Section 319
NONPOINT SOURCE PROGRAM SUCCESS STORY
Delaware

Removing Agricultural and Residential Bacteria Sources Improves Water Quality

Waterbody Improved

Excessive nutrient loading from agriculture operations and failing septic systems led to elevated bacteria levels in the Gravelly Branch subwatershed. As a result, the Delaware Department of Natural Resources and Environmental Control (DNREC) added a 6.5-mile-long segment of Gravelly Branch to its 1996 Clean Water Act (CWA) section 303(d) list for bacteria. Project partners developed nutrient management plans for local farmers, implemented agricultural best management practices (BMPs), and connected failing septic systems to a central sewer system. These activities significantly reduced bacteria levels in Gravelly Branch; as a result, Delaware removed this segment from its 2008 CWA section 303(d) list for bacteria impairment.

Problem

Southern Delaware's Gravelly Branch subwatershed drains into the Nanticoke River, which in turn flows into the Chesapeake Bay (Figure 1). Gravelly Branch begins in the town of Ellendale and flows southwest toward the city of Seaford. The major land use in the 24,423-acre Gravelly Branch subwatershed is agriculture.

The town of Ellendale is situated on land with poor soils and high seasonal groundwater levels. An Ellendale-area survey conducted in 1989 showed that 67 percent of homeowners with septic systems had problems with their systems overflowing or needing to be pumped out more than once a year. Further, many Sussex County residents reported concerns regarding potential health and public safety impacts from septic system effluent and drinking water contamination. Today, most of the area cannot be permitted for septic and other disposal systems because of wastewater disposal regulations.

Delaware maintains a statewide General Assessment Monitoring Network of 181 stations, which provide data used to conduct long-term status and trend assessments of water quality conditions in the state's surface waters. Before 2006, Delaware collected data four to six times a year. Since 2006, data have been collected six to 12 times a year for physical and chemical parameters, including bacteria. Gravelly Branch water samples from the mid-1990s routinely exceeded Delaware's water quality standard for enterococci bacteria, which requires that bacteria levels not exceed a maximum geometric mean of 104 colony-forming units (CFU) per 100 milliliters (mL) over a five-year period. Consequently, a 6.5-mile-long segment of Gravelly Branch was placed on the state's 1996 CWA section 303(d) list of impaired waters for bacteria. DNREC identified nonpoint sources, including direct discharge from failing septic systems and agricultural sources, as the probable

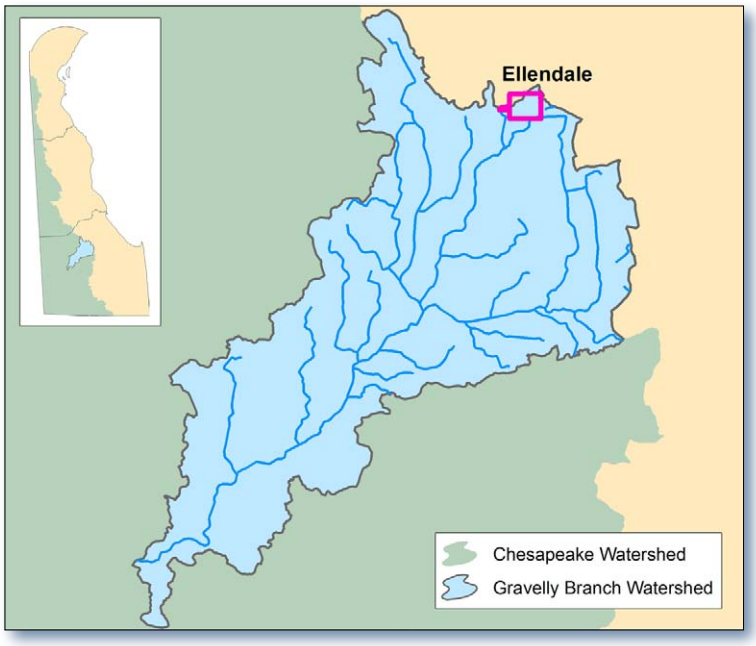

Figure 1. The Gravelly Branch subwatershed lies within the Chesapeake Bay Basin.

sources of bacteria. Segments of Gravelly Branch were also listed as impaired for dissolved oxygen and nutrients (1996) and biology/habitat impairment (1998).

