



## Section 319

# NONPOINT SOURCE PROGRAM SUCCESS STORY

# Maryland

## Implementing Best Management Practices Reduces Nitrogen in Two Corsica River Tributaries

### Waterbodies Improved

Algae blooms in the upper tidal reaches of Maryland's Corsica River prompted the Maryland Department of the Environment (MDE) to add the river to the state's Clean Water Act (CWA) section 303(d) list of impaired waters in 1996 for impairment of aquatic life and recreational use. MDE developed a total maximum daily load (TMDL) for nitrogen and phosphorus. After six years of restoration efforts, water quality monitoring in two nontidal Corsica River tributaries shows a significant decrease in nitrogen concentrations. These improvements indicate that project partners are making progress toward meeting the Corsica River nutrient TMDL.

### Problem

The six-mile-long Corsica River is a tidal tributary on Maryland's Eastern Shore. It flows through Queen Anne's County and the town of Centreville before entering the Chester River, which discharges into the Chesapeake Bay (Figure 1). Major land uses in the 40-square-mile watershed are agriculture (64 percent), woodland (28 percent) and developed areas. The nontidal portions of the Corsica River are designated for aquatic life protection and contact recreation; most of the estuarine portions are designated as shellfish harvesting areas.

Algal blooms and other water quality problems in the tidal portions of the Corsica River prompted MDE to add this watershed assessment unit to the CWA section 303(d) list in 1996 for impairment by nutrients, suspended sediment and fecal coliform bacteria. Water quality surveys conducted in 1997 found that the local eutrophication problems (the overenrichment of aquatic systems caused by excessive nutrient input) tended to be the greatest slightly downstream of the tidal/nontidal interface. Data showed chlorophyll *a* concentrations (a measure of algal content) as high as 146 micrograms per liter ( $\mu\text{g/L}$ ).

MDE developed a TMDL for nitrogen and phosphorus, which EPA approved in 2000. According to the TMDL, the major source of nutrient loading was agricultural runoff (85 percent); other sources were forest and urban nonpoint sources and the town of Centreville's wastewater treatment plant (WWTP). The TMDL established the following water quality goals for the Corsica River: (1) chlorophyll *a* concentrations should remain below 50  $\mu\text{g/L}$ , and (2) dissolved oxygen (DO) levels should remain above the state's minimum water quality standard, 5 milligrams per liter (mg/L).

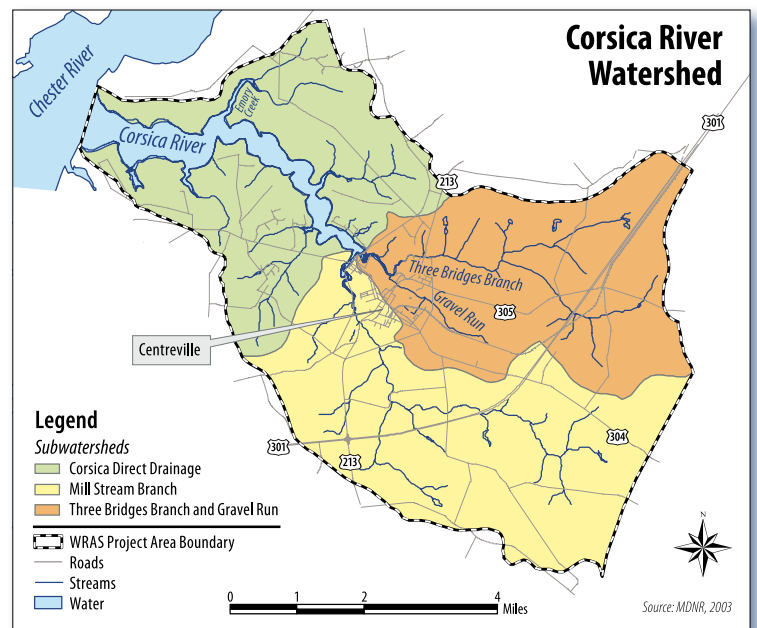


Figure 1. The Corsica River's three subwatersheds are part of the Corsica River Watershed Restoration Action Strategy (WRAS).

### Project Highlights

In 1998 the Maryland General Assembly passed the Water Quality Improvement Act, which required that all agricultural operations with gross annual income over \$2,500 and any livestock operations with more than eight animal units develop and implement nutrient management plans. All plans were developed by 2004, helping to reduce nutrient pollutant loading.

