



A Swimmable Charles?

Water quality and public access
with examples from Swiss urban rivers



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The Charles River Conservancy is working with a coalition of public and private partners to return public swimming to the lower Charles River. The potential for the return of public swimming to the Charles River exists today as a result of the Clean Charles River Initiative begun by the US Environmental Protection Agency in 1995.

The Clean Charles River Initiative established the goal of making the lower Charles River, from Watertown to Boston Harbor, fishable and swimmable by 2005. Through the efforts of federal, state and local agencies, nonprofit organizations, private institutions and local residents, tremendous progress has been made toward this goal. Through these efforts, the water quality of the Charles has improved from a grade of D in 1995 to a B+ in 2008. The water quality is now considered swimmable many days of the year. Because of these water quality improvements, the Charles River Swimming Club, with the support of the Charles River Conservancy, began holding an annual one mile swim race in the Charles in 2007.

Despite the improvements to the water quality of the Charles, there are still significant challenges to meet before the public can have a safe place to swim in the lower Charles River. This booklet provides an overview of how the Charles River has been cleaned up to date, what still needs to be done to improve and maintain high water quality, provides examples of urban swimming in Europe, and shows how you and other citizens can help protect and improve the water quality of the Charles River and help support the return of swimming to the Charles River. **We hope you will take the time to read this booklet and get involved with the Swimmable Charles Initiative.**

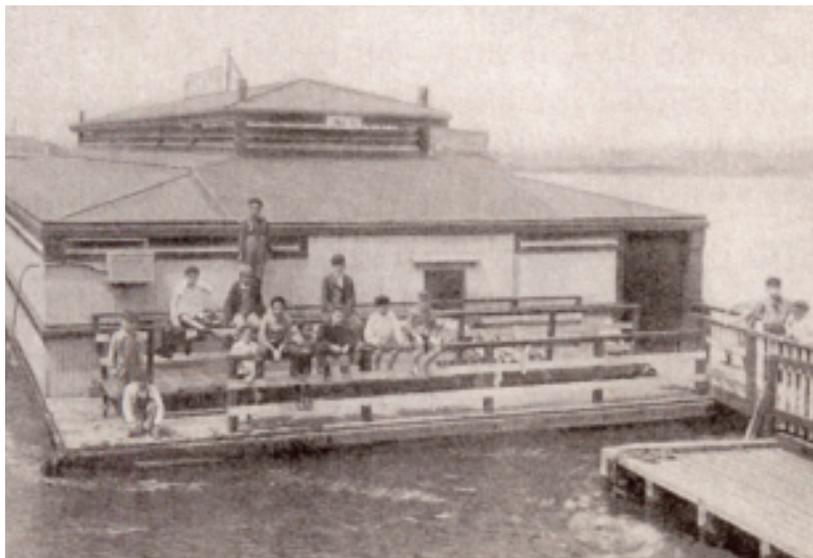


Bathers at Magazine Beach in Cambridge enjoy a swim in the Charles. Beaches were closed in the mid-1950s due to an awareness of water pollution.

“...foul and noisome, polluted by offal and industrious wastes, scummy with oil, unlikely to be mistaken for water...”

—Bernard DeVoto, Harpers Magazine, describing the Charles River in 1955.

Mention the idea of taking a swim in the Charles River and at least one person is bound to make a comment about the “Dirty Water” highlighted in the Standells hit song, sung at the end of every Red Sox win at Fenway Park. Never mind that the San Diego band had never traveled to Boston when they wrote the song: the idea that the Charles River is “dirty water” is ingrained in the public consciousness. Since the shores of the Charles River were settled, swimming in the river was a popular activity. In fact, people swam in this water “unlikely to be mistaken for water” until an awareness of poor water quality closed the river and its many beaches to swimming in the mid-1950s.



Pictured is the West Boston Bridge (now the Longfellow) Boathouse, circa 1906.

Like other urban rivers in the United States, the Charles has felt the impacts of industry and the sheer density of people that live and work in the area surrounding the river. The Charles River was used as an open sewer, polluted with waste from residences, mills, slaughterhouses and other industrial wastes.

Fortunately, as people became more aware of the harmful effects their actions were having on the Charles, they chose to work to improve the health and cleanliness of the river. In 1965, the Charles River Watershed Association (CRWA), a citizen advocacy group, was founded to work towards a cleaner Charles. Nationally, the Clean Water Act of 1972 was enacted in response to events such as the heavily polluted Cuyahoga River in Ohio catching fire.

