NONPOINT SOURCE SUCCESS STORY

Kentucky

Upgrading Septic Systems and Removing Straight Pipes as Part of a Watershed Plan Reduces Bacteria in Eagle Creek

Waterbody Improved

High bacteria loading from failing onsite wastewater treatment systems in the Ten Mile Creek watershed led to increased bacteria levels in Eagle Creek, the receiving stream. Because bacteria levels exceeded water quality standards, the Kentucky Division of Water (KDOW) added a 12.9-mile segment of Eagle Creek to the state's 1998 Clean Water Act (CWA) section 303(d) list of impaired waters. The partial implementation of a watershed-based plan led to bacteria loading reductions from the Ten Mile Creek watershed and improved water quality in Eagle Creek. As a result, Eagle Creek met its designated use for primary contact recreation (PCR) and was removed from Kentucky's impaired waters list in 2010.

Problem

Ten Mile Creek is in the northeastern corner of the Kentucky River basin in the Eagle Creek watershed. The 68-square-mile Eagle Creek watershed is popular for fishing and swimming. Ten Mile Creek drains to Eagle Creek (Figure 1) and encompasses two hydrologic unit code (HUC) 12-digit subwatersheds. Malfunctioning onsite wastewater treatment units in the Ten Mile Creek subwatershed and straight pipes that drain directly to the creek led to an increase in stream bacteria levels in Ten Mile and Eagle creeks.

According to Kentucky's water quality standards for PCR, fecal coliform levels cannot exceed 400 colony-forming units (CFU) per 100 milliliters (mL) in more than 20 percent of samples taken during the May through October PCR season, and *Escherichia coli* levels cannot exceed 240 CFU/100 mL in more than 20 percent of samples taken during the May through October PCR season. A KDOW water quality assessment conducted in 1999 found that the river mile segment 14.4 to 27.3 of Eagle Creek, immediately below the confluence with Ten Mile Creek, did not support its PCR use because bacteria levels exceeded the PCR water quality standard. As a result, KDOW added this 12.9-mile segment of Eagle Creek to the state's 2000 CWA section 303(d) list of impaired waters. Water quality monitoring and data analyses during the total maximum daily load development process in Eagle Creek indicated that onsite wastewater treatment units and straight pipes in the Ten Mile Creek subwatershed (included on the 2004 section 303(d) list of impaired waters) were the likely causes of the elevated bacteria levels in Eagle Creek.

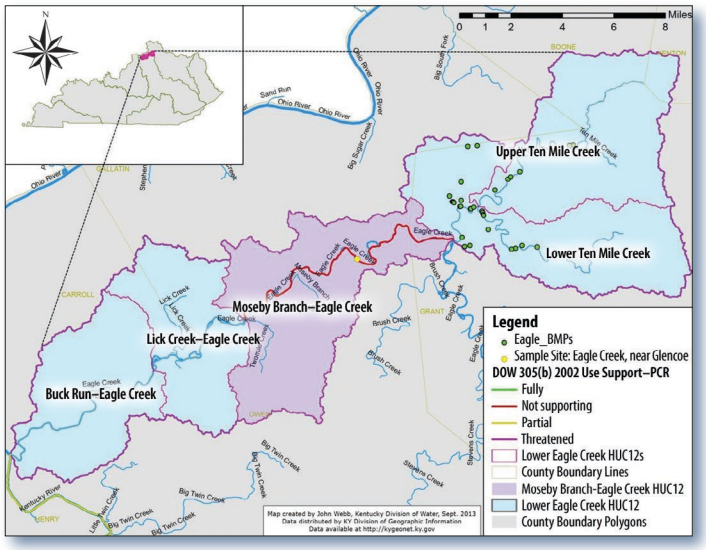

Figure 1. The Eagle Creek and Ten Mile Creek watersheds are in northern Kentucky.

Project Highlights

As part of Kentucky's Watershed Management Framework (initiated in 1997) assessment and ranking efforts, the Kentucky River Basin Team (KRBT) identified Eagle Creek as one of three river basin priority watersheds in 2000. It was subsequently added to the KDOW list of priority watersheds, where it still remains. By conducting watershed planning workshops and meetings, the KRBT identified issues and opportunities in the watershed, which led to the development of the Eagle Creek Watershed Council (Council), a group of local stakeholders that wanted

Figure 2. Project partners fixed failing septic systems (left) and removed straight pipes (right).

to work to address these water quality issues. The Northern Kentucky Health Department (NKHD) agreed to lead the Council's development of a watershed-based plan for the Ten Mile Creek subwatershed.

In 2005 the KDOW awarded the NKHD CWA section 319 grant funding to develop and implement a watershed-based plan for the Ten Mile Creek subwatershed of Eagle Creek. This watershed plan was the first in the state to receive KDOW official acceptance. The plan outlines the pathogen, sediment, nutrients and pesticide load reductions needed for Eagle Creek to achieve water quality criteria. The focus of this initial watershed-based plan was to identify sources of pathogens, enhance community involvement in watershed protection, and provide education about the operation and maintenance of onsite wastewater systems. A subsequent CWA section 319-funded project provided additional on-the-ground implementation funding for the watershed plan, which included reducing pathogen loading to Eagle Creek from the Ten Mile Creek subwatershed.

The Ten Mile Creek watershed-based plan identified an estimated 45 straight pipes and 158 failing septic systems (leaking lateral fields, overflows, etc.) in the subwatershed (Figure 2). As part of their work on TMDL development, the Kentucky Water Resources Research Institute estimated that pathogen loads could be reduced by 90 percent by installing or upgrading 40 to 100 septic systems.

Through the NKHD onsite wastewater grant program, 34 septic systems were installed or upgraded in the subwatershed. The majority of these systems were completed in 2006 and 2007, with the last several installed in 2008. A subsequent CWA section 319 grant in 2009 enabled the NKHD to install another 23 septic systems in the Ten Mile Creek subwatershed.

In addition, NKHD initiated a public education/social marketing campaign using newspaper, radio and television messages to inform area residents about onsite wastewater issues. These messages discussed proper septic system maintenance and the illegality of straight pipes. After implementing the social marketing campaign, the NKHD announced an onsite wastewater grant program available to homeowners in the Ten Mile Creek subwatershed.

Results

As a result of the improved operation and functioning of onsite wastewater systems, pathogen loads decreased in Eagle Creek. A 2008 water quality data assessment showed that the entire "Eagle Creek 15.3 to 28.5" segment (KY491407 _ 01: From Two Mile Creek to Ten Mile Creek) fully supported its designated use for PCR. Only 8 percent of samples exceeded the maximum allowable bacteria levels. On the basis of these data, KDOW removed the waterbody from the 2010 CWA section 303(d) list. As of 2014, Ten Mile Creek was still impaired for PCR. Streams in the KY River Basin will be sampled again in 2018. (Note: In the 2010 water quality assessment, KDOW adjusted the Eagle Creek segment lengths to reflect the National Hydrography Data Set. This segment increased slightly from 12.9 to 13.2 miles long.)

Partners and Funding

Restoring water quality in Eagle Creek was the result of a collaborative effort by many partners, including the KRBT, Eagle Creek Watershed Council, NKHD, Ten Mile Creek residents, Kentucky Water Resources Research Institute, Kentucky River Watershed Watch and KDOW. The Ten Mile Creek project used a total of $473,163 in CWA 319 funding (2005–2013).

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