Massachusetts Department of Environmental Protection
Division of Watershed Management

Assabet River Watershed Innovative Permitting

Project Update for:
EPA 2002 State Innovation Pilot Grant

June 30, 2004

Introduction

This document provides a progress update of the State of MA Assabet River Watershed Innovative Permitting Project that was partially funded through the 2002 Environmental Protection Agency (EPA) State Innovation Pilot Grant Program competition. It also provides a summary of Massachusetts experience and activities associated with the project. Over the course of five years (from 1999– 2004), the Massachusetts Department of Environmental Protection (MA DEP) has worked in partnership with a coalition of community stakeholders on a common goal- *Restoring the Health of the Assabet River!*

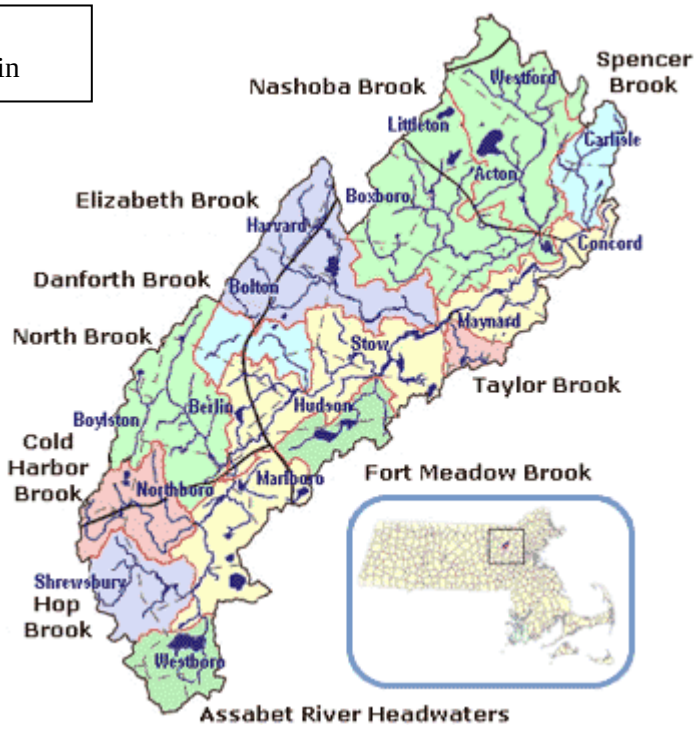
Specifically, this summary provides 1) a brief background of the Assabet River watershed, 2) the various challenges associated with project development, 3) the overarching strategic goals, and 4) the inter-connected project areas and partnerships that were developed during the project. It also provides a summary the environmental permitting innovations used, the project accomplishments and results, and a summary of key themes and lessons learned.

In addition, a copy of the Final MA DEP TMDL Report, Press Release, and several accompanying project press articles are included as part of this update.

Background

The Massachusetts Assabet River Watershed (see Figure 1) covers 111,542 acres and contains nine tributaries that feed the 31-mile Assabet River. Like many of the once naturally, free-flowing rivers across America more than 150 years ago, the Assabet River was tamed to help power the industrialization of communities along its path. A total of nine dams were constructed to obstruct the river's natural course that transformed the regional economy to host some of the country's most productive mills. Today, the brick mills along the Assabet River no longer house the industrial mill giants, but rather accommodate many high-technology companies and service based organizations throughout the watershed. Over 170,000 people reside in the watershed.

Figure 1
Assabet River Basin



Graphic Courtesy of the Massachusetts Organization of the Assabet River (OAR)

The steady and progressive development of communities in the watershed created major public infrastructure needs. This included the need to effectively process and treat wastewater from growing communities. In an effort to meet the growing regional wastewater demand, four major Publicly Owned Treatment Works (POTWs) that serve six communities, and three minor facilities discharge treated wastewater into the Assabet River.

In 1998, the Massachusetts Executive Office of Environmental Affairs launched the "Massachusetts Watershed Initiative". Multi-discipline watershed teams, comprised of state and federal officials, local municipal officials, non-profit watershed partners, and business leaders, were charged with providing comprehensive watershed protection in each of the 27 major watersheds in the Commonwealth. The Initiative's goal was to facilitate locally based problem identification and problem solving and coordinate implementation activities among all parties.

