



## Section 319

# NONPOINT SOURCE PROGRAM SUCCESS STORY

# Oklahoma

## BMPs Result in Significant Reduction of Bacteria and Phosphorus Loading

### Waterbody Improved

Beaty Creek, in northeast Oklahoma, was impaired for pathogens, specifically *E. coli* and *Enterococcus*, due in part to poor waste management practices and direct access of livestock to the stream. Landowner education and implementing best management practices (BMPs) to promote proper animal waste and nutrient management, as well as better riparian zone management have led to significantly decreased amounts of bacteria in the creek. As a result, Oklahoma expects to remove Beaty Creek from its 2006 303(d) list for *E. coli* impairment. In addition, expected phosphorus loading to Beaty Creek is also decreasing as compared to a control watershed with no BMP implementation.

### Problem

The Beaty Creek watershed contains approximately 39 chicken houses; hog and turkey operations; and extensive, streamside cattle grazing on pasture fertilized with animal waste. Septic systems, land development, some row crop agriculture and fertilizer application are also found in the watershed. These activities have cumulatively generated a high amount of nonpoint source pollution and resulted in elevated levels of bacteria in Beaty Creek. In 2002, Oklahoma placed all 13 miles of Beaty Creek on the 303(d) list as impaired for *E. coli* and *Enterococcus*. In addition, high levels of phosphorus loading contributed to eutrophication and phosphorus exceedance in Lake Eucha, a downstream reservoir.

### Project Highlights

The number one restoration priority for the Beaty Creek area was riparian buffer establishment and protection. Another focus was disseminating information on pasture management and proper application of poultry litter as fertilizer—key issues in the watershed. Numerous educational workshops, meetings, and tours demonstrating BMPs in the watershed were essential for the success



Areas for cattle feeding and waste storage were constructed to reduce the amount of bacteria and nutrients entering the stream.

of this project. Approximately 63 percent of landowners in the watershed implemented BMPs through cost-share contracts from 2000 to 2004.

### Results

Attendance was high at the various educational presentations. Approximately 100 cost-share contracts to implement BMPs in the Beaty Creek watershed were signed into action in both Oklahoma and Arkansas. BMPs included establishing 335 acres of riparian buffer

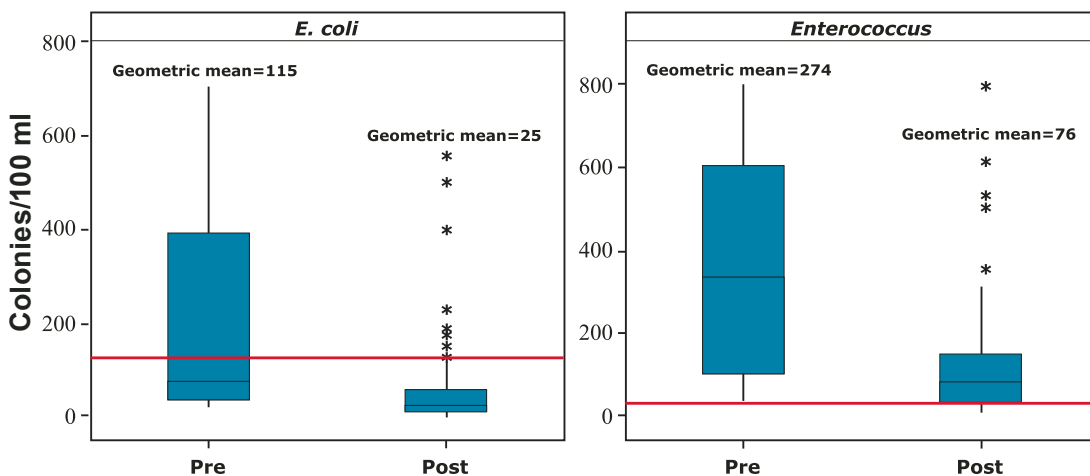
areas, establishing/managing approximately 10,000 acres of pasture; the provision of more than 150 alternative water sources for cattle; the construction of 56 heavy use areas, 16 cattle feeding/waste storage facilities, 31 miles of cross fencing, four poultry waste storage facilities; and the replacement of 27 septic systems. Resulting water quality improvements led to Beaty Creek being nominated for removal from the 2006 303(d) list for *E. coli*. This brings it one step closer to full attainment of the Primary Body Contact Recreation (PBCR) beneficial use.

In addition, BMPs have reduced the expected loading of phosphorus in the Beaty Creek watershed as compared to a control watershed with no BMPs. Analysis of water quality data collected after the implementation of the Beaty Creek BMPs indicates that the increasing trend is no longer evident, which, in itself, is a measure of success. Independent analysis of water quality data, conducted by Oklahoma State University, using a paired watershed methodology showed a 31 percent decrease in expected phosphorus loading to the lake from Beaty Creek in the presence of BMPs, compared to expected loading in the absence of BMPs. Average flow-weighted phosphorus concentrations decreased from 0.220 mg/L to 0.191 mg/L. Although phosphorus loadings are still significant, the rate of phosphorus loading has been reduced. BMP implementation to reduce nutrient loading and evaluation of the stream continues.

The success of this project and continued interest in implementing BMPs has allowed the pursuit of a related project in the adjoining Spavinaw Creek watershed. One of the greatest successes of the project is that landowners are beginning to implement the practices without the benefit of cost-share assistance, and they are requesting assistance with BMP design and using their own funds. Even landowners outside the watershed are interested in the practices that were demonstrated in Beaty Creek and are beginning to implement them.

## Partners and Funding

A total of \$1,338,401 was available to support installation of the BMPs associated with this project. This included \$632,467 federal dollars from EPA section 319 funds, \$528,133 state dollars, and a required \$177,800 match from landowners. The Eucha watershed has been a special emphasis area for Oklahoma's EQIP program, ensuring that at least \$325,000 worth of additional practices were implemented throughout the watershed. Different groups participating in the Beaty Creek project included the Oklahoma Conservation Commission, Delaware County, Oklahoma and Benton County, Arkansas Conservation Districts, Oklahoma Department of Agriculture, Oklahoma State University Cooperative Extension Service, NRCS, Farm Services Agency, Arkansas Soil and Water Conservation Commission, local producers, poultry integrators, and animal waste marketers.



Boxplots indicate the interquartile range (25<sup>th</sup>-75<sup>th</sup> percentile) and median of the data in each of two periods: "Pre" contains data from August 1999 to January 2001; "Post" includes data from July 2001 to May 2005. The red line indicates the geometric mean above which the beneficial use is not achieved. There were significant reductions in mean levels of both *E. coli* and *Enterococcus* bacteria.



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