Stormwater Funding for the Upper Charles River Communities

The Charles River Watershed

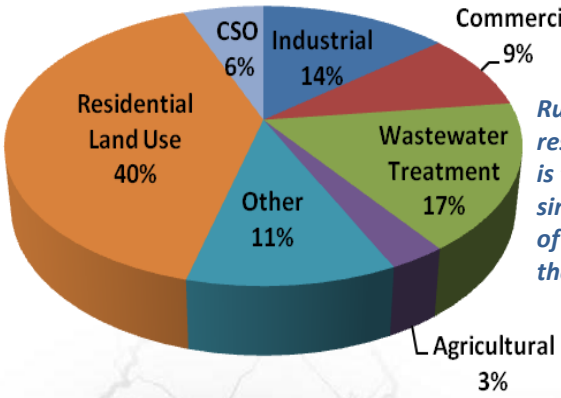
A watershed is defined as the land area that drains to a common body of water, such as a stream, lake, estuary, wetland, or even the ocean. The Charles River runs approximately 80 miles from its source at Echo Lake in Hopkinton to its mouth in Boston, Massachusetts; it drains a 308 square mile watershed containing all, or part, of 35 municipalities including the three pilot communities discussed in more detail below (see map).

The Charles River has long been impaired and unable to meet water quality standards. Despite recent gains, the river still is impacted by an over-abundance of **phosphorus**. Phosphorus is a nutrient found in soils and vegetation throughout the watershed, but excessive inputs from human activities can lead to an **over-abundance** of aquatic plant and algae growth. Too much plant growth uses up oxygen in the river, which reduces the amount available for other aquatic life, such as fish and insects, and can create "eutrophic conditions."

