potential and Rhode Island and Massachusetts' strong Congressional delegations have an excellent chance of delivering increased funding if other barriers are overcome for ready projects.

# 16

## Complete new sections of the Blackstone River Bikeway/Greenway.

Subject Area Need: Project Installation

Scale: Site

Short Description: Complete design and installation of specified sections of the interstate Blackstone River Bikeway/Greenway.

Implementation Timeline: October 2021—September 2026.

Justification: The Blackstone River Bikeway/Greenway is a regional gem for biking, running, and hiking. Some portions constitute a green ribbon (greenway) along the river and through parks, while others are designed more as bike trails or lanes in existing roadways. For the purposes of this report the bikeway/greenway are viewed collectively as a spine of trails that connects the upper and lower watershed. There are three completed sections of the bikeway/greenway, totaling 17 miles of off-road paved trails with the remainder connecting the segments on marked, on-road routes. Finished sections include 2.5 miles from Worcester to Millbury, MA, 3.5 miles from Uxbridge to the Rhode Island border, and 11 miles from Woonsocket to Cumberland, RI (BRVNHC, 2021). These sections were completed with federal transportation funds. Besides connecting 14 municipalities in the Blackstone River Valley National Heritage Corridor, it also links the Blackstone River and the historic Blackstone Canal to form the Riverway, a green corridor within the Heritage Corridor that will offer opportunities for residents and visitors to experience history and enjoy nature. The vision is for the bikeway/greenway to extend 48 miles from Worcester, MA to India Point Park in Providence where it would connect to the existing East Bay Bike Path and continue an additional 14.5 miles to Bristol, RI (BRVNHC, 2021). Completing the additional 31 miles of the bikeway/greenway is not an easy task it will require coordination with landowners, fundraising, planning, construction, and advocacy. The route is unlikely to follow the Blackstone for its entire length and will need to be designated roadway shoulder or follow other off-river paths. Identifying, championing, and advocating for *specific* sections will assist with necessary funding and approvals. The following sections of the bikeway/greenway will be designed and installed over the next five years: [Specific locations TBD based on comment]. These stretches were selected based on legal considerations, field and financial realities, public input, and consideration of recreational access equity along the path. Ultimately finishing this the bikeway/greenway would be a signature accomplishment for Blackstone advocates and a lasting asset for both states.

Potential Participants: State of Massachusetts, State of Rhode Island, Blackstone River Valley National Heritage Corridor, Blackstone Valley Tourism Council, US National Park Service, RIDEM, Massachusetts Department of Conservation and Recreation, Massachusetts Department of Transportation, Rhode Island Department of Transportation, municipalities, environmental and recreation-related NGOs, elected officials. by 2026.

Outputs: Analysis, plan, and permit for specified sections of bikeway/greenway, completed sections of bikeway/greenway.

Outcomes: Bikeway/greenway is closer to completion, new educational and recreational opportunities created, momentum created for completing the project from top to bottom of the watershed.

Cost: [Cost TBD based on comment].

Funding Ideas: Federal budget/legislative appropriations, US Federal Highway Administration Recreational Trails Program and Congestion Mitigation and Air Quality Program, Land and Water Conservation Fund, Community Block Grant Program, US Forest Service Urban and Community Forestry Program, MassTrails grants, RIDEM Green Space Program, state DOTs, state bonds, private foundations, bike/trail-related businesses, and local donors.

Outlook: **EXCELLENT.** Local physical/political barriers and funding are the biggest challenges faced by this action. However, with the steadfast commitment to date of bikeway/greenway advocates, the popularity and visibility of the path with municipalities and elected officials, and the thoughtful selection of specific sections to be pursued, completing this action is attainable by the end of 2026.

# 17

## Increase maintenance of waterway for wildlife, recreation, and safety.

Subject Area Need: Project Installation

Scale: Site

Short Description: Increase regular maintenance of waterways to remove debris, trees, sediment, and other hazards that harm their health and safety.

Implementation Timeline: January 2022-December 2016.

