

# **Blackstone River Watershed**

## **Five Year Watershed Action Plan**

*First Draft*

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Sponsored by Massachusetts Environmental Trust

### **In Cooperation With:**

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# Executive Summary

## A. Purpose of the Action Plan

The Five Year Action Plan is part of the Planning and Implementation Year (Year 4) of the Five Year Basin Cycle. This year comprises planning, resolving watershed problems and protecting resources, initial implementation of solutions, and soliciting grant proposals, while providing technical support. A main component with much emphasis is Outreach, which is aimed at providing opportunities for citizen input into this Five Year Action Plan. In this way, citizens can help solve problems as well as identify them.

The Action Plan is a way to create a comprehensive understanding of the Blackstone Watershed and to define actions to protect and improve its watershed resources. In order to achieve this, the Plan is the culmination of all of the elements of the watershed protection approach. For example, it is developed among a collaboration of Blackstone Watershed interests; it provides a comprehensive and cohesive framework for better management of the Blackstone watershed and its activities for protection; and it also provides a clear role for community partnership with state agencies, as well as, public demonstration throughout the Blackstone with the help of the Blackstone Watershed Team's commitment to progress.

The Plan will unify existing assessment processes and identify areas in the Blackstone Watershed that:

1. Do not meet, or face the imminent threat of not meeting, water and other natural resource goals.
2. Meet quality goals but needs action to sustain and preserve water quality and natural resources.
3. Are considered high quality resource waters.
4. Need additional information to assess conditions.

The Plan will also identify restoration priorities and action strategies. The priorities established in the Plan will be used to target federal and state resources, grant and loan programs, regulatory decision making, and educational and technical assistance programs to solve the highest priority areas.

The Plan is built on the preceding Annual Work Plans of Years 1-3 (Outreach, Research, Assessment), and will set the direction for the work of the succeeding five annual work plans. These preceding annual work plans will help assemble the information and support necessary to complete and implement the Plan. Then with the completion of the Plan, subsequent annual work plans will provide an opportunity to review its priorities and develop specific responses to achieving its goals. The end result is a continuous interplay between the Five Year Action Plan and the Annual Work Plans which the Blackstone Team will use as a yearly opportunity to evaluate and make refinements to enhance its success.

- The Year 4 Implementation Activities for the Action Plan in the Blackstone:
  1. Outreach and Education

2. Local Capacity Building
3. Water Quality
4. Water Quantity
5. Habitat
6. Open Space
7. Recreation

## **B. Overview of the Massachusetts Watershed Initiative (MWI):**

The Massachusetts Watershed Initiative began with the belief that the state's environmental agencies could best fulfill their various missions by coordinating activities within the state's 27 river basins. Over the past two years, the Executive Office of Environmental Affairs (EOEA) and its five primary agencies have recognized that to meet this challenge, they must place greater emphasis on interagency communication and goal-setting. At the same time, the environmental agencies have strengthened their partnerships with watershed associations and other community groups. Together we hope to work more creatively and effectively in our efforts to improve the quality of the state's river corridors and to protect our drinking water, wetlands, and other natural resources.

There is an important connection between protecting our natural resources and maintaining good public health and quality of life. There is also an understanding that protection of these valuable resources requires stewardship that transcends town boundaries and state regulatory authority. Therefore, protection must be accomplished watershed by watershed. (A watershed is a region or area whose boundaries waters contribute water to a particular watercourse or body of water. There are 27 major watersheds in the Commonwealth).

In 1993, Secretary Coxe launched the MWI to prevent pollution and protect or restore environmental quality, while targeting limited resources to where the most environmental benefit can be achieved for our dollars. The Initiative is a statewide effort, focusing state agencies, regional and local groups on managing, coordinating and integrating all activities within the natural boundaries of Massachusetts' watersheds.

- The Initiative seeks to achieve five goals:

1. Measurable improvement in water and environmental quality
2. Protection and restoration of habitats
3. Improved public access to, and balanced use of, waterways
4. Improved local capacity to protect water resources
5. Shared responsibility for watershed protection and management

Local stewardship is a fundamental part of the Watershed Initiative because it enables communities to protect the areas that they are most concerned about and know best. Groups such as Watershed Associations through outreach and data collection can promote community stewardship in order to protect and improve water quality, local

recreation, and quality of life. The EOE Basin Teams are another critical element of the MWI because their staff includes all the environmental agencies, in addition to representatives from federal agencies, watershed associations, municipalities, and local groups. Together, the Teams practice watershed management.

Specifically, the Blackstone Watershed Team has collaborated on numerous projects and activities over the past three years. Established in early 1997, the Team partnered with federal and state agencies, watershed associations, and community groups, to find strategies for further protection of the Blackstone watershed and assist local officials and citizens in their work with things like shoreline surveys, other studies, and allocation of grant monies. The Team Leader, D. Lynne Welsh, was then appointed to help focus and coordinate these groups, while providing useful information on research and technical assistance. Now as the Team continues with its capacity building, long-term monitoring of the watershed will strengthen to create more effective efforts in improving the quality of the Blackstone River and its tributaries, as well as its drinking water, wetlands, wildlife, and other natural resources.

## **Key Issues, Findings, Recommended Actions**

### **Accomplishments (Review of Previous Workplan Years)**

When assessing the accomplishments of the workplan years (1-4), it is difficult to exactly place the activity or accomplishment within the right year (from 1997-2000) because the Fiscal Years are different from the normal calendar years. The workplans are based calendar years but are developed for resource allocation on a Fiscal Year basis, which may incorporate at least a compilation of two calendar years, therefore resulting in an overlap. For example, Year 2 includes some of FY98 and FY99.

#### **1. Year 1 (Outreach):**

FY97 from Central Regional Office, Department of Environmental Protection (DEP): Realignment of BRP into interdisciplinary basin teams was accomplished and a significant cross-training program was designed and initiated. BRP's Municipal Assistance and Program Support (MAPS) group was created in order to design municipal outreach programs to assist local decisions regarding municipal infrastructure. Other activities included Enforcement, Permitting, Administrative Improvements, and Program Development.

- Formalized membership in Blackstone Headwaters Coalition.
- Kendrick Brook Study, Coal Mine Brook Shoreline Survey, Clark Clean up, Stenciling Day.
- Mill Brook Task Force worked towards "Breakfast Meeting" for local business around watershed issues. Beaver Brook Task Force had first step for outreach, a neighborhood "study" on behalf of BHC seeking information regarding flooding problems in the area. Planned for NPDES Permit outreach proposal and a Fall Waterways Cleanup.
- Put out newsletters keeping membership updated with activities.

- Blackstone River Watershed Association: Held two canoe races; Surveyed members asking them what they perceive as the major problems in the Blackstone; Produced a Community Needs Assessment Survey; Submitted grants for Stream Team development and for Capacity Building.
- Formed Stream Teams to do Shoreline Surveys.
- Worcester County Conservation Service received a grant to map Wetland Restoration opportunities in the Headwaters.
- DEM got grant to investigate cleanup options for Rice City Pond.
- Mass Highway Department started construction on the Northern portion of the Blackstone Bikeway.
- Taskforce set up for Outreach and Beaver Brook.
- Blackstone Headwaters Coalition established.

## 2. Year 2 (Research):

- DEP Environmental Monitoring Program: Emphasized “Response Indicators” such as biological community indices; Section 303(d) Listed Waters in Blackstone Watershed prioritized monitoring needs—Blackstone River, Peters, Mumford, Mill, West, Middle, Kettle, Tatnuck, and Mill.
- DEP Sampling—Fish Toxics; Habitat and Biological Assessment; Optical Brighteners; Water Quality; Metals; Subwatershed Monitoring by volunteers (Kettle Brook, Tatnuck Brook, Beaver Brook, Mill Brook, Middle River).
- The Blackstone Watershed Team (BWT) held four forums throughout the watershed, followed up with a specific “State of the Headwaters” Summit, worked with the BRVNHCC and conducted many BWT meetings. These results are expected in 2001.
- Two themes for this year were Water Quality and Growth which helped focus efforts by the many active groups in the watershed and helped the BWT prioritize their budget.
- Army Corps of Engineers Feasibility Study (FS) contract was issued to quantify sediment remediation areas and develop engineering plans for habitat restoration; Beaver Brook “daylighting” project undertaken by ACE as part of the FS; Stormwater Specialist was hired; signed a contract for development of a sustainable development evaluation of the 146 Corridor to help communities handle growth along this new access corridor in the Blackstone; Rice City Pond phytoremediation pilot and bench study.
- Blackstone River Initiative: Conducted a comprehensive study on the main stem of the river under low flow and storm conditions. This project was unique because of the assessment of the river in both Massachusetts and Rhode Island. It identified a number of problem areas—headwaters during storms, combined effect of wastewater treatment facilities, contaminated sediments in the impoundments, and rapid changes in the water levels. (The Army Corps of Engineers study will continue to quantify the problem areas).
- Worked with USEPA, DEP, and the City of Worcester DPW to develop a stormwater permit for the City of Worcester and to implement the

recommendations of the wasteload allocation for the wastewater treatment facilities; Conducted biological assessment work in the headwater tributaries; Conducted a water quality sampling plan; Completed the database of stormwater sites and prioritized those sites; The resources agencies worked with the National Heritage Corridor Stream Flow Taskforce and the hydropower facilities to understand the river system.

- UMASS study of watershed from 3 levels: water quality, habitat, and growth.
- Taskforce for Mill Brook established.

