NONPOINT SOURCE SUCCESS STORY

Arizona

Boy Scout Camp Project Reduces Phosphorous in Christopher Creek

Waterbody Improved

In 2006 Christopher Creek was listed on the state's Clean Water Act (CWA) section 303(d) list of impaired waters for nutrients (total phosphorus) due to pollution from recreational areas. Managers of recreational facilities began implementing best management practices (BMPs) beginning in 2008 to address pollution sources, especially leaking septic systems and horse pastures. As a result, phosphorus levels decreased and the phosphorus impairment was removed in 2016.

Problem

Christopher Creek is a seven-mile-long creek flowing within the greater Salt River watershed, about 100 miles northeast of Phoenix. The area surrounding Christopher Creek is predominantly U.S. Forest Service land, and the area is sparsely populated. Christopher Creek empties into Tonto Creek, which flows 73 miles through the Tonto National Forest and ultimately drains into Roosevelt Lake just outside of Phoenix. Roosevelt Lake, part of the Salt River Project, is the largest reservoir in Arizona and serves as a major water source for the Phoenix metropolitan area (Figure 1).

Recreational use of lands surrounding Christopher Creek led to nutrient (phosphorus) and *Escherichia coli (E. coli)* impairments. Christopher Creek (waterbody 15060105-353) was listed as impaired for nutrients (phosphorus) on the state's CWA section 303(d) list in 2006. In addition, Christopher Creek and Tonto Creek are not attaining for *E. coli*. A total maximum daily load (TMDL) was developed and approved for *E. coli* in 2004.

A broad watershed plan for the greater Salt River watershed was written in the mid-2000s. This watershed plan provided broad themes and ideas on how to address watershed impairments. As a result, the Boy Scouts, Gila County, and the Arizona Department of Environmental Quality (ADEQ) identified an aging campsite wastewater treatment system (septic system) and nearby horse pasture lands as sources of *E. coli* and nutrients. In 2007 the local Boy Scout Troop submitted a project proposal to address contaminants entering Christopher Creek from the septic system and horse pasture lands.

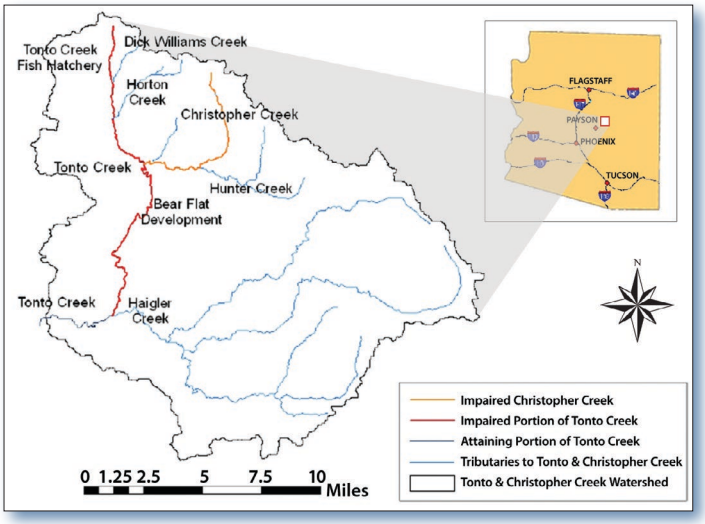

Figure 1. Christopher Creek flows into Tonto Creek in central Arizona.

Project Highlights

In 2008 project partners completed a septic system upgrade and horse pasture clean-up at the R-Bar-C Boy Scout Camp on Christopher Creek (Figure 2). The project received $162,300 in CWA section 319 funds, with an additional $108,000 of in-kind match provided by Gila County and a $200 in-kind match provided by the Boy Scouts in the form of volunteer services. Overall, the project included installation of two 5,300-gallon septic tanks, one 5,300-gallon recirculating tank and one 4,000-gallon pump tank. Several buildings were connected to the new septic lines and treatment facilities. The central kitchen was connected to the treatment system through a new 5,300-gallon grease trap.

Figure 2. A new septic system was installed at the Boy Scout campground.

To address future potential horse pasture runoff, ongoing pasture clean-up activities have been established by the Boy Scouts as part of their own camp management program.

Results

At the outset, project partners anticipated load reductions for *E. coli* and nutrients between 75 percent and 90 percent. Effectiveness monitoring was conducted by ADEQ in Christopher Creek, and the sampling primarily focused on *E. coli* and nutrients. Nitrogen, *E. coli*, and phosphorus sample results were analyzed and compared to data collected for the TMDL report.

The analysis showed that phosphorus exceeded the water quality standard in pre-project sampling, and never during post-project sampling. The standard requires that the total phosphorus annual mean not exceed 0.10 milligrams per liter (mg/L). In 2003, before project implementation, annual mean total phosphorus levels exceeded the standard under baseflow conditions (0.134 mg/L) and stormflow conditions (1.367 mg/L). In 2014, after project implementation, the annual mean total phosphorus levels met the standard under both baseflow conditions (0.042 mg/L) and stormflow conditions (0.0398 mg/L). As a result, in 2016 Christopher Creek was delisted as impaired for total phosphorus based on the results of the 2013 and 2014 sampling data. Christopher Creek is still listed as impaired for *E. coli* and dissolved oxygen.

Partners and Funding

Gila County partnered with the Grand Canyon Council of the Boy Scouts of America to implement this project. The project was entirely within the Boy Scouts' camp, including the horse pasture. Gila County provided in-kind match ($108,000) by providing staff time. The Boy Scouts provided in-kind volunteer services ($200). The project received $162,300 in CWA section 319 funds. ADEQ analyzed the data, wrote the TMDL, provided technical assistance, and continues to monitor the creek. The total project cost was $270,500.

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