Justification: Natural and man-made waterways (e.g., canals), especially those in urban area, require regular maintenance to protect water quality and wildlife, remain functional and safe for navigation, and/or support public recreation. Tree falls and other large debris can take out small dams, cause flooding, and cause hazardous conditions. River maintenance plans at the state, watershed, or municipal level are rare, mostly relying on ad hoc clean-up events by local watershed groups relying upon volunteers. The necessity to hire experts to remove large debris, difficulty disposing of certain items (e.g., tires, televisions, propane tanks), and tipping fees to properly dispose of refuse are barriers to more frequent and extensive maintenance. The Seekonk River, Pawtucket River Channel, and Blackstone Canal were noted as waterways especially in need of maintenance to improve their health and navigability. Maintenance of attendant facilities like parking lots, boat ramps, rest rooms, and picnic areas was also mentioned. A good place to start would be developing a list of priority maintenance locations, seeking any permits or approval for on-going maintenance, identifying entities willing to provide regular maintenance, and identifying sources of funds for tree removal and tipping fees. Discussions at future Blackstone Collaborative can surface further next steps to advance this action.

Potential Participants: Blackstone River Tourism Council, Blackstone River Watershed Council, Blackstone Watershed Association, Blackstone River Valley National Heritage Corridor, RIDEM, MassDEP, local trash removal and recycling businesses, local outdoors and tourism businesses, Blackstone Collaborative (*once established*).

Outputs: List of 5-10 priority maintenance locations, appropriate permits, and volunteers to pursue regular maintenance at each location, funding for qualified debris removal.

Outcomes: More waterways and recreation sites that are functional and safe that support wildlife, recreation, and tourism.

Cost: In-kind time of local NGOs and resource agencies; \$15,000 for debris removal.

Funding Ideas: EPA Trash Free Waters, other public and private grants, municipalities, outdoor/tourism businesses.

Outlook: **EXCELLENT.** History of support and resourcefulness to hosting river clean-ups by local watershed groups makes this a action readily doable with some modest coordination and funding.

# 18

## Create program to recognize developers and communities that execute sustainable development.

Subject Area Need: Sustainable Development

Scale: Watershed

Short Description: Create a watershed-wide program that recognizes developers and communities using sustainable site, neighborhood, and land development practices.

Implementation Timeline: January 2024-December 2026.

Justification: Land developers and communities in the Blackstone region undertaking and incentivizing projects that align with environmental, economic, and community sustainability. These developers go beyond existing regulations and add practices and facilities that offer co-benefits that present a sound short-term investment for the developer and the long-term health of the community. Sustainable tactics include smart site selection (e.g., proximity to transportation, avoid important natural area), installation of LID practices, preservation of open spaces, wildlife habitat restoration, recreational amenities, and aesthetic features. In Rhode Island, the Green Buildings Act specifies the Sustainable SITES Initiative and LEED for Neighborhood Development (LEED ND) as applicable ratings for public buildings. The SITES program applies to development projects with or without buildings, from parks to business parks to streetscapes (<http://www.sustainablesites.org/>). LEED ND can guide the location, design, and finished performance of development (<http://leed.usgbc.org/nd.html>). For example, Devens, MA adopted new regulations modeled on LEED ND, and local developments have been planned consistent with these principles. Creating a new recognition program for developers and the municipalities that pursue innovative sustainable projects can show what is possible, give them credit for going above and beyond, influence others to adopt these solutions, and motivate community members and elected officials to call for this level of performance by others. The program would not need to offer a direct financial reward per se, but instead offer significant positive publicity that indirectly attracts buyers, businesses, and people to the community. Further discussion is necessary to determine what entity or entities would offer the recognition, what criteria would be utilized to select recipients, and other details of the program. This could potentially be a new initiative of a future Blackstone Collaborative.

Potential Participants: Blackstone Watershed Coordinator, municipalities, US Green Building Council, SITES, Mass Development, GrowSmart RI, Massachusetts Smart Growth Alliance, Chambers of Commerce, municipalities, NGOs, local watershed groups, Blackstone Collaborative (*when established*).

Outputs: Design of new recognition program, 3 awards.

Outcomes: Greater recognition and publicity for developers and communities doing the right thing and influencing others to do the same.

Cost: In-kind time of potential participants; \$5000 for an annual event.

*Funding Ideas:* Donations from potential participants to cover costs for an award event.