### 3. Year 3 (Assessment):

- FY99: Task forces were set up for Stormwater, Mill Brook, Water Quantity, and Outreach; the Water Quality Task Force encompassed a variety of representatives ranging from EPA to BRVNHCC to RI DEM and even to hydropower operators; a Steering Committee for NGO activities in the headwaters consisted of Regional Environmental Council, Mass Audubon, and BHC.
- EPA, MA DEP, and URI completed work on the Blackstone Initiative Report that developed water quality modeling for the River. Results were presented to the National Science Advisory Board.
- Water Resources Commission: Continued work on stressed basins/streamflow protection; Impacts of Wastewater Interbasin transfers; Finalized drought standard operating procedure for MA; Streamline Water Supply Permitting Process; Outdoor Water Use Conservation Program.
- BRVNHCC Stream Flow Task Force expressed need for developing data that will get to source of resulting river fluctuations, riparian zone, recreational, and water quality impacts.
- Team supported emerging groups in the headwaters and in Rhode Island for stream team development and project implementation.
- Applied for a Stewardship grant (EMPACT) for headwaters.
- River Restore set up with Farnumsville Dam.

### **Unresolved Issues**

- Think about Worcester Stormwater discharge permit related to construction impacts; Cleanup of Brownfields sites; Voluntary inspection of key industrial sites.
- UBWPAD facilities planning; Recent NPDES program changes include an allowance for pollutant trading.
- Wetlands Protection Act; Rivers Protection Act; Assistance in location of potential vernal pool habitats; 604b3 grant to identify degraded wetlands for restoration candidates.
- Ongoing enforcement activities to correct violations of environmental laws and regulations; Commitment to environmental education; TMDLs currently underway.
- Worcester program to identify/correct building sewer-to-storm drain misconnections; US ACE Aquatic Restoration Program; Mill Brook Task Force to

reduce pollutant loadings; Strengthening businesses' environmental policies; Storm drain stenciling projects; City of Worcester Waterways signs.

- Impoundment Management Pilot for Lake Quinsigamond and Flint Pond
- DEP-BWSC site work related with river and water body restoration.
- DEM project management of the Watershed-wide Open Space/Land Acquisition Strategy.
- Comprehensive Water Resources Management Plan.
- EMPACT Grant—Stewardship grant for stormwater processes in headwaters.
- Stream Flow Taskforce Experiment Committee—Fluctuation Finding Team.
- Daylighting beaver Brook.
- DEM's project management of ACE FS work.
- LQ/FP restoration and use of drawdowns to improve weed control.
- Strategy to fund wetlands restoration.
- Low flow/safe yield analysis of Mumford and Mill Rivers

### **Priorities for Action**

Here are some large goals or statements for the action priorities of the Blackstone watershed. More specific projects will be described in the body of the Plan.

- Help towns prepare for Phase II Stormwater requirements.
- Reduce Flow Fluctuation.
- Mitigate Stormwater, impacts to and landuse on lakes and ponds.
- Cleanup HW sites along impoundments that help the river.
- Restore brownfields along riverways.
- Create open space plans that link to adjacent towns.
- Reduce sprawl.
- Make sure new infrastructure does not reduce Headwaters.
- Develop a plan to address contaminated sediments in lakes, ponds, and impoundments.
- Follow Restoration Metrics to help gauge work.

### **Partner Responsibilities**

1.

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## **Introduction**

### **A. Massachusetts Watershed Initiative**

Massachusetts's waters are in need of help. Some rivers run dry during the summer because too much water is extracted for drinking water uses, as well as main uses. There are rivers that even flow backwards at one point due to the amount of water taken out of lakes and ponds upstream. Fresh water is such a high demand in some parts of the state that communities are considering building desalination plants to turn seawater into drinking water. Not even one third of the Commonwealth's rivers are safe for swimming and fishing. The biggest source of water pollution in Massachusetts is actually from contaminated stormwater runoff from roads, driveways, and parking lots. This stormwater runoff has gotten worse in the past 20 years, with the increasing development in Massachusetts. "Sprawl" is another aspect of this problem; in addition it consumes open space, harms natural resources, and diminishes wildlife habitats.

These are the many problems facing our state's waters today. But the Massachusetts Watershed Initiative (MWI) is one attempt to overcome these obstacles. The challenges facing us now can not be solved using traditional methods of our government, such as top-down controls or simple dictation of solutions. Instead the MWI is a revolutionary way for helping to solve our water concerns: protection of our natural resources is best accomplished watershed by watershed, requiring stewardship that transcends town boundaries. Therefore, the Initiative creates a partnership between state agencies and communities to work together to find comprehensive and effective solutions to our problems. This calls for a much larger role for local leaders and citizens to play when identifying and addressing their environmental issues. Thus, state agencies now focus on helping communities find their answers that pertain and make sense to them locally.

Beginning in 1993, the MWI addresses environmental issues, like preventing pollution and protecting or restoring environmental quality, with a team approach. As a statewide effort, it focuses state agencies and regional or local groups on managing, coordinating, and integrating all activities within the natural boundaries of the Commonwealth's 27 watersheds. In this way, local officials from different towns will be working together with their state agencies, landowners, and concerned citizens. The Executive Office of Environmental Affairs will also be available for financial assistance to help guide local organizations into becoming involved with the Initiative. There are also Capacity Building Grants that help strengthen local watershed associations to achieve a certain level of participation in order for this Initiative to succeed.

Furthermore, Secretary Bob Durand of MA EOE, established four main priorities for his focus. The first one is increased open space protection. Governor Cellucci already approved a goal for 200,000 acres within the next ten years, and Durand wishes to increase open space by 100,000 acres during his time of office alone. Bioreserves is another priority that includes the recent ACEC Warren, Whitehall, and Miscoe Brook approval. Increasing Environmental Education has always been a top issue in schools, and the MWI will be used as part of the curriculum to set the framework for kids. A last

goal is Community Preservation, which gives towns the tools necessary to protect their lands.

Each watershed now has a dedicated EOEA Basin Team Leader who is responsible for guiding the protection and planning efforts for their basin. The Team Leaders guide the Basin Teams which are another critical element of the Initiative. These teams practice better watershed management by including staff from all environmental agencies, representatives from federal agencies, watershed associations, municipalities and local groups, all having an interest in resource management in the basin. This allows them to work with local groups, like Stream Teams and town officials, so that local concerns are recognized and addressed. These partnerships are the key to workings and future success of the Massachusetts Watershed Initiative.

The way the MWI works is that each watershed team starts with a five-year process. The first year is Outreach, which includes determining what information is available, and whether there are gaps in the information needed to assess watershed conditions, as well as making contacts with the residents. The second year is the Research year when the team gathers information using monitoring and other sources to fill in the information gaps about things like water quality and water quantity. Assessment is the concentration of the third year in which the information from the previous years is compiled and used to determine existing conditions, to see whether uses are impaired, and to identify causes and sources of existing or potential use impairment. In the fourth year, the team directs a large amount of resources into strategically planning and implementing the strategy for the next five years. This involved writing permits, developing grant proposals, and generating mitigation plans. The fifth and final year is spent on evaluation of the progress the team has made, as well as updating information that has been received.

Furthermore, the MWI established seven objectives or goals that the Basin Teams must incorporate into their assessments and work done in their prospective watersheds. These objectives will help guide the Teams into coordinating and developing their projects or studies, as well as, helping them to achieve the goals set forth by the Initiative.

1. Outreach and Education: To foster strong partnerships among all watershed interests by working together.
2. Local Capacity Building: To work with municipalities and community partners to increase the capacity of all partners to protect natural resources.
3. Water Quality: To implement necessary actions to return waters to their designated uses pursuant to the Water Quality Standards.
4. Water Quantity: To protect and restore water levels and water flows in rivers, streams, and other aquatic and water dependent ecosystems necessary for sustaining they're ecological integrity and supporting sustainable human needs.
5. Habitat: To work with community partners to protect and restore habitat and to evaluate efforts to protect high quality habitat within the watershed.
6. Open Space: To work with community partners to protect appropriate open space and to evaluate the increase in high quality open space.
7. Recreation: To work with community partners to ensure high quality recreational opportunities.

## **B. Development of Five Year Action Plan**

The Five-Year Action Plan or the Plan is developed during Year 4 of the Five-Year Basin Cycle set forth by the Massachusetts Watershed Initiative. During this Planning and Implementation year, the Plan will identify comprehensive implementation strategies and the specific actions necessary to address priority problems in the watershed. These implementation actions may continue until implementation is completed, which could take several years. The priorities established in the Plan will then be used to target state resources and grant programs to address the highest priority areas. It may also be used to focus regulatory decision making and educational and technical assistance programs.

The purpose of the Five-Year Action Plan is to create a comprehensive understanding of the watershed and to define actions to protect and improve its resources. The Plan is based on assessments of problems and broad public input. Utilizing each year's Annual Work Plan, the Plan will outline the activities and accomplishments in the watershed and will set the stage for the next five to ten years of watershed protection and management. The Plan will therefore contain specific and measurable environmental targets to focus local and regional efforts.

The Blackstone River Basin Team is the author and developer of the Plan. It is done so among a collaboration of watershed interests, stemming from the many watershed groups, associations, and agencies. The development is through an inclusive, consensus-building process so that participants and others in the watershed can live with and support the findings and recommendations of the Plan. The Blackstone Team already has a wide collaboration of groups all working together to promote and protect the natural resources of the Blackstone Watershed. These partners include state and federal agencies, local and regional groups, water quality monitoring groups, Stream Teams, volunteer groups, and a strong community base. Some of our partners:

- Blackstone River Watershed Association (BRWA)
- Massachusetts Department of Environmental Protection (MA DEP)
- Massachusetts Department of Fisheries, Wildlife, and Environmental

Law Enforcement (DFWELE)

- Massachusetts Department of Environmental Management (MA DEM)
- Massachusetts Department of Food and Agriculture (DFA)
- Office of Technical Assistance for Toxic Use Reduction (OTA)
- John H. Chaffee Blackstone River Valley National Heritage Corridor

Commission

- Blackstone Headwaters Coalition (BHC)
- Massachusetts Audubon Society
- Central Massachusetts Regional Planning Commission (CMRPC)
- Natural Resources Conservation Service (NRCS)
- Worcester County Conservation Services (WCCS)
- U.S. Environmental Protection Agency (US EPA)
- U.S. Geological Survey (USGS)
- Army Corps of Engineers (ACE)

Some major findings and accomplishments of the previous years of the basin cycle include things like education and outreach and increased capacity building. State, federal, and academic conducted extensive water quality studies groups throughout the early 1990's in order to develop permitting requirements for wastewater treatment facilities that line the river, as well as an extensive environmental monitoring program for the Headwaters. They found that during dry weather, the upper reaches of the river is effluent dominated by runoff from the City of Worcester, the Upper Blackstone Water Pollution Abatement District, and the Worcester's Combined Sewer Overflow Facility. But in wet weather events, the river is affected by re-suspension of sediments from the River's numerous impoundment of dams and runoff from storm water systems. Some major issues for now and the future include the result and effects of the accelerated growth and development in the region, water quality and quantity assessments, and how existing or potential plans for the Blackstone will impact this Watershed Action Plan.