Despite these local and national efforts to address pollution in our rivers, the water quality of the Charles remained very poor. By 1988 1.7 billion gallons/year of untreated sewage was entering the Charles River (*US EPA*). In 1995, for the first time, EPA New England issued a “report card” for the Charles and the river nearly failed, earning a “D” which meant it was safe for boating only 39% of the time and safe for swimming only 19% of the time. Depressing, certainly, but this news brought about a groundswell of public

interest in water quality and led John DeVillars, then head of the New England EPA office, to announce the goal of a swimmable and fishable Charles by 2005.

The EPA’s top priority for the Clean Charles River Initiative was to work with the Massachusetts Water Resource Authority (MWRA) and cities and towns along the Charles to rid the river of excessive bacteria levels caused by untreated sewage entering the river. Much of the sewage entered the river through **combined sewer overflows, or CSOs**. Combined sewer systems are designed to carry both sewage and storm water in the same pipes. After heavy rainfalls these sewers can overflow, resulting in a flood of wastewater directly into our water sources, carrying not only storm run-off but *untreated human waste, industrial waste, toxic materials, and floating debris*. Another major source of sewage pollution is the conventional sewer system which can break, leak or back up into storm drains, allowing sewage to flow directly to the river. Finding and fixing these cross connections has been an expensive and time consuming process in the Charles, but it has proven enormously effective at removing bacteria and other sewage-borne pathogens from the river.

Myth

“Brown water = dirty water”

There is a distinct difference between a river being “brown” and a river being “dirty.” The brown color of the Charles comes from tannins leaching into the slow moving river from organic materials like decaying leaves and vegetation in the large wetland areas upstream. Tea is naturally high in tannins and the water in your cup reacting with the tea bag is similar to what occurs on a larger scale in the Charles River.

Sewage and The Charles: A Brief History

- 1876** Boston creates the city’s first sewage system, but all waste is still released directly into outgoing tides.
- 1889** Boston forms one of the first regional sewerage systems in the country. Although considered one of the nation’s best, it *offered no treatment*, but merely collected wastewater for discharge into the harbor.
- 1919** Water quality crises and the spread of disease are linked to the dumping of raw sewage into the river. Clam beds in Boston Harbor are shut down.
- 1952** The first regional sewage treatment plants are built in the city.
- 1972** Federal regulations mandate primary and secondary treatment for all municipal sewer systems.
- 1995** US EPA New England begins Clean Charles River Initiative.
- 1997** Boston’s Deer Island processing plant meets federal regulations for the first time.
- 2005** Waltham, Watertown, Newton and Brookline required to eliminate all known connections. Combined Sewer Overflows (CSOs) in the lower Charles reduced by 90%.
- 2006** EPA and MWRA reach agreement to implement long term control plan to reduce CSOs throughout the sewer system. When complete the CSO discharges will have been reduced from 1.7 billion gallons/year in 1988 to 8 million gallons/year.
- 2007** By the end of 2007, 10 CSOs remain active on the Charles and nine have been closed and are no longer operative.
- 2013** Sewage overflows will be reduced by 99.5% from the unchecked days of the late 1980s.

Sources: Massachusetts Water Resources Authority and US EPA websites.

Charles River Report Cards

After 10 years of cleanup efforts, real progress has been documented. Each year, EPA provides a summary of progress and future actions as efforts continue to bring the Charles River to full ecological health. The general standards for the grade at the outset were as follows:

- A: Always meets standards
- B: All boating and some swimming
- C: Some boating and swimming
- D: Some boating and no swimming

Year	Grade	Overall		Dry		Wet	
		Boat	Swim	Boat	Swim	Boat	Swim
2008	B+	97	55	100	79	92	42
2007	B+	100	63	100	84	100	50
2006	B+	90	62	100	80	84	51
2005	B+	97	50	97	59	96	32
2004	B+	96	54	94	38	97	62
2003	B-	85	46	91	56	81	41
2002	B	91	39	100	71	86	21
2001	B	82	54	97	80	74	40
2000	B	92	59	94	82	91	46
1999	B-	90	65	100	71	85	62
1998	C+	83	51	98	85	74	31
1997	C	70	34	87	56	61	22
1996	C-	57	21	94	40	45	15
1995	D	39	19				