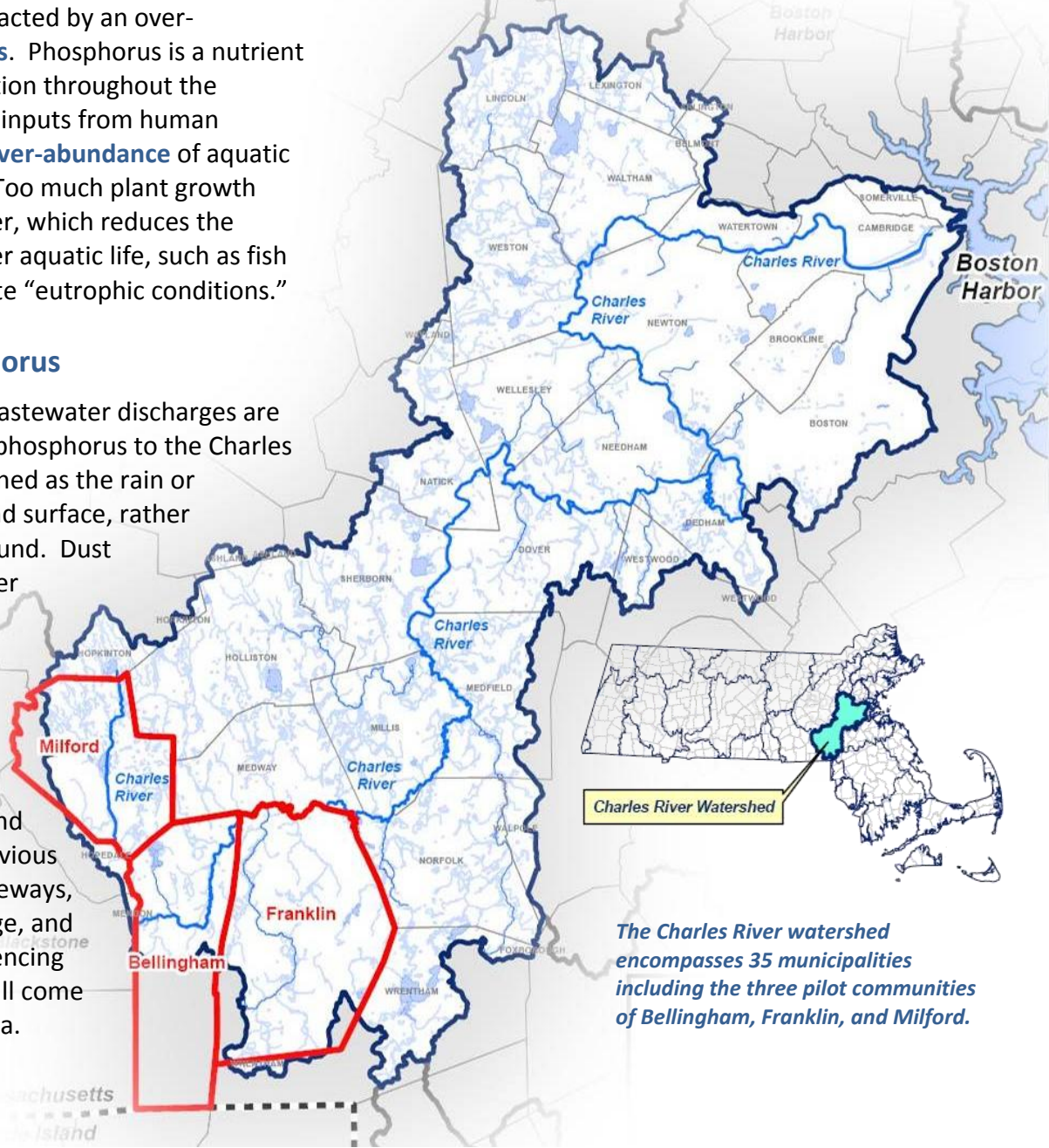
The Source of Phosphorus

Stormwater runoff and wastewater discharges are the main contributors of phosphorus to the Charles River. Stormwater is defined as the rain or snow that runs off the land surface, rather than filtering into the ground. Dust and dirt particles, leaf litter and other plant debris, fertilizers, detergents, vehicle exhaust, and pet waste on lawns and pavement are conveyed by stormwater to streams and rivers. Land use, the amount of impervious cover (e.g., rooftops, driveways, roads, etc.), fertilizer usage, and soils are key factors influencing how much phosphorus will come from a given drainage area.

Annual Phosphorus Inputs by Source to the Lower Charles River Basin (CRWA)



Runoff from residential areas is the largest single contributor of phosphorus to the Charles River.



The Charles River watershed encompasses 35 municipalities including the three pilot communities of Bellingham, Franklin, and Milford.

Requirements of the Clean Water Act

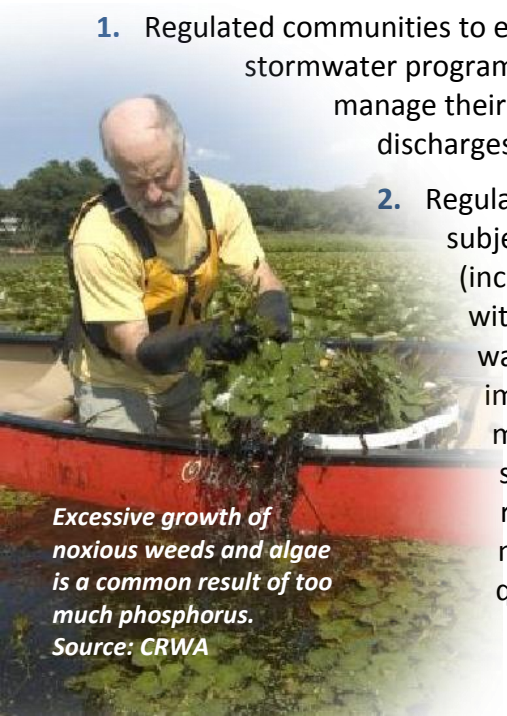
The Federal Clean Water Act requires states to identify waters that fail to meet water quality standards and to develop limits for each pollutant contributing to their impairment. These limits are expressed as "**Total Maximum Daily Loads**" (TMDLs) that establish the amount of a particular pollutant that a water body can receive while still meeting water quality standards.

