Summary of
Restoration Priorities for the
Parker, Ipswich & Essex River Watersheds Action Plan

as amended June 2019

Summary

This document summarizes important opportunities to protect and restore the valuable aquatic resources of the PIE-Rivers region, which includes the combined watersheds and estuaries of the Parker, Ipswich and Essex Rivers in northeastern Massachusetts.

Mission

To protect, restore and increase the resiliency of the valuable aquatic resources of the Parker, Ipswich and Essex River Watersheds.

Approach

PIE-Rivers works to achieve its mission by focusing on efforts that seek to address the following broad environmental **goals**:

- **Enough Fresh Water:** Restore and protect the natural flow regime to the extent technically feasible, so that our rivers and watersheds have enough water to sustainably support both human and ecological needs.

- **Clean Water:** Ensure that the water in the Parker, Ipswich and Essex watersheds and the Great Marsh estuary meets water quality standards and supports both aquatic life and human needs including recreational uses.

- **Healthy Ecosystems:** Restore, protect and increase the resiliency of natural resources that maintain ecosystem functions, support native biodiversity, and protect communities throughout the PIE-Rivers region.

Objectives

1. **Natural Streamflow:** Promote more natural streamflow conditions to better support human and environmental water needs.
2. **Water Quality:** Promote efforts to protect and enhance surface and groundwater quality for the benefit of people and the environment.
3. **Ecosystem Restoration:** Promote efforts to protect and restore ecosystem function through habitat restoration, species protection and other available measures.
4. **Community Engagement:** Increase community involvement in and support for taking care of, restoring and protecting our rivers, watersheds and the Great Marsh.
5. **Responsible Water Management:** Ensure that decisions and actions affecting the PIE-Rivers region watersheds support the Partnership's goals.
6. **Land Management and Protection:** Ensure that development and land use practices support efforts to preserve and restore critical ecosystem services throughout the PIE-Rivers region.

Actions

The following is a complete list of the 50 actions identified through the process outlined above. These actions have been organized into one of six "toolkits" (or types of action) based on the nature of the suggested effort. Toolkits are groupings based on the nature of the proposed action rather than the specific ecological threats, goals and objectives they address. As a result, individual toolkits contain actions that address a wide variety of issues. Additionally, since this list of actions was consolidated from the original draft list of 92 actions, many actions address more than one objective. The PIE-Rivers Steering Committee and Technical Sub-Committees identified 50 actions that, if implemented would help protect, restore and increase the resiliency of the region's aquatic resources. Below are toolkit definitions identified by the PIE-Rivers sub-committees and their associated actions.

Toolkit 1: Community Involvement: These actions focus on education, outreach and partnership-building efforts that will increase restoration capacity.

Action 1: Water Conservation Outreach
Continue and broaden regional outreach campaign, including water conservation website, highlighting the need for water conservation and promoting household and municipal water conservation measures. These measures could include, but not be limited to, water banks, use restrictions, billing incentives, and low impact landscaping. Increase capacity for municipalities to incorporate "water wise" practices (Levin, 2006).

Action 2: Expand PIE-Rivers
Expand and reinforce the PIE-Rivers partnership, seeking to engage broader representation (especially from municipalities, conservation organizations and the public)

Action 3: Citizen Stewardship
Develop a network of local citizen stewardship groups or stream teams throughout the region to improve capacity to implement measures at the community level.

Action 4: Water Quality Outreach
Increase outreach efforts to improve public understanding of the negative water quality effects of nutrients and other pollutants. Utilize public outreach campaigns (such as Greenscapes) to highlight how individual behaviors can impact drinking water quality and ecosystem health and encourage practices that reduce or eliminate contamination.

Action 5: Promote Low Impact Development
Promote the implementation of Low Impact Development (LID) techniques to reduced development impacts on factors including water use, groundwater recharge and stormwater induced flooding.

Action 6: Local Flow Awareness
Empower local leaders to consider the flow impacts of water-related decisions. Instill the approach of seeking to (1) avoid impacts where possible, (2) minimize impacts that cannot be avoided, and (3) mitigate those unavoidable impacts.