Sediment Pollution

While the Charles River water quality is much improved and considered swimmable many days of the year (see chart on previous page), public swimming is currently **not** allowed in the river. There are many reasons why swimming has not returned to the Charles as of yet. One of the most important is that sediments on the river bottom contain toxic heavy metals, PCBs, and other contaminants. When the dam at the mouth of the River (where the Museum of Science now sits) was constructed in 1911, it essentially turned the lower Charles into a lake. The river no longer rises and falls with the tide, and the dam slows the downstream current so much that suspended solids in the water drop out and settle on the river-bottom. This has resulted in a buildup of polluted sediments on the river-bottom that are trapped by the dam and cannot be washed out into Boston Harbor. Dredging the entire river-bottom to remove all the polluted sediments would be extremely expensive. As a result, it is likely that any public swimming area in the Charles will have to provide some means of keeping swimmers from interacting with those sediments either through spot dredging or the construction of swimming facilities (examples to follow in the section on Swiss urban swimming) that allow entry directly into deep water.

Water quality in the Charles and other urban rivers in the United States is improving. Much work has been accomplished by state, federal and municipal agencies, various non-profits and advocacy groups, and by increasingly aware citizens. But to make our rivers healthy *and* swimmable, there is still more work to do. On the Charles, the historic beaches cannot simply be reopened because of the problem of toxic sediments.



The lower Charles River, from the Watertown Dam to the Harbor.

Swimmable Charles Initiative

In 2004 the Swimmable Charles Working Group—which includes representatives from the Charles River Conservancy, the CRWA, the EPA, the Department of Conservation and Recreation (DCR), and the Esplanade Association—was formed to examine the potential for returning public swimming to the Charles. This group has been exploring potential locations for new public swimming areas on the Charles. In 2009, the Massachusetts legislature passed a bill, spearheaded by Representative Alice Wolf of Cambridge, establishing a Charles River Water Quality Commission. The charge of the Commission is to make an investigation and study relative to improving the conditions necessary to, and determining the feasibility of, bringing the water quality in the Charles River lower basin to a level safe for swimming. The Commission will support the goals established in 1995 by the EPA's Clean Charles River Initiative and assist with the objectives of the Swimmable Charles Working Group to return public swimming to the Charles River.

The return of public swimming areas to the Charles would be good for our cities, because it would:

- add to our urban park system by encouraging another way for people to interact with nature.
- inspire people to care about the health of our water and the effects of our actions on our environment.
- provide a healthy, physical outdoor activity.
- serve as a place of public interaction, thereby contributing to the overall strength of a community.

Fact

In the area between the Watertown Dam and Boston Harbor, about 300,000 people live and 400,000 people work within a 10 minute walk of the Charles River.

The Charles River Swim Race

The Charles River Swimming Club was founded in 2005 with the dual purpose of organizing competitive swimming events in the Charles River and facilitating the return of public river swimming. Currently, the main event is an annual one-mile swim race. While the first race in 2006 had to be cancelled due to a toxic algal bloom, the race was successfully held in 2007 and 2008 and the Third Annual Charles River One Mile Swim is planned for 2009.



With urban river swimming such a novelty in the U.S., the first Charles River Swim Race in 2007 made quite a splash! The race was featured in the New York Times (above) and on the front page of the Boston Globe.

Swimmers cut through the water with the Longfellow Bridge in the background. Over 100 swimmers participated in the 2008 race.

Think Swim, Think Swiss: Bringing Swiss-Style Swimming to the Charles River

While there are no freshwater urban rivers in the United States that might offer examples of swimmers returning to once industrialized waters, there are plenty of European examples. When most people think Swiss they think of watches, chocolates, army knives, and cheese. But increasingly, the Swiss people are gaining recognition for their environmental efforts and innovation.

Think Swim, Think Swiss is a joint effort of the Consulate of Switzerland/Swissnex Boston and the Charles River Conservancy aimed at educating people on what it took to clean up Swiss urban rivers and to help people envision the potential for public swimming in the Charles. The exhibit premiered on the banks of the Charles in September 2008 before traveling to other U.S. cities, including Chicago and Washington, D.C.



The three dimensional "Swiss Cross" viewer allows one to envision the future of the Charles River by superimposing images from Swiss bath-houses on the shoreline. (photo © Christina Stier)

Urban Bath-Houses and Urban Swimming

The Swiss people have brought swimming back to their urban rivers by devoting financial resources to environmental issues, taking responsibility for individual actions that impact water quality, and letting their government know their priorities concerning issues relating to water quality and urban livability issues. From their story we can learn what it takes to bring about an *American First*: a Charles River that's clean enough for fish and a return of public swimming.

