



# NONPOINT SOURCE SUCCESS STORY

## Indiana

### Aquatic Life in Big Creek Benefits from Land Conservation Practices

#### Waterbody Improved

Nutrients from fertilizer, livestock, and failing septic systems are the primary detriments to water quality in the Big Creek and Central Muscatatuck watershed. In 2010, the Indiana Department of Environmental Management (IDEM) listed three segments of Big Creek and one unnamed tributary segment on the state's Clean Water Act (CWA) section 303(d) list of impaired waters. Forty-four miles of stream were listed for failure to support aquatic life after a 2006 survey revealed that the fish community consisted of mostly tolerant species and few sensitive fishes. Project partners implemented a variety of land management and best management practices (BMPs) in the watershed between 2006 and 2019. Sampling in 2019 revealed that the water quality standards for aquatic life use are now being met. As a result, IDEM removed the three segments of Big Creek and the unnamed tributary segment from the 303(d) impaired waters list.

#### Problem

The Big Creek area of the Muscatatuck watershed is in southeastern Indiana and includes parts of Jennings, Jefferson, and Ripley counties (Figure 1). Big Creek was designated by the Natural Resources Commission as an outstanding river in 1997 due to the stream's environmental and aesthetic interest. This section of Big Creek flows through the Big Oaks National Wildlife Refuge. Despite the high-quality landscape directly surrounding part of the stream, the watershed receives nutrient runoff from septic systems and agricultural practices in the Big Creek headwaters. Other impairments have been documented due to exploded ordnances and metal contamination from a former military base that is now part of the Big Oaks Wildlife Refuge.

#### Story Highlights

IDEM used CWA section 319 funds to help support the creation of a watershed management plan in 2006. The plan for the greater Central Muscatatuck watershed was completed in 2009. State and federal programs were used to install BMPs in the Big Creek area of the watershed, including cover crops (340 acres), livestock exclusion fencing (382 feet), heavy use area protection (561 acres), animal trails and walkways (480 feet), watering troughs and facilities (15 units), pasture and hayland planting (81 acres), and others (Figure 2).

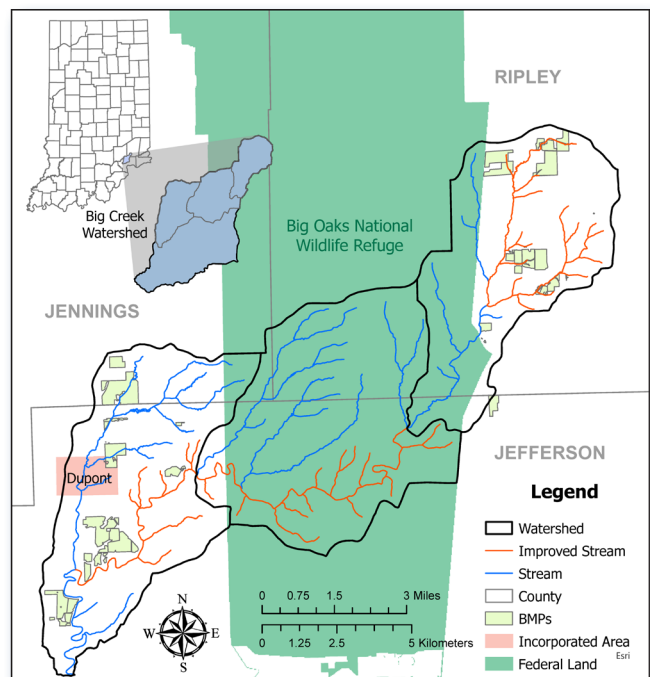


Figure 1. The Big Creek watershed is in southeastern Indiana.

The 319-funded BMP implementation phase for Central Muscatatuck watershed began in 2009 with the first of three implementation projects. The third and final phase of implementation was concluded in 2021. Land management practices in the Big Oaks National Wildlife Refuge likely contributed to

improvements and included invasive species control, pollinator habitat restoration, and controlled burns. Habitat enhancements also included dams built by beavers that were encouraged to expand their range on the refuge. The vegetation and wetlands created by the habitat restoration slowed the seepage of water into streams and allowed for greater filtration of nutrient runoff.

## Results

IDEM reassessed the biological community in 2019 and determined that the fish communities showed improvement and met water quality standards for fully supporting aquatic life use. For a waterbody to be considered as fully supporting aquatic life, the index of biotic integrity (IBI) score must be at least 36. A waterbody is classified as biologically impaired if the fish community IBI score is below the target benchmark. Results of the 2019 sampling event showed improvement in the fish community IBI compared to the 2006 sampling (Table 1). Due to these results, IDEM removed the four segments (INW0714\_02, INW0712\_01, INW0711\_T1002, and INW0711\_01) from the 303(d) list of impaired waters in 2022.

## Partners and Funding

Multiple partners collaborated to restore the biotic communities in the Big Creek watershed. IDEM provided four rounds of funding totaling \$1,589,757 in CWA section 319 grants to Historic Hoosier Hills Resource Conservation & Development (RC&D), who coordinated the cost-share program to implement the Central Muscatatuck watershed management plan. Historic Hoosier Hills RC&D provided \$975,990 in landowner and in-kind matching funds to complete the projects that benefited the Big Creek area and the greater Central Muscatatuck watershed (hydrologic unit code [HUC]-10s: 0512020706 and 0512020701). The U.S. Department of Agriculture provided \$140,678 and \$49,838 in funding for BMPs in the Big Creek area (HUC-12s: 051202070101, 051202070102, and 051202070104) through the Environmental Quality Incentives Program and the Conservation Reserve Program, respectively. The Indiana Department of Agriculture provided \$538,535 in Clean Water Indiana funding for projects throughout Ripley, Jennings, and Jefferson counties, and they provided technical assistance for the installation of BMPs.



Figure 2. Multiple BMPs were implemented to improve water quality in the watershed, including fencing to keep livestock out of streams (top), a watering facility installed on a concrete heavy use protection area pad (bottom left), and cover crops (bottom right).

**Table 1. Fish community IBI scores, before (2006) and after (2019) restoration, for four stream segments in the Big Creek area of the Central Muscatatuck watershed.**

Stream segment	2006 IBI score	2019 IBI score
Camp Creek – Big Creek (INW0714_02)	32	48
Marble Creek – Big Creek (INW0712_01)	18	50
Headwaters Big Creek (INW0711_T1002)	28	36
Headwaters Big Creek (INW0711_01)	26	36



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