### **C. Blackstone Watershed Overview**

The Blackstone River Watershed is located in south central Massachusetts and includes portions of the northeastern corner of Rhode Island. Together, the two states form a collection of streams, tributaries, and rivers that make up the Blackstone Watershed. The watershed encompasses approximately 540 square miles draining all or part of 29 communities in Massachusetts and includes the second largest city in New England. The Blackstone River, named for the first European resident of the Valley, Reverend William Blaxton, originates as a series of streams in the hills of Worcester and flows 48 miles south into Rhode Island, emptying into the Narragansett Bay near Providence. Eventually, the river drops 450 feet before entering the Bay because of average hydraulic gradient of feet per second. There are six major tributaries: Quinsigamond, Mumford, West, Branch, Mill, and Peters.

The history of this river is quite becoming. Dating back to the 19<sup>th</sup> century, the Blackstone Valley became known as the "birthplace of America's Industrial Revolution" as settlers took advantage of its natural waterpower. At this time, mills were installed as a series of dams between Worcester and Pawtucket, RI. The river therefore earned its reputation of "America's hardest working river." Yet, the many dams built harnessed so much of the water that the river sacrificed a varied and plentiful food source provided by anadromous fish, which could no longer migrate upstream to spawn.

With further industrialization, the valley was opened up to further development and soon the canal that were common sights for barges, were soon replaced by railroads. This period left a lasting mark on the water quality of the river, leaving much pollution of dyes, oil, and toxic compounds. Some of these materials settled behind impoundments formed by dams and still some of these contaminated sediments remain. The River has also been identified as the number one source of pollution for the Narragansett Bay in Rhode Island. But, the Blackstone is now undergoing dramatic improvement resulting in many successes. More and more attention is brought to this watershed as the Governors of Rhode Island and Massachusetts signed an agreement to work together to restore the

Blackstone. In 1986, Congress established the Blackstone River Valley National Heritage Corridor. President Clinton also designated the river as one of America's Heritage Rivers back in 1998.

The Blackstone Watershed, lying outside the I495, is still relatively undeveloped and has a large number of natural resources including biological, recreational, economical, and cultural. These resources combine with the elaborate historical make-up of the watershed producing a strong community with continuous recreational and economical opportunities and a growing interest in protecting and conserving its land, water, and wildlife. Most important are the biological resources that enhance the vitality of the Blackstone. The River system is a collection of waters, including large water bodies such as Lake Quinsigamond, the Mumford and Branch Rivers, Manchaug and Rice City Ponds, and many other smaller streams and ponds. The hydrological source is located at an elevation of 1,300 feet on the slopes of Asnebumskit Hill near Holden, MA. Its headwaters are wetlands and brooks feeding into the river stream. As it flows in a southeasterly direction, the River becomes wide and marshy in areas north of Rhode Island. Waterfalls are formed as a result of the dramatic drop in elevation, which is a response to changes in the geology. As the river flows into Pawtucket, Rhode Island, it joins the Seekonk before emptying into Narragansett Bay. The system also includes the Blackstone Canal, built in the 1820's. The canal flows through downtown Providence also into Narragansett Bay as it joins with the Moshasuck River forming the Providence River beforehand, finally going all the way to Worcester.

The landscape of the Blackstone Valley comprises of gently rolling hills and rocky, acidic soils left by glaciers once covering the surface. Large rock outcrops mark the River's edge. The glacier also left deposits lying over bedrock of granite and limestone, which became important building materials economically as the valley grew. The vegetation is part of New England's Oak Forest with dominant trees such as oaks, beeches, maples, and ash. Yet, white pines tower over these deciduous trees. Along the river, second growth forests often edged with birches and aspens can endure flooding. Low-lying areas like islands have blueberry bushes, willows, and alders. Wetland meadows attract many migratory birds.

In terms of wildlife, there were many more anadromous fish species prior to settlement. Yet today, there are about 20 species of fish and game species are most common, even though poor water quality limits their numbers. A large variety of mammals can also be found, totaling over 40 species. But, waterfowl have great importance because of the dominance of the River. About half of the more than 200 species of birds strongly depend on the wetlands for their habitat. Some nesting species are the mallard, wood duck, and Canada goose.

The Blackstone receives an annual rainfall of about 44 inches, distributed throughout the year, and intense local storms occur. Floods therefore are resulting factors that cause much damage. However, the River has experienced water quality problems for the past 100 years due to industrialization and municipal waste with untreated sewage, detergents, solvents, heavy metals, and other industrial wastes. Much of the waters were still

polluted by these discharges until the passage of the Clean Water Act, but in recent years, the main source of pollution is stormwater runoff. Because of the numerous dams that create impoundments, toxic sediments become trapped continuing to hurt the long-term health of the river. Also, during periods of low to moderate flow, water quality is poor, due in part to the dam created backups in river flows that results in warmer water. Yet, recent improvements as a result of the Clean Water Act and pollution reduction initiatives, the water quality is improving, but much still needs to be done.

Still, the watershed opens up a variety of recreational opportunities, as well as cultural sites. Massachusetts and Rhode Island have identified sites of statewide significance that house threatened and endangered species or important natural communities through the Natural Heritage Program. The region has high recreational potential because it connects the second and third largest cities in New England and is only about 25 miles from Boston. Recreational opportunities are mainly based on trails such as boating on navigable stretches of the river and its streams, hiking along its banks and through forests, and biking along the old railroad beds. There is also a plan for a River Bikeway through the Blackstone River Valley, both in Massachusetts and Rhode Island. Other opportunities include canoeing, kayaking, recreational fishing, cross-country skiing, picnicking, and sightseeing. Yet, inadequate river access and unsafe pollution levels for consumption of fish limit activities. Some cultural sites include the designated Blackstone Valley National Heritage State Park, old mills, dams, and villages. Significant sites are Slater's Mill, Slatersville mills and village, and Wilkinson Mill. Trails like the North-South Trail, Midstate Trail, and Southern New England Trunkline Trail connect the many state parks and forests to increase the access to the beautiful historical and cultural sites.

The social setting was the most ethnically and religiously diverse earlier in New England. The first settlers were of English decent (Congregationalists and Quakers). Then further industrialization attracted the Irish and French-Canadian, followed by Germans, Swedes, and Dutch. Large immigration began from 1890 to the First World War, but receded during the 1930's with the Great Depression, sparking up with the Second World War. Population growth among the various communities differs. Over the past forty years, Worcester and Providence have experienced out-migration, while other parts experienced tremendous growth. Much of the manufacturing sector has had a sharp decline increasing unemployment as a result of the new high technology economy. However, urban revitalization and renewed growth and change in recent years, especially in Providence, can be seen and more projects will likely to develop with the help from state and federal agencies.

The Blackstone however faces large growth increments happening now and more in the future. It offers a suburban traditional landscape and is increasingly accessible through a growing highway network. The new Mass Pike exit off Route 146 will generate more attention to the Valley. There is an influx of new residents and business opportunities placing more development pressure. But without advanced planning, the new occurrences can deteriorate the land and its valuable resources through uncontrolled sprawl consuming open space. Growing concerns are the changing cultural landscape,

water quality/quantity, growth management, and Combined Sewer Overflows (CSOs) resulting in poor management of stormwater runoff. Efforts must also include better cooperation from all levels of government and local decision-makers. The main challenge is to manage growth through a resource management approach in order to balance a growing economy and a healthy environment with a traditional community character.

## **Resource Plan—Blackstone Watershed**

In accordance with the seven goals outlined in the Massachusetts Watershed Initiative, the following is what the Blackstone Team and its partners have addressed and Accomplished in the Blackstone on a watershed-wide basis according to the goals respectively. This part includes summaries of the key objectives and issues, its progress to date, and an outline of an action plan that identifies actions to take, responsibilities to complete them, and a milestone schedule. The purpose of this section is to define the desired state of the resource or its goals, what is preventing that desired state or its issues, what has been done so far or its progress, and what needs to be done to achieve the desired state or its action plan. The Team has been encouraged to identify those items and their associated time frame, if they cannot accomplish them within five years. In the following year (Year 5 Evaluation), the Team will measure their progress to date, refine their goals and objectives identified in the Five Year Action Plan, and then continue to implement their necessary actions.

### **A. Outreach and Education**

#### **Objectives and Issues**

- Activities were effective in achieving some amount of wider recognition of the watershed and/or the MWI, but because there is no central group with a master outreach and education strategy, the message does not reach significantly more residence. Therefore, a next step should be to develop a more uniformed message and to try to put further activities within the context of the MWI. This is the SCA pilot project.
- Regional and municipal growth planning by UMASS and UMASS-Extension builds upon Community Preservation build-outs conducted by EOE. The towns are given opportunities to evaluate several options for growth and its financial and environmental impacts.
- Developing electronic data layer of parcel line work for towns within the Mill and Mumford subwatersheds in order to work with towns to develop regional open space strategies.
- Increase participation in granting process.
- Increase public understanding and participation in permit process.

#### **Progress to Date**

- The Team and the BHC sponsored two Summits on headwater activity.
- BRVNHC held an Open Space Forum and taped results.

