



# NONPOINT SOURCE SUCCESS STORY

## Indiana

### Implementing Best Management Practices Corrects Nutrient Impairments in the Buck Creek-Busseron Creek Watershed

#### Waterbodies Improved

Increased nutrient levels from nonpoint sources such as livestock, agricultural activities, and septic systems caused the Buck Creek-Busseron Creek watershed to be impaired for aquatic life use. As a result, the Indiana Department of Environmental Management (IDEM) listed nearly 27 stream miles in the watershed on its Clean Water Act (CWA) section 303(d) list of impaired waters for nutrients in 2002 and for impaired biotic communities in 2010. Project partners implemented a variety of best management practices (BMPs) in the watershed between 2003 and 2015. Sampling in 2016 revealed that applicable nutrient and biologic community water quality standards are now being met. As a result, Indiana is proposing to remove three waterbodies in the Buck Creek-Busseron Creek watershed from its 2018 CWA section 303(d) impaired waters list.

#### Problem

The Buck Creek-Busseron Creek watershed is in Sullivan County in southwest Indiana (Figure 1). The watershed contains 2 miles of Busseron Creek, along with 37 stream miles of two major tributaries of Busseron Creek: Robbins Branch (10.3 stream miles) and Buck Creek (27 stream miles). The watershed is mixed land use, with 54 percent in cultivated crops, 21 percent in forest, and 7 percent in pasture/hay with some minimal mining activity. Though the watershed is mostly rural, it also contains most of the city of Sullivan, whose wastewater treatment plant has several combined sewer overflow outlets that empty into Buck Creek.

Indiana’s nutrient assessment methodology states that a waterbody is classified as impaired if two or more of the following conditions are met on the same date (assuming a minimum of three sampling events): (1) dissolved oxygen is less than 4 milligrams per liter (mg/L) or is consistently in the range of 4–5 mg/L; (2) nitrogen exceeds 10 mg/L; (3) total phosphorus exceeds 0.3 mg/L; (4) pH exceeds 9 or is consistently in the range of 8.7–9; and/or (5) algae is deemed “excessive” based on field observations by IDEM scientists.

Nutrient parameters were sampled in the watershed in 1999 and 2000. This sampling revealed an elevated level of phosphorus (1.1 mg/L and 0.47 mg/L) in both Buck Creek and Robbins Branch. In addition to

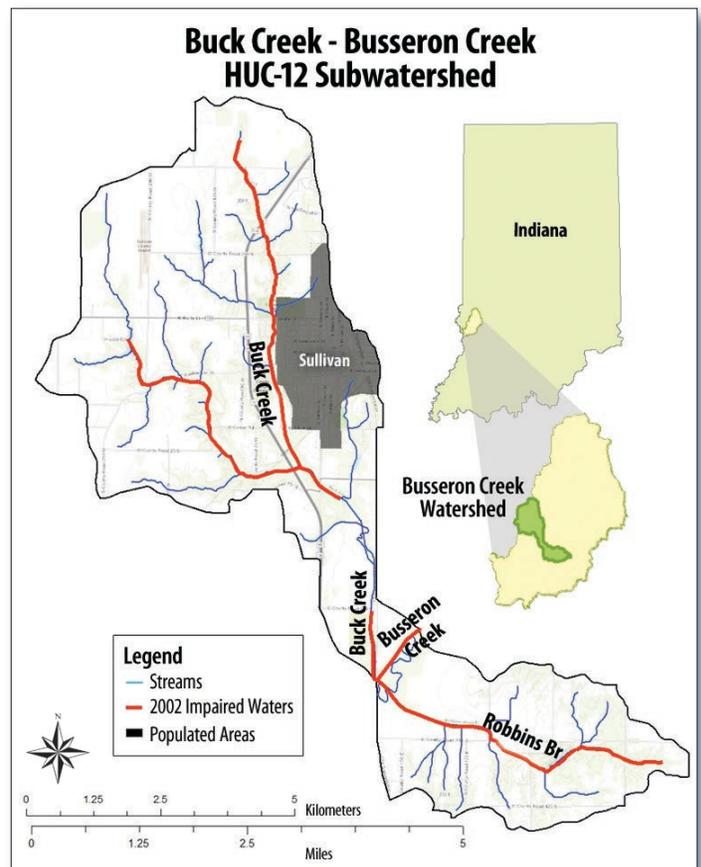


Figure 1. The Buck Creek-Busseron Creek watershed is in southwest Indiana. Buck Creek and Robbins Branch are being delisted in 2018.

elevated phosphorus levels, dissolved oxygen was found to be low in Buck Creek and Robbins Branch (4.79 and 4.7 mg/L, respectively); however, it was not low enough to prompt an official impairment listing.