*Outlook:* **EXCELLENT.** Based on discussions at Project meetings, there is substantial support for this action. Relying on the passion and initiative of leading advocates for sustainable development in the region, existing models that offer criteria for selecting awardees, and very limited costs, this action should be successfully accomplished.

# 19

## Increase free and equitable access to use and benefits from waterways.

Subject Area Need: Advocacy

Scale: Site

Short Description: Increase free, safe, and equitable access to use and benefit from the region's waterways.

Implementation Timeline: October 2022-September 2026.

Justification: Public access to river, streams, lakes, and other waterbodies in the Blackstone Watershed and associated educational programming is bountiful. However, access can be limited for certain members of the community. Using waterways can be hindered by a lack of signage for non-English speakers, a requirement to pay a fee, absence of public transportation to sites, the necessity for specialized outdoors equipment (e.g., canoe, kayak, personal flotation device), inadequate access for rescue crafts, the fact that some access points are informal and not maintained, and a requisite level of mobility to access and viewing points. Overburdened communities, many located along the river, are especially impacted by these factors. A concerted effort is needed to map public access locations, take steps to address the issues noted above, monitor through on-site monitoring (starting with the most heavily trafficked sites) whether access for all members of the community is realized. Several Project participants are well-suited to take on this action and improve conditions over the course of the next five years.

Potential Participants: Blackstone River Tourism Council, Blackstone River Watershed Council, Blackstone Watershed Association, Blackstone River Valley National Heritage Corridor, RIDEM, Massachusetts Department of Conservation and Recreation, outdoors businesses.

Outputs: Inventory of public access locations and conditions, [Number TBD based on comment] sites upgraded to meet inclusive access goals.

Outcomes: More inclusive, safe, and functional access to waterways in the watershed.

Cost: In-kind time of potential participants; [Funding TBD based on comment].

Funding Ideas: Public grants to NGOs (see list under Recommended Action #16 [Bikeway/Greenway]), support from outdoor businesses.

Outlook: **GOOD.** Blackstone advocates are committed to public access to natural spaces and amenities they were work so hard to protect. Starting with the modest goals here and working to expand as sites and funding allow makes the outlook for this action good.

# 20

## Pursue coordinated advocacy to advance these recommended actions.

Subject Area Need: Advocacy

Scale: Watershed

Short Description: Pursue direct advocacy and education of local, state, and federal agency management and elected officials to authorize new programs and policies to advance the recommended actions in this report.

Implementation Timeline: October 2021 to December 2026.

Justification: This report includes an ambitious suite of recommend actions to be implemented over the next five years. Blackstone advocacy for needs at the municipal and project level occurs routinely. However, coordinated, collaborative advocacy at the watershed scale has not been undertaken. Most of the actions and supporting activities will require some measure of advocacy to get done. The term “advocacy” is inclusive of direct lobbying (i.e., communication with elected about a specific legislation) indirect lobbying (grassroots organizing influence public opinion about specific legislation), and broad educational activities (widely distributed education materials presenting general facts about a topic) before elected officials or the executive branch at the federal, state, and local level. Government employees and some NGO’s staff are not allowed to conduct any form of lobbying, while other NGOs, business, and individual community members routinely speak to elected and agency officials. A split off group of the future Blackstone Collaborative that is made up individuals that are permitted to lobby/education would be good forum for identifying a modest list of actions needing advocacy and matching them with messaging, and people who can deliver the message.

Potential Participants: The Nature Conservancy, Mass Audubon, Audubon Society of Rhode Island, Save The Bay, Environmental Council of Rhode Island, local watershed and community groups, river/outdoor/sustainable development-oriented businesses, individual community members.

Outputs: Consistent forum for advocacy discussions, simple matrix of lobbying/education needs and assignments, delivery of watershed-scale advocacy.

Outcomes: Greater knowledge about Blackstone-specific problems and solutions among government officials, more programs and funding targeted to or supportive of recommended actions in this report.

Cost: In-kind time of NGO staff that can educate or advocate for specific policies before elected officials.

Funding Ideas: Certain foundation grants and private donors to NGOs.

Outlook: **GOOD.** Coordinated advocacy coming from partners collaborating at the watershed scale has rarely taken place in the past. If done strategically, the diversity and number of interests represented would be powerful. Further, sticking to a modest list of priorities each year, and relying predominately on proven experts among participant organizations has the best chance for success.