- BRVNHC and the Worcester Historical Museum held a “Second Beginnings” Event to reenergize participants in developing a Northern Gateways Visitor Center at Quinsigamond Village.
- Southern Gateway in Pawtucket, RI opened.
- Team maintained an Outreach Subcommittee that coordinates with other groups within the watershed.
- BHC worked with the Northern Worcester Business Association to give information on pollution reduction methodology and alternatives to destructive chemical use.
- Planning is continuing for a Northern Gateway.
- BRWA participated in River’s Day, sponsored by BRVNHC.
- Initiated and maintained 3 workgroups on Blackstone Team.
- Increased Team member support of projects from previous years.
- Initiated and implemented a BHC Second Annual Water Quality Summit.
- Increased agency support of the Team by DEP and DEM.
- BRWA hold annual Canoe Races and has held 2 Fishing Derbys.

## **Action Plan**

### **1. Actions**

- Support continuing work of the Flint Pond Stream Team and the Lake Quinsigamond Commission in developing action items to address the management of the Lake.
- Continue to fund Open Space Project and help towns take advantage of GIS resources available from Regional Service Centers.
- Work with BRVNHC to develop follow-up on outreach and study efforts to identify and implement innovations or alternatives for growth management, i.e. regional land management agreements that are implemented locally.
- Outreach to the Chambers of Commerce.
- Greenway along the Blackstone River that focuses on land that DEM may not be able to take.
- Watershed-wide storm drain stenciling day.
- A Fish Study for the Blackstone, MA DF&WELE scheduled for summer 2001.
- Support development of a joint 3-watershed (Blackstone, Chicopee, French/Quinnabaug) outreach project with UMASS Extension and Strategic Cable Alliance (SCA), a local partner.
- Making people aware that the river can be an aesthetic and recreational asset is an important factor in reaching the goal of having a swimmable and fishable river.

### **2. Responsibilities**

- 

### **3. Milestone Schedule**

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## **B. Local Capacity Building**

### **Objectives and Issues**

- Team has been active in major NPDES permit process within the Blackstone. The permits include: Worcester Stormwater permit, UBWPAD Discharge permit, and CSO permit. These are major permits for the headwaters and they present the only avenues to address one of the biggest pollution impact to the River. The next step is to work with the regulators and permittees to formulate real action steps to improve water quality and to do that in a financially effective manner.
- The Stream Teams mentioned below focus on resources that are impacted by essentially the same two sources, highway runoff and local land use. The next step is finding a way to bring the highway state agency to work with the stream teams and the MWI teams.
  - The Lake Quinsigamond Watershed Association (LQWA) is growing because of the Flint Pond Stream Team. The next step is to get them the resources they need to follow up on DEP's TMDL recommendations with funding that prepares them to prioritize the actions they will need to take. There is a Roundtable request to address this need by asking DEP for resources through their CWA 604b grant process.
  - Because of new leaders and new board members (Headwaters groups, Coes & Patches, LQC), opportunities are presented for new directions for groups and has energized them to move forward in addressing problems in a coordinated way.
- Through the Open Space project, town assessors are becoming involved in evaluating their towns pace of development with the loss of open or protected space. This gives the opportunity to include some of the financial advisors of the towns on environmental issues.
  - A Second Forum on Open Space Preservation is being planned for the towns of Douglas and Sutton. Then, discussions can be started about regional open space planning.
- The Regional Environmental Council (REC) has been working with Worcester DPW to undertake an Urban Tree Survey. This should lead to many opportunities to strengthen the connection made between trees in an urban environment and water quantity and quality. The next step is to get more resources for this effort as a possible offset in Worcester's CSO NPDES permit.
- The WTL has coordinated with many groups. But, the goal would be to try to get them to work in a more coordinated fashion by maybe developing a web site calendar of events for the Blackstone that all the groups could use.

### **Progress to Date**

- Two new Stream Teams formed: Flint Pond and Newton Pond. Two previous groups became involved with MWI, Dorothy Pond and Leesville Pond. Mill Brook Taskforce sponsored a Cleanup Day.
- Supported: a second Capacity Building grant for BWA; REC in undertaking

more water-related advocacy; development or expansion of six stream teams (3 headwaters, 2 new ponds); NGO/DEP taskforce for Mill Brook.

- Encouraged BHC to apply for a Stewardship Grant under MWI.
- Participated in several advocacy/planning groups.
- Training was provided for conflict management.

## **Action Plan**

### **1. Actions**

- Support continuing work of the Flint Pond Stream Team and the LQC in developing action items to address management of the Lake.
- Continue to fund Open Space project and help towns take advantage of GIS resources available from Regional Service Centers.
- Work with BRVNHC to develop follow up on outreach and study efforts to identify and implement innovations or alternatives for growth management, i.e. regional land management agreements that are implemented locally.
- Help develop a QAPP with Circuit Rider and database for the Volunteer Monitoring Program.
- Initiate Vernal Pools survey clubs.
- Initiate Pilot Project for a Corporate Wetland Banking Program.
- Green way along the Blackstone River that focused on land that DEM may not be able to take.
- Watershed-wide storm drain stenciling day.
- Develop a water quality based pollution-trading program tied to habitat restoration.
- Stream-line redevelopment of old mill factories by reexamining some of the policies that are acting as road blocks, such as, DOR policy that will not allow leases to stand when a town makes the building over.
- Explore the possibility of setting up a Blackstone River Valley Revolving Fund for purchasing open space supported by offset monies from recent utility deregulation.
- Support development of a joint 3-watershed (Blackstone, Chicopee, French/Quinnabaug) outreach project with UMASS Extension and Strategic Cable Alliance (SCA), a local partner.

### **2. Responsibilities**

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### **3. Milestone Schedule**

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## **C. Water Quality**

### **Objectives and Issues**

- Team works with Mass Audubon to train, resource, and coordinate with student and Strategic Volunteer Monitoring Group. The group serves as a vital

function because state and city resources cannot generate all the needed data. A next step is to help improve the quality and proficiency of the sampling and to create a database for the results in order to have a meaningful interpretation of the data. This step is embodied as part of the Roundtable request for 604b funding for LQ/Flint Pond/Newton Pond.

- The Flint Pond Stream Team works to identify and understand land use impact to water quality. Next step is to become part of the Strategic Monitoring Network that is working with LQ/FP/NP.
- Team works with DEP Stormwater Specialist to help ensure water quality is not adversely impacted by storm water runoff from construction and municipal systems. Initial issues have come out that need to be brought up to EPA as potential regulation changes.
- Working with local high school math and science teacher to help students train on highly technical analytical methods for pollution identification as another way to increase understanding of what effects we have on our waterways.
- Support Worcester DPW in focusing their NPDES Stormwater permit on Lake Quinsigamond subwatershed.
- Continue to develop Phytoremediation project with DEM.
- Have agreement with DEM to provide a project manager for the full term of the ACE FS.
- Army Corps of Engineers is doing studies to identify remediation projects for removing contaminants from sediments at trouble spots. These spots are mostly from Rice City Pond in Uxbridge, the impoundment behind Coz. Chemical in the Rockdale section of Northbridge, and in Fisherville Pond, in an impoundment behind the Fisherville Dam.

### **Progress to Date**

- Team has been active in major NPDES permit process within the Blackstone.
- Team supported the ACE FS, which initiated the first of several contracts to test the sediment and water quality of the River.
- Worcester's Stormwater NPDES permit is final and a Team Subcommittee has been formed in response to permit comments generated during public comment on that permit.
- Funded the study of Daylighting Beaver Brook; garnered interest from Worcester DPW in additional daylighting locations.
- Regional municipal growth assessments by UMASS and UMASS Extension evaluated the present development in the watershed and developed predictive models for water quality impacts.
- Initiated first contract element of Army Corps of Engineers (ACE) Feasibility Study.

### **Action Plan**

#### **1. Actions**

- Continue funding the ACE FS at highest level possible.
- Support a CWA 319 Grant for Dorothy Pond.
- Work with BRVNHC to develop follow up on outreach and study efforts to

identify and implement innovations or alternatives for growth management, i.e. regional land management agreements that are implemented locally.

- Help develop a QAPP with Circuit Rider and database for the Volunteer Monitoring Program.
- Urban Tree Stormwater Demonstration Project.
- Bio-remediation or capping and revegetating of floodplains near Coz. Chemical Co. in Rockdale and Rice City Pond in Northbridge, MA.
- Watershed-wide storm drain stenciling day.
- Develop a water quality based pollution-trading program tied to habitat restoration.
- Stream-line redevelopment of old mill factories by reexamining some of the policies that are acting as road blocks, such as, DOR policy that will not allow leases to stand when a town makes the building over.

## 2. Responsibilities

- Army Corps of Engineers, once studies are done, begin such options as dredging the sediments or planting specific types of aquatic plants that absorb heavy metals from the sediment.

## 3. Milestone Schedule

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## D. Water Quantity

### Objectives and Issues

- Working with BRVNHC Stream Flow Task Force to identify problems to water caused by low flow fluctuating. Next steps are not defined yet. This Task Force has been active for the last 3 years and its trying to bring the users of the River together with the environmental advocacy groups as well as the regulatory agency representatives.
- Developing a proposal with the USGS for studying flow dynamics within the river. DEM's contribution would be the equivalent of the cost of doing a Water Resource Study in the Mill River subwatershed. Water quantity is one aspect of growth that this study will highlight generally, but there are concerns that the Mill River may be actually experiencing water shortages in the near future, due to its growth and the relative scarcity of local aquifer material.
- Regional municipal growth assessments by UMASS and UMASS Extension that look at the present development in the watershed and develop predictive models for that impact on water quality and quantity.
- Through a project based on 2 subwatersheds that focuses on identifying critical open space priorities, water resource protection will be proposed as a new factor in that prioritization.
- Team input on MEPA projects that affect water quantity.
- Developing partnership with USGS through the American Heritage River

initiative to evaluate water resources within the watershed as an update to DEM's Water Resource Management Study.

