



# NONPOINT SOURCE SUCCESS STORY

# Texas

## Implementing Stormwater Practices Improves Concho River Aquatic Habitat

### Waterbody Improved

Nutrient and sediment loads from upstream urban sources degraded habitat in a portion of Texas' Concho River. As a result, the Texas

Commission on Environmental Quality (TCEQ) placed a 5-mile portion of the Concho River (assessment unit [AU] 1421 \_ 07) on the state's 2002 Clean Water Act (CWA) section 303(d) list of impaired waters for failing to meet Texas' water quality standards for macrobenthic communities. TCEQ, Texas State Soil and Water Conservation Board (TSSWCB), Upper Colorado River Authority (UCRA) and the city of San Angelo implemented several best management practices (BMPs) and programs in San Angelo that reduced nutrient and sediment loading into the North Concho River, which is upstream of the impaired segment. Aquatic habitat improved in AU 1421 \_ 07, and TCEQ removed it from the CWA section 303(d) list in 2012.

### Problem

The main stem Concho River begins at the confluence of the North Concho and South Concho rivers in the city of San Angelo. The North Concho River is affected by urban runoff from the city of San Angelo (Figure 1). Sedimentation and nutrient enrichment problems associated with urban runoff, along with low flow, have had a detrimental effect on the aquatic life in the Concho River.

A 2002 biological assessment of AU 1421 \_ 07, which is directly downstream of the confluence, showed that the AU's Benthic Index of Biotic Integrity (BIBI) score fell below the minimum score of 29 that would indicate support of aquatic life. As a result, TCEQ included AU 1421 \_ 07 on the 2002 CWA section 303(d) list for macrobenthic community impairment. Macrobenthic organisms are sensitive to changes in water quality and nonpoint source (NPS) pollutants, making them an indicator species of the overall health of a waterbody. Sediment, dissolved solids, nutrients and diminished flow can negatively affect macrobenthic communities in freshwater streams. Sediment loading into the North Concho River degrades macrobenthic habitats downstream and disrupts the organisms' ability to filter feed.

### Project Highlights

Many parties collaborated to implement BMPs in the Concho River watershed. A CWA section 319(h)-funded program was initiated in 1994 between San Angelo, UCRA and TCEQ to restore the North Concho River by constructing BMPs that reduced sediment and nutrient loads from stormwater runoff. A gabion retention structure designed to reduce stormwater

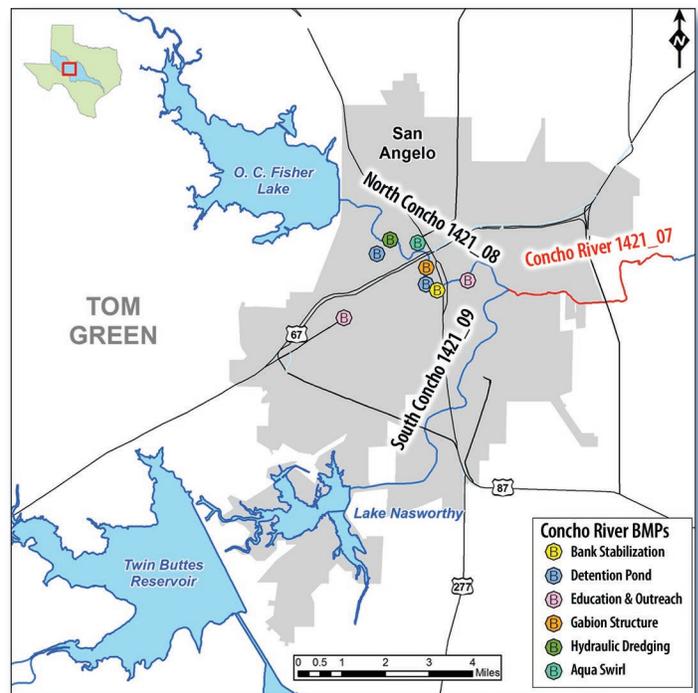


Figure 1. Map of BMP Locations in San Angelo, Texas.

runoff was constructed at the Civic League Park in San Angelo in 1998. This was the first of many structural BMPs built using CWA section 319(h) funding to reduce urban runoff and pollutant loading to the North Concho River. The construction of two additional BMPs, a wet retention pond at Brentwood Park and a dry detention pond at Santa Rita Park, were completed in 2001. A gravity-based stormwater cleaning device was installed in downtown San Angelo in 2007. After stormwater is gravity-separated and filtered in this device, high-quality effluent from the system is



Figure 2. Partners added bank-stabilizing BMPs along the North Concho River.

discharged into the river or pumped into nearby “living laboratory” demonstration ponds, which are part of the expanded public education effort. More recent BMPs have included the hydraulic dredging of the North Concho River, completed in 2010, followed by stabilizing select sections of the bank in 2011 (Figure 2). These improvements removed silt and

sediment from the river and stabilized areas of bank deterioration, thereby mitigating slumping and erosion that contribute to streambed deposition of sediment.

