



## Section 319

# NONPOINT SOURCE PROGRAM SUCCESS STORY

# Delaware

## Removing Agricultural and Residential Bacteria Sources Improves Upper Marshyhope Creek

### Waterbody Improved

Nonpoint source pollution, including direct discharges from failing septic systems and nutrient pollution in agricultural runoff contributed to elevated bacteria counts in upper Marshyhope Creek. As a result, the Delaware Department of Natural Resources and Environmental Control (DNREC) added a 19.7-mile segment of Marshyhope Creek to the state's 1996 Clean Water Act (CWA) section 303(d) list of impaired waters for bacteria. Stakeholders implemented agricultural best management practices (BMPs) and worked with the local agricultural community to develop nutrient management plans, which led to water quality improvements. Upper Marshyhope Creek now meets state standards for bacteria, prompting DNREC to remove the creek from the state's list of impaired waters in 2008.

### Problem

The Delaware portion of the Marshyhope Creek watershed (upper Marshyhope Creek) lies within Kent and Sussex counties on the western edge of Delaware (Figure 1). The creek flows southwest into Maryland before eventually discharging into the Nanticoke River, which in turn empties into the Chesapeake Bay (Figure 2). The drainage area of the Marshyhope Creek watershed within Delaware is approximately 250 square kilometers. Nonpoint source pollution from agricultural areas and from failing and unmaintained septic systems led to elevated bacteria counts in upper Marshyhope Creek.

DNREC maintains a General Assessment Monitoring Network (GAMN) of 181 stations throughout Delaware. GAMN stations are considered long-term stations whose data are used to make long-term status and trend assessments of water quality conditions. The monitoring frequency before 2006 was four to six times per year; after 2006, the monitoring frequency increased to 12 times per year for a suite of physical and chemical parameters. The data from upper Marshyhope Creek, which include data from two distinct GAMN sample collection stations, showed that water samples were routinely exceeding Delaware's water quality standard for bacteria, which requires that the bacteria geometric mean remain below 100 colonies (col) per

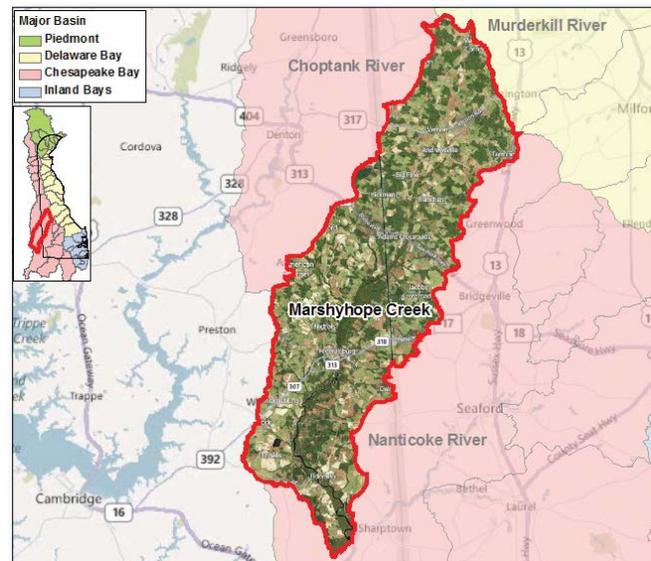


Figure 1. The Marshyhope Creek watershed is in southwestern Delaware and eastern Maryland.

100 milliliters (mL) for a period of 5 years. These data showed that the waterbody was failing to support its primary contact recreation designated use. Consequently, DNREC placed a 19.7-mile segment of Marshyhope Creek (DE-200-001; headwaters to state line) on the state's 1996 CWA section 303(d) list of impaired waters for bacteria. A total maximum daily load (TMDL) was developed for bacteria and approved in 2006.