- Evaluate how to increase flow in the Blackstone Gorge with bi-state and federal partners.
- Have agreement with DEM to provide a project manager for the full term of the ACE FS.

## **Progress to Date**

### **Action Plan**

#### **1. Actions**

- Need to support a hydrogeologic study for the Blackstone Watershed.
- Urban Tree Stormwater Demonstration Project.
- Stream flow study for the Blackstone to identify dams that could support fish ways.
- A joint watershed effort-Ten Mile River Fish way.

#### **2. Responsibilities**

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#### **3. Milestone Schedule**

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## **E. Open Space**

### **Objectives and Issues**

- Team is working on an Open Space project and is requesting additional funds from the Roundtable to carry on this work. The continuing step is to complete digitizing the town assessor maps and then begin developing outreach to active groups interested in land conservation.
- Work with Towns of Douglas and Sutton to help them finalize their connected OS plan and then build more connections with adjacent towns. Next step is to help these towns develop financial mechanisms or strategies to acquire their priority parcels.
- Hold a second "Protecting Open Space" Forum.
- Supporting Metacomet Land Trust in their efforts to update a regional OSP plan for Bellingham, Blackstone, and Millville. As an active group, Metacomet Land Trust could be a major factor in a land acquisition strategy in order to implement the BRVNHC's River Access Plan and in acquiring land/development rights that the state could not.
- Beginning initial discussions between DEM and DEP in order to develop a working relationship to address DEM concerns of potential hazardous waste liability of potential land acquisitions along the Blackstone River.
- Supporting DEM land acquisition priorities for River Bend Farm, Purgatory Chasm, and the Bi-State Park.

- DEM has offered to work with local partners and the LQC to prepare a Management Plan and address some storm water issues from UMASS Medical Center.
- Regional municipal growth planning by UMASS and UMASS Extension that evaluates development's affect on the quality and diversity of habitat so that critical land protection priorities can be identified.
- Planning and constructing a Class 1 (off-road) bike path from Pawtucket to Worcester.
- Help DEM develop a strategy with DEP-BWSC to assist in defining the potential risk posed by hazardous wastes for land that it wants to acquire or is offered as donation.
- Develop outreach to towns on limited or conservation development as a tool to increase open space, manage growth, and contain municipal service requirements.

### **Progress to Date**

- ACEC nomination was approved but with adjustments to the boundaries.
- Watershed-wide Open Space project has focused on creating a GIS data layers for parcel line work with assessor tabular attributes for the Mill River subwatershed.

### **Action Plan**

#### **1. Actions**

- Need to support land acquisitions for River Bend and Purgatory Chasm State Parks.
- Continue to fund Open Space project and help towns take advantage of GIS resources available from Regional Service Centers.
- Work with BRVNHC to develop follow up on outreach and study efforts to identify and implement innovations or alternatives for growth management, i.e. regional land management agreements that are implemented locally.
- Green way along the Blackstone River that focused on land that DEM may not be able to take.
- Support development of a joint 3-watershed (Blackstone, Chicopee, French/Quinnabaug) outreach project with UMASS Extension and Strategic Cable Alliance (SCA), a local partner.

#### **2. Responsibilities**

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#### **3. Milestone Schedule**

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## **F. Recreation**

## **Objectives and Issues**

- MHW is working with DEM to complete the Rt. 146 portion of the Bike Way and MHW is undertaking a bridge study for a southern portion from RI border almost up to River Bend Farm State Park.
- BRVNHC working with local partners and MA DEM to fund a Northern Visitor Center in Worcester.
- DEM offered to work with local partners and the LQC to prepare a Management Plan and address some storm water issues from UMASS Medical Center.
- Facilitating the BRVNHC to implement its Canoe Access Plan.
- Work to increase availability of grant monies.
- Help DEM develop a strategy with DEP-BWSC to assist in their evaluation of the potential risk posed by hazardous waste for land that it wants to acquire or is offered as donation.
- The proposed Rice City Pond Dam pedestrian and bikeway project to be built on top of the dam raises some concerns: the present condition of the dam, which needs \$2 million of work to get it up to snuff; what if EPA demands increasing the level of the Pond and the added stress on the dam; what is the likelihood of EPA or DEP demanding that the pond's level be increased. Increasing the elevation of the pond not only adds pressure on the dam but also would adversely affect the current recreational use of the toe path and other land around the pond.

## **Progress to Date**

- Team supported Bike Way from RI to Worcester.
- BRVNHC developed a River Access Plan that they would like local partner involvement to acquire and maintain.

## **Action Plan**

### **1. Actions**

- Support continuing work of the Flint Pond Stream Team and the LQC in developing action items to address management of the Lake.
- Address the aquatic weed problems of both Flint and Newton Ponds.
- Support land acquisitions for River Bend and Purgatory Chasm State Parks.
- Green way along the Blackstone River that focused on land that DEM may not be able to take.
- A Fish Study for the Blackstone, MA DF&WELE scheduled for Summer 2001.
- Support the development of a joint 3-watershed (Blackstone, Chicopee, French/Quinnabaug) outreach project with UMASS Extension and the SCA, a local partner.
- People work together to get people onto the river in order to create recreational opportunities. To improve the quality of life, while getting riverside parks and canoe access points.

### **2. Responsibilities**

### 3. Milestone Schedule

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#### G. Habitat

##### Objectives and Issues

- As part of UMASS Economic Development Project, two modeling efforts were undertaken, FRAG STAT and GAP. Both of these look for implications to species diversity and habitat range. Next step is outreach with interactive component.
- Worcester County Conservation Service Wetlands Restoration Project was a match for FY99 for the ACE FS. Coinciding with the UBWPAD, it may give some initial projects for consideration in developing a pollution trading framework.
- Identify riparian areas that need revegetation and stabilization.
- Restore Fisherville Marsh in Grafton.
- Phytoremediation Pilot Project through DEM and UMASS.
- Develop outreach to towns on limited or conservation development as a tool to increase open space, manage growth, and contain municipal service requirements.
- Habitat assessment by MA DFWELE would probably be next summer (2001). EOE is funding the ACOE to undertake a Feasibility Study for habitat restoration opportunities and MA DFWELE's work would be useful in helping to identify and prioritize sites they should focus on.

##### Progress to Date

- ACEC nomination approved.
- Watershed-wide Open Space project focused on developing parcel coverage for towns in the Mill and Mumford subwatershed so that the habitat analysis conducted for the Regional municipal growth study would help to identify critical species and range in order to prioritize agency and NGO actions.

##### Action Plan

###### 1. Actions

- Address the aquatic weed problems of both Flint and Newton Ponds.
- Bio-remediation or capping and revegetating of floodplains near Co. Chemical Co. in Rockdale and Rice City Pond in Northbridge, MA.
- Toxic food chain study conducted on local wildlife to determine which kind of toxins is moving through the food chain.
- Initiate vernal pools survey clubs.
- Stream flow study for the Blackstone to identify dams that could support fish ways.
- Initiate a pilot project for a Corporate Wetland Banking Program.
- Green way along the Blackstone River that focused on land that DEM may not be able to take.

- A joint watershed effort-Ten Mile River Fish way.
- Develop a water quality based pollution trading program tied to habitat restoration.
- A Fish Study for the Blackstone, MA DF&WELE scheduled Summer 2001.
- Explore the possibility of setting up a Blackstone River Valley Revolving Fund for purchasing open space supported by offset monies from recent utility deregulation.

**2. Responsibilities**

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**3. Milestone Schedule**

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## **Resource Plan—Mumford River**

The Mumford River subwatershed is one of the largest located in the central part of the Blackstone watershed. The towns of Uxbridge, Northbridge, Sutton, and Douglas mainly encompass the Mumford. Some areas of concern are water quality, fisheries habitat, habitat assessment, and physical restoration.

### **A. Outreach and Education**

#### **Objectives and Issues**

#### **Progress to Date**

- BRWA organized two Shoreline Surveys: one with about 15 participating people, while 10 others met to review the findings; and the other when Charley Sweet worked with the Girl Scouts.

#### **Action Plan**

1. **Actions**
2. **Responsibilities**
3. **Milestone Schedule**

### **B. Local Capacity Building**

#### **Objectives and Issues**

#### **Progress to Date**

#### **Action Plan**

1. **Actions**
2. **Responsibilities**
3. **Milestone Schedule**

### **C. Water Quality**

#### **Objectives and Issues**

- A major focus for the Shoreline Survey was to document the potential for a “greenway” along the Mumford in Douglas. The Conservation Commission endorsed the idea, but due to landowner concerns, they wanted to be low-key about it.

#### **Progress to Date**

- BRWA organized a Shoreline Survey in Douglas and Sutton.
- BRWA worked with Girl Scouts to perform a Shoreline Survey along a stretch

of Aldrich Brook.

#### **Action Plan**

- 1. Actions**
  - Mumford River Improvement Project
- 2. Responsibilities**
- 3. Milestone Schedule**

### **D. Water Quantity**

#### **Objectives and Issues**

#### **Progress to Date**

#### **Action Plan**

- 1. Actions**
- 2. Responsibilities**
- 3. Milestone Schedule**

### **E. Open Space**

#### **Objectives and Issues**

#### **Progress to Date**

#### **Action Plan**

- 1. Actions**
- 2. Responsibilities**
- 3. Milestone Schedule**

### **F. Recreation**

#### **Objectives and Issues**

#### **Progress to Date**

#### **Action Plan**

- 1. Actions**
- 2. Responsibilities**
- 3. Milestone Schedule**

### **G. Habitat**

#### **Objectives and Issues**

#### **Progress to Date**

#### **Action Plan**

- 1. Actions**

2. **Responsibilities**
3. **Milestone Schedule**

## **Resource Plan—Mill River**

The Mill River subwatershed is located on the eastern side of the watershed, extending from Hopkinton to the tip of Woonsocket, RI.

