NONPOINT SOURCE SUCCESS STORY

West Virginia

Controlling Contaminant Sources and Restricting Livestock Access to the Riparian Corridor Improves Water Quality and Aquatic Habitat in Kitchen Creek

Waterbody Improved

Waste from agricultural production and the presence of livestock in riparian areas degraded water quality in Kitchen Creek. As a result, the stream was placed on the 2006 Clean Water Act (CWA) section 303(d) list as impaired for fecal coliform. The West Virginia Conservation Agency (WVCA) developed and implemented a watershed-based plan to address the problem through practices such as limiting livestock access to the stream and constructing waste storage facilities. Water quality has generally improved in response to this restoration work; bacteria levels have decreased and habitat conditions have improved.

Problem

Kitchen Creek is in the Gap Mills area of Monroe County in southeastern West Virginia. It flows along the northeast foot of Peters Mountain from the continental divide, and travels southwest to Second Creek. Second Creek flows northwest to the Greenbrier River. Kitchen Creek is a 5.5-mile-long stream that flows into Second Creek at Gap Mills (Figure 1). The Kitchen Creek watershed consists mostly of grassland pasture used for beef cattle and dairy operations.

West Virginia's fecal coliform (FC) bacteria standard states that water samples are not to exceed 200 colonies (col) per 100 milliliters (mL) as a monthly mean, based on at least five samples per month. In addition, no more than 10 percent of all samples taken during the month may exceed 400 col/100 mL. Data collected in 2004 and 2005 failed these criteria, causing Kitchen Creek (segment WVKNG-23-G) to be placed on the 2006 CWA section 303(d) list for FC bacteria. A total maximum daily load (TMDL) was developed for the Greenbrier River in 2008, which included Kitchen Creek and Second Creek. The TMDL analysis revealed that the use of the stream for agricultural purposes was the root of the bacteria contamination. At one time there were three dairies and two large beef feedlot with very little, if any, waste storage, and much of that waste was able to enter the stream (Figure 2).

Other farms in the area allowed unrestricted grazing of beef cattle along the riparian areas, while also overapplying liquid and solid manure, poultry litter, and fertilizer to pasture and cropland. In addition, the karst geology of the area might have led to a slow release of bacteria into the stream from underground sources.

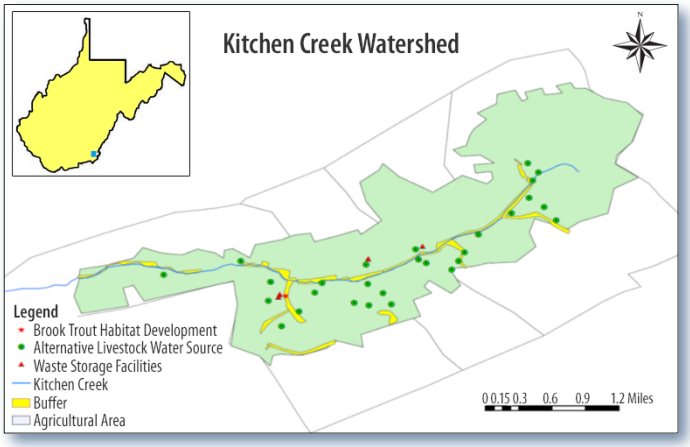

Figure 1. Kitchen Creek watershed and BMP locations.

Project Highlights

The key best management practices (BMPs) implemented to address the FC bacteria contamination included installing alternative water systems, limiting livestock access to the riparian area, and building waste storage facilities. The majority of these practices were implemented from 2009 to 2014 as part of the Second Creek watershed-based plan (see Figure 1 for BMP implementation locations).

The 11 alternative watering systems were vital to restricting livestock access to the riparian pasture. These systems provided cleaner and fresher water for livestock while grazing, and also allowed farmers to implement rotational grazing systems to decrease bacteria-laden runoff. Some of the alternative water sources also used renewable energy such as wind and solar power for pumping.

Figure 2. Before project implementation, this section of stream flowed through the middle of a beef feedlot.

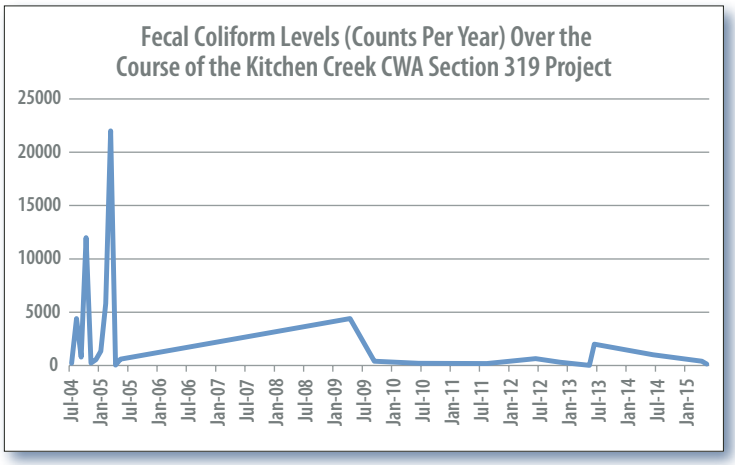

Figure 3. FC bacteria levels in Kitchen Creek generally declined after 2009, thanks to project implementation.

More than 100 acres of riparian area and more than 6 miles of stream were developed into buffers once the alternative water sources were in place. These riparian areas are mostly grass buffers; farmers allow livestock to graze on a limited basis in accordance with a rotational grazing plan that is designed to meet or exceed the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) standards for riparian grazing. Allowing livestock to graze the buffers facilitates the plants' ability to uptake nutrients. These buffers and grazing management plans have reduced the overall time livestock can access the stream from 5 percent to 0.12 percent.

Finally, three waste storage facilities were constructed or repaired to stop the direct flow of manure to the stream. The nutrients from these waste storage facilities were then used in nutrient management plans for additional forage production, further reducing the need for riparian pasture and improving water quality.

Results

FC bacteria levels have dramatically decreased as a result of the restoration work in Kitchen Creek (Figure 3). Unexplained spikes in bacteria levels shown in recent monitoring data might be linked to above-average precipitation and legacy sources of livestock waste in the karst system that will take a significant amount of time to flush out completely. WVCA will conduct further sampling along Kitchen Creek to confirm that FC levels continue to improve as a result of better land management.

Wildlife habitat has also improved due to the restoration work. A fish population evaluation conducted one year after brook trout reintroduction to the stream in 2013 showed that the trout population reestablished itself. In addition, the fish surveys indicated a change in the primary nongame fish population from dace to sculpin, an indicator of high-quality water. Terrestrial species, including river otters, bald eagles, golden eagles, golden winged warblers and bobwhite quail, were also spotted in the area after Kitchen Creek water quality began improving (even though the creek does not yet meet state standards).

Partners and Funding

Many project partners were involved in the Kitchen Creek improvement project. WVCA was the primary lead for this project, while the Greenbrier Valley Conservation District served as the local funds holder. NRCS provided engineering and plant materials support. The U.S. Fish and Wildlife Service's White Sulfur Springs National Fish Hatchery and Partners for Fish and Wildlife Program provided support for implementing BMPs and establishing brook trout. Trout Unlimited was closely involved with fence construction on most of the projects.

Federal funding ($556,560 total) was provided by the CWA section 319 program. State funds included $120,811 from the WVCA; additional state funds were provided in the form of staff time and resources. Participating farmers and landowners contributed over $100,000 of their personal funds, time, labor and other resources to assure this project's success.

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