In 2007, the US Environmental Protection Agency (EPA) approved a TMDL for phosphorus for the Charles River that established annual phosphorus load reduction targets including for stormwater runoff from municipalities and from large private property owners. ***Phosphorus reduction targets were set for all communities in the upper watershed***. The towns of Milford, Bellingham and Franklin have target reductions of **57%**, **52%,** and **52%,** respectively.

Addressing TMDLs Through Stormwater Permits

These targets were recently incorporated by EPA into two **draft** general permits that affect how all municipalities and some private properties in the Charles River Watershed manage stormwater. These permits are referred to as the Small Municipal Storm Sewer Systems (MS4s) General Permit and the Residual Designation Authority (RDA) General Permit, and they require:

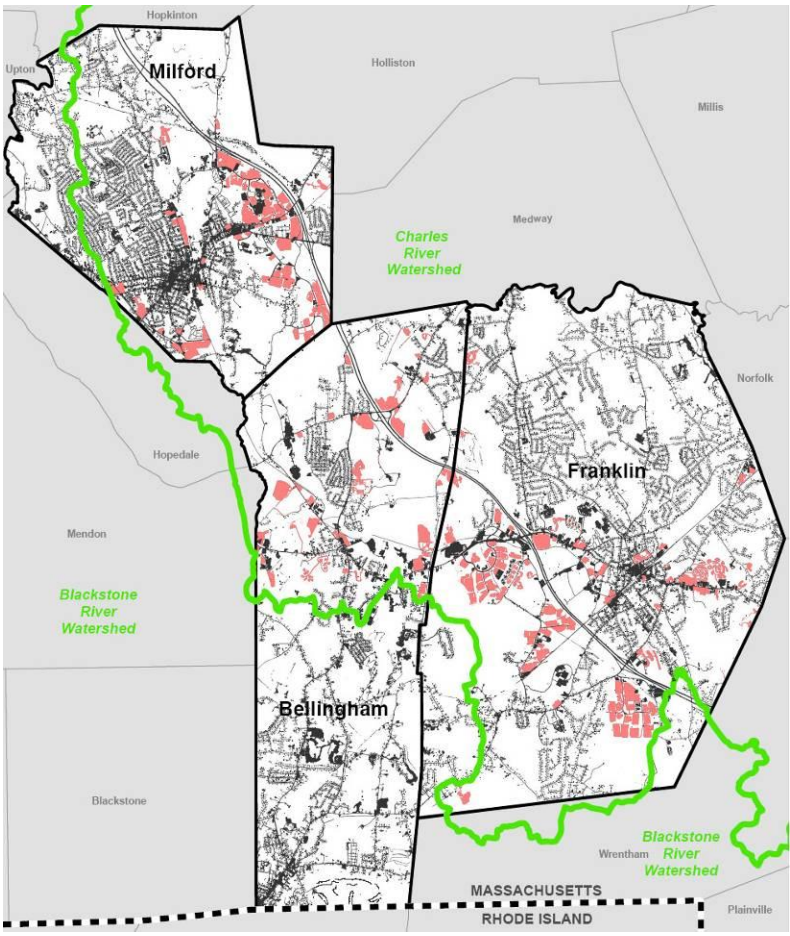
1. Regulated communities to enhance their existing stormwater programs to more effectively manage their stormwater discharges;
2. Regulated communities subject to TMDLs (including all those within the Charles River watershed) to implement additional measures to achieve specific pollutant reduction targets and meet state water quality standards; and
3. Private properties with **two or more acres of impervious cover** to reduce existing phosphorus loads by 65% either on their own, or in partnership with the Town. This requirement currently is being piloted in the three Upper Charles communities of Bellingham, Franklin, and Milford (see map).



