



A volunteer helping to remove water chestnuts, an invasive weed, from the Charles River in Newton. These and other plants are able to grow prolifically because they are 'fertilized' by excess phosphorus in the Charles.



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*This project is funded by the
Massachusetts Environmental Trust.*

Phosphorus in the Charles River: What You Should Know!



*Information about the
consequences of too much
phosphorus entering the Charles.*

Definitions

Nutrient: a substance an organism needs to live, which must be obtained from its external environment.

Stormwater runoff: rainwater that runs along impervious surfaces, collecting pollutants and then flowing into local waterways.

Combined sewer overflow (CSO): overflow of raw, or partially treated, sewage combined with rainwater runoff flowing into a water body, usually during heavy rain.

Cyanobacteria (blue-green algae): Photosynthetic bacteria that live and grow in aquatic environments. These organisms can produce toxins which are harmful to humans and other mammals in high doses. These organisms can give the water a green paint-like appearance (as pictured on the front cover) when present in large numbers.

References and Additional Resources

Cyanobacteria advisory sign courtesy of Massachusetts Department of Conservation and Recreation, <http://www.mass.gov/dcr/>.

Final Total Maximum Daily Load for Nutrients in the Lower Charles River Basin, Massachusetts. MassDEP and US EPA, June 2007.

Massachusetts Department of Public Health (MDPH) Guidelines for cyanobacteria in freshwater recreational water bodies in Massachusetts.

Nonpoint Pollution of Surface Waters with Phosphorus and Nitrogen. In *Issues in Ecology*, Summer 1998. <http://www.epa.gov/watertrain/pdf/issue3.pdf>.

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Streamflow, Water Quality, and Contaminant Loads in the Lower Charles River Watershed, Massachusetts, 1999-2000. USGS Water Resources Investigations Report 02-4137.

Occurrence of Cyanobacterial Toxins (Microcystins) in Surface Waters of Rural Bangladesh: Pilot Study Report, May 2004. World Health Organization. http://www.who.int/water_sanitation_health/emerging/wsh0406.pdf.



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What is phosphorus?

Phosphorus is a naturally-occurring element present in rock, soil, and organic matter. Plants require phosphorus during photosynthesis. Aquatic plants obtain this **nutrient** from the water around them.

Where does phosphorus come from? How does it get into the Charles River?

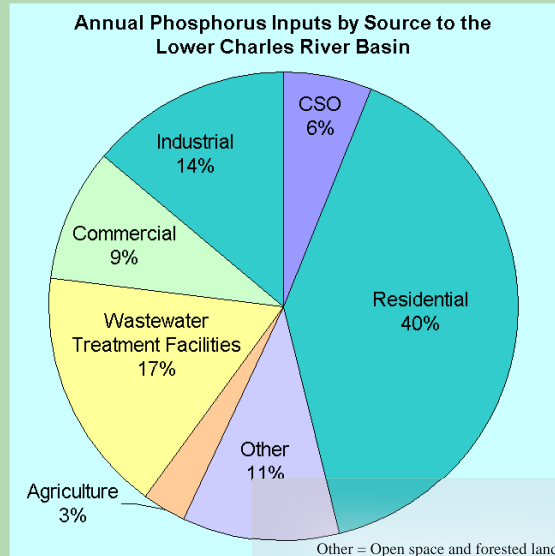
Phosphorus naturally enters rivers and other water bodies through erosion of rocks and soils and decomposition of organic matter. Today, human activities add a large amount of extra phosphorus to the Charles River. High phosphorus levels are causing problems for the human and wildlife populations that depend on the Charles. Phosphorus is carried by **stormwater runoff** from fertilizers, sediment, automobile exhaust and animal waste. Phosphorus also enters our waterways through wastewater treatment facility discharge and **combined sewer overflows (CSOs)**.

Due to human activities and natural abundance, phosphorus is ubiquitous in the environment. The larger the volume of **stormwater runoff** that enters the Charles River, the larger the load of phosphorus it will carry with it.

Phosphorus is everywhere in the environment. The larger the volume of stormwater runoff that enters the Charles River, the larger the load of phosphorus it will carry.

What are the health effects of too much phosphorus in the Charles River?

Phosphorus is not toxic to humans or animals, yet excess levels in a water body can have adverse health effects for you, your children, and your pets. Phosphorus feeds toxin-producing photosynthetic **cyanobacteria**, also known as blue-green algae. (See photo on front cover.) Too much phosphorus allows these organisms to flourish and produce toxins which can be harmful to humans and animals through exposure by skin contact or ingestion. When **cyanobacteria** presents a potential danger in the Charles, CRWA works with state agencies and other organizations to post advisory signs to notify the public (at right).



What are the ecological effects of too much phosphorus in the Charles River?

Adding phosphorus to a river or lake essentially fertilizes the aquatic system. As phosphorus is typically the **nutrient** limiting plant growth in fresh water systems, the addition of phosphorus allows more plants to grow. Algae, photosynthetic cyanobacteria and aquatic weeds can grow in abundance, altering the natural balance of the aquatic ecosystem.

What can I do to prevent excess phosphorus from entering the Charles River?

There are many things you can do to reduce the amount of phosphorus that enters our local environment and reduce overall **stormwater runoff** volume to the Charles:

- Test your soil to determine if it requires additional fertilizers; many local soils do not.
- If your soil requires additional **nutrients**, use compost instead of store-bought fertilizer or choose "slow-release" organic fertilizer.
- Walk, bike or take the T to nearby destinations.
- Do not feed wild animals, especially geese and ducks.
- Reduce and/or treat **stormwater runoff** from your own property as much as possible. Consider planting a rain garden or green roof, using rain barrels or dry wells and replacing impervious areas, such as driveways and patios, with permeable pavers or porous pavement.
- Visit a car wash, where water is treated and recycled, instead of washing your car in your driveway.
- Perform regular maintenance on your septic system to prevent backups.
- Reduce areas of exposed soil on your property; this is especially important during renovations.
- Do not dispose of grass clippings in rivers, streams, or on their banks.
- Pick up after your dog and properly dispose of the waste in the garbage or pet waste composter.

