



# NONPOINT SOURCE SUCCESS STORY

## Texas

### Local Partnerships and Community Involvement in Growing City Leads to Improved Water Quality in the Upper Cibolo Creek

#### Waterbody Improved

Upper Cibolo Creek (UCC) was listed for failing to meet water quality standards for bacteria in the 2006 Texas Water Quality Inventory and 303(d) List (Integrated Report). The City of Boerne collaborated with the Upper Cibolo Creek Watershed Partnership and the Cibolo Nature Center to develop a Clean Water Act (CWA) section 319(h)-funded watershed protection plan (WPP), accepted by the U.S. Environmental Protection Agency in 2013. The Cow Creek Groundwater Conservation District, which represents Boerne and surrounding areas, worked to implement the WPP through education and outreach efforts. Best management practice (BMP) implementation and stakeholder response to education events has led to water quality improvements in the UCC. As a result, the Texas Commission on Environmental Quality (TCEQ) removed UCC assessment unit (AU) 1908\_02 from the impaired waterbodies list for bacteria in the 2018 Integrated Report.

#### Problem

UCC is in central Texas and flows through the City of Boerne in Kendall County (Figure 1). The creek was first listed on the Texas CWA section 303(d) list of impaired waters in 2006 with an *Escherichia coli* (*E. coli*) geometric mean of 476 colony forming units (cfu)/100 milliliter (mL). These levels are nearly quadruple the state standard of 126 cfu/100 mL for primary contact recreation use. UCC is a limestone bottom stream that runs through the center of the City of Boerne, and it is a tourist attraction for the area. High concentrations of bacteria, as well as concerns about nutrients, threatened this sensitive natural resource (Figure 2). Multiple probable sources of bacteria and nutrients were identified in the WPP, including wildlife and agricultural livestock sources (via direct deposit and stormwater wash off from adjacent land cover) and urban/residential sources (via stormwater wash off from urban lands, failing septic tanks, sanitary sewer overflows and treatment failures).

#### Story Highlights

In response to high bacteria levels in the creek, the City of Boerne installed six pet waste stations along the UCC on public parkland and posted signs to discourage residents from feeding ducks. The city also planted multiple bald cypress trees along riparian

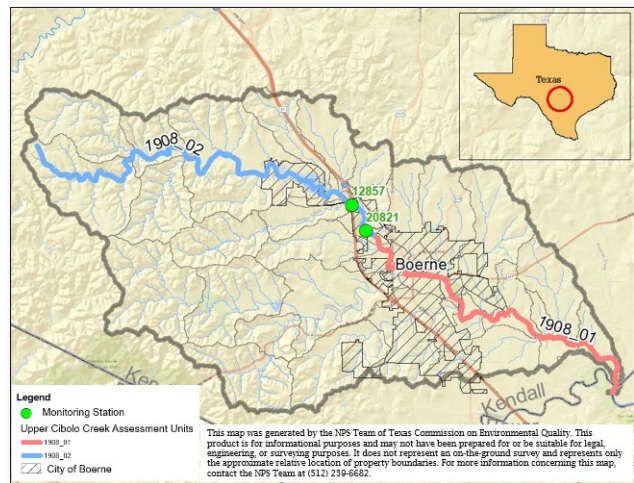


Figure 1. Upper Cibolo Creek is in central Texas.

zones to improve runoff filtration, create a buffer and provide bank stabilization. These enhancements improve water quality while calling attention to activities that can contribute to water quality problems.

To address rapid growth and significant land use changes in the surrounding area, the City of Boerne adapted the San Antonio River Authority's low impact development (LID) guidance document to meet these needs. The city's master plan also considers modifications to development ordinances that include establishing riparian buffers and LID as part of new

development in sensitive areas. In areas of existing development, the master plan evaluates opportunities to improve riparian buffers on city-owned properties and outlines potential zoning changes to protect riparian corridors, stream slopes and mature trees.

