NONPOINT SOURCE SUCCESS STORY

Texas

Best Management Practices, Infrastructure Improvements, and Outreach Improve the Guadalupe River Above Canyon Lake

Waterbodies Improved

High levels of bacteria prompted the Texas Commission on Environmental Quality (TCEQ) to add the Guadalupe River Above Canyon Lake to the state's 2002 Clean Water Act (CWA) section 303(d) list of impaired waters. Local and state watershed partners addressed the bacteria impairment by implementing best management practices (BMPs), improving municipal wastewater collection infrastructure, and conducting education and outreach in the watershed. Thanks to the collaborative efforts, water quality in assessment units (AUs) 1806_04 and 1806_06 has improved. As a result, TCEQ removed AU 1806_04 and 1806_06 from the state's impaired waters list in 2012 and 2014, respectively.

Problem

The Guadalupe River Above Canyon Lake is in south-central Texas, beginning in western Kerr County and ending at Canyon Lake Reservoir. The 3.5-mile reach of Segment 1806 that includes the impaired AUs, 1806_04 and 1806_06, is defined as the Guadalupe River from Ranch Road 394 to 1 mile upstream of Flat Rock Dam (Figure 1). These AUs run through the city of Kerrville; land use immediately surrounding the river is predominately urban.

The designated beneficial use for Segment 1806 is primary contact recreation (PCR). To meet the PCR Texas water quality standard, *Escherichia coli* levels cannot exceed a geometric mean of 126 colony forming units per 100 milliliters (cfu/100 mL) of water. In 2002, Segment 1806 was found to have geometric means that exceeded the standard for PCR. As a result, TCEQ added Segment 1806 to the 2002 CWA list of impaired waters.

Project Highlights

In 2004 the TCEQ initiated a total maximum daily load (TMDL) project to conduct public outreach, identify sources and establish loads. The TCEQ adopted the TMDL in 2007 and approved the TMDL implementation plan (I-Plan) in 2011. The TCEQ provided the Upper Guadalupe River Authority (UGRA) with CWA section 319(h) funding to implement the I-Plan in partnership with the city of Kerrville, Kerr County, and the Texas Department of Transportation (TXDOT). To address the bacteria impairment, the I-Plan included implementing

Figure 1. BMPs were implemented along Segment 1806 (includes impaired AUs 1806_04 and 1806_06).

BMPs to control bacteria from animal waste, improving infrastructure, and conducting education and outreach in the watershed.

The TMDL and I-Plan were the result of a successful, locally driven process to address the watershed's bacteria impairments. Bacteria sources referenced in the TMDL included urban storm water runoff, malfunctioning septic systems, nesting birds at bridge crossings, livestock, direct human deposition, pet and wildlife waste, and failing municipal wastewater infrastructure.

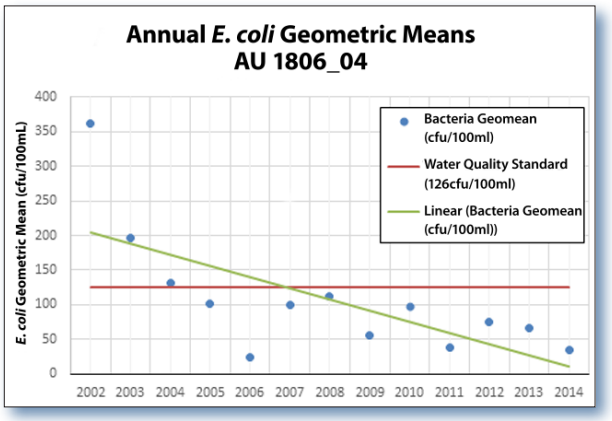

Figure 2. *E. coli* data collected at SWQM Station 12615 on AU 1806_04. The geometric mean of these data show that the AU is meeting water quality standards.

In 2011 TCEQ provided the UGRA with CWA section 319(h) funding to implement several BMPs included in the TMDL I-Plan on the impaired reaches of Segment 1806. BMPs installed included 23 pet waste stations at parks around Kerrville. UGRA staff monitored the effectiveness of seven of these stations in Flat Rock Park for 4 years. During that time frame, an average of 18 pounds of waste per month was collected from each station. To exclude birds from roosting directly over the waterway, bird deterrent structures were installed on three sections of the SH16 Bridge over the Guadalupe River in Kerrville through a partnership with TXDOT. The UGRA also partnered with the city of Kerrville to design and install "Don't Feed the Ducks and Geese" signs at five locations in Kerrville parks in an effort to reduce direct deposition of waste from waterfowl. Limited removals of waterfowl from riverside parks were also conducted.

From 2011 to 2015, the city of Kerrville improved wastewater collection infrastructure by repairing or replacing 42,675 feet of collection line, 16 lift stations, 337 sewer system access points, and 100 manholes. In addition, 150,926 feet of collection line was inspected by video camera and 804,836 feet of gravity main was cleaned. To prevent future damage to underground infrastructure, the city removed 2,058 feet of tree roots in the vicinity of wastewater collection lines.

To keep local stakeholders involved in the TMDL implementation and informed about water quality, the UGRA disseminated information about septic systems, broadcasted radio public service announcements and gave an average of 25 presentations per year throughout the watershed highlighting nonpoint source pollution issues and watershed stewardship. An annual river cleanup sponsored by UGRA raises public awareness of the impact of litter on water quality. In 2015, 403 participants collected 6,315 pounds of trash from the Guadalupe River and its bank. UGRA also contracts with a local company to pick up trash at a number of low-water crossings in Kerr County. A total of 754 visits to 15 different river crossings resulted in the removal of 25,503 pounds of trash in 2015. In addition, UGRA and the city of Kerrville routinely support citizen-initiated cleanup groups by providing supplies and free trash disposal.

Results

Water quality monitoring data now show that both impaired AUs meet the state's PCR standard (Figure 2). For AU 1806_04, the 2012 Integrated Report showed an *E. coli* geometric mean of 87.25 cfu/100mL. For AU 1806_06, the 2014 Integrated Report showed an *E. coli* geometric mean of 97.3 cfu/100mL. These data led to the removal of AU 1806_04 from the impaired waters list in 2012 and AU 1806_06 in 2014. These waterbodies currently support water quality standards for all their designated uses.

The success can be attributed to the local stakeholders for developing the TMDL and the TMDL I-Plan, and to the BMPs implemented by the UGRA in conjunction with the TCEQ, the city of Kerrville, Kerr County, and TXDOT. Implementing BMPs to address bacteria, improving infrastructure, and conducting education and outreach programs have decreased the bacteria load; the trash cleanups and education and outreach programs have kept the community involved and informed. BMP implementation is ongoing, and water quality monitoring is continuing to track *E. coli* levels to ensure this restoration process remains a success.

Partners and Funding

Over $329,000 in CWA section 319(h) funds and over $219,000 of local match from the UGRA, the city of Kerrville, Kerr County, and TXDOT combine for a total of $548,851; these funds were used to establish BMPs and education and outreach programs in the watershed. In addition, from 2011 to 2015 the city of Kerrville spent over $22 million on improvements to the city's wastewater collection infrastructure.

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