The Challenge

As noted above, the Assabet River is dominated by Publicly Owned Treatment Works (POTWs), both in flows and nutrient loads during low flow conditions. Beginning in 1998 and 1999, preliminary evaluations conducted by the Massachusetts Department of Environmental Protection (MA DEP) and the Organization for the Assabet River (OAR) – a non-profit river advocate, indicated that water quality conditions in the River were being negatively impacted due to excessive vegetative growth, primarily resulting from excess nutrients (phosphorus). Excessive nutrient concentrations contribute to algal blooms that impair the health of the river by choking the water resource with plant life, reducing oxygen for fish and other aquatic life and leaves them unsuitable for swimming, fishing, and boating. During low flow conditions the four major POTWs generally accounted for approximately 60-80% of the river flow and up to 97% of the phosphorous entering the river. Given the preliminary evaluations the MA DEP, EPA Region 1, OAR, and Massachusetts Watershed Initiative's **Su**dbury / **As**sabet / **Co**ncord (SUASCO) Team initiated a comprehensive, multi-phase watershed approach to document actual water quality conditions, evaluate what actions are needed to meet water quality standards, and to identify and assess both current and future wastewater and water supply needs in the affected communities. Right from the start, the Assabet River Watershed Project faced two major hurdles:

- *Financial Resources* - A steady multi-year stream of financial sources were going to be necessary to conduct the detailed water quality monitoring, assessment, modeling and evaluation activities. Existing traditional MA DEP state program sources and mechanisms were not going to be sufficient to sustain the necessary funding and technical expertise required for comprehensive watershed analysis and TMDL pollutant load (phosphorus) decisions.

- *Local Autonomy* – There are four major POTW's that treat wastewater for six communities (Hudson, Marlborough, Maynard, Northborough, Shrewsbury and Westborough) along the Assabet River. Aside from two inter-municipal wastewater-processing agreements between the towns of Northborough/Marlborough and Shrewsbury/Westborough, the remaining POTW's operate relatively independently of each other. Any additional future nutrient (phosphorus) reduction upgrades to the four, wastewater treatment plants would be borne by local community residents. Six separate Town meeting appropriation approvals would be necessary to fund preliminary environmental studies and any future long-term plant upgrades.

Strategic Goals

Driven by the federal and state Clean Water Acts, EPA and MA DEP are striving to restore and maintain the chemical, physical, and biological health of the Commonwealth's waters. The Assabet River is designated as a Class B water under the Massachusetts water quality standards [314 CMR 4.05(3)b]. Class B waters are designated as capable of providing and supporting habitat for fish and other aquatic wildlife, and for primary and secondary contact recreation, such as swimming, fishing, and boating. The goal for the Assabet River is to achieve water quality standards as defined in Massachusetts 314 CMR 4.0. The water quality standards provide numerical and narrative criteria to meet designated uses.

The strategic goals of this project are:

- *Water Quality Improvements*: To develop a Total Maximum Daily Load (TMDL) analysis, which will set the "pollution budget" and outline a cleanup plan to restore the health of the Assabet River including investigating ways that may be more cost effective of achieving standards other than solely relying on facility upgrades. More specifically, the TMDL analysis includes identifying the source(s) of the pollutant from direct discharges (point sources) and indirect discharges (non-point sources including sediment), determining the maximum amount of the pollutant, including a margin of safety, that can be discharged to a specific water body while maintaining water quality standards for designated uses.

- *Community Empowerment:* To develop a comprehensive watershed-based community planning process that maximizes local municipal, state, federal, and nonprofit organizational resources (financial and technical staff) that will aid community stakeholders in making informed decisions.

- *Adaptive Management*: To develop a short and long-term, phased watershed-based cleanup plan that is both technically sound and environmentally responsive in order to limit and reduce the nutrient phosphorus in the Assabet River system and achieve water quality compliance.