In 2004 the town of Centreville, along with several key local partners and with support and cooperation from MDE and the Maryland Department of Natural

Resources (MDNR), finalized the *Corsica River Watershed Restoration Action Strategy* (WRAS). The plan outlined implementation strategies needed to protect and restore the watershed. In 2005 EPA accepted the Corsica River WRAS, which was highlighted as one of the nation's best watershed plans at the CWA section 319 nonpoint source annual meeting. That same year, Maryland's governor selected the Corsica River for the state's targeted restoration watershed program.

Watershed partners have worked to implement agricultural best management practices (BMPs) since 2004. Over the last several years, farmers have annually planted increasing acres of cover crops. Since 2010, annual cover crop coverage has exceeded the WRAS goal of 3,000 acres per year. Other agricultural BMPs implemented include approximately 5 acres of natural buffer, 30 acres of grassed buffers, 30 acres of riparian herbaceous cover, 3 acres of grassed waterways and 2 miles of stream fencing.

In 2005 the Maryland Department of Agriculture (MDA) received CWA section 319 funds to promote and partially reimburse cover crop planting on farm fields in the watershed. Since then, CWA section 319 funds have also supported efforts by an MDA agricultural technician to help local farmers select and target agricultural BMPs.



Figure 2. From 2009–2010 the town of Centerville and MDNR converted an existing stormwater management pond into a multi-cell pond-wetland complex to more effectively capture and treat runoff.

In 2006 the town of Centerville and Queen Anne's County began a series of CWA section 319-funded projects, including urban stormwater infiltration projects and support for education and outreach efforts. Local partners installed stormwater wetland ponds and bio-retention practices, which capture and hold excess stormwater runoff during heavy precipitation events. The town installed stormwater retrofits on 112 acres (Figure 2).

Local residents volunteering through the Corsica River Conservancy have installed more than 300 rain gardens.

Maryland legislation established the Bay Restoration Fund in 2004. It supports upgrading WWTPs with enhanced nutrient removal technology, improving on-site septic systems and implementing cover crops to reduce nutrient loading to the Chesapeake

Bay. As of May 2012, 13 on-site septic systems in the Corsica River watershed were enhanced with nitrogen-reducing treatment capability. In 2010 the town of Centerville completed upgrades of its WWTP to include biological nutrient reduction technology. In addition, Centerville now applies its WWTP discharge to farmland through spray irrigation for nine months each year, which has greatly reduced the amount of discharge directly entering the upper tidal reaches of the Corsica River.

## Results

Monitoring data from 2005–2011 show decreasing trends of instream nitrogen and phosphorus concentrations in the nontidal tributaries of the Three Bridges Branch and Gravel Run subwatershed. Groundwater monitoring conducted on crop fields in the watershed during 2005–2007 spring sampling periods indicates that cover crop planting may be reducing nutrient loadings.

The upgrades to Centerville's WWTP have also reduced nutrient loading. Comparing discharge monitoring records from 1997 (before upgrades) to the period 2007–2012 (after upgrades) shows that total nitrogen loads from the plant have declined by 87 percent (from 11,175 pounds per year to 1,424 lb/yr) and that total phosphorus loads have declined by 96 percent (from 2,395 lb/yr to 92 lb/yr).

## Partners and Funding

Key partners have included local government entities (the town of Centerville, Queen Anne's County and the Queen Anne's Soil Conservation District), local watershed groups (Corsica Conservancy and the Chester River Association), state agencies (MDE, MDA and MDNR), and federal agencies (EPA and the U.S. Department of Agriculture's Natural Resources Conservation Service [NRCS]). To date, partners have invested almost \$3.5 million in nonpoint source implementation projects. Maryland's agricultural cost-share program and NRCS have provided funding to implement BMPs in the watershed. From 2004 through 2012, \$450,000 in federal CWA section 319 funds supported agricultural technical assistance to local farmers for selecting and targeting BMPs. Another \$920,000 funded urban BMP implementation and provided local nonpoint source program support. As of May 2012, Maryland's Bay Restoration Fund had provided more than \$150,000 for 13 septic system upgrades in the Corsica River watershed. The WWTP upgrade and capital cost of seasonal land treatment (farmland application of discharge) totaled about \$4.5 million.



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