NONPOINT SOURCE SUCCESS STORY

Tennessee

Septic Tank Effluent Pumping Project Improves King Branch

Waterbody Improved

Since 1993 King Branch has been posted with signs for water contact avoidance due to high *Escherichia coli (E. coli)* levels from failing septic systems. In 1998 the Tennessee Department of Environment and Conservation (TDEC) added the entire West Prong Little Pigeon River watershed to the Clean Water Act (CWA) section 303(d) list; King Branch was added to the 303(d) list as an individual segment in 2002. The Tennessee Nonpoint Source Program, in conjunction with the Sevier County Environmental Health Department and using partial funding support through CWA section 319 grant funding, installed a septic tank effluent pump (STEP) sewer system to treat sewage that had been impacting both surface and groundwater. In April 2014 the water contact advisory was lifted due to improved water quality and decreased *E. coli*. TDEC removed the 2.5-mile segment of King Branch from Tennessee's CWA section 303(d) list in 2014.

Problem

King Branch is within the West Prong Little Pigeon River–Upper watershed (060101070206) near Pigeon Forge in central Sevier County, Tennessee (Figure 1). King Branch flows generally east/northeast into the West Prong Little Pigeon River, which is part of the Lower French Broad River watershed.

In the early 1990s TDEC conducted an intensive bacteriological study of the West Prong Little Pigeon River to determine if the river met bacteriological standards for body contact recreation during recreational seasons. The sampling results showed that King Branch exceeded regulatory bacterial limits, and the stream was deemed unsafe for contact recreation. The primary cause of impairment was identified as failing septic systems (chiefly for homes and businesses along King Branch Road). In 1993 a public advisory was issued and warning signs were posted. In 1998 and 1999 TDEC tested samples from King Branch for *E. coli*; the sample concentrations ranged from 1,553 counts (cts) per 100 milliliter (mL) to over 2,419 cts/100 mL (i.e., above the test method's detection limit). In 1998 TDEC added the entire West Prong Little Pigeon River watershed to the Clean CWA section 303(d) list; King Branch was added to the 303(d) list as an individual segment (TN06010107010_0200) in 2002.

A total maximum daily load (TMDL) for pathogens in the Lower French Broad River was developed by TDEC and approved by the U.S. Environmental Protection Agency in December 2005. The goal of the TMDL was

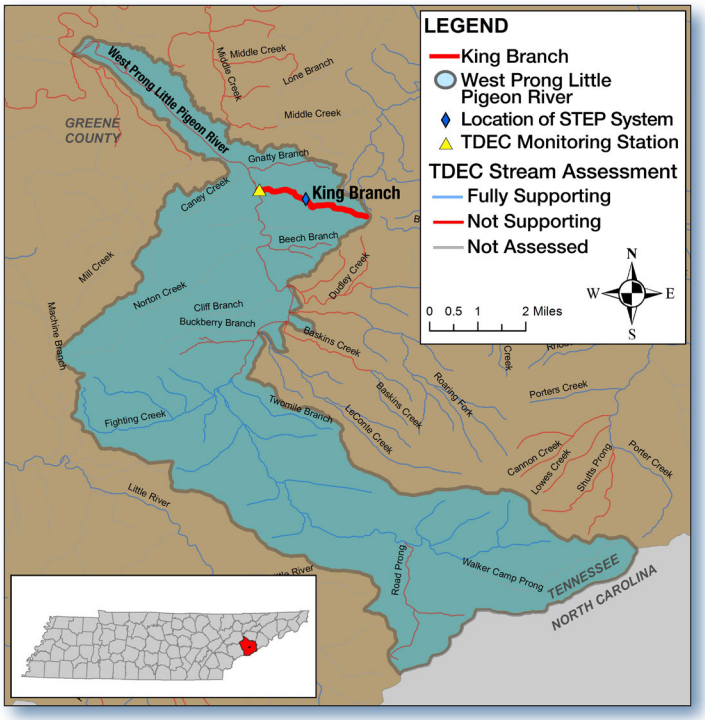

Figure 1. The King Branch Road STEP project was implemented in the West Prong Little Pigeon River watershed in Sevier County, Tennessee. The locations of King Branch, the STEP system, and the nearest TDEC monitoring station are shown in the lower watershed.

to have King Branch meet the Tennessee criteria/standard for *E. coli*, which states that the concentration of a fecal coliform group shall not exceed 200 colony forming units (cfu) per 100 mL nor shall the concentration of the *E. coli* group exceed 126 cfu/100 mL as a

Figure 2. Maneuvering the new STEP system equipment into place was challenging because of tight working conditions along King Branch Road.

