



## Section 319

# NONPOINT SOURCE PROGRAM SUCCESS STORY

# Tennessee

## Installing Diversion Levees and Dikes Protect Water Quality

### Waterbody Improved

Sediment in runoff from pastureland and from non-irrigated crop production caused siltation and a loss of habitat in Dry Creek. This led Tennessee to place 17.8 miles of Dry Creek on its 303(d) list of impaired waters for siltation and habitat alteration. To remedy this problem, local agencies installed a diversion levee that affected 83 acres and a dike that affected another 5 acres in the watershed. These practices mitigated runoff from the crop fields and prevented sediment from reaching the stream. As a result, water quality improved along the 17.8-mile Dry Creek segment, and Tennessee removed it from its 2006 303(d) list of impaired waters.

### Problem

Dry Creek is in Benton County's Big Sandy River watershed. Tennessee listed the creek as impaired on its 2004 303(d) list because siltation and a loss of habitat reduced the creek's biological integrity. The creek did not meet the state standard for the designated use of fish and aquatic life, which requires that waterbodies have no distinctly visible solids, scum, foam, oily slick, or the formation of slimes, bottom deposits, or sludge banks of such size or character that could be detrimental to fish and aquatic life. Sediment from eroding stream-banks and agricultural fields accumulated in Dry Creek—physically altering the creek's substrate and reducing viable habitat for macroinvertebrates and fish.

### Project Highlights

The Chickasaw-Shiloh Resource Conservation & Development Program (RC&D) installed a diversion levee in 1998 using Tennessee's Agricultural Resources Conservation Fund (ARCF). The diversion levee stopped runoff water from rapidly eroding the upper end of a drainage channel (Figure 1). This site had been contributing large volumes of sediment to the creek. A diversion levee is a berm of earth that redirects polluted runoff to a pipe or some other controlled outlet that slows the water and allows sediments and nutrients to settle out before the water discharges to the stream. The RC&D constructed the diversion levee on an agricultural field that was subsequently enrolled in the Conservation Reserve Program, which promotes the retirement of cropland along waterbodies. In this case, the landowner, Mark Hargis, further protected the land from erosion and eliminated sedimentation of the stream channel by planting grass instead of crops (Figure 2).



Figure 1. Re-grading channel banks and installing a levee along a rapidly eroding drainage area prevents agricultural field runoff from entering Dry Creek.



Figure 2. A completed levee system borders an agricultural field, now converted to grassland.

Using matched Clean Water Act section 319 funds from the ARCF, the Benton County Soil Conservation District constructed a dike in 2004 in a different area of the watershed. The dike, also a type of earthen berm, provides a barrier to protect

people and cropland from flooding, while also reducing erosion and preventing sediment from further degrading aquatic habitat. Henry County Soil Conservation agents advised landowners on the technical design and specifications of best management practices (BMPs), and provided oversight and expertise during installation (see Figure 3 for BMP location map).

## Results

State monitoring data show that siltation and habitat alteration declined, allowing the waterbody to meet state standards. The quality of the in-stream habitat improved, once again providing for the development of a diverse aquatic community that meets regionally based biological integrity goals. Using U.S. Environmental Protection Agency rapid bioassessment protocol III, state biologists calculated a biological reconnaissance score (biorecon) for Dry Creek, which is used to measure compliance with the state water quality standard for siltation. Biorecon—a tool used to assess stream impairment—uses species richness measures, emphasizing the presence or absence of indicator organisms without regard to relative abundance. The biorecon index is scored on a scale from 1 to

15. A score of less than 5 is regarded as *very poor*. A score of more than 10 is considered *good*. The principal metrics used are the total macroinvertebrate families, the number of families of mayflies, stoneflies, and caddisflies (collectively referred to as EPT—short for the order names Ephemeroptera, Plecoptera, and Trichoptera), and the number of pollution-intolerant families found in a stream.

In 2004 biological sampling of Dry Creek, state biologists documented 23 total macroinvertebrate families, including 4 EPT families and 1 intolerant family. The biological reconnaissance (biorecon) score for the station was 11 out of a total score of 15, which is in the unimpaired range. Therefore, Tennessee removed Dry Creek from its 303(d) list in 2006.

## Partners and Funding

This project was funded through cost-sharing from section 319 grant pool projects. The ARCF provided \$2,500 in state matching funds, and landowner Mark Hargis donated \$3,343. Additional key partners in this effort included the Henry and Benton counties' Soil Conservation Districts and the Chickasaw-Shiloh RC&D.

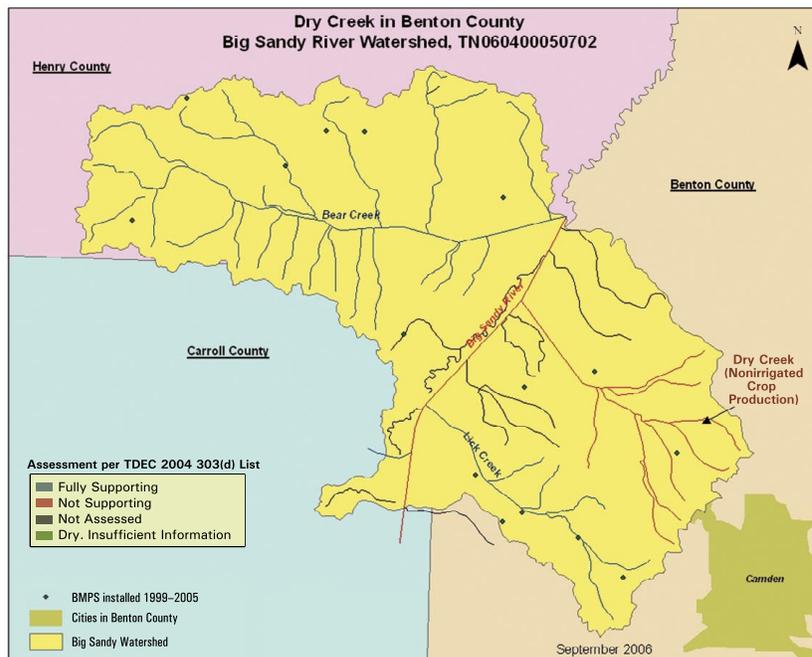


Figure 3. Map indicating the locations of the two key BMP measures (diversion levee and dike) installed in the Dry Creek watershed (see the lower-right portion of the map).



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