



Section 319

NONPOINT SOURCE PROGRAM SUCCESS STORY

Indiana

Agricultural BMPs Reduce Chlordane and Sediment in Pigeon Creek

Waterbody Improved

Pigeon Creek, in southwestern Indiana, was impaired for chlordane and other priority pollutants from use of these chemicals on agricultural lands with poor stream buffers and high historic soil loss. Indiana placed 32 miles of this waterbody on its 303(d) list in 1996 and again in 1998 based on fish tissue data collected. Installing best management practices (BMPs) such as vegetated buffers and conservation tillage, combined with landowner education, produced a measurable improvement in water quality. As a result, Indiana removed Pigeon Creek from the 303(d) list in 2002.

Problem

The Pigeon Creek watershed lies within Posey, Warrick, Gibson, and Vanderburgh counties in southwestern Indiana. The creek flows south to the Ohio River, where its waters enter upstream of the city of Evansville's drinking water intake. Agriculture is the watershed's main land use. Crops in this watershed were historically treated with chlordane to control insects. Even though use of chlordane was prohibited in the early 1980s, high levels of this chemical persist in the sediments in Pigeon Creek and its tributaries. Because these chemicals form a strong bond with soil, Indiana Department of Environmental Management (IDEM) and local watershed groups have identified erosion from agricultural lands as the chief source of these pollutants.

The allowable threshold level of chlordane at the time that the original samples were collected would have been the U.S. Food and Drug Administration's (FDA's) action level for chlordane, which is the total of all isomers with results > 0.02 milligrams per liter. The value cited for fish tissue in the FDA's handbook, *Action Levels for Poisonous or Deleterious Substances in Human Food and Animal Feed*, is 0.3 parts per million (ppm), which was current as of August 2000.

Project Highlights

In 1997 the Citizens for the Improvement of Pigeon Creek cooperated with the Natural

Resources Conservation Service (NRCS) and the Vanderburgh County Soil and Water District (SWCD) to develop a watershed plan for the portion of Pigeon Creek in Vanderburgh County. The partners received Clean Water Act (CWA) section 319 funding to support projects on Pigeon Creek and its tributaries, including enhanced watershed planning, education, and installing BMPs such as filter strips, grassed waterways, field buffers, and conservation tillage.

From 1997 through 2001 the partners installed more than 50 BMPs designed to reduce soil erosion in the Pigeon Creek watershed. These land treatment measures have significantly reduced the amount of contaminant reaching the stream, allowing the legacy sources to be covered by cleaner sediments from other points in the watershed, moved naturally, or degraded over time. Locally led efforts continue to address sediment loading to streams in the Pigeon Creek watershed.

Results

In 2002 IDEM assessed water quality in Pigeon Creek to determine whether a total maximum daily load (TMDL) was still needed. IDEM further analyzed Pigeon Creek in 2005. IDEM compared the 1992 and 2005 data to the current FDA action level for chlordane (see table).

Table 1. Comparison of fish tissue chlordane isomer levels taken from channel catfish sampled in Pigeon Creek at Kleymyer Park, Evansville, Indiana. The sample point is near the lowest point of the Pigeon Creek watershed.

Parameter	September 1992 sample results (wet weight)	August 2005 sample results (wet weight)	Reduction
Chlordene, Alpha-	.082 ppm	.014 ppm	83%
Chlordene, Gamma-	.056 ppm	.004 ppm	93%
Nonachlor, cis-	.055 ppm	.009 ppm	84%
Nonachlor, trans-	.11 ppm	.032 ppm	71%
Oxychlordane	.012 ppm	.001 ppm	92%
Total chlordane residue	.315 ppm	.060 ppm	81%
FDA action level for chlordane*	.3 ppm	.3 ppm	–

* Maximum concentration of allowable levels of chlordane residue in edible portions of fish tissue.

Using the FDA action levels for determining impairment, the results indicated that Pigeon Creek was no longer impaired for chlordane. Therefore, the data indicated that chlordane and priority organic pollutant levels had dropped to levels sufficient to remove Pigeon Creek from the 303(d) list for both parameters.

The reductions in chlordane and other priority organic pollutants can be attributed to the efforts in this watershed to address sedimentation from erosion of croplands, which is the primary source of these pollutants. The BMPs in 1999 resulted in an estimated soil savings of 584 tons per year. Chlordane levels in fish tissue dropped significantly, including levels of chlordane breakdown isomers, further indicating that the sources of chlordane were successfully addressed by installing agricultural BMPs.

The Pigeon Creek Watershed Management Plan is addressing other water quality impairments in addition to those associated with chlordane and priority organic pollutants. IDEM and the local watershed group will continually assess progress on the status of these other impairments and determine what further work is needed.

Partners and Funding

This project was supported by \$171,990 from two CWA section 319 grants (awarded in 1997 and 1999). Landowners and partner agencies within the watershed contributed an additional \$42,997 in matching funds, in-kind services, and materials. Partners for the CWA section 319 grants included the Vanderburgh, Warrick, Gibson, and Posey County SWCDs, as well as the Four Rivers Resource Conservation and Development office. These partners helped to select sites for BMP installation, conduct education and outreach activities, and offer technical support. Monitoring and assessment of water quality in 2002 was funded by \$78,001 from a CWA section 205(j) grant to IDEM's Assessment Branch. The Indiana Department of Natural Resources, through the Lake and River Enhancement program, funded planning and BMP installation projects amounting to \$270,000 in state funds. The NRCS greatly assisted this project by allocating \$135,000 each year for the years of 1997, 1998, and 1999 through the Environmental Quality Incentives Program.



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