While physical water quality improvement projects were successfully implemented, perhaps the greatest achievements in the UCC watershed were the public outreach and education events. Watershed partners reached thousands of community members through public meetings, technical workshops, newsletters, creek cleanup events, education programs within schools, and a water conservation festival. Of note are two on-site sewage facility (OSSF) workshops held by the city. Both workshops were well-attended. The first workshop had a wait list of 50 people.

Texas State Soil and Water Conservation Board (TSSWCB), Texas Water Resources Institute (TWRI), Texas A&M AgriLife Extension, and Texas A&M AgriLife Research have hosted education and outreach programs in the UCC watershed since 2010. These programs focus on water quality, feral hog management, livestock management, septic systems management and water well protection. Field days to demonstrate these BMPs to landowners were held, with some events reaching over 850 stakeholders.

Homeowners were also encouraged to harvest rainwater to conserve water and reduce stormwater runoff. The Cow Creek Groundwater Conservation District led education efforts on rainwater harvesting, offering several well-attended workshops and tours of existing residential systems.

## Results

The TCEQ originally listed AU 1908\_02 on the 2006 Integrated Report because of high bacterial levels at surface water quality monitoring station 12857. During 2012–2016, there were inadequate amounts of data to analyze for the Integrated Report, so the impairment was carried forward. Data for 2012–2014 are shown in Figure 3. An additional monitoring station was added to the AU in 2015 (station 20821) to increase the amount of available data. Surface water quality data taken from the two stations were combined to assess the AU in the 2018 Integrated Report. In this report, the *E. coli* geomean for AU 1908\_02 was below

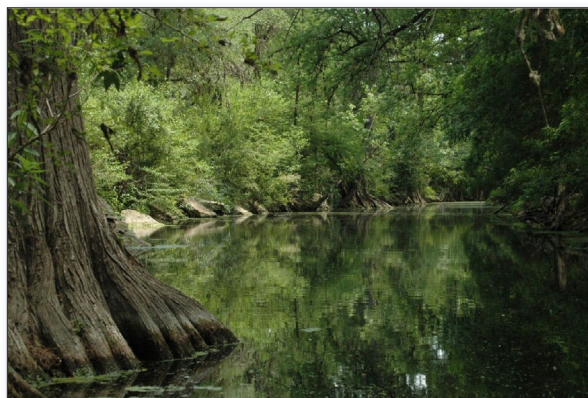


Photo: Ryan Bass

Figure 2. Upper Cibolo Creek flows through the Cibolo Nature Center, a local recreational resource.

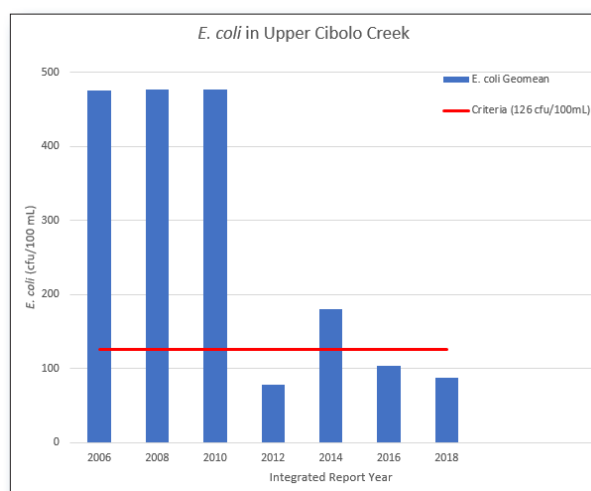


Figure 3. Upper Cibolo Creek (AU 1908\_02) *E. coli* geomeans have fallen over time.

the 126 cfu/100 mL primary contact recreation use criterion (Figure 3). As a result, the AU was removed from the impaired waters list in 2018.

## Partners and Funding

As of 2020, watershed partners have spent approximately \$758,842 on water quality improvements and education and outreach efforts, combining \$455,305 in CWA Section 319(h) funds with \$303,537 matched by local efforts. Locally organized creek cleanups, interaction with permanent educational displays, and participation in outreach events are expected to help sustain improvements to water quality.



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