Excessive growth of noxious weeds and algae is a common result of too much phosphorus. Source: CRWA

How will these requirements impact the residents/businesses of the Charles River?

EPA hired consultants to evaluate for the three pilot communities: 1) how much it might cost to comply with the two draft permits and achieve TMDL phosphorus reduction targets over a 10-25 year period, and 2) assess the potential options for generating the necessary revenue to pay for implementation. Some of the results from this study are summarized below. The full Upper Charles River Sustainable Stormwater Funding report is available on EPA's stormwater website at www.epa.gov/region1/npdes/charlesriver/index.html.



Impervious cover in the three pilot communities. The red shaded area represents impervious cover on the private properties subject to the draft RDA Permit.

How much will it cost?

Towns are obligated to maintain drainage infrastructure (i.e., pipes, catch basins, ditches, and culverts), keep roads safe and reduce flooding hazards, provide clean drinking water, recharge aquifers, and clean polluted discharges. These stormwater services all cost money, which currently comes primarily from general tax revenue.

The study estimates how much each community currently pays for existing stormwater services. Future costs were also projected based on additional requirements of the new draft permits and to meet phosphorus load reduction targets of the TMDL. New anticipated capital costs include the design, permitting, construction, administration, and land acquisition costs associated with **structural** stormwater retrofits. The analysis also assumes that 15% of the total phosphorus reduction will be achieved through **"non-structural"** control measures (e.g., enhanced street sweeping, leaf and debris collection programs, and a ban on phosphorus in fertilizers), and that the costs for these are already accounted for or have no cost associated with them.

The table below summarizes the estimated current and future annual stormwater program costs, as well as the total cost for implementing structural and non-structural practices to reduce phosphorus to the target amount for each town. **In the long-term, total costs will vary based on how long it takes to fully implement all of the required capital projects.**