### **A. Outreach and Education**

**Objectives and Issues**

**Progress to Date**

**Action Plan**

1. **Actions**
2. **Responsibilities**
3. **Milestone Schedule**

### **B. Local Capacity Building**

**Objectives and Issues**

**Progress to Date**

**Action Plan**

1. **Actions**
2. **Responsibilities**
3. **Milestone Schedule**

### **C. Water Quality**

**Objectives and Issues**

**Progress to Date**

**Action Plan**

1. **Actions**
2. **Responsibilities**
3. **Milestone Schedule**

### **D. Water Quantity**

**Objectives and Issues**

**Progress to Date**

**Action Plan**

1. **Actions**

2. **Responsibilities**
3. **Milestone Schedule**

## **E. Open Space**

**Objectives and Issues**

**Progress to Date**

**Action Plan**

1. **Actions**
2. **Responsibilities**
3. **Milestone Schedule**

## **F. Recreation**

**Objectives and Issues**

**Progress to Date**

**Action Plan**

1. **Actions**
2. **Responsibilities**
3. **Milestone Schedule**

## **G. Habitat**

**Objectives and Issues**

**Progress to Date**

**Action Plan**

1. **Actions**
2. **Responsibilities**
3. **Milestone Schedule**

## **Resource Plan--Headwaters**

This is the Worcester-Shrewsbury area of the watershed. It is important because it includes the second largest city in New England, Worcester, and also protection of this area will help downstream of the Blackstone. Water quality here in the upper reaches is characterized by runoff from the City of Worcester, effluent from the Upper Blackstone Watershed Abatement District treatment plant, and the Worcester CSO facility. The river system is effluent dominated during dry weather conditions, while all three sources affect the system during wet weather conditions. Major issues in this area range from CSO permits and pollution trading to management of growth and Phase II Stormwater. The urbanized environment has great effects on the land and the watershed and urban strategies like planting urban trees come into play. The Blackstone Headwaters Coalition (BHC) had done much work over the past three years. Some Stream Teams are Ararat, Tatnuck, Beaver Brook, Coal Mine Brook, and the Mill Brook Taskforce.

### **A. Outreach and Education**

#### **Objectives and Issues**

##### **Progress to Date**

- Last summer 30-40 people participated in a Shoreline Survey for Flint Pond.

##### **Action Plan**

#### **1. Actions**

- Every single storm drain to be stenciled.
- Permanent plates.

#### **2. Responsibilities**

- Raise \$ for plates; organize volunteers to install or do it through Coalition or donors.

#### **3. Milestone Schedule**

### **B. Local Capacity Building**

#### **Objectives and Issues**

##### **Progress to Date**

##### **Action Plan**

#### **1. Actions**

- Fix old infrastructure.
- Special monitoring be taken by a reliable organization.

#### **2. Responsibilities**

- Comprehensive planning for locating/fixing illicit connections; City already doing now and will pay for half.

### **3. Milestone Schedule**

## **C. Water Quality**

### **Objectives and Issues**

- Improvements planned to alleviate sedimentation, thick weeds and algae in Flint Pond, in North Grafton and Shrewsbury.
- Stormwater drains are being upgraded to remove silt and contamination.
- Private septic systems, which can leach into nearby wetlands, are being replaced with municipal sewers.
- Efforts are under way to have the city of Worcester and Mass Audubon monitor the city's brooks for volume and contamination from stormwater runoff.
- Salisbury Pond is a focus for the Mill Brook Taskforce.
- Feasibility of Dredging starts in fall; Report done in Spring 2001.
- Several draft TMDLs are being finalized for 5 major lakes in this area.
- Ecological data from the Army Corps work last year as part of the Feasibility Study will be released shortly.
- ACOE will be initiating a sampling contract with Ray Wright to undertake more water quality work along the main stem of the Blackstone.
- EPA and DEP are going to issue Worcester's CSO permit by the end of the federal fiscal year. The Team will discuss development of Supplemental Environmental Projects (SEP) to include in that permit as potential "offsets" to requiring Worcester to separate the storm and sanitary sewers.

### **Progress to Date**

- Got water quality monitors.
- Sponsored studies done by Worcester Polytechnic Institute (WPI).
- Shoreline Survey of Flint Pond last summer. Developed an action plan and presented the results to the Lake Quinsigamond Commission, who agreed to pursue a drawdown of the Lake to reduce the noxious weed growth.
- No re-classification of that discharge point from Class B to Class B/CSO.

### **Action Plan**

#### **1. Actions**

- Look at how fertilizers are used on lawns near a lake or a river.
- Twin Combined Sewer areas separated.
- Ponds restored; smaller ones in city dredged; parks taken care of.

#### **2. Responsibilities**

- Shift in allocation of Parks Department; City change budget

#### **3. Milestone Schedule**

## **D. Water Quantity**

**Objectives and Issues**

**Progress to Date**

**Action Plan**

1. **Actions**
2. **Responsibilities**
3. **Milestone Schedule**

## **E. Open Space**

**Objectives and Issues**

**Progress to Date**

**Action Plan**

1. **Actions**
  - Reduce impervious surfaces.
2. **Responsibilities**
  - City should consider less parking.
3. **Milestone Schedule**

## **F. Recreation**

**Objectives and Issues**

**Progress to Date**

**Action Plan**

1. **Actions**
2. **Responsibilities**
3. **Milestone Schedule**

## **G. Habitat**

**Objectives and Issues**

**Progress to Date**

**Action Plan**

1. **Actions**
2. **Responsibilities**
3. **Milestone Schedule**

## **Resource Plan—Rhode Island**

The Rhode Island section of the Blackstone is the most southern part of the Blackstone watershed. It encompasses three main subwatersheds: Branch River, Blackstone River (RI), and Abbott Run. The state is known for its Narragansett Bay, which is the ending to the Blackstone River and its tributaries. The Bay occupies about a third of Rhode Island's total land area and carves out more than 400 miles of shoreline, coves, and inlets. This area too has had its share of environmental impacts due to changing landscapes, prevailing new technologies and economies, and increasing growth. A significant percent of Rhode Island's, as well as Massachusetts', rivers, lakes, and coastal waters do not support key aquatic organisms or important recreational uses because of non-point pollution sources that come from lawns, roads, and parking lots. The state's urban and rural environments are endangered with the onset of further growth. An interesting fact is that "more land was developed in Rhode Island between 1961 and 1995 than in all its 325 years before." However, under the MWI, for the first time Massachusetts and Rhode Island will be pooling their resources to enhance protection of the Blackstone. This bi-state collaboration is a key factor in maintaining the watershed's wealthy resources.

### **A. Outreach and Education**

#### **Objectives and Issues**

#### **Progress to Date**

#### **Action Plan**

- 1. Actions**
- 2. Responsibilities**
- 3. Milestone Schedule**

### **B. Local Capacity Building**

#### **Objectives and Issues**

- The Taunton, Ten Mile, Mt. Hope, Narragansett, and Blackstone Team Leaders are enhancing coordination efforts towards combined input to Narragansett Bay.

#### **Progress to Date**

#### **Action Plan**

- 1. Actions**
- 2. Responsibilities**
- 3. Milestone Schedule**

## **C. Water Quality**

### **Objectives and Issues**

- Feasibility Study Rhode Island Ecosystem Restoration Project Study Plan

### **Progress to Date**

#### **Action Plan**

1. **Actions**
2. **Responsibilities**
3. **Milestone Schedule**

## **D. Water Quantity**

### **Objectives and Issues**

### **Progress to Date**

#### **Action Plan**

1. **Actions**
2. **Responsibilities**
3. **Milestone Schedule**

## **E. Open Space**

### **Objectives and Issues**

### **Progress to Date**

#### **Action Plan**

1. **Actions**
2. **Responsibilities**
3. **Milestone Schedule**

## **F. Recreation**

### **Objectives and Issues**

### **Progress to Date**

#### **Action Plan**

1. **Actions**
2. **Responsibilities**
3. **Milestone Schedule**

## **G. Habitat**

**Objectives and Issues**

**Progress to Date**

**Action Plan**

- 1. Actions**
- 2. Responsibilities**
- 3. Milestone Schedule**

## **Resource Plan—Quinsigamond River**

This River is located in the north-eastern section of the watershed, located next to Lake Quinsigamond, the largest lake in the watershed. The subwatershed encompasses the towns of Shrewsbury and Grafton.

### **A. Outreach and Education**

**Objectives and Issues**

**Progress to Date**

**Action Plan**

- 1. Actions**
- 2. Responsibilities**
- 3. Milestone Schedule**

### **B. Local Capacity Building**

**Objectives and Issues**

**Progress to Date**

**Action Plan**

- 1. Actions**
- 2. Responsibilities**
- 3. Milestone Schedule**

### **C. Water Quality**

**Objectives and Issues**

**Progress to Date**

**Action Plan**

- 1. Actions**
- 2. Responsibilities**
- 3. Milestone Schedule**

## **D. Water Quantity**

### **Objectives and Issues**

#### **Progress to Date**

- USGS has connected the River's Gage to their real-time network.

#### **Action Plan**

1. **Actions**
2. **Responsibilities**
3. **Milestone Schedule**

## **E. Open Space**

### **Objectives and Issues**

#### **Progress to Date**

#### **Action Plan**

1. **Actions**
2. **Responsibilities**
3. **Milestone Schedule**

## **F. Recreation**

### **Objectives and Issues**

#### **Progress to Date**

#### **Action Plan**

1. **Actions**
2. **Responsibilities**
3. **Milestone Schedule**

## **G. Habitat**

### **Objectives and Issues**

#### **Progress to Date**

#### **Action Plan**

1. **Actions**
2. **Responsibilities**
3. **Milestone Schedule**

## **Resource Plan—West River**

The West River subwatershed is again on the eastern side adjacent to the Mill River. It flows from the Town of Upton into the tip of Millville.

### **A. Outreach and Education**

#### **Objectives and Issues**

- Planning a Shoreline Survey with the Girl Scouts this fall. It will include the West Hill Dam and the Upton Treatment Plant.