Action 7: Promote Restoration
Conduct outreach campaign, including public presentations, web content, etc. highlighting the importance of restoration efforts.

Action 8: Identify Target Audiences for Expanded Outreach
Assess current levels of community interest and involvement in watershed issues to identify groups that would benefit from increased outreach efforts. Develop and implement outreach strategies targeting these groups to build support and active participation in conservation and restoration initiatives.

Action 9: Link Ecosystem and Economics
Promote economic valuation of ecosystem services and functions in water management and publicize the mutual benefits of saving water and saving energy.

Action 10: Support Solutions for Regional/Global Issues
Provide support for local measures that seek to address factors contributing to the larger-scale stressors of climate change and sea level rise (for instance, measures to reduce greenhouse gas emissions). Engage community in resiliency discussions aimed at adapting to the unavoidable consequences of sea level rise, climate change and other externally-driven issues.

Toolkit 2: Restoration Science and Prioritization: *Includes research and survey work to ensure that restoration approaches and prioritization of projects are based on science.*

Action 11: Prioritize Conservation Land

Identify lands of high conservation value with respect to their influence on the PIE-Rivers environmental goals (enough water, clean water and healthy ecosystems) in the region. Areas of focus should include:

(1) existing floodplains and groundwater recharge areas that can attenuate extreme flows and increase resiliency,
(2) land that affects the quantity and quality of current and future drinking water sources, (3) headwaters and small streams,
(4) critical habitats such as wetlands, shorelands, and migration corridors.

*Note: This action provides information necessary to implement Action 39, "Regional Land Protection and Conservation Plan"

Action 12: Prioritize Aquatic Barriers

Identify and prioritize barriers including physical (dams, culverts, etc.) and "soft" barriers (temperature, DO, chemical, behavioral) that may be limiting critical aquatic organism migration. For physical barriers, include analysis of risk of infrastructure failure and impacts on flood risk (upstream and downstream) and community resiliency in prioritization where feasible and applicable.

*Note: This action provides information necessary to implement Action 44, "Remove Migration and Flow Barriers"

Action 13: Identify Factors Limiting Aquatic Species

Identify critical factors limiting abundance and community structure of important biota (including shellfish, fluvial fish (brook trout, etc), diadromous fish) and identify restoration methods to improve conditions in the project area.

*Note: This action provides information necessary to implement Action 45, "Implement Additional Aquatic Species Restoration"

Action 14: Identify Water Quality Problems

Expand water quality assessments to unmonitored areas (DEP Unassessed areas) and identify areas where water quality threatens important aquatic ecosystems using existing information and new research as necessary. Consider ecological and public health effects of trace chemicals such as pharmaceuticals that end up in surface and groundwater systems. Develop a list and proposed timeline to address high priority "Hot Spots" for degraded water quality in both the freshwater and estuarine zone.

Action 15: Identify Stormwater Priorities

Identify, monitor and prioritize areas where stormwater is degrading water quality and aquatic habitat conditions.

*Note: This action provides information that will aid implementation of Action 33, "Upgrade Stormwater Systems"

Action 16: Prioritize Degraded Habitats

Identify (and prioritize for restoration and/or mitigation) degraded habitats including freshwater wetlands, floodplains, shorelands and uplands with a special focus on sites where existing development is a particular threat to water resources.

*Note: This action provides information necessary to implement Action 49, "Restore Priority Degraded Habitat"

Action 17: Assess Climate Change Vulnerability

Identify vulnerabilities of upland, shoreline and aquatic habitats to anticipated impacts of climate change and sea level rise. Propose appropriate actions to mitigate or adapt to impacts.

Action 18: Research Water Conservation Economic Drivers

Conduct research on economic drivers of water use and conservation

*Note: This action would help inform the following actions:

- Action 9, "Link Ecosystem and Economics"& Action 37, "Implement Economic Water Management Tools"

Action 19: Develop Bird Conservation Strategy

Identify strategies to counteract any concerning decreases in bird diversity and population stability that can be enacted on a regional level.

