



# NONPOINT SOURCE SUCCESS STORY

## Rhode Island

### Installing Infiltrating Catch Basins Helps Reduce Bacteria in Greenwich Cove

#### Waterbody Improved

Greenwich Cove is an important recreational and boating area in Greenwich Bay, an estuary that connects with the upper West Passage of Narragansett Bay in Rhode Island. Greenwich Cove was added to the 2002 Clean Water Act (CWA) section 303(d) list as impaired for swimming and boating recreation due to pathogens (using fecal coliform as the indicator organism). Installing best management practices (BMPs) and fixing failed septic systems reduced bacteria in the cove. Data (2012–2016) show that the cove now meets water quality standards (WQS) under both dry and wet weather conditions. As a result, Rhode Island Department of Environmental Management (RIDEM) has submitted Greenwich Cove for removal from the 2016 list of impaired waters.

#### Problem

Greenwich Cove is bordered on the west by the town of East Greenwich and on the east by Potowomut Point in the city of Warwick (Figure 1). The Maskerchug River, the second largest freshwater tributary to Greenwich Bay, discharges to the head of Greenwich Cove at its southern end. With a surface area of 1.1 square kilometers (km<sup>2</sup>) and a total watershed area of 17.7 km<sup>2</sup>, Greenwich Cove offers mooring and docking space for boats along the East Greenwich shoreline and supports a variety of land uses throughout its watershed, including a forested state park, a golf course, state highways, commercial properties, and low- to high-density residential development.

Greenwich Cove was added to the 2002 CWA section 303(d) list as impaired for swimming and boating recreation due to pathogens (using fecal coliform as the indicator organism). In February 2006 the U.S. Environmental Protection Agency (EPA) approved a total maximum daily load (TMDL) (dated December 2005) for Greenwich Cove as a part of the Greenwich Bay Pathogen/Bacteria TMDL. This TMDL identified the sources of impairment as direct stormwater discharges, substandard and failing septic systems, waterfowl, and wildlife and domestic pet waste. Enterococci were adopted as the recreational/swimming WQS per the Beach Act (2000). The WQS requires that the enterococci bacteria annual geometric mean must be less than 35 colonies/100 milliliters (col/100 mL) of water (samples collected between May and October).



Figure 1. Greenwich Cove is in eastern Rhode Island.

#### Project Highlights

Improvements in water quality conditions in Greenwich Cove can be attributed to several actions in the watershed that have occurred since the TMDL was written, including the installation of BMPs to improve water quality from stormwater runoff and improvements to wastewater infrastructure. One of

the largest BMPs installed was the result of the town of East Greenwich's work under multiple grant projects funded through several CWA section 319 grants. The section 319 grants enabled East Greenwich to perform a feasibility study to determine the best locations for installing 10 infiltrating catch basins. Initially the town had anticipated the need for only 10 of these catch basins, but its studies found an additional 13 appropriate sites for catch basin construction. In 2012 the town installed a total of 23 infiltrating catch basins in the Greenwich Cove watershed. By capturing the first flush of stormwater and allowing it to infiltrate into the surrounding soils, East Greenwich was able to significantly reduce its nonpoint source pollutant loadings to Greenwich Cove.

East Greenwich also cleans the catch basins annually together with frequent street sweeping throughout the watershed, and has replaced a sewer main along Water Street, which runs adjacent and parallel to Greenwich Cove. While there was no evidence that the sewer main was exfiltrating sewage, it was known to be affected by infiltration. RIDEM's Shellfish Program identified two storm drains with elevated bacterial and coliphage levels discharging into Greenwich Cove during a periodic shoreline survey in 2005. Working with East Greenwich and Warwick, RIDEM's Office of Compliance and Inspection conducted illicit discharge detection studies of the two storm drain networks. The studies found several illicit connections from failing septic systems, including one at a senior living facility as well as a mill property. Both of these sources were connected to sewers as a result of the studies. Investigations also resulted in identification of a marina with a cesspool which subsequently was connected to a sewer line and the correction of an illicit gray water discharge that had been entering the storm drain network.

In addition, in the neighboring city of Warwick, a CWA section 319 grant was used to connect the drastically failing septic system of a fire station (Fire Station #5) to the Warwick sewers. The system had failed to the point that septage was backing up into the fire station, putting fire personnel health at risk, as well as contributing raw septage to the Maskerchugg River during rain events. The closure of this septic system and the connection of Fire Station #5 to the sewer line eliminated a source of pathogens to the Maskerchugg River, which flows into Greenwich Cove.

**Table 1. Annual enterococci geometric mean data show that Greenwich Cove (at the East Greenwich town dock) meets the applicable WQS<sup>1</sup>.**

	2012	2013	2014	2015	2016
<b>Number of Samples</b>	6	6	6	6	6
<b>Enterococci (col/100 mL)</b>	27.9	13.6	22.2	14.2	9.9

<sup>1</sup>WQS for enterococci = annual geometric mean of no more than 35 colonies/100 milliliters of water, collected monthly from May to October.

## Results

In the 2005 TMDL, RIDEM used fecal coliform data from 2001 and 2002 to characterize the water quality condition in Greenwich Cove. At that time, data collected under wet weather conditions did not meet the Rhode Island recreational WQS for fecal coliform bacteria. In recent years, the area has been sampled by volunteers from Watershed Watch for enterococci, the current Rhode Island recreational indicator bacteria. These recent data (2012–2016) show that Greenwich Cove is meeting the applicable Rhode Island WQS for enterococci under both dry and wet weather conditions (Table 1). In addition, Greenwich Cove is sampled by the RIDEM Office of Water Resources Shellfish Program for fecal coliform under dry weather conditions and has met the fecal standard during the same time period. As a result of these improvements, RIDEM proposes to remove the Greenwich Cove bacteria impairment from the state's 2016 list of impaired waters for swimming and boating recreation, subject to EPA approval.

## Partners and Funding

Partners included the University of Rhode Island Watershed Watch (monitored water quality); the town of East Greenwich, Rhode Island (provided matching funds for nonpoint source projects); the RIDEM Shellfish Program (conducted effort to detect illicit discharges into storm drains); and the city of Warwick, Rhode Island (provided matching funds for the connection of Fire Station #5 to the municipal sewer system).



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