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# Appendices

## Appendix 1: Project Meeting Locations, Dates, and Links

### **Blackstone Needs Assessment Meeting #1**

Cumberland Public Library

Cumberland, Rhode Island

December 11, 2019

[Meeting materials](#)

### **Blackstone Needs Assessment Meeting #2**

Blackstone River Valley Heritage Corridor Visitors Center

Worcester, Massachusetts

March 11, 2020

[Meeting materials](#)

### **Blackstone Needs Assessment Meeting #3**

Zoom

May 6, 2020

[Meeting materials](#)

### **Blackstone Needs Assessment Meeting #4**

Zoom

August 26, 2020

[Meeting materials](#)

### **Blackstone Needs Assessment Meeting #5**

Zoom

November 19, 2020

[Meeting materials](#)

### **Blackstone Needs Assessment Meeting #6**

Zoom

April 14, 2021

[Meeting materials](#)

### **Blackstone Needs Assessment Meeting #7**

Zoom

July 7, 2021

[Meeting materials](#)

### **Blackstone Needs Assessment Meeting #8**

[TBD]

September 28, 2021

Meeting materials

## Appendix 2: Needs Identification Exercise Raw Results (March 11, 2020)

### **Watershed Coordination**

- (1) Operate Umbrella Organization**
  - a. Host monthly meetings/calls.
  - b. Coordinate grants, technical transfer, and projects across the watershed —herd cats!
  - c. Go beyond water quality to habitat, quality of life and other priorities in the watershed.
  - d. Resilient Taunton Watershed Network (RTWN) is a great example.
    - i. BRC played an “RTWN role” but funds dried up—could rebuild.
      1. Still have email lists and website but needs overhaul.
  - e. State has watershed teams.
  - f. Develop new more sustainable entity just for Blackstone.
- (2) Create Central Information Clearinghouse**
  - a. Bi-state important.
  - b. Document repository.
  - c. Could be like the 2005/2006 document.
  - d. Included resources: fact sheets, reports, plans, monitoring data, regulatory/permitting/enforcement updates.
  - e. Will need capacity to host—money, intern.
  - f. Who could host?
    - i. BRC.
    - ii. Blackstone River Valley National Heritage Corridor.
    - iii. Section potentially available on Resilient MA, which is a climate change data clearinghouse for Massachusetts <http://resilientma.org/> ( need to include RI).
- (3) Assist Communication With/Among Towns and Cities**
  - a. Municipalities have different capacities, drivers, constraints than others.
  - b. EPA National Pollution Discharge Elimination System (NPDES) municipal separate storm sewer system (MS4) and construction general permits (CGP) permits can be unifying factors.
  - c. Entities that could help represent/connect municipal folks.
    - i. Central Mass Regional Planning Commission.
    - ii. Central Mass Stormwater Coalition.
    - iii. RI Dept of Administration, Division of Statewide Planning
    - iv. RI League of Cities & Towns
  - d. This need tied to Item (1) above re: Umbrella Organization.
- (4) Encourage New municipality/Non-profit/Academic Partnerships**
  - a. This need tied to Item (1) above.
- (5) More Diverse Outreach**
  - a. See Outreach table.
- (6) Greater Technical Assistance**
  - a. Massachusetts Municipal Vulnerability Preparedness (MVP)/Rhode Island Municipal Resilience Program (MRP) programs.
  - b. New Southeast New England Program (SNEP) Network.
  - c. Rhode Island Rivers Council.
- (7) Better Understand FEMA Map Changes**
  - a. Get all municipalities informed and provide feedback opportunities.
  - b. Obtain Federal Emergency Management Agency (FEMA) money for hazard mitigation and training of floodplain managers in each municipality.

