



"Photo Gallery." U.S. Environmental Protection Agency. N.p., 28 Apr. 2008. Web. 6 Dec. 2009.

Green algae forms on the Charles as a result of phosphorous from storm water runoff.

The River Basics

- Longest river wholly within Massachusetts ¹
- Stretches 80 miles ¹
- Head of river in Hopkinton at Echo Lake, mouth at Boston Harbor ¹
- Upper watershed above the Watertown dam: relatively flat wetland ¹
- Lower watershed: 40 square miles of urbanized area ¹
- Two largest tributaries: Stony Brook and Muddy River ¹



"Charles River Watershed." 2008. <http://www.crw.org/>.

Freshwater wetland in Mattapan, in about 1900.

River Manipulation



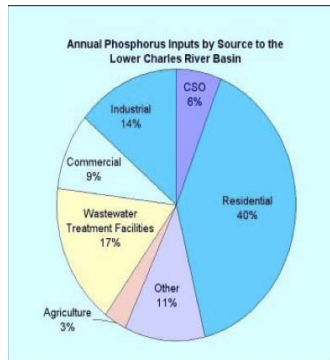
Weiskel, Peter K., Lois K. Barlow, and Tomas W. Smieszek. *Water Resources and the Urban Environment. Lower Charles River Watershed, Massachusetts, 1630-2005*. U.S. Geological Survey Circular 1280 ed. Vol. 1280. United States Geological Survey, 2005.

- 200 years ago, Cambridge and Boston were separated by nearly 2 miles of water and 1000's of acres of salt marshes ²
- Filling of Back Bay 1790s to 1800s: built to remediate sewage problem, create new real estate ³
- Charles River Dam built in 1910 completely eliminated the mudflats and tidal flux of the river estuary ⁴
- Dam had navigation lock and sluiceway for flooding ⁵
- 1979 Dam at river mouth built by Army Corps of Engineers to replace function of 1910 dam ⁵
- Lower part of river: built a structure with the capacity to discharge flooding from storm water runoff ⁵
- Upper part of the river: preserve 8,500 acres of marshes and swamps as non-structural flood-protection ⁵



Boston, Cambridge, and their environs in the 17th century. Map. *The History of Cambridge*. Harvard Square Library, n.d. Web. 5 Dec. 2009. <http://www.harvardsquarelibrary.org/ehistory/section1.htm>.

The mouth of the River circa 1630.

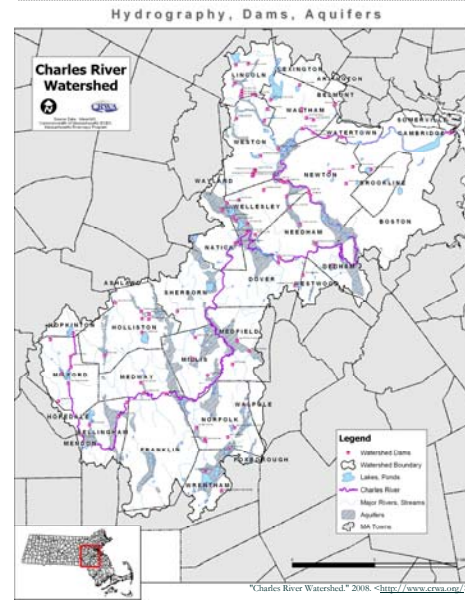


Picketing, Nigel. "Upper/Middle Charles Total Maximum Daily Load (TMDL) Project." October 27 2009. <http://www.crw.org/projects/TMDL.html>.

Love that Dirty Water?

“It is a tidal estuary, a shallow and muddy trough.”

Charles Eliot, 1892



"Charles River Watershed." 2008. <http://www.crw.org/>.

- 20% of MA population lives in the CR watershed region, resulting in urbanization and highly impervious land cover ⁶
- 1995: Charles River Watershed Association began doing a comprehensive water quality monitoring program ⁶
- EPA launched an effort in 1999 to make the Charles swimmable and fishable by 2005 ⁶
- 2000: Deer Island wastewater treatment plant completed, expanding sewer capacity which reduced CSO (combined sewer outflows) to the Charles ⁷
- 1995: lower Charles met swimming standards for bacteria 19% of the time. 2007: lower Charles met swimming standards for bacteria 63% of the time ⁸
- Earth Day 2005: Waltham, Watertown, Newton and Brookline eliminate all know CSO connections; CSO flows in lower Charles reduced by 90% ⁷
- 2006: separation of Stony Brook flow complete. Stony Brook was the largest remaining source of bacteria flow to the river ⁷
- 2007: TMDL (Total Mass Daily Load) established by EPA and MassDEP to monitor and reduce levels of phosphorus ⁷
- Master Swim Races organized in Charles in 2007 and 2008. The first public swimming in the river since CR public beaches were closed in the 1950s. ⁹

Pollution

- 1988: 1.7 billion gallons/year of untreated sewage entered the river ⁶
- Blue-green algae (*cyanobacteria*) grows rampant, especially in summer months ⁹
- Algae thrives in calm, warm water rich in nitrogen and phosphorous ⁶
- Phosphorous levels very high in river because of storm water run off, sewer overflows, illegal CSOs ¹⁰
- Tests indicate that automobile exhaust condensate also contributes to CR pollution ¹¹
- Cities installing infiltration chambers, permeable pavement to reduce storm water runoff directly into river ⁸
- Toxic heavy metals, PCBs, other suspended solids drop out at low-flow areas to river bottom ⁹

Works Cited

1. "Charles River." *Encyclopedia Britannica*. *Encyclopedia Britannica Online*. Encyclopedia Britannica, 2009. Web. 14 Nov. 2009. <http://www.britannica.com/>
2. Haglund, Karl. *Imagining the Charles River*. Cambridge: MIT Press, 2003.
3. Weiskel, Peter K., Lois K. Barlow, and Tomas W. Smieszek. *Water Resources and the Urban Environment. Lower Charles River Watershed, Massachusetts, 1630-2005*. U.S. Geological Survey Circular 1280 ed. Vol. 1280. United States Geological Survey, 2005.
4. Hansen, Brent. "Turning the Tide: The Charles River Basin." *Land Engineering*. 2005. 77-10 (2007): 38-9.
5. Nototomato F. Doyle, A. F. "Corps Takes New Approach to Flood Control." *Civil Engineering*. ASCE. 49.6 (1979): 65-8.
6. "Charles River Watershed." 2008. <http://www.crw.org/>.
7. "History of Human Impacts on Charles River." *United States Environmental Protection Agency*. April 29 2008. <http://www.epa.gov/region01/charles/history.html>.
8. Varney, Robert W. "Residual Designation Pursuant to Clean Water Act Region 1." *United States Environmental Protection Agency*, 2008. <http://www.epa.gov/region01/charles/residual.html>
9. "A Swimmable Charles' Water Quality and Public Access with Examples from Swiss Urban Rivers." *Charles River Conservancy*, 2008. <http://www.charlesriverconservancy.org/projects/swimmable/pdf/A_Swimmable_Charles_Series.pdf>
10. "Addressing Excessive Nutrients in the Charles River." Friday, November 13 2009. <http://www.epa.gov/region01/charles/tmdl.html>.
11. Hites, Ronald A., and K. Bieman. "Water Pollution: Organic Compounds in the Charles River, Boston." *Science*. 178.4057 (1972): 158-60.