#### **Progress to Date**

##### **Action Plan**

- 4. Actions**
- 5. Responsibilities**
- 6. Milestone Schedule**

### **B. Local Capacity Building**

#### **Objectives and Issues**

#### **Progress to Date**

##### **Action Plan**

- 4. Actions**
- 5. Responsibilities**
- 6. Milestone Schedule**

### **C. Water Quality**

#### **Objectives and Issues**

- Approval of ACEC Warren, Whitehall, and Miscoe Brook also encompasses tributaries of the West River. This designation will help retain the excellent water quality of the River's upland reaches.
- West Hill Dam and Reservoir in Uxbridge, MA, affects discharges into the Blackstone River. It is a dam hazard.
- Will perform a Shoreline Survey of the River in the fall, and it will include the West Hill Dam and the Upton Treatment Plant.

#### **Progress to Date**

##### **Action Plan**

- 4. Actions**
- 5. Responsibilities**
- 6. Milestone Schedule**

## **D. Water Quantity**

### **Objectives and Issues**

### **Progress to Date**

### **Action Plan**

- 4. Actions**
- 5. Responsibilities**
- 6. Milestone Schedule**

## **E. Open Space**

### **Objectives and Issues**

### **Progress to Date**

### **Action Plan**

- 4. Actions**
- 5. Responsibilities**
- 6. Milestone Schedule**

## **F. Recreation**

### **Objectives and Issues**

### **Progress to Date**

### **Action Plan**

- 4. Actions**
- 5. Responsibilities**
- 6. Milestone Schedule**

## **G. Habitat**

### **Objectives and Issues**

- The designation of the Warren, Whitehall, Miscoe Brook ACEC will help protect habitat for several endangered species.

### **Progress to Date**

### **Action Plan**

- 3. Actions**
- 4. Responsibilities**
- 5. Milestone Schedule**

## **Implementation Priorities**

Even though there are a wide array of activities that are desirable to improve the Blackstone Watershed, this section is devoted to identifying and pursuing only achievable goals that promote water quality improvement and growth management. Therefore, the following can be utilized by the Blackstone Team to summarize the major priorities for the watershed, outline the top action priorities for the next five years, and assign responsibilities for completing those actions. Then as the Team carries out the implementation process in subsequent years, they will be able to revisit this Plan and the items identified as priorities when developing future Annual Work Plans.

### **A. Major Watershed Priorities**

Major priorities for the Blackstone extend from projects or issues that have already been a concern to ones that will be of importance within the coming years. It is imperative that the Team and the community work together to address these issues along with the ones specifically for action. For these priorities will or already have had a major effect on the Blackstone watershed-wide.

- **Total Maximum Daily Loads (TMDLs)**

This is a critical program for achieving a healthy Blackstone watershed and clean water. This includes a comparison of relative contributions from all pollutant sources including both point and non-point sources. By establishing TMDLs in the watershed and working together to implement them, the Blackstone and its 303d list of impaired waters may be able to meet the water quality standards. A TMDL has already been established for the Blackstone River, but now is time to establish one for the number of lakes and ponds in the watershed. The Team will need increased volunteer monitoring for lakes and ponds, around 10 acres, to identify sediment and nutrient, as well as aquatic weed impairments.

- **Flow Analysis**

- **Tributary Sampling**

- **Combined Sewer Overflows (CSOs)**

When it rains, the connected sewer system cannot handle the large volume of sewage and stormwater. The result is a combined sewer system because both sewage and stormwater flow into one pipe. Then polluted water, containing pollutants that can be a public health threat to the community, is discharged into the Blackstone watershed. Two types of structural controls can be used to help the problem: sewer separation and CSO retention, both very expensive. In some instances, the cost of these structural controls may outweigh the benefit. Non-structural

controls should be explored and piloted. The Team, with community members, local officials, and other partners, needs to begin implementing ways to solve this problem because this issue may grow to be a larger threat in the future.

- **Headwaters Communities MS-4**

Assist other headwaters communities with their MS-4 to get up to speed on the Phase II, which is under the Clean Water Act.

- **Water Quantity**

Water quantity is an issue that has been of major concern in the Blackstone. Reducing water quantity or flow may impact designated uses for a given body of water. The Clean Water Act's definition of pollution was broad enough to encompass the effects of reduced water flow. The amount of flow in the Blackstone River and some of its tributaries is affecting water quality, pollutant concentration, water temperature, aquatic habitat, and recreational uses. The Team needs to work with local partners to evaluate the specific \_\_\_\_\_, magnitude and effects flow volume and fluctuation have on the river environment and their mitigation, reduce flow fluctuations, where necessary integrate long-term water planning and management, and optimize water-use efficiency to assure that future needs are met cost-effectively for users and with a minimum of environmental effect.

- **Growth Management**

Further growth and uncontrollable sprawl is an imminent threat to the community and well-being of the Blackstone watershed if not managed well or closely. With the UMASS Extension and the MassPike exit off Rt. 146, the watershed is more easily accessible resulting in an influx of people. This has social, economic, and environmental impacts on the watershed. The Team needs to work with local officials and agencies in assessing the Blackstone and its growth problems as a regional outlook and with a subregional planning approach. There has already been a study done by UMASS. Strategies like urban revitalization will work, also check out CMRPC's "2020 Growth Strategy for Central Massachusetts."

- **Infrastructure**

An increase in growth will bring a need for an increase in infrastructure. Things to be considered are large vs. small package plans and sewer extensions. These adjustments will also have environmental and economic impacts.

- **Community Preservation and Capacity Building**

There are many towns within the Blackstone that are involved with this. This is an upcoming program that can give up to a

\$30,000 grant to eligible towns for state funds once they have build outs and presented their materials. The Team should look to see how these grant monies might be used as a regional area than for just individual towns. Maybe then they can pool together, especially areas that fall around the Mumford and Mill Rivers.

- **Blackstone River Bikeway**

This plan is for a bikeway through the River Valley, both in Massachusetts and Rhode Island. However, the bikeway may impact a number of dams in the watershed. It then becomes a question of dam repair, and many dams need repair before they are suitable for a bikeway or walkway. An issue is the Rice City Pond Dam in Uxbridge and the plan calls for a \$1 million bikeway. The Team should take into consideration more of the smaller impacts this bikeway will have.

- **EMPACT Grant Projects**

Connecting the Headwaters, the Worcester-Shrewsbury area of Massachusetts located in the watershed. This area has some great challenges like volume of flow during rain storms increases, an undersized CSO facility has discharged sewage and stormwater into the River, and also financial challenges. The grant will create needed information on water quality and flow, explain complex data to the public, and define how the metropolitan area affects the headwaters. Some projects include working with the USGS to install temporary staff gages, expanding the present monitoring program to include flow monitoring and macroinvertebrate sampling, training citizen scientists in proper protocols and equipment use, providing outreach to community members, and assisting the City of Worcester in its implementation of its EPA Stormwater Management Plan. Major tasks are also involved, but the approval of this grant will do a lot for this area in the Blackstone.

- **Blackstone River Campaign**

This Campaign is more like a business plan for the Blackstone River. Through the BRVNHC and a strong coalition, the campaign ensure that the health of the River is a concern for every valley resident. Many events will be included like the kickoff event, the River Expedition. The Team will be able to work with the Heritage Corridor in getting the public involved more and informing them the progress, status, and future of the Blackstone.

- **Warren, Whitehall, Miscoe Brook ACEC**

The Miscoe, Warren, and Whitehall Watersheds Resource Area has been designated an Area of Critical Environmental Concern. Two challenges face this area: water quality and quantity improvements that

affect and are affected by growth and the need to better manage growth. This ACEC will help address these major challenges by helping state agencies justify additional costs, helping communities have access to additional technical resources, and creating a Stewardship Plan to be developed by the residents of the three towns.

- **Wetlands Restoration**

Worcester County Conservation Service (WCCS) 604b grant does projects like using infra red photography to see which wetlands are filling in or degrading so that they can be able to prioritize.

- **Brownfields Cleanup**

This is a program launched by EPA that helps to cleanup any run-down or unused sites and parcels of land.

Another important priority that will have to be carried out by the Team either annually or every five years is the various metrics for the Massachusetts Watershed Initiative. These metrics are data measurements collected by the watershed teams to help guide their priority planning and target setting. They are standard measurements that correspond with the seven goals that are to be addressed through the MWI. The data can then be used to identify hot spots or trends using the various element areas.

### **Outreach and Education**

- # of Team meetings held (during the last year)
- Team representation analysis: # of Federal, state, regional and municipal agency, NGO, and business representatives
- # of Watershed-wide or subwatershed public outreach meetings
- # of specific group outreach meetings
- # of press releases about a MWI related event
- # of committees on your team
- List of watershed specific publications

### **Local Capacity Building**

- # of businesses engaged in watershed projects in their community
- # of Lakes & Ponds with active advocacy groups
- # of grants written for state money
- Amount of money received -- \$\$
- # of stream teams formed
- # of stream teams active
- # of land trusts in the watershed

### **Water Quality**

- # of total river/stream miles
- # of river/stream miles impaired (of those assessed)
- # of river/stream miles monitored by volunteers

- # of river/stream miles monitored by state agencies
- # of shoreline surveys conducted by volunteers
- # of non-point source hot spots identified by surveys
- # of lakes/ponds with non-native invasive species
- # of river miles identified with non-native invasive species
- # of NPDES permits (major and minor)
- # of other point sources
- # of CSOs
- # of POTWs in compliance
- # of POTWs out of compliance
- # of water supplies downstream from 21E sites (zone II)
- # of Title V inspections
- # of water supply wells downstream from major highway bridges (zone II)
- # of high threat operations to groundwater or surface water sources (SWAP)
- # of landfills

### **Water Quantity**

- # of permitted water withdrawals greater than 100,000 gallons
- # of public/permitted water withdrawals under 100,000 gallons
- # of river/stream miles that run dry during summer
- # of interbasin transfers approved
- # of interbasin transfers proposed (in/out, volume)
- # of water suppliers with water conservation plants

### **Habitat**

- # of habitat studies/surveys conducted
- # of species threatened or endangered
- # of acres of open and closed shellfish beds (if applicable)
- # of acres of wetlands
- # of acres of wetlands lost
- # of acres of wetlands restored
- # of dams
- # of dams in need of repair
- # of fish passage ways

### **Open Space**

- # of acres in the watershed
- % of watershed protected open space
- # of permitted developments within the 200 ft. buffer zone
- # of permitted developments within the 100 ft. buffer zone
- % of impervious surface
- # of communities with recycling grades below B

- # of hazardous waste sites (21E and superfund)
- # of towns with approved open space plans
- # of towns with a recent master plan (1990)
- # of towns with current Buildout analyses (1995-present)
- # of approved cluster or conservation-planned subdivisions as a percent of total subdivisions
- # of communities with digitized parcel information
- # of towns with environmental zoning: cluster, aquifer protection, etc.