Action 20: Assess Estuarine Habitat Limitation

Inventory eelgrass beds and other important estuarine habitats, identify factors limiting their distribution, and propose restoration measures to increase distribution and resilience of these habitats.

*Note: This action provides information necessary to implement Action 50, "Restore Estuarine Habitat Conditions"

Action 21: Research Stormwater Capture and Storage

Research options to capture and store stormwater runoff by natural or engineered means, such that flooding risk is reduced and water is conserved.

Toolkit 3: Monitoring and Technical Support: *Includes monitoring of ecological conditions and restoration progress. Also includes technical tools and support for municipalities and other entities to implement critical restoration measures.*

Action 22: Provide MS4 Support
Provide technical support to help municipalities comply with new Municipal Separate Storm Sewer Systems (MS4) permit requirements

Action 23: Monitor Aquatic Species
Survey populations and communities of ecologically and economically important biota in the region to identify areas of concern and monitor trends. This could include: (1) native diadromous fish including river herring, (2) bivalves (especially soft-shelled clams), (3) fluvial fish species including Eastern brook trout, (4) saltmarsh and breeding birds.

Action 24: Develop River Health Index
Develop a "River Health Index" or report card to help the public understand the health of our waters.

Action 25: Identify Ecological Restoration Targets
Develop science-based ecological targets that integrate water quality, water quantity and structural habitat requirements. Implement monitoring programs to gauge current conditions and restoration progress with respect to these targets.

Action 26: Monitor Invasive Species
Coordinate volunteer-based mapping and monitoring of invasive species distribution in the region to identify problem areas.
*Note: This action would inform implementation of Action 43, "Control Invasive Species"

Action 27: Provide Stewardship Tools
Develop and assemble tools and online resources to help communities, businesses and residents make informed decisions related to water use and watershed stewardship. This should include distilling science-based information about the PIE-Rivers region, guides to preferred best management practices (like the Water-Wise Communities Handbook), etc.

Action 28: Monitor River Flow
Monitor river flows at USGS gauges and other sites in the watersheds and examine for trends related to precipitation, water use and land use.

Action 29: Address Estuarine Pollution Sources
Work with coastal communities to identify and address high priority pollution sources for the estuarine environment.

Action 30: Provide Mapping Technical Support
Assist communities in using existing planning and monitoring tools such as MassCAPS, GIS, BioMap2.

Toolkit 4: Integrated Water Management: *Actions focused on integrated water management, including drinking water, stormwater and wastewater issues. Includes systemic and policy initiatives to improve water management locally and at the state level.*

Action 31: Incentivize Water Conservations
Reduce lawn watering and other non-essential water demand through a combined approach including use restrictions and billing incentives

Action 32: Create Model Municipal Integrated Water Resources Management Program
Create model municipal-level program that integrates water supply, wastewater, stormwater, habitat and land use management. Seek to implement and test program in one or more communities and use lessons learned to scale to a region-wide implementation of integrated water resource management (IRWM) principles.

Action 33: Upgrade Stormwater Systems
Upgrade stormwater systems that are identified as high priority.

*Note: This action relies on priorities identified in Action 15, "Identify Stormwater Priorities"

Action 34: Limit Withdrawals from Sensitive Areas
Optimize water supply operations to minimize environmental damage by discontinuing or limiting withdrawals from sensitive sub-basins and streamside wells. This might include adopting flow-triggered measures to limit and prioritize withdrawals and developing alternative water sources to replace or relieve pressure from the most damaging sources (from particular sub-basins and streamside wells).

Action 35: Develop Water Conservation Program
Develop a regional water conservation program staffed with a stewardship coordinator.

Action 36: Identify Water Protection Gaps
Identify the strengths and gaps in water (including drinking water) protection in each community including review of Source Water Assessment and Protection (SWAP) reports and local zoning ordinances/bylaws.

Action 37: Implement Economic Water Management Tools
Implement management tools that link water resource protection with economic drivers (e.g. progressive rates, fees for water, water banks, stormwater utilities).