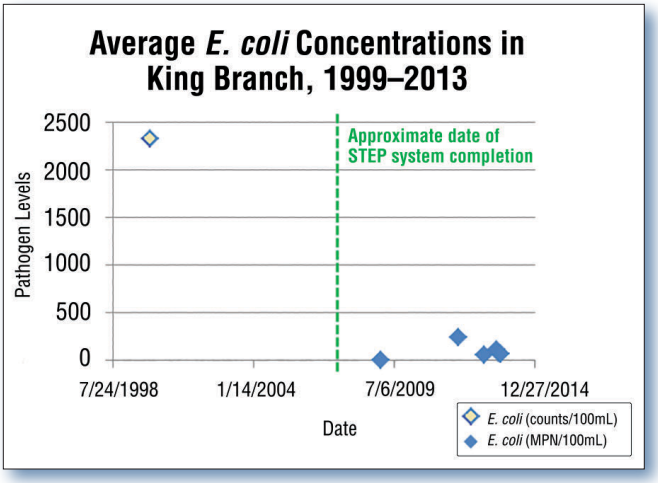

Figure 3. *E. coli* levels consistently met standards after the STEP system was installed.

geometric mean based on a minimum of 10 samples collected from a given sampling site over a period of not more than 30 consecutive days, with individual samples being collected at intervals of not less than 12 hours; and, the concentration of the fecal coliform group in any individual sample shall not exceed 1,000 cfu/100 mL.

Project Highlights

Planning and design for restoring King Branch began in 2001. In 2006 the Sevier County Environmental Health Department approved the construction of a STEP sewer system in this area because of an immediate threat to public health from failing septic systems. STEP systems collect sewage from the customers on the system and route it to a recirculating sand filter with drip irrigation lines for disposal. Previously existing septic leach lines are removed from service, which prevents sewage from reaching the soil surface and contaminating runoff. In 2007 a STEP system capable of treating up to 11,000 gallons of effluent per day was constructed to service over 30 homes and businesses along King Branch Road (Figure 2).

Results

Removing septic-related pollution sources reduced bacteria levels in King Branch. Sampling conducted by TDEC in 2013 showed that the *E. coli* levels within the stream had improved and met water quality standards for all designated uses. Observations from June to August 2013 indicated *E. coli* had decreased to a range of 62.2 most probable number (MPN) per 100 mL to 112.4 MPN/100 mL (this is approximately equal to a range of 62.2–112.4 cfu/100 mL), which is well below the 126 cfu/100 mL required by state standards (Figure 3). In 2014 TDEC lifted the contact advisory and removed King Branch from the impaired waters list for bacteria.

Partners and Funding

The Sevier County Environmental Health Department served as the lead organization for the STEP project. Other cooperating organizations included the Sevier County Soil Conservation District, Smokey Mountain Resource Conservation and Development Council, Tennessee Department of Agriculture, TDEC, Tennessee Department of Health – Division of Lab Services, and the U.S. Department of Agriculture – Natural Resources Conservation Service.

Sevier County was the recipient of two CWA section 319 grants (2001 and 2005) for a total of $334,425. Partial funding through the CWA section 319 program assisted in the purchase of the STEP system itself, along with the accompanying packed bed trickling filter/drip effluent dispersal system. Matching funds for the project were supplied by Sevier County. The system is owned and operated by Tennessee Wastewater Systems and is inspected twice a month. The system serves approximately 35 homes under Permit No. SOP-05043; the permit must be renewed every 5 years (the current permit expires August 31, 2017).

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

EPA 841-F-16-001R
August 2016

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