Finally, management actions have facilitated additional water quality improvements in the Concho River. These actions have included the Concho River Watermaster Program, established in 2005, and development of the 2008 Concho River Watershed Protection Plan (WPP). The Concho River Watermaster Program provides two local Watermaster deputies with the authority to resolve water rights issues in the area. The deputies are responsible for monitoring and regulating water availability, as well as establishing measures that control the flow of the river and allowing diversions when necessary. This program developed rules requiring base flows entering an upstream reservoir to be released downstream, resulting in increased flows in AU 1421 \_ 07.

The 2008 Concho River WPP was developed by the UCRA, with funding from TSSWCB. The WPP evaluated and assessed potential sources of NPS pollution and identified control strategies. Components of the plan included a public stakeholder outreach and education program, water quality monitoring, the development of water quality goals and objectives, and implementing BMPs to improve water quality. The Concho River Basin Aquatic Research and Education Center, built in 2008, supports the watershed improvement effort by providing a permanent, publicly accessible venue for educational workshops about NPS BMPs and water quality issues.

## Results

Approximately 3,273 tons of sediment and debris have been removed from stormwater through the gravity-based stormwater cleaning BMP and bank stabilization projects implemented in downtown San Angelo.

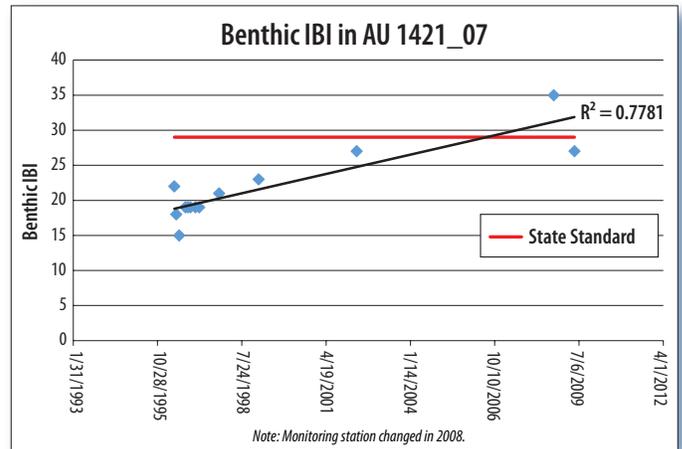


Figure 3. The BIBI scores in the Concho River AU 1421 \_ 07 improved from 1996 to 2009.

The gabion structure at Civic League Park removed 36,000 pounds of sediment and organic matter in its first year. Through monitoring, the Brentwood retention pond has been found to remove 99 percent of incoming total suspended solids, 85 percent of the biochemical oxygen demand (BOD5), and 98 percent of fecal coliform from stormwater entering the river. The dredging of the river removed roughly 1.43 million cubic feet of silt and added over 10 million gallons of storage capacity. Water quality data indicate that concentrations of sediment and phosphorus have decreased in the North Concho River directly upstream of the delisted AU. During a 2008–2009 assessment AU 1421 \_ 07 received a mean BIBI of 32.6, resulting in the waterbody being removed from the CWA section 303(d) list in 2012 (Figure 3).

## Partners and Funding

Watershed partners have spent approximately \$3,928,263 on water quality improvements in the North Concho River, combining \$2,358,958 in CWA section 319(h) funds with \$1,569,305 matched by local efforts. Of these combined funds, TCEQ granted \$1,983,718 with \$1,322,478 from local match, for a total of \$3,306,196. The TSSWCB provided \$375,240 with \$246,827 from local match, totaling \$622,067.

Private funding for NPS water quality improvements on the North Concho River in San Angelo included a contribution of \$260,000 from a private benefactor, Ms. Mayme Daniels, in 1997. The city of San Angelo also implemented a ½-cent sales tax to raise \$11 million for NPS BMPs.



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