Project Areas and Partnerships

A three-phased approach was developed for the project to address the three strategic goals previously identified. The first two phases included data collection/monitoring and data analysis. In order to achieve phase 1 objectives several partnerships were formed to obtain the necessary funding. During phase 1 the watershed team (previously mentioned) was able to secure $224,000 in state funding for data collection activities. That funding was matched with $127,500 of federal Section 22 funding from the Army Corps of Engineers. Combined this funding was used to hire a consultant to conduct 13 water quality surveys @ 26 river locations and in 5 impoundments necessary for detailed water quality assessment and modeling studies on the river. All partners assisted in this effort. The Organization for the Assabet River (OAR) partnered with the state consultant and assisted in the field data collection activities as defined in a Quality Assurance Project Plan (QAPP) and the POTWs assisted by first optimizing their treatment processes to reduce effluent phosphorus concentrations and by increasing the effluent sampling frequency for phosphorus in order to quantify the amount of phosphorus discharged by each facility during the study period.

Once the data identified the extent of impairment it became clear that a second phase of the project was necessary that contained two additional activities. First, funding was needed to develop a detailed water quality model that could be used to evaluate potential options to restore the river to water quality standards including investigating innovative and potentially cost effective alternatives such as dam removal and

sediment remediation. With support from the communities and environmental groups MA DEP was able to provide about $300,000 in state funding for this effort. At the same time and on a parallel track the POTW communities, with assistance from the State Revolving Fund (SRF) began development of a Comprehensive Water Resource Management Planning (CWRMP) to determine the future needs of each community, treatment options, costs, and ultimately develop a recommended plan. The goal was to have the TMDL process and CWRMP process completed at approximately the same time so decisions could be made on how best to proceed. What is not evident is how unique this process was and the partnerships that were formed. It was recognized early in the process that if each community applied for SRF funding individually they would likely not receive enough priority points in the SRF program to be eligible for funding. As a result the communities formed a consortium and requested funding jointly to address all their needs at once as well as to address a number of watershed issues common to all. As a group they received high priority points and were ultimately awarded $3.5 million in SRF funding for this evaluation. This was critical to not only obtaining the necessary funding but to analyze the watershed as a whole. This was the first time this process was used in MA and is a good model for future watershed permitting proposals.

The figure below provides a summary of the integrated project areas, partnerships, and leveraged contractual resources of the Massachusetts Assabet Watershed Project (**Bolded Activities** either currently in-process or will occur in the near future): *During the first two critical phases of the project, a total of approximately $4 million of contractual resources have been effectively leveraged from a variety of federal, state, local, and nonprofit sources into a common goal*- Restoring the Health of the Assabet River!

PROJECT AREAS

Phase 1	*Phase 2*		***Phase 3***
TMDL Data Collection / Monitoring (1999-2001)	*Analysis (2000 –2004)*		***Implementation (2004 –2009)***
MA Watershed Initiative (Exec. Office of Env.) **($224,000)**	Watershed Management (CWRMP (1))	TMDL Modeling	**NPDES Permit** (EPA & MA DEP)
US Army Corps of Engineers (ACOE) **($127,500)**	Assabet River Consortium **($ 3,500,000 SRF)** 1. Needs Analysis 2. Treatment Options 3. Costs & Disposal 4. Recommended Plan	MA DEP **($300,000 (2))** 1. WQ Model 2. Run Options 3. Develop TMDL	**Sediment Evaluation** **($100,000 EPA & $130,000 MADEP/USGS)** 1. Extent & Quality 2. Evaluation
Organization for the Assabet River **(Volunteer Monitoring and In-Kind Services)**			**Dam Removal Options** (ACOE 65%; Assabet Consortium 35%) Sect 206. Ecosystem Restoration **(Up to 5,000,000 (3))**
			(4) POTW Upgrades Assabet Consortium **(Cost Undetermined)**
			Monitoring Plan **(Cost Undetermined)**

(1) CWRMP- MA DEP's Comprehensive Water Resource Management Planning process.

(2) Estimated amounts.

(3) Current efforts are underway to potentially pursue US Army Corps of Engineers (ACOE) Section 206, Aquatic Ecosystem Restoration Funds.

