



# NONPOINT SOURCE SUCCESS STORY

# Michigan

## Replacing Failing Septic Systems with Community-Based Wastewater Treatment Reduces Bacteria in a Pilgrim River Tributary

### Waterbody Improved

Failing septic systems and illicit connections to surface water contributed high levels of bacteria to an unnamed tributary of Michigan's Pilgrim River, causing the stream to violate water quality standards. As a result, the Michigan Department of Environmental Quality (DEQ) added the stream to the state's 2006 Clean Water Act (CWA) section 303(d) list for bacteria impairment. Failing septic systems and illicit connections were removed and replaced with community-based wastewater treatment systems. Bacteria levels dropped, and the tributary now meets water quality standards. As a result, Michigan DEQ removed the stream from its CWA section 303(d) list in 2014.

### Problem

The 15,600-acre Pilgrim River watershed is on northern Michigan's Keweenaw Peninsula (Figure 1). The river empties into the Keweenaw Waterway, which connects to Lake Superior. Several small copper-mining communities were created in the watershed in the late 1800s. Sewage disposal for these communities consisted of open channels, some of which persisted into the late 1900s.

Water quality monitoring showed that a 4.47-mile reach of an unnamed tributary to the Pilgrim River, known locally as "the Baltic Sewer," contained high levels of *Escherichia coli* bacteria. The Michigan water quality standard for partial body contact is a daily geometric mean of 1,000 *E. coli* colonies per 100 milliliters of water (colonies/100 mL), and the standard for total body contact is a daily geometric mean of 300 *E. coli* colonies/100 mL and a 30-day geometric mean of 130 colonies/100 mL.

Samples collected at the Laitila Road monitoring station in 2006 showed a daily geometric mean of 2,160 *E. coli* colonies/100 mL, which violated water quality standards for partial and total body contact recreation. As a result, Michigan DEQ added the tributary (assessment unit 040201030302-02) to the 2006 CWA section 303(d) list for bacteria impairment. DEQ suspected the source to be illicit connections to the surface water and failing and inadequate septic systems from a population of about 1,000 people.



Figure 1. The Pilgrim River tributary is on northeastern Michigan's Keweenaw Peninsula.

### Project Highlights

In 1990 DEQ entered into a compliance agreement with Adams Township to fund construction of a sewer collection system in four small communities: Atlantic Mine, Trimountain, Painsdale and Baltic. Over the next 23 years, sewer systems and lagoons were constructed for each community. All raw sewage discharges were eliminated by 2013.

In 2010 the Houghton Keeweenaw Conservation District (HKCD) received a grant from the National Oceanic and Atmospheric Administration (NOAA) to develop a Pilgrim River watershed management plan. The plan addresses the hydrology, ecology, water quality, and current and historical land uses. Although not directly related to the community-based wastewater treatment installation, this planning work will be used to improve and further protect water quality along the restored tributary and the larger Pilgrim River watershed.

## Results

Constructing community-based sewage collection systems resulted in a 96 percent decline in the daily geometric mean bacteria concentration between 2006 and 2013 (Table 1). The tributary now meets both total body and partial body contact recreation water quality standards. Consequently, Michigan DEQ removed this tributary from Michigan's CWA section 303(d) list in 2014.

## Partners and Funding

Adams Township received Rural Development funding (\$2,953,000) from the U.S Department of Agriculture (USDA) to pay for construction of the sewage collection system. The pre- and post-construction monitoring was performed by DEQ and partially funded by CWA section 319 base funds.

HKCD received a Michigan Coastal Management grant from NOAA to develop a Pilgrim River Watershed Management Plan. The funds included \$51,000 in NOAA grant funds and \$51,000 match from partners, including Michigan Tech, Copper County Trout Unlimited, the Keweenaw Land Trust and the USDA Natural Resource Conservation District. A Pilgrim River Watershed Advisory Council, comprised of landowners, interested citizens, business owners, and representatives from local government, also participated in plan development.

**Table 1. *E. coli* Concentrations in the Unnamed Tributary to the Pilgrim River**

Location	2006 Daily Geometric Mean <sup>1</sup> (col/100 mL)	2013 Average Daily Geometric Mean <sup>2</sup> (col/100 mL)	2013 30-Day Geometric Mean (col/100 mL)
Laitila Road Monitoring Station	2,160	89	60

<sup>1</sup> n = 1 day

<sup>2</sup> n = 5 weekly events



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

EPA 841-F-14-001JJJ  
October 2014

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