## Capacity-Building

- (1) More Staff Time at Municipal and State Government**
  - a. Staff is often insufficient to think beyond today's needs to the longer-term.
  - b. Staff turnover is also a problem.
  - c. Lack of proactive assistance or enforcement follow-up.
    - i. Could revise watershed council involvement in enforcement.
  - d. Training for Public Works staff on balancing infrastructure and environmental needs.
  - e. Creative approaches to expanding capacities (e.g., DC Water creating green jobs through stormwater utility, National Green Infrastructure Certification Program required landowners to use NGIC-certified labors for maintenance on green infrastructure).
- (2) More Operational Staff at NGOs**
  - a. The small groups/coalitions working in the watershed are generally short of administrative (overhead) and technical staff that can attend meetings, coordinate with partners, write grants, map projects, etc.
  - b. Rebuild capacity of BRC and Blackstone River Valley National Heritage Corridor.
  - c. Could get funding to provide technical assistance on projects.
  - d. Consistent flow of interns could help in the interim.
- (3) Greater Technical Assistance Municipalities and NGOs**
  - a. Specific assistance needed for grant writing, Quality Assurance Project Plan (QAPP) development and consistency across states, mapping, and reducing any backlogs so forward-thinking is more possible.
- (4) Reliable Long-Term Funding**
  - a. Stormwater Fees/Management Districts. MVP/MRP, SNEP, and other grant programs can solve an acute problem, but don't provide a long-term, reliable source of funding for future stormwater projects, maintenance, monitoring, adaptive management, etc.—all the steps that truly make up a high-quality project.
  - b. Funding for small projects that may not be competitive on a national/regional basis.
- (5) Maximize Existing Capacity**
  - a. Form diverse, broad-based partnerships.
  - b. Hold more watershed-wide meetings (perhaps quarterly) to learn how we can all help each other—share staff, collaborate on advocacy, and offer consistent messaging and leadership to support efforts of municipalities.
  - c. Continue to hold annual watershed summit.
  - d. This need ties into the Figure 5: Watershed Coordination subject area.
- (6) Re-Energize Those Who Care for the Blackstone**
  - a. Generate interest from new people—nurture new champions.
  - b. Celebrate successes (e.g., Shrewsbury Stormwater Fee passed).
  - c. Highlight what individuals stand to gain, connect to their values.
  - d. Use Zap the Blackstone to share what still needs to be done and why it's important.
  - e. Pick a signature project to rally folks around.
  - f. Re-brand work as good for environment and communities (See Figure 10: Outreach subject area).
    - i. 30 years ago, visuals were enough to drive action—need to get creative.

## On-the Ground Projects

### (1) Specific Projects to Implement

- a. Install fish ladders on lower four dams on Blackstone River.
- b. Prioritize culvert replacement (UMASS-Amherst North Atlantic Aquatic Connectivity (NAACC) mapping tool).
- c. Finish interstate bike path (Auburn wants to connect).
  - i. Provide stewardship for bike path.
  - ii. Provide signage for bike path.
- d. Grafton Lake ripple sediment delta (proprietary sediment removal, needs to be on MassDOT approved materials list).
- e. Turn Cumberland dump into park/other recreation space.
- f. Poor Farm Brook dam removal.
- g. Reduce impervious surfaces.
- h. Install urban tree canopy cover (with heat mapping and water quality).
- i. Increased buffers.
- j. Protect priority open space parcels.
- k. Install greater public access on river main stem.
- l. Look for “multi-benefit” projects.

### (2) Processes to Get Projects Done (convening, planning, permitting, etc.).\*

- a. Solicit new project ideas.
  - i. Municipalities.
  - ii. Recreation groups.
  - iii. Community-based organizations.
  - iv. Ties into Watershed Coordination subject area.
- b. Permitting as barrier.
  - i. Municipalities have less capacity than developers.
  - ii. Conflicts across federal, state, and local requirements.
  - iii. Person/clearinghouse for permitting assistance (could be SNEP Network).
- c. Prioritizing Projects.
  - i. Not just considering environmental issues, work with municipalities, landowners, etc. to ensure broad benefit to the community.
  - ii. Make sure water quality impact is considered with new projects (e.g., impact of new public access).
- d. Project Funding.
  - i. Can MVP focus on priority projects—yes, projects that focus on climate vulnerabilities.
- e. Regulations.
  - i. Advocate for revised regulation that enable the type of projects partners would like to see in the Blackstone (e.g., increased buffers, less impervious surface, better stormwater management, prevent development in floodplain).

\*This could be a separate need subject area.