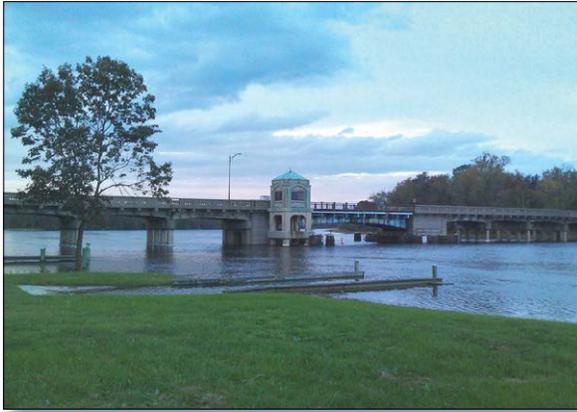


Figure 2. Marshyhope Creek flows through Eldorado, Maryland, before emptying into the Nanticoke River.

## Project Highlights

The Sussex County Conservation District (SCD) provided technical assistance to the local farming community to help them develop nutrient management plans and provided cost-share funding to help implement agricultural BMPs. The SCD partnered with the U.S. Department of Agriculture's (USDA's) 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 SCD planners, 13 poultry farm operators in the Marshyhope Creek watershed installed 11 manure storage sheds, six dead bird composters, one dead bird incinerator, and 42 heavy-use-area protection pads (pads made from concrete or other artificial materials that help to manage animal waste, sediment, and nutrient runoff). In addition, one dairy farm operator installed a liquid animal waste system and a heavy-use-area protection pad. A horse farm operator and a goat farm operator installed additional manure sheds on their properties as well. The SCD planners worked with area farmers to install annual winter cover crops to protect barren fields from winter runoff and erosion. Farmers plant an estimated 1,100 acres of cover crops annually in the Marshyhope Creek watershed.

Delaware's Department of Agriculture (DDA) offers animal operation owners a nutrient relocation cost-share program that provides financial reimbursement to farmers, brokers, and trucking businesses for the cost of transporting litter from a Delaware farm to an alternative-use project or another farm for

land application. Funding for this program is partially provided by Nonpoint Source Program grants paid for by CWA section 319 funds, Chesapeake Bay Program grants, and funds from poultry integrators active in Delaware. On average, 750 tons of poultry manure is transported out of the Marshyhope Creek watershed annually. 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 coordinator to assist with developing and implementing CREP in the upper Marshyhope Creek watershed and other areas throughout the state. The CREP coordinator worked with landowners to enroll 172 acres of hardwood trees in the land retirement program, plant 51 acres of vegetation for wildlife support, install 117 acres of grassed filter strips, and restore 6.5 acres of wetlands in the upper Marshyhope Creek watershed.

## Results

DNREC collected monitoring data on upper Marshyhope Creek between April 2003 and April 2008. The geometric mean of the 167 samples collected over the 5-year period was 89 col/100 mL—well below Delaware's freshwater bacteria water quality standard, 100 col/100 mL. As a result, DNREC removed the 19.7-mile segment of Marshyhope Creek (DE-200-001) from the state's list of impaired waters in 2008. The creek now fully supports its primary contact recreation designated use; continued monitoring will ensure that it continues to meet water quality standards.

## Partners and Funding

The success in Delaware's Marshyhope Creek watershed was the result of a partnership involving the SCD, NRCS, the USDA's Farm Service Agency, DDA, and the DNREC Nonpoint Source Program. Project funding was provided through DNREC, USDA's EQIP and CREP, and Delaware's Conservation Cost Share Program. Where not specifically tracked for the watershed, estimates for BMP implementation are based on average per-unit costs. Projects were supported by \$906,446 in EQIP and state cost-share funds, \$112,185 in CREP funding, \$49,500 in cost-share funds from DNREC's Annual Cover Crop Program, and \$3,240 in cost-share funds from DDA's Annual Nutrient Relocation Program.



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

EPA 841-F-14-001M  
April 2014

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