Project Update

At the time of grant application we had completed phase 1 of the project (data collection) and portions of phase 2 (modeling and analysis). DEP's proposal was to use the $100,000 innovations grant funding, matched by an additional $100,000 in state funds to make some additional model runs and to better define options for achieving water quality standards and to begin phase 3 of the project (to quantify and qualify the extent of sediment in downstream impoundments with a goal of developing a final permit conditions at the end of 2003 or early to mid 2004. Since that time the consortium has finalized the first two phases of their Comprehensive Water Resources Management

Plan (CWRMP) and is beginning to finalizing steps 3 and 4 of that process as previously identified. In addition, additional model runs were made bringing the total to about 30 separate runs that evaluated water quality results resulting from various phosphorous reduction strategies including but not limited to those resulting from reductions in point sources, sediment, and those that may result from watershed alternatives such as dam removal. Those runs concluded that reductions in point sources alone would not be sufficient to achieve water quality standards and that a combination of point source reductions (down to 0.1 mg/l total phosphorus) and 90% reduction in sediment phosphorus were needed to meet water quality goals.

As a result of the above analysis the MA DEP developed a detailed TMDL, and held many meetings with all stakeholders and the public prior to finalizing the TMDL and submitting it to EPA for final approval. It included a detailed implementation plan that outlines actions to be taken using an adaptive management approach over the next ten years or two permit cycles. The TMDL, DEP's formal response to comments, and other documents are attached to this update for additional information.

Finally, draft NPDES permits have been developed incorporating the requirements and timelines of the TMDL and public hearings are scheduled for July 13 & 14th of 2004.

In addition, while these actions were taking place grant funding was also used to hire the United States Geological Survey (USGS) to investigate sediment quality and quantity. This was the necessary first step to determine if sediment remediation was a feasible option. That project had several tasks the status of which are outlined as follows.

Task 1—Map the extent and depth of sediments in six Assabet River impoundments

Status: Drafts of all maps completed.

Task 2 —Collect sediment samples for physical and chemical analysis

Status: Remaining data entered into spreadsheets for analysis. Report draft data tables and figures prepared. Draft Scientific Investigations Report completed and under review.

Task 3—Determine whether there are measurable increases in phosphorus storage due to P release from sediments

Status —Interpretation of phosphorus-release data nearing completion.

Once completed this information will be used to help develop a detailed dam removal/sediment remediation feasibility study to investigate the most cost effective alternatives to achieve standards. To this end stakeholders have had one or more meetings with the US Army Corps of Engineers to discuss, develop, and pursue a funding proposal under USACOE Section 206 "Restoration Program to Improve Aquatic Habitat". That program will provide up to 65% funding (with a 35% local match) to develop a Preliminary Restoration Plan (PRP) and recommended implementation plan that will include dam and sediment remediation options.

Project Innovations
The Assabet River Watershed Project has created innovations on several very important environmental and community fronts as highlighted below.

- *Watershed Permitting*. As a result of the comprehensive watershed and water quality modeling analysis, an adaptive management approach was collectively formulated that enabled the four community wastewater treatment plants to pursue nutrient reduction strategies likely to be most effective at improving water quality conditions in both the short and long term. In June of 2004, the EPA / MA DEP wastewater permits (NPDES) for all four POTW's have been drafted and include a 87% reduction of total phosphorus (from .75mg/L to .1mg/L) during the five-year permit cycle, along with an extensive sediment evaluation, and an implementation plan to possibly remediate phosphorus-laden sediments from the river impoundments.

- *Community-Based Environmental Protection.* Building local capacity by collaborating among a wide range of stakeholders and using both voluntary and regulatory tools and approaches has been a critical part of this project. First, the voluntary formation of the Assabet River Consortium- which comprises six communities (Hudson, Marlborough, Maynard, Northborough, Shrewsbury and Westborough) which operate four wastewater treatment plants on the Assabet River provided, along with support of the local environmental organization, a sustaining structure of municipal leaders, environmental consultants, and river advocates for watershed project development, leveraging of funding and technical resources, sharing of information and coordinated decision-making, and cost-effective implementation. Second, the Clean Water Act and TMDL analysis provided the necessary regulatory driver and framework to pursue "fishable and swimmable" goals.