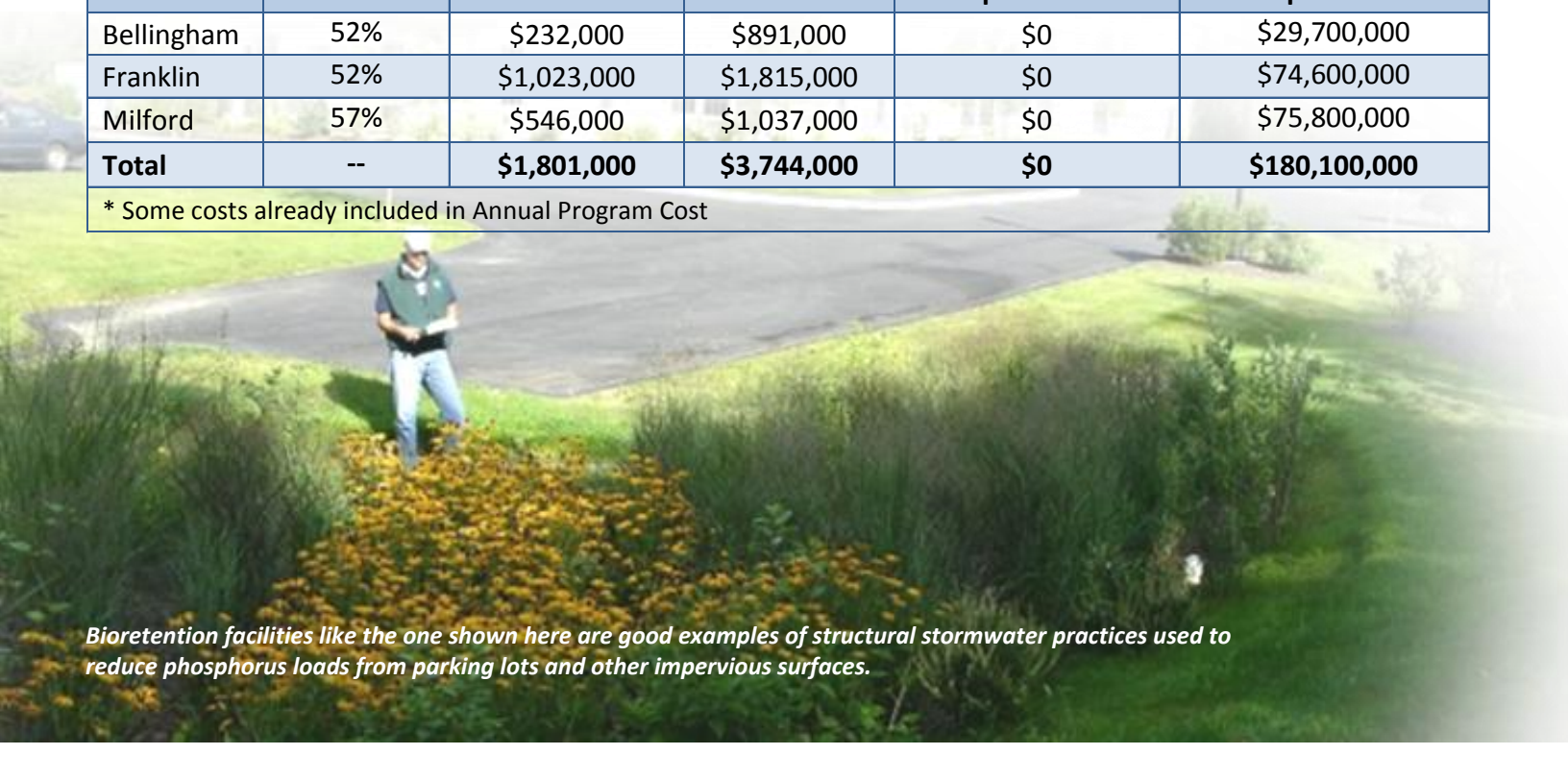
How will we pay for additional stormwater services?

This project evaluated the possibility of creating a **Stormwater Utility** as an option to fund the future stormwater programs for the three towns. Stormwater utilities are user-fee systems based on the premise that stormwater drainage systems are public services, similar to municipally operated wastewater or water supply systems. Just like water rates that are based on the number of gallons used per household, the billing rates for a stormwater utility are often based on the square footage of stormwater-generating impervious cover per parcel.

Summary of Current and Future Cost of Stormwater Program and Capital Expenditures

Town	Phosphorus Reduction Target	Current Program Estimated Cost	Anticipated Future Costs to meet Program Requirements		
			Average Annual Program Cost	Total Cost of Non-Structural Practices to Remove 15% of Phosphorus Load*	Total Cost of Structural Practices to Remove Remaining Phosphorus Load
Bellingham	52%	$232,000	$891,000	$0	$29,700,000
Franklin	52%	$1,023,000	$1,815,000	$0	$74,600,000
Milford	57%	$546,000	$1,037,000	$0	$75,800,000
Total	--	**$1,801,000**	**$3,744,000**	**$0**	**$180,100,000**