Further monitoring in 2006 revealed that aquatic community scores were not achieving target benchmarks. For a waterbody to be considered supporting aquatic life use, the index of biotic integrity (IBI) score must be at least 36. The 2006 sampling revealed an IBI score of 16 in Buck Creek. On the basis of these data, Busseron Creek-Robbins Creek (INB11GA\_00) was listed on Indiana's 2002 CWA section 303(d) list of impaired waters for nutrients, and on Indiana's 2010 CWA section 303(d) list for impaired biotic communities. Since being listed as impaired in 2002, Busseron Creek-Robbins Creek has been resegmented multiple times for assessment purposes. As of 2012, it was classified as three separate segments: INB11F9\_T1001, INB11F9\_T1003, and INB11F9\_T1004.

## Project Highlights

IDEM used CWA section 319 grant funding to support the creation of a watershed management plan (WMP) in 2010. A variety of state and federal programs were used to install BMPs including 20 acres of access control; 64.1 acres of conservation cover; 3,556 acres conservation tillage; 972 acres of cover crops; 2 acres of critical area plantings; 600 feet of fence; 34 acres of filter strip; 13.4 acres of grassed waterway; 10,725 acres of nutrient management; 3,687 acres of pest management; 100 feet of streambank protection; 13 water and sediment control basins; one waste management system; and 82.7 acres of waste recycling.

## Results

IDEM reassessed the water quality in the Buck Creek-Busseron Creek watershed in 2016. Results of that sampling indicate that nutrients are no longer a water quality threat (Table 1) and that the biologic community has recovered (IBI score on Buck Creek was a 36). Due to these results, IDEM will propose to remove three segments (INB11F9\_T1001, INB11F9\_T1003, and INB11F9\_T1004) from the state's list of impaired waters in 2018. All three segments are being removed from the impaired waters list for nutrients, and the two Buck Creek segments (INB11F9\_T1003 and INB11F9\_T1004) are also being removed for impaired biotic communities (see Figure 1).

**Table 1. 2016 monitoring data for Buck Creek-Busseron Creek segments.**

Sampling Date	Dissolved Oxygen (mg/L)	Nitrogen, Nitrate-Nitrite (mg/L)	pH (standard units)	Phosphorus, Total (mg/L)
<b>Segment INB11F9_T1001 (Monitoring Site WBU-15-0041)</b>				
6/6/2016	9.97	4.7	8.16	0.087
7/6/2016	9.35	3.0	7.87	0.094
9/20/2016	7.21	0.6	7.27	0.161
<b>Segment INB11F9_T1003 (Monitoring Site WBU160-0029)</b>				
6/6/2016	5.96	1.7	7.72	0.274
7/6/2016	6.68	1.3	7.81	0.483
9/20/2016	7.66	0.2	7.27	0.283
<b>Segment INB11F9_T1004 (Monitoring Site WBU160-0161)</b>				
6/6/2016	6.30	2.6	7.77	0.335
7/6/2016	7.41	1.6	7.96	0.444
9/20/2016	7.30	0.2	7.59	0.351

Note: Indiana's nutrient assessment methodology states that a waterbody is classified as impaired if two or more of the following conditions are met on the same date: (1) dissolved oxygen is <4 mg/L or is consistently in the range of 4–5 mg/L; (2) nitrogen concentration is >10 mg/L; (3) total phosphorus is >0.3 mg/L; (4) pH is >9 or is consistently in the range of 8.7–9; and/or (5) algae is deemed excessive based on field observations.

## Partners and Funding

Multiple partners collaborated to restore water quality in the Buck Creek-Busseron Creek watershed. IDEM provided \$795,635 in CWA section 319 grants to the Sullivan County Soil and Water Conservation District, who coordinated planning and restoration work in the watershed and provided \$612,885 in landowner and in-kind match. The U.S. Department of Agriculture provided \$408,464 in Environmental Quality Incentives Program, Wildlife Habitat Incentives Program, Conservation Stewardship Program and Conservation Reserve Program funds to install BMPs. The Indiana State Department of Agriculture also provided \$20,785 in state funding for marketing, education programs, technical assistance and BMPs.



U.S. Environmental Protection Agency  
Office of Water  
Washington, DC

EPA 841-F-17-001JJ  
December 2017

## For additional information contact:

**Jamie Hosier**  
Indiana Department of Environmental Management  
317-308-3218 • [jhosier@idem.IN.gov](mailto:jhosier@idem.IN.gov)  
**Joe Schmees**  
Indiana Department of Environmental Management  
317-308-3194 • [jschmees@idem.IN.gov](mailto:jschmees@idem.IN.gov)