



NONPOINT SOURCE SUCCESS STORY

Rhode Island

Reducing Bacteria Led to the Reopening of a Conditionally Approved Shellfishing Area in Greenwich Bay

Waterbody Improved

At sunrise on September 2, 2022, the Rhode Island Department of Environmental Management (RIDEM) opened 180 acres of conditionally approved shellfishing area in the Nausauket area of Greenwich Bay, just southeast of the mouth of Apponaug Cove in the city of Warwick, Rhode Island. This section had been closed to shellfishing for 20 years due to elevated fecal coliform levels, and its opening increased Greenwich Bay's conditionally approved shellfish area by 10%. The shellfish classification upgrade was possible due to water quality improvement efforts, including the passage of Rhode Island's Cesspool Phaseout Act in 2007, state and local actions to strengthen stormwater controls (particularly in the Hardig Brook subwatershed), and a substantial increase in sewerage in the area around Apponaug Cove.

Problem

Greenwich Bay is on the western side of Narragansett Bay. The Apponaug Cove subwatershed of Greenwich Bay is within Warwick in east-central Rhode Island (Figure 1). High- to medium-density residential land use covers almost one-third of the 17.5-square-kilometer watershed. Another 18% of the land is in commercial and industrial use, mainly along high-traffic roads. For years, most homes around Apponaug Cove used cesspools and septic systems for onsite wastewater disposal, with large neighborhood areas remaining unsewered.

In addition, untreated stormwater regularly caused closures of shellfish beds and the three bathing beaches in Greenwich Bay, which lasted up to a week after as little as 0.5 inches of rain. The primary driver in determining the classification of shellfishing waters is the level of fecal coliform, as determined by compliance with the U.S. Food and Drug Administration (FDA) National Shellfish Sanitation Program (NSSP). Shellfish harvesting waters must exhibit geometric means of less than 14 colony-forming units (CFU) per 100 milliliters (mL), with no more than 10% of the most recent 15 samples exceeding 31 CFU/100 mL. In 1992, a large rain and snow event caused weeks of violations of this standard in all of Greenwich Bay, leading to its permanent shellfishing closure shortly afterward. Although a 1993 RIDEM/FDA classification study allowed conditional openings of certain areas depending on rainfall conditions, this area just southeast of the mouth of Apponaug Cove remained closed until September 2022.



Figure 1. Hardig Brook basin (outline) and Apponaug Cove-area homes sewered 1980–present (shaded).

Story Highlights

Commercial shellfishing is an important economic driver in Rhode Island. NOAA data place Rhode Island's commercial shellfish catch (scallops, quahogs/clams, and Jonah crabs) at \$20 million annually, comprising roughly 20% of the state's commercial shellfish catch (not including lobster). During the winter, when rough seas may prevent shellfishing in the remainder of Narragansett Bay, the relatively sheltered Greenwich Bay has served as a highly valuable harvesting alternative and has been a priority for restoration and protection.

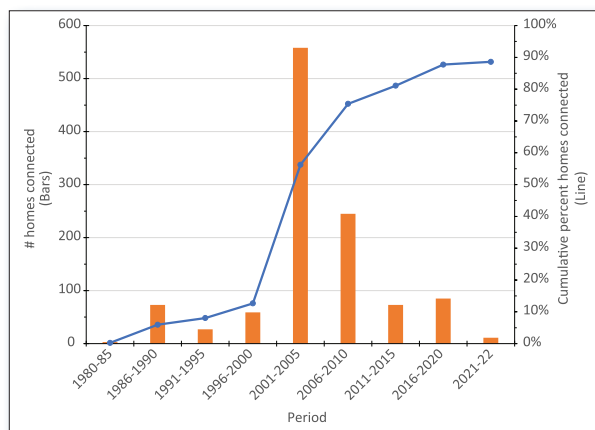


Figure 2. Number of homes sewered in the Apponaug Cove area (1980–2023).

Over the last 20 years, three major actions helped reduce the fecal coliform bacteria that led to this increase in open conditional shellfishing area. The passage of the Cesspool Phaseout Act of 2007 was key—it mandated all cesspools within 200 feet of the shoreline be removed immediately. Homes formerly served by cesspools are now connected to municipal sewer service (see Figure 1).

Secondly, the Apponaug Cove watershed, especially the area in the Hardig Brook subwatershed has benefited from recent stormwater controls, including best management practices installed over the years throughout the watershed with nonpoint source (NPS) funding. In addition, Warwick redesigned a major traffic intersection (the Apponaug Circulator) to incorporate significant NPS controls, including daylighting a 650-foot section of Hardig Brook, with measures designed to slow the flow of stormwater, improve water quality, restore vegetated wetlands, and restore and enhance an important native herring run.

Lastly, Warwick implemented a municipal sewer service tie-in program for the Apponaug Cove area. The percentage of homes connected to sewer service progressively increased from near 0% in 1980–1985 to 89% in 2022 (Figure 2). There was a significant statistical linkage (p value=0.0005) between the percent of homes connected to municipal sewer service and declining fecal coliform levels at the Shellfish Program sampling station just outside of Apponaug Cove from 2001 to the present. Although this significant statistical association indicates that sewer connection is the primary management action responsible for the



Figure 3. The new closure line at Cedar Tree Point adds 180 acres of conditionally approved shellfishing .

reduced fecal coliform levels, it is the cumulative effect of point and NPS management options together that reduced fecal coliform levels and led to this increase in conditionally approved shellfishing area.

Results

Recent NSSP fecal coliform compliance statistics showed that the monitoring station inside the shellfishing area just southeast of Apponaug Cove (known as station 8-7) can be reclassified as Conditionally Approved with a 0.5", 7-day rain closure (consistent with the overall conditional management of Greenwich Bay). This determination is based on 10 years of data showing that average fecal coliform levels at station 8-7 have not differed significantly from those found at conditionally approved station 8-6 (a shellfish monitoring station just east of 8-7); neither has the frequency of fecal coliform observations more than the NSSP variability standard of 31 CFU/100 mL been significantly different compared with 8-6. Therefore, the RIDEM Shellfishing Program has moved the new conditional closure line to Cedar Tree Point, adding another 180 acres of shellfishing grounds to the Conditionally Approved area in Greenwich Bay (Figure 3).

Partners and Funding

Project partners included RIDEM, the City of Warwick, and the Warwick Sewer Authority. The Rhode Island NPS Program provided Clean Water Act section 319-funded program support for drafting the Cesspool Phaseout legislation and a staff person who has managed the Cesspool Phaseout program since 2003.



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