Bath-houses in Switzerland play an important role in the health (and happiness) of urban residents. In summer, the bathhouses operate as an important part of daily life, offering people a place to gather on the waterfront, to interact with the natural resources of their urban setting, and to enjoy a low-cost, democratic form of recreation, exercise, and social contact. Swiss cities have always regarded their waterways and baths as central to the health and happiness of their citizens. When an old bath is retired, more often than not a new bath replaces it. This practice has enabled many baths to endure, so that a tour of Switzerland's baths offers an architectural and cultural journey spanning many eras of history.

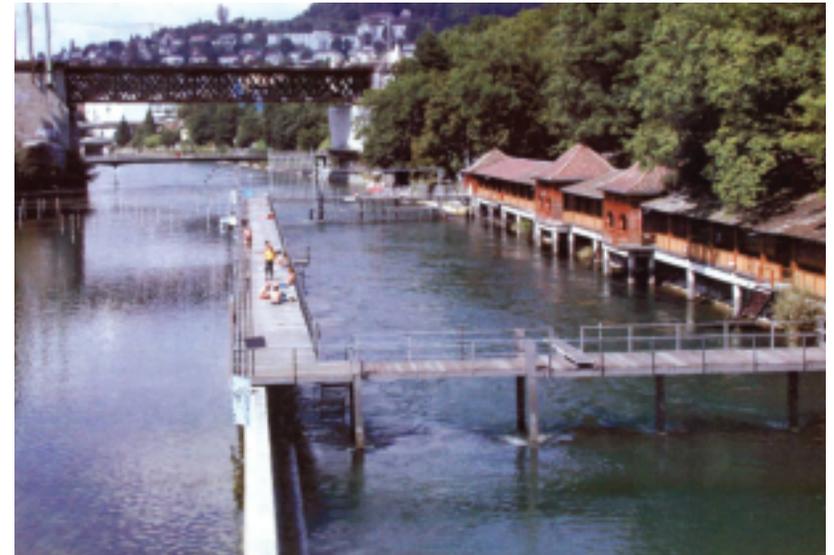
Today, bath-houses in the Swiss city of Zurich serve as waterfront spots offering not only exercise but also dining, entertainment and nightlife, and relaxed and romantic spots for socializing. To encourage healthy lifestyles beyond swimming, some bathhouses offer yoga and aerobics, others saunas and massage therapy. For those more business-minded, several bath-houses offer wireless internet in their cafes. The riverfront belongs to the public, and the Swiss bath-house culture offers people a great variety of ways for them to enjoy their important natural resource that is common ground for all urban residents.



Swiss cities with urban swimming facilities highlighted on the following pages.



Residents of Basel, Switzerland enjoy a day swimming in the Rhine, once polluted and still used for shipping and transportation. This picture shows bathers on a special day, the annual Rhine Swim, and guidelines for everyday swimming recommend staying away from the middle of the river because of boats (© Basel Location Marketing).



The Unterer Letten swim facility in Zurich, where swimmers jump in upstream and float down the river.



Frauenbad Stadthausquai, Zurich

The Stadthausquai, an elegant structure from the late 1800s, is the oldest Zurich bathhouse and is located near the historic city center. By day, it is open only to women and offers multiple decks for sunbathing and river water flowing through the floating structure. At night, it is a popular nightspot known as the Barfussbar (Bare Foot Bar) offering concerts and dance recitals, massage and nutritional counseling, and has its own restaurant and even its own library.

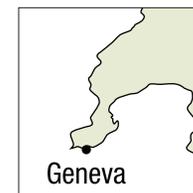
- Offers the famous full moon swims in July and August.
- Can accommodate 1,000 visitors, the same number that Walden Pond in Concord holds on hot summer days.
- Is an attractive night-spot and entertainment center, bringing culture and life to the riverbanks both day and night.



Bain de Paquis, Geneva

The Bain de Paquis, located on the waterfront of Lake Geneva, is a popular spot within walking distance of the train station in an area of the city that had previously been disreputable and even dangerous. The bath-house stands as a symbol of the reinvigoration of the neighborhood and features an extended jetty that offers spectacular views of the lake, city, and surrounding mountains. In addition to sun decks and a diving platform, the Paquis offers a restaurant and a state-of-the-art spa to attract visitors in all seasons.