Project Accomplishments And Results
The Assabet River Watershed Project has realized a variety of environmental accomplishments. Although the primary goal of ecological restoration and water quality improvements will be achieved during the next 5 – 10 years, a variety of intermediate measures demonstrate the success of this project.

- *Watershed Coalition*. Over the project course of five years (1999 – 2004), stakeholders covering a range of public, private, and non-government organizational interests collectively collaborated, deliberated and agreed on a watershed-modeled phosphorus "pollutant budget" that would significantly reduce the permitted levels of direct total phosphorus entering the Assabet River system. More specifically, the new EPA / MA DEP NPDES permit discharge limits of 0.1mg/L, which were drafted in June 2004, represents an approximate 87% reduction of phosphorus-tainted discharge from four major wastewater treatment plants during April 1 - October 31 (the vegetative growing season of river weeds nourished by phosphorus).

- *Phased Adaptive Management Approach.* Although considerable and significant discussions and deliberations occurred among the stakeholders on a potentially lower POTW discharge limit, the extensive river sampling conducted by regulators, river advocates and municipalities when combined with the participatory TMDL model analysis supported an adaptive regulatory management approach. More specifically, the water quality modeling revealed that a more restrictive, and potentially unachievable wastewater discharge limit would not produce the future attainment of water quality standards in the

river by itself. Hence, a two-prong phased implementation approach was adopted, which includes current sediment analysis and an evaluation of potential sediment remediation and dam removal options that may be more cost effective in achieving the overall water quality goals. This grant provided in-part funding to begin evaluating those options by identifying the quantity and quality of the sediment in each of the major impoundments on the river and the vertical extent of phosphorus throughout each impoundment. This information will help determine potential remediation options. This adaptive approach goes well beyond the traditional NPDES regulatory requirements by integrating environmental, economic, and social objectives into the community based decision-making process.

- *Capacity Building and Sustainability.* The multi-stakeholder partnerships that were forged during the first five years of this project (Phase 1 & 2 from 1999-2004) have contributed to citizen empowerment. Local officials from six geographically separate communities, working under a watershed approach, have effectively partnered with state, federal, and non-profit organizations to restore the health of the Assabet River. These working partnerships are continuing in the implementation phase. For example, the Assabet River Consortium (six local governments) has joined up with OAR (non-profit river advocate) to lobby the New England congressional delegation to earmark $500,000 of the Army Corps of Engineers (ACOE) Section 206, Aquatic Ecosystem Restoration Program, to the Assabet River Restoration Project feasibility study. This federal funding, which potentially could provide up to $ 3,250,000 (65% of $ 5,000,000) to the Assabet River communities for sediment dredging, sediment treatment, and dam removal or breaching activities, will be a critical resource for future remediation of the phosphorus released from the bottom sediments into the Assabet River.

Summary of Key Themes and Lessons Learned

- *Building local community capacity for environmental protection is more than a trend, it's a necessity!*
  - Building trustful regulatory and community relationships is crucial.
  - Open, candid and frequent dialogue with local officials and interests groups is hard work and resource intensive. However, once a foundation of trust is established and relationships are built, the collective returns can be significant. (Note: Initially, the goal of this project was to complete phases 1 & 2 in two years; it actually took five years.)
  - The realization that 100% consensus in multi-stakeholder policy decisions is rarely achieved. However, the citizen participation process "of being represented at the table" and "engaging in public dialogue" is critical in garnering local and sustaining support for project development and implementation.

- *Limited Resources*
  - Limited resources constantly challenge local, state, and federal governmental officials. This project showed the importance of bringing multi-interest stakeholders, who have diverse, unique and relevant skills, into the environmental decision making process. The combined "community horsepower" provided a maximization of local, state, federal, and nonprofit resources into a sustaining project package. This innovative and effective utilization of public and private resources is a critical part of environmental restoration efforts on the Assabet.