*Note: This action would be enhanced by information from Action 18, "Research Water Conservation Economic Drivers"

Action 38: Water Resources Legislation
Advocate for passage of legislation (like the Sustainable Water Resources Act) that requires environmentally relevant streamflow standards, enables easier removal of unnecessary dams and authorizes waterbanking (allowing communities to assess fees for water conservation and sustainability measures).

Toolkit 5: Land Protection and Management: *Actions dealing with land acquisition, zoning, land management, and land use issues that influence aquatic systems.*

Action 39: Regional Land Protection Conservation Plan
Develop and implement land conservation plan for northeastern Massachusetts' coastal watersheds. An emphasis should be placed on protecting lands of high conservation value with respect to their influence on flood resilience, water quantity, water quality and ecosystem integrity (including rare species) in the region.
*Note: This action depends on priorities developed in Action 11, "Prioritize Conservation Land"

Action 40: Improve Land Use Bylaws
Develop and implement bylaws and incentive systems at the municipal level to encourage landowners to make land use decisions that improve flood capacity, water quality and quantity conditions (including Low Impact Development (LID), zero-runoff ordinances, etc.). Special attention should be given to implementing measures on existing developments.

Action 41: Improve Conservation Land Stewardship
Support land stewardship and land management actions for conservation lands and key areas that maximize quality habitat and watershed services.

Action 42: Protect Drinking Water Sources
Protect the quality and quantity of current and future drinking water supplies through land use education, incentives and regulation.

Action 43: Control Invasive Species
Develop protocols for volunteer-based control of invasive species. Implement invasive species control measures on problem areas seeking to use volunteers as appropriate.

*Note: This action would be informed by Action 26 "Monitor Invasive Species"

Toolkit 6: Habitat Restoration: *Physical habitat and ecosystem restoration projects.*

Action 44: Remove Migration and Flow Barriers

Improve aquatic habitat connectivity and restore natural flow regime through various methods including dam removal, culvert replacement/upgrade, and fishways as necessary with focus on barriers identified as high priority for both habitat and flooding impacts. Changes in flow capacity for structures such as culverts and bridges should take into account position in the watershed and potential effects on upstream and downstream structures.

*Note: This action relies on priorities identified in Action 12, "Prioritize Aquatic Barriers"

Action 45: Implement Additional Aquatic Species Restoration Measures

Implement aquatic species restoration measures identified in Action 13 that are not already underway.

*Note: This action relies on the results of Action 13, "Identify Factors Limiting Aquatic Species"

Action 46: Implement Demonstration Restoration Projects

Implement at least 3 restoration projects in the next 5 years that can be used as demonstration projects (local proof of concept) – publicize all stages of the projects and seek a high level of community involvement at all stages (implementation, monitoring, etc).

Action 47: Restore Vegetative Buffers and Floodplains

Restore natural vegetative buffers along tidal shorelands, riparian zones of all stream orders, and wetlands. Where feasible, seek to "undevelop" and reconnect floodplains where flood storage has been lost and consider removal and relocation of structures and/or infrastructure that are highly flood susceptible or worsen flooding, in order to allow natural movement of marsh and vegetative buffers to accommodate sea level rise.

Action 48: Restore Salt Marshes

Restore or enhance impaired salt marshes through approaches including removal of tidal restrictions and invasive species management. Consider the influence of sea-level rise on long-term marsh viability in prioritization of projects. Where possible, incorporate opportunities to mitigate future marsh losses to sea-level rise by providing space for marshes to migrate up slope.

Action 49: Restore Priority Degraded Habitat

Restore high priority degraded habitats identified in Action 16 using appropriate measures.

*Note: This action relies on priorities identified in Action 16, "Prioritize Degraded Habitats"

Action 50: Restore Estuarine Habitat Conditions

Restore eelgrass beds and other important estuarine habitats through the implementation of restoration measures identified in Action 20.

*Note: This action relies on the results of Action 20, "Assess Estuarine Habitat Limitation"