## Sustainable Development

- (1) Better Protect Farmland and Open Spaces**
  - a. Seek incentives beyond tax breaks, which have not been especially effective.
  - b. Focus on protecting farmland still a priority 61A land (e.g., Douglas).
  - c. Work with community farms (e.g., Holyoke/Worcester, Franklin) and local food.
  - d. Create new safety net for emerging producers.
  - e. Track Massachusetts Healthy Soil Plan for opportunities to protect prime soils.
  - f. Follow progress of MA Resilient Lands Initiative (Bob O'Connor at MA Executive Office of Energy and Environmental Affairs)-- [https://www.mass.gov/doc/rli-exec-sum-july-31-2020/download?\\_ga=2.11165820.934518548.1619662308-851129292.1619558470](https://www.mass.gov/doc/rli-exec-sum-july-31-2020/download?_ga=2.11165820.934518548.1619662308-851129292.1619558470).
- (2) Pursue Local Ordinance Reform**
  - a. Support zoning and other bylaw/ordinance reform that supports sustainable and resilient land use that benefits ecology, economy, and community.
- (3) Maximize Implementation of MA Municipal Vulnerability Preparedness (MVP) Program and RI Municipal Resilience Program (MRP)**
  - a. Existing participants to continue to pursue projects.
  - b. Sign up new municipalities—as of 4/2021, Oxford, Millville, and Boylston remain in Central Reg.
  - c. Coordinate within and among municipalities.
- (4) Pursue Natural Solutions to Water Quality, Water Supply, and Habitat Preservation**
  - a. Preserve existing wetlands and restore degraded wetlands.
  - b. Planning that reduces fragmentation of existing green spaces and wildlife corridors.
  - c. Encourage low impact development practices (LID) practices.
  - d. Reduce impervious surfaces (e.g., de-pave parking lot sizes).
- (5) Implement Erosion and Sediment Control on Active Projects**
  - a. Build developer/contractor knowledge.
  - b. More consistent enforcement and follow-up.
- (6) Maintain Existing Infrastructure and BMPs**
- (7) Access Existing Wastewater Capacity**
  - a. Massachusetts Title V for septic is good but must do more.
  - b. Compare MA to RI requirements.
- (8) More Sustainable Water Supply**
  - a. Study, plan, and take actions to meet need.
- (9) Address Affordable Housing Shortage**
  - a. Emphasize and incentive reuse of existing buildings.
  - b. Cumberland, Woonsocket, Pawtucket, Providence Climate Justice Plan.
- (10) Brownfield Redevelopment**
  - a. Still high priority--tax credits and other incentives not as available.
  - b. Discuss with experts at Mass. Department of Environmental Protection in Springfield.
- (11) Greater Transportation Planning**
  - a. Walkable/bikeable mass transit.
  - b. Reliable Saturday-Sunday expansion, free buses, etc.
- (12) Responsible Renewable Energy Siting**
  - a. Incentivize solar on rooftops.
- (13) Encourage Composting**
  - a. Homeowner and municipal level.
  - b. Lessons on how to do properly/safely in urban/suburban areas.
  - c. Black Earth Compost is expanding west of Boston (maybe Canton).
- (14) Recognition for Sustainable Land Use/Developers/Designs/Decisions**
  - a. Encourage LEED, SITES, ENVISION, and similar certification and/or practices.

## Monitoring

### (1) Prioritize Monitoring that Can Inform Local Decisions and Actions

- a. Focus on headwaters and small tributaries in watershed where development is increasing impervious surfaces and/or resulting in loss of wetland, open spaces, and corridors.
- b. Impaired streams/those with TMDLs in place.

### (2) Address Specific Monitoring Gaps

- a. Bacteria—could use more data for trends and municipal engagement.
- b. Temperate monitoring in cold water streams.
- c. Expand habitat monitoring.
  - i. Benthic.
  - ii. Invasive species.
  - iii. Freshwater macroinvertebrates.
  - iv. Water flow/quantity.

### (3) Funding for Volunteer Monitoring

- a. Fully fund traditional funding programs in watershed.
- b. Consider higher tech options—24/7 systems (30 min intervals) and remote sensing.
- c. Balance low tech with high tech options based on volunteer capabilities and utility of data (e.g., Stow & Hudson MVP project includes a citizen science team at Lake Boon in spring 2021 and raised \$18K in local donations to meet match, <https://lakeboon.wordpress.com/2021/03/06/healthy-lake-boon-update-2>).