Delaware completed a total maximum daily load (TMDL) analysis for nutrients and dissolved oxygen in the tributaries and ponds of the Nanticoke River and Broad Creek watersheds in 2000. In 2006 Delaware developed a TMDL for bacteria for the entire Chesapeake Bay drainage basin, including the Gravelly Branch subwatershed. The TMDL required that the nonpoint source bacteria load in the entire Nanticoke River, Gum Branch, Gravelly Branch, Deep Creek and Broad Creek watersheds be reduced by nine percent from the 2000 to 2005 baseline level, and that all point source bacteria loading in the entire Chesapeake Bay drainage basin be capped at the current geometric mean, 100 CFU/100 mL.

Project Highlights

The Sussex County Conservation District (SCD) provided technical assistance to the local farming community to help them develop nutrient management plans; it also provided cost-share funding for implementing agricultural BMPs. The SCD also partnered with the U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS), to develop conservation plans and Environmental Quality Incentive Program (EQIP) contracts. The DNREC Nonpoint Source Program provided CWA section 319 funding to support five SCD planners. With the assistance of the planners, farmers in the Gravelly Branch subwatershed installed 17 manure storage sheds, 15 dead bird composters, one dairy waste handling system, and 35 heavy-use-area protection pads (concrete or other artificial surface pads that help manage animal waste, sediment and nutrient runoff).

USDA's Delaware Conservation Reserve Enhancement Program (CREP), a voluntary land retirement program that helps agricultural producers protect environmentally sensitive land, was established in Delaware in 1999 to improve water quality. The DNREC Nonpoint Source Program directed CWA section 319 funds to support a full-time Delaware CREP Program Coordinator to assist in developing and implementing the CREP program in the Gravelly Branch subwatershed and other areas throughout the state. In the Gravelly Branch subwatershed, the CREP Program Coordinator worked with landowners to enroll 204 acres of hardwood trees in the land retirement program and supported 17 acres of wildlife planting and 5 acres of wetland restoration through the CREP program.

To address the failing septic systems throughout Sussex County, the Ellendale–New Market Sanitary District began operating in 2005 and connected 483 equivalent dwelling units (EDUs) to a centralized sewer system. Today, the town has 585 EDUs connected to the system, and it has the remaining capacity to permit another 250 new homes in the district.

Results

After agricultural BMP implementation and removal of failing septic systems, monitoring data collected from Gravelly Branch between August 2004 and September 2009 showed that 34 samples had a geometric mean of 76.8 col/100 mL. This value was well below Delaware's freshwater bacteria water quality standard, which requires a geometric mean below 104 col/100 mL for a period of five years. As a result, DNREC removed Gravelly Branch from the state's list of impaired waters in 2008. Monitoring will continue in Gravelly Branch to ensure that it continues to meet standards.

Partners and Funding

The success in the Gravelly Branch subwatershed was the result of a partnership involving the SCD, USDA, NRCS, and Delaware Nonpoint Source Program. Approximately $705,000 in federal CWA section 319 funds supported Gravelly Branch subwatershed projects. Additional funding was provided through the USDA EQIP and CREP programs, as well as the State of Delaware Conservation Cost Share program. Approximately $1.7 million from Delaware's State Revolving Fund and $3.8 million from the state's 21st Century Fund supported the development of the Ellendale–New Market sanitary system.

U.S. Environmental Protection Agency
Office of Water
Washington, DC

EPA 841-F-12-001E
March 2012

For additional information contact:

Robert Palmer
Delaware Department of Natural Resources
and Environmental Control
Nonpoint Source Program
robert.palmer@state.de.us • 302-739-9922