- Offers free bikes and scooters adjacent to the swim facility, enticing visitors to take a ride along the banks of the lake.
- Was carefully planned to afford awe-inspiring views in all directions.
- Is a year-round attraction that makes the waterfront a must-see destination no matter the weather.

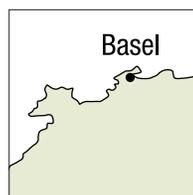




Rheinbadhaus Breite, Basel

The Rhine River in Switzerland is considered both an important trade route and, thanks in part to bath-houses such as the Rheinbadhaus Breite, the largest spa in the region. Swim structures are one of the reasons that the locals refer to this shoreline as “the Swiss Riviera.” Until recently the river was too polluted for swimming, but now its waters host not only humans but pollution sensitive creatures like salmon.

- Allows swimmers to leave their personal belongings and walk upstream before swimming back to the facility.
- Provides a multi-level swim structure that allows access even when there is a seawall (like those along the Charles in front of MGH or MIT).



Oberer Lettenbad, Zurich

You can experience a different kind of urban history at the Oberer Lettenbad, residing on the banks of an old industrial canal of the Limmat River. An area that was run-down, polluted, and the site of an infamous drug scene has been transformed by its bathing structure into one of the trendier spots in the city.

- Features a former railbed that has been transformed into an area for beach volleyball nets and sun decks, food stands, and barbecues.
- Combines grassy parklands and decks that allow safe access to the water as well as green resting spots and connects parklands to the river.
- Transformed an old industrial canal into a swimming area, proving that swimming innovations can occur almost anywhere as long as the water is made clean enough.



Further Water Quality Improvements Needed

The Swiss offer exciting examples of how we might envision public swimming facilities on the Charles. The first official step in the process of returning public swimming to the Charles River was the establishment of the Charles River Water Quality Commission. The Commission's report is due in March 2010. Meanwhile, there are still important water quality improvements that can be made in the interim.

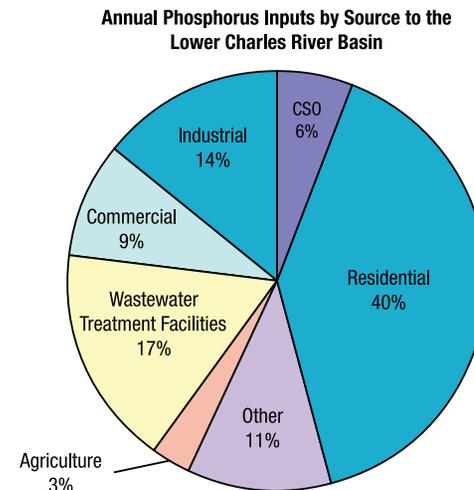
While much of the work to clean up the Charles in the past 14- plus years has focused on dramatically reducing the amount of sewage discharged into the river, there is still a great deal of work to be done on reducing stormwater pollution. During a rainstorm, precipitation falls on the land where it filters into the ground or pools and begins to run over the land surface to the nearest waterway. This is known as **stormwater runoff**. In a rural or less developed area, streams are protected by **riparian buffer zones**, an area of trees and other vegetation that allows for much of the stormwater to seep into the ground rather than runoff into our waterways. In urban areas, however, the many impermeable surfaces such as parking lots, rooftops, and roads, prevent rainwater from filtering into the ground so more of the water runs over the surface and into waterways. Because this creates a great volume of stormwater runoff, urban areas use a network of storm drains and pipes to capture the runoff and channel it to nearby streams and rivers. The stormwater runoff becomes polluted when water running over paved surfaces or chemically-treated lawns and parks, picks up pollutants and carries them along into the waterways. Examples of such pollutants are:

- Automobile exhaust
- Lawn fertilizers and pesticides
- Carwash runoff
- Auto fuel, lubricants, tire rubber, and other related elements like heavy metals
- Excess vegetative debris such as leaves or grass clippings
- Waterfowl and pet waste

The Problem With Too Many Nutrients

Nutrients such as **nitrogen** and **phosphorus** are vital to the growth of plant life and are highly effective as fertilizers. However, an overabundance of nitrogen and phosphorous in our streams leads to an excessive growth of aquatic plants. Rapid plant growth can lead to *algal blooms*, when rapidly growing, at times toxic bacteria, covers the surface of the water. In addition to being aesthetically unpleasant, the bright green shiny surface of algal blooms are harmful to a river's health, as well as to people. Algal blooms cause:

- Degradation to fish habitats, as the algae raises water temperature, clogs the streams, and causes bottom-dwelling plants to die off due to lack of sunlight.
- Oxygen levels in the water temporarily spike due to algal photosynthesis, but the end result of all of this algae dying robs the water of its oxygen. This can lead to huge fish kills and many creatures dying of asphyxiation (suffocation).



