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Cleaning up Algae in the Charles

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Wednesday November 7, 2007

Last month, the US Environmental Protection Agency (EPA) issued a report highlighting the need for dramatic cuts in nutrient pollution in the Charles River. Excessive nutrient levels, especially phosphorus, are a persistent threat to the health and beauty of the Charles River. Although bacteria levels in the Charles River have been reduced dramatically over the last decade, the EPA report confirms that nutrients are still a major water quality problem.

Excessive phosphorus can promote the growth of algae and other aquatic plants, especially in slow-flowing waters like impoundments behind dams. The Charles River has twenty impoundments along its length and many have excessive aquatic plant growth. Much of the Upper Charles River is classified as an “impaired water body” due to nutrients. The Lower Basin acts like a large pond that receives nutrient-laden flow from the entire watershed and has frequent algal blooms during the summer. More recently there have been outbreaks of toxic blue-green algae causing concern for recreational water users.

Although phosphorus is ubiquitous in the natural environment, and some amount of phosphorus is essential for healthy rivers, the Charles has become overloaded with phosphorus from human inputs such as combined sewer overflows (CSOs), wastewater treatment plants and storm water runoff. The EPA report, a so-called Total Maximum Daily Load (TMDL), has determined that phosphorus loads to the river need to be reduced by 54% in order to achieve water quality standards and to avoid excessive algae and vegetation problems.

The TMDL project used intensive monitoring and modeling to quantify contributions of phosphorus load to the river. The final report recommends a mitigation action plan that specifies load reductions for the various sources so that the river will meet water quality standards in the future and result in reduced algal levels. The plan also has some built-in safety factors to help ensure that target loads are achieved.

For the 1992-2002 study period, the Lower Basin TMDL estimated that only 10% of the phosphorus load was natural while 67% of the phosphorus load was from storm water. CSO load reductions (96%) are already required and any assumed load reductions from the WWTFs (32%) will be dealt with in a separate TMDL for the upper Charles, (now being completed by CRWA). The prescribed load reductions for communities in the Charles River watershed varied from 17% to 65% depending on the intensity of land use. Most developed communities near Boston, like Newton, fall into the 65% category.

There are numerous approaches that a city like Newton can take to reduce phosphorus in storm water. Human activities that exacerbate the level of phosphorus in storm water include motor vehicle exhaust, fuels, and lubricants; fertilizers; some detergents and car wash products; and pet waste. A community's action plan should

include public education and outreach (proper disposal of pet wastes, use of low phosphorus fertilizer); discharge detection and elimination program (elimination of wastewater in storm water); high-efficiency street sweeping and municipal good housekeeping (source control of phosphorus); storm water control of sediment on construction sites (reduction of sediment-bound phosphorus); and, enhanced storm water controls that promote infiltration and/or lateral flow through soils (reduction of soluble phosphorus via soil adsorption).

One of the most effective ways to reduce phosphorus loads in storm water runoff is to direct runoff to vegetated areas, where water is filtered and recharges into the ground rather than discharged into drains and directly to the river. Low Impact Development (LID) designs are especially well suited to this, as is increasing the street tree canopy and using green infrastructure such as swales instead of pipes. These approaches also provide many ancillary benefits, such as a better air quality, a cooler urban environment, and aesthetically attractive neighborhoods. Newton's new storm water utility will be a tremendous help to the City as these new initiatives are undertaken. The process will be will be iterative and adaptive as more information on the suitability and performance of various approaches becomes available.

The magnitude of the proposed phosphorus load reductions is daunting for many communities, but if we do not move towards these levels of control, it is blatantly clear from the Lower Basin TMDL that we will never achieve the ultimate goal of a swimmable and fishable Charles.

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