* Some costs already included in Annual Program Cost

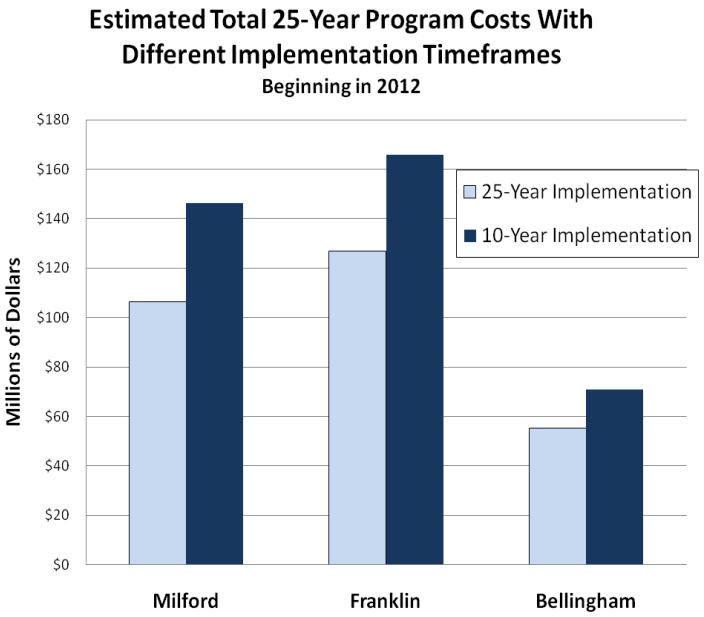


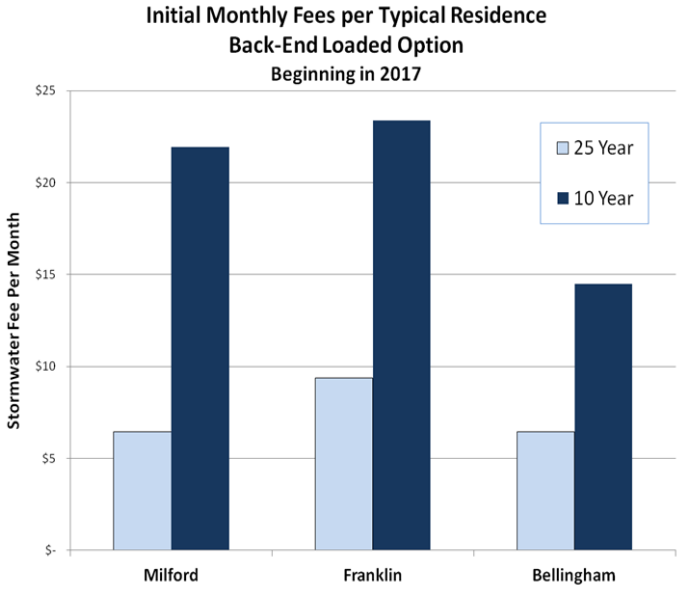
Bioretention facilities like the one shown here are good examples of structural stormwater practices used to reduce phosphorus loads from parking lots and other impervious surfaces.

Total program costs to be paid by the stormwater utility for each year include: interest on capital bonds, operations and maintenance cost on accumulated capital construction, general program operating costs, and utility billing and administration costs.

As shown in the chart to the right, total costs estimated over a 25-year period are higher if implementation is condensed into the shorter, 10-year timeframe than in a longer 25-year implementation.

The chart below compares the estimated monthly utility fee for a typical residential home for 25- and 10-year implementation period if much of the capital construction expenses can be deferred until the end of the implementation period ("back-end" loaded).





Initial monthly fees represent the average fee for single family residents during the first five years of implementation beginning in 2017.

Findings and Recommendations

The study confirmed that the future costs of stormwater services for the three municipalities will be significantly higher than their current costs. Compliance with phosphorus reduction requirements will require a combination of both non-structural and structural controls implemented over time. In addition, it is likely that each community's general fund cannot continue to fully support implementation and that additional revenue sources will be needed.

To reduce overall costs, the study recommends that the municipalities, EPA, and other stakeholders take the following next steps (among others):

- Implement non-structural control measures to the maximum extent practicable including a phosphorus ban on fertilizers to reduce program costs.
- Implement structural control measures in the context of a watershed management plan.
- A longer (>10 years) and back-end loaded implementation period is most cost-effective.
- Pursue the implementation of a stormwater utility.
- Implement a public education and engagement project explaining the benefits of a comprehensive stormwater program.

For More Information

Visit EPA's stormwater permitting webpage at:
www.epa.gov/region1/npdes/stormwater/index.html