### **Recreation**

- # of miles meeting fishing standards
- # of miles meeting swimming standards
- # of public boat ramps (% handicapped accessible)
- # of public beaches (% handicapped accessible)
- # of fish advisories
- # and location of whitewater/flatwater areas
- % of great ponds with boat ramps

### **Resource Allocation for projects**

- Types of projects in the work plan – Assessment, Outreach, Research, Planning, Implementation
- Cost share analysis for projects in the work plan – Federal, state, regional planning agency, municipal, NGO
- # of grants sponsored projects managed by team members
- # of projects nominated by agency people or fitting into state agency priorities

## **B. Priorities for Action**

- Work on Stormwater quality and quantity in the headwaters of the Blackstone; Worcester stormwater progress identified, Shrewsbury and Grafton.
- Education of water balance--everyone should know where their water comes from, goes, etc.
- Improve water quality to increase fisheries.
- NRCS outreach to 61A landowners as well as others.
- Tree planting in areas with most impact to water quality impairment and 25% impervious surfaces; Know the function of trees in urban landscapes.
- Outreach for homeowners, individuals, businesses; quantifying water balance in subwatersheds.
- Clean up Rice City Pond; Sediment issues.
- Targeting compliance around hot spots in order to condition permits and focus on enforcement.
- TMDL process for ponds.
- Water use on eastern subbasins is hot topic.

- Outreach for role of dams in 21st century; Up and Down stream resources vs. dam removal.
- Working with planning boards more on impervious surfaces.
- Hydrogeologic study of watershed; Increase flow in tributaries.
- BRWA--with 300 dues paying members, ambitious Executive Director
- Cooperation between everyone working to add/restore wetlands and bring them back to life.
- Corporate Wetlands Restoration Project.
- Capital Improvements program.
- Water Quality goals for Blackstone River.
- Mumford River Improvement Project

### **C. Partner Responsibilities**

- Stormwater issues in the Headwaters:
  1. Worcester implement everything in their Stormwater Permit SW Management Plan.
  2. Team facilitate funding to accelerate the rate at which Worcester can repair sanitary sewer leaks that are feeding into Stormwater, i.e. push for SFR funding priority, lobby city for increased repair budget, push Department of Health to acknowledge the health implications of old, seive like sewers.
  3. Identify and mitigate silt/sediment sources feeding to Salisbury Pond. For example, get 319 funding to construct the maintainable silt trapping forebay for the pond on Kendrick Brook north of Ararat St. to prevent silt from reaching Salisbury Pond. Identify an entity to do the regular maintenance (Norton Co.—it is on their property). Get Mass Highway to cooperate and cut down their contribution of sediments to that pond. Get volunteers and Mass Audubon to work on restoring the pond and habitat as part of the mitigation project.
  4. Create 5 videos (one per year) as short public education spots to be shown on public access video portraying how storm drains go to water bodies and urging folk to not litter, to use a pooper scooper, or whatever is the most important thing to NOT let get into a storm drain.
  5. All Team agencies involved in enforcement work out a system for coordinating enforcement of erosion and sedimentation control on large construction sites in Worcester. Who goes first local CC, DEP, or EPA? When and how are other agencies called in for reinforcement?

### **Conclusion**

As the first draft of the Five Year Action Plan under the Massachusetts Watershed Initiative, this Plan incorporates the previous workplan years, the status of the Blackstone today, and its top priorities for the future. For the past two years, the

Team has conducted and taken part in numerous projects. Some are ongoing today and others are being planned. Two major themes stemming from the Blackstone comprise these years: growth and water quality.

Growth seems like it will always be an issue. The extension of such major routes like 146 and the Mass Pike and major revitalization in the cities of Worcester and Providence will definitely generate an influx of people. But it is up to the planners, town officials, state agencies, and even citizens to ensure that this growth is controlled and managed in a way to promote economic and recreational opportunities, while protecting and maintaining a healthy environment. In this way, the Blackstone watershed will be sustainable for all forms of life in generations to come.

Such factors like growth affect water quality. From the beginning of the Industrial Revolution until the time of the Clean Water Act in the 1970's, the Blackstone and its tributaries have been extremely vulnerable to all kinds of pollution, including non-point sources. Now since much progress has been done to stop the main sources of pollution and to clean up the many contaminated materials in the water, much direction is given to the non-point sources like stormwater runoff from impervious surfaces, which is a continuing problem with growth, especially in Worcester. Concerned citizens should also look at factors like the use of fertilizers and an increase in recycling, which includes proper disposal of everyday chemicals, to help improve the water quality so that we achieve the watershed's goal of being fishable and swimmable within the near future.

The Five Year Action Plan further outlines the major priorities of the Blackstone watershed and the implementation strategies that will be used by the Team and its partners for the next five years to address those priorities. The Plan will be used as a guide within the next years to direct all major activities and work in the watershed. As more groups and agencies work together in a cooperative effort, these issues can be addressed clearly with the means necessary to further protect and manage the Blackstone for better years to come.

This Plan also stresses the idea of creating a coalition. Building a strong coalition among individuals and local environmental organizations, with businesses and corporate involvement, responsibility for the Blackstone can carry a long way. When more concerned groups and people pull their resources together, much can be done with little effort. It is these important and necessary resources that can help these folks take back the river. However, a large coalition will call for more cooperation in order to accomplish our goals. It is then up to the people to work together in an administrative manner to improve the Blackstone.

Recovery cannot be measured. But please take note that the Blackstone watershed is improving with tremendous effort. Even though the past of the Blackstone named it as "America's hardest working," but extremely polluted

river, improvements have led it to be recognized as an aesthetic and recreational asset in Central Massachusetts. There will probably not be any pristine illustrations of the Blackstone in any time soon, but its rivers and tributaries are benefitting. From government intervention to efforts from local groups and individuals, people are vested in the continuing improvements of its water quality, wildlife habitat, and open space, as well as public access. With the help of this Plan, the future of the Blackstone is hopeful and bright because it is in good hands.

## **Glossary of Terms**

### **ACECs**

Areas of Critical Environmental Concern. These areas contain concentrations of highly significant environmental resources that have been formally designated by the Secretary of Environmental Affairs following a public nomination and review process. The environmental features that critical areas may include, range from wetlands and water supply areas to rare species habitats and agricultural areas. The formal designation directs the state environmental agencies to take actions to preserve, restore, and enhance the resources of the ACEC.

### **Anadromous**

Type of fish that spawn from the sea. Examples are great Atlantic salmon, shad, herring, and alewives. Before the Europeans arrived to the Blackstone, these fish were abundant. But with harnessing of the river by the many dams and mills, these fish were shut out and still have yet to return.

### **CSOs**

Comined Sewer Overflows occur when it rains and both sewage and stormwater flow into one pipe because the sewer system cannot handle the large volume of sewage and stormwater. Then, the combined sewer system dumps polluted water directly into the Blackstone River and this discharge is known as CSO.

### **Desalination**

When sea water is turned into drinking water. The demand for fresh water is so high that communities are considering building these plants.

### **GIS**

Mass Geographic Information Systems. Electronic data on maps, sites, natural resources, etc.

### **Impervious Surfaces**

All surfaces that are paved or hard topped.

### **Non-point Source Pollution**

Now the most common type of pollution. It is pollution that enters the river from things that cannot exactly be pointed out, like septic systems, runoff, junkyards, landfills, pesticides, and fertilizers.

### **NPDES Permit**

The National Pollutant Discharge Elimination System is part of the Stormwater Phase II Rule. It is a regulatory scheme that, until recently, dealt with only point source discharges of pollutants. Recent changes to this include an attempt to bring non-point sources of pollution under control.

## **Stewardship**

Stewardship is the key to the Massachusetts Watershed Initiative. It is building partnerships within local communities and other groups to ensure better community decision making in order for a better focus in protecting the watershed.

## **Stormwater**

The runoff water from a rain storm. Most common type of non-point source pollution.

## **Stream Team**

These teams are made up of concerned citizens, businesses, etc. who want to know what is going on in their watershed. They are then organized as a group by Riverways program and together they do things like Shoreline Surveys. Soon the Team fosters long-term stewardship for the stream and eventually come up with Action Plans for helping to protect and manage it.

## **Watershed**

The geographic area in which surface water flows to a common point such as a river, lake, or bay. They are areas connected by water.

## **Taskforce**

A Taskforce can be a delineation from a particular Stream Team. But, this group comes together to solve a specific problem. They mostly do one thing, however both Stream Teams and Task Force are really similar.

## **TMDLs**

Total Maximum Daily Loads is a critical program for achieving a healthy watershed and clean water. Set forth by the EPA, TMDLs get beyond point sources and target non-point sources. It is the total amount of material from all sources, including point, non-point, and background, which a river segment can accept and still meet water quality standards. Their proposals provide new directions to achieve clean water through things like identification of impaired waters, encouraging response plans, and bringing together all sources of pollution in a watershed.

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## **Appendices**

A. Contact List

B. Watershed Associations