### (4) Federal and State Monitoring Efforts

- a. Rhode Island Board of Health to monitor for septic issues.
- b. United States Geological Survey (USGS) nitrogen in both states.
- c. Improve communication of current monitoring efforts and results.

### (5) Data Sharing

- a. Massachusetts Department of Environmental Protection external portal for submitted data a good idea but difficult for NGOs to meet specifics. What about RIDEM and municipalities taking NGO data (Scott Jackson may have ideas for regional data systems based on NAACC work).
- b. Data is available, but we need to know where to get it. A central repository with comparable data would help. Ties back to Watershed Coordination subject area.
- c. Bottom line: if we have data share it.

### (6) Increase Public Awareness of Conditions

- a. Use scorecards that spotlight specific problems and successes with citizens.
- b. Post water quality and other data more real time at parks, neighborhoods, trails, and educators/educator groups.
- c. Need a web presence that connects with younger, more diverse audiences (social media platforms).

## Outreach

- (1) Empower Greater Community Participation in Decision-Making**
  - a. Inform about public comment opportunities at commissions and boards.
  - b. Meet people where they are—evening, weekends, on-line; schools, sports fields, playgrounds, farmers markets, grocery stores, festivals, and local events.
- (2) Expand Outreach to New Interests**
  - a. Community cultural centers, churches, parks, scouts, businesses/groups, Environmental Justice communities, high school environmental clubs.
- (3) Expand Existing Youth Education**
  - a. Include discussion of resilience/sustainability in civics, other classes.
  - b. Think about “Watershed 101” classes.
    - i. Cater learning to age groups (e.g., DEP CERO has 5<sup>th</sup> grade curriculum developed with WPI (contact [andresa.briggs@mass.gov](mailto:andresa.briggs@mass.gov)).
  - c. Massachusetts needs to catch up to Rhode Island in this work—Rhode Island can share best practice.
    - i. Groundwork camp program—expand to Massachusetts.
    - ii. Rhode Island Department of Environmental Management fish in the classroom
- (4) Pursue Targeted Outreach to New interests**
  - a. Environmental Justice Communities.
    - i. Public health (e.g., drinking water, heat islands, asthma), access to nature (and benefits of ecosystem services), food security, affordable housing, renters’ rights, and public safety are all key issues.
    - ii. Pay close attention to community needs—don’t push an outsider agenda.
  - b. Business Community.
    - i. Speak of both benefits and consequences from not address MS4, flooding, and quality of life issues on their bottom line.
    - ii. Find local leaders in the business community who can be champions.
    - iii. Devens Forward—Climate Action Toolkit for Business (<https://kladashboard-clientsourcefiles.s3.amazonaws.com/Devens/Devens+Climate+Action+Toolkit+FI+NAL.pdf>).
- (5) More Simple Educational Signage**
  - a. Expand/replace signage river/stream road crossings in each town (e.g., Rt 146).
  - b. Signage at parks, canoe launches, etc.
  - c. Increase storm drain stenciling—use volunteers.
  - d. Water quality/flood alerts at sites along with signs—dual locate.
  - e. All should connect to downstream, Bay, and consequences.
- (6) More Compelling, Inspiring, and Targeted Education and Messaging**
  - a. Connect to people’s real-life experience—water, flooding, health, safety, etc. (MA Resilient Lands Initiative is a good contact for this).
  - b. Identify and activate local champions, who are trusted, good speakers, etc.
  - c. Make the connection to climate change—will impact flooding, fishing.
  - d. Highlight successes as a “we” thing—what we all did worked!
  - e. Use Zap the Blackstone 50<sup>th</sup> Anniversary as a re-call to action.
  - f. Relaunch ‘Fishable, Swimmable’ or equivalent campaign—with specific actions.
  - g. Training for public officials (mayors, town managers) about why watershed actions (e.g., reduced impervious leads to less flooding) are important.
  - h. Highlight how public access to rivers/nature has improved.
  - i. Proactively seek press.