Over 40% of the phosphorous entering the Charles come from our own homes! (chart and statistics courtesy of the CRWA).

Excess nitrates and phosphates enter our rivers and streams through both stormwater runoff and discharge from sewage treatment plants. For example, between 9% and 34% of the phosphorus in domestic sewage comes from automatic dishwasher detergent alone! (N.B. Pickering, CRWA 2001)

Easy Ways to Help Improve Water Quality:

- Rather than using fertilizers on your lawn, consider using compost. If you do use fertilizer, choose one that does not contain phosphorous as the soils in the Charles River watershed generally contain plenty of phosphorous. Adding fertilizers with phosphorous will just lead to greater phosphorous runoff into our streams.
- Look for and use dish and laundry detergents with no or very low phosphorous levels (see www.assabriver.org/takeaction/prevent-pollution/detergents for a list of such detergents).
- Refrain from feeding wild animals. Providing food to wild animals can lead to unsustainable populations, and the animal waste contributes to an excess of nitrates in our water.
- Pick up after pets and dispose of their waste in the trash or toilet.
- Consider composting rather than using a garbage disposal. That way, organic materials are turned into healthy soil and reduce the need for synthetic fertilizers.
- Support tree planting efforts, especially along riverbanks. In addition to providing shade and aesthetic value, trees intercept water runoff, act as filters for pollutants and prevent stream bank erosion.

Water Quality Fact

Nitrogen fertilizes not just lawns and gardens but rivers and oceans, too, and this fertility can poison our waters. In the Gulf of Mexico, where the Mississippi River ends its trip through the fertile western farmlands, fish are smothered due to the wild growth of algae. A dead zone, where nothing save algae lives, has been created that is now the size of New Jersey, and growing.

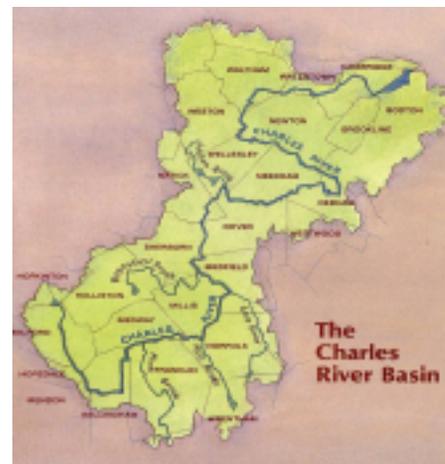
From Michael Pollan's The Omnivore's Dilemma.

Problem: Excessive Water Use

The Charles River is fed by springs and aquifers, underground reservoirs that slowly release water to streams and thereby replenish them. But increased residential and commercial development leads to increased demand for groundwater, leaving less to replenish the streams. Water that is withdrawn from the Charles for residential and commercial use is not returned to the Charles, instead it is transported through the sewage system to Boston Harbor. The health of an urban river and the sustainability of its ecosystem depends also on water conservation and management. We must conserve and reuse water—especially during the peak demand summer season when streamflows are already low. Low volumes of water in our streams and rivers also means that pollutants become more concentrated.

Easy Ways to Help Conserve Water:

- Reduce the amount of water you use in irrigating your lawn, washing your car, filling your pool, etc.
- Implement a rainwater recovery and reuse system for your roof by using rain barrels or disconnecting your down spouts.
- “Green roofs” can insulate, cool, and evaporate stormwater. Check out the CRWA's *Blue Cities Initiative* to learn more about these. www.crwa.org/blue.html



The Charles River Conservancy strives to make the Charles River Parklands more active, attractive, and accessible for all, dedicating its efforts to the stewardship and renewal of the Commonwealth's parklands from Boston Harbor to the Watertown Dam.

Charles River Conservancy programs include advocating for the Parklands, overseeing some 2500 volunteers annually, offering environmental education and service learning, building a skate park, restoring pathways, illuminating bridges, and producing the free community events RiverSing and Sunday Parkland Games. www.thecharles.org

The following government organizations, non-profits, and advocacy groups are also working hard to improve the Charles River and helping to return public swimming. Visit their websites for more info!

Charles River Watershed Association

Founded in 1965 to tackle growing public concern about the declining condition of the Charles, the CRWA uses science, advocacy, and law to protect, preserve, and enhance the Charles River and its watershed. www.crwa.org

The Conservation Law Foundation

The Conservation Law Foundation works to protect the public trust interests along the river's banks. www.clf.org

The Charles River Swimming Club

Formed in 2005 with the goals of organizing competitive swims in the Charles River and facilitating the return of public river swimming. Their main event is the annual One Mile Charles River Swim Race.

www.charlesriverswimmingclub.org

The US Environmental Protection Agency New England

The EPA formed the Clean Charles Initiative in 1995 and is the leading government agency in efforts to clean the river.

www.epa.gov/region01/charles/initiative.html

The Massachusetts Department of Environmental Protection

The DEP monitors the water quality of the Charles and prepares biennial reports on the status of the river's water quality.

www.mass.gov/dep/water/index.htm

The Urban Ecology Institute

The UEI aims to promote the health of urban ecosystems through research, education, advocacy, and community action, including teaching local students about water quality in the Charles. www.urbaneco.org

The Esplanade Association

TEA works to protect, restore, and beautify the historic Esplanade.

www.esplanadeassociation.org

The Massachusetts Department of Conservation and Recreation

The DCR manages our state parks, including the Charles River parklands, for both recreational and environmental purposes.

www.mass.gov/dcr/parks/charlesriver

Massachusetts Water Resources Authority

The MWRA provides drinking water and sewer services to 2.5 million people in 61 communities in central and eastern Massachusetts. The MWRA has been central to efforts to clean up the Charles by significantly reducing sewer discharge to the Charles River. www.mwra.com

The Charles River Cleanup Boat

The Charles River Cleanup Boat removes floating trash from the Charles. Volunteers can ride on the boat and help clean up the river.

www.rbcant.us/cleanupboat

Acknowledgements

The Charles River Conservancy would like to thank the following individuals for sharing their expertise in reviewing the content for this publication: Rebecca Scibek and Kate Bowditch of the CRWA; Anina Koeppli-Hitz of swissnex Boston, Consulate of Switzerland; Bill Walsh-Rogalski and Tom Faber of US EPA New England; Richard Scott of DCR; Roger Frymire; and Mary Tambiah. Special thanks to Ben Martens, John Broderick, and Karen Patterson Greene of the Charles River Conservancy for the research and writing of this publication and to Catherine Donaher and John DeVillars of the Swimmable Charles Working Group for their enthusiastic and strong support for the return of public swimming to the Charles River. The CRC is grateful to the Boston Foundation for funding provided to hire the Swimmable Charles Coordinator and to the Massachusetts Environmental Trust for funding this booklet.



Ten Things You Can Do to Help Create a Clean, Healthy, and Swimmable Charles

- 1 Volunteer with one of the many groups working on the river, including the Charles River Conservancy Volunteers, the Charles River Cleanup Boat, the CRWA monthly water quality monitoring program, and the Esplanade Association.
- 2 Walk, bike or use public transportation to reduce pollution from automobiles, especially phosphorous from automobile exhaust.
- 3 Use compost or other organic lawn care products with little or no phosphorous to reduce phosphorous runoff to streams.
- 4 Conserve water: it's a prized resource in a watershed as densely populated as ours. Try planting drought tolerant native plant species which require less water.
- 5 Pick up after pets and dispose of waste properly. Pet waste is a major source of bacterial contamination.
- 6 Sign the petition in support of a swimmable Charles at www.thecharles.org and become a fan of CRC on Facebook.
- 7 Participate in or attend the annual Charles River One Mile Swim Race.
- 8 Buy a whale license plate. The proceeds will support the Massachusetts Environmental Trust which makes grants to organizations that protect and enhance the state's water resources.
- 9 Use low phosphorous dish and laundry detergents to reduce the amount of phosphorous entering sewage treatment plants and then the River.
- 10 Make a donation to the Conservancy to support the Swimmable Charles Initiative at www.thecharles.org/membership/index.php



This publication was made possible with a grant from the Massachusetts Environmental Trust.