

Executive Summary

Highland-Pigeon Watershed drains nearly 300,000 acres of southwestern Indiana to the Ohio River. Since settlement by Europeans, the landscape of the watershed has been altered dramatically. Over the decades, settler activities have changed the dynamic equilibrium of the streams and their upslope systems. The cumulative effect of these watershed changes on the aquatic ecosystem has been degradation of water quality, loss of floodplain storage, diminished wildlife populations, and decreased aesthetic and recreational values. This Watershed Management Plan was written to evaluate the severity of these changes and to recommend implementation of best management practices, engineering studies, and educational opportunities to improve water quality in Highland-Pigeon watershed.

Major nonpoint sources of pollutants to the watershed are row crop agriculture, mined lands, and urban runoff. Cropland area in the watershed has been reasonably constant since 1997. Watershed wide, conservation tillage systems were used on 25% of cropland in 1997, 16% of cropland in 1998, and 33% of cropland in 2000. Data on the conservation tillage in the watersheds are insufficient to statistically demonstrate trends. In the year 2000, the Warrick County portion of the plan area had the highest rate of conservation tillage adoption, with 51% of its cropland in some type of conservation tillage.

While all 37 subwatersheds are impaired for aquatic life support to some degree, among the more healthy subwatersheds, and those most warranting protection against degradation, include principally Smith Fork (subwatersheds 20 and 21), Little Pigeon Creek (subwatershed 12) and Big Creek (subwatersheds 17, 18 and 19).

There are also extensive bottomland wetlands along Pigeon Creek and the Ohio River (subwatersheds 15, 19, 21 and 33) that remain. We recommend these be studied for enhanced legal protection, perhaps in association with an overall corridor initiative for the watershed.

RESTORATION OF STREAM CORRIDOR

According to IDEM's surface water assessment methodology, all streams in the watershed are impaired for support of aquatic life due to physical habitat degradation. No site met the IDEM's QHEI score to be considered fully supportive of aquatic life and therefore should be considered a candidate for 303(d) listing and TMDL development.

This is the effect of nearly two centuries of single-purpose water resource management for improved agricultural drainage and construction of the Wabash and Erie Canal. To address historic stream degradation and soil erosion, we recommend extensive new investments in agricultural BMPs. Stream corridor restoration is required to improve connectivity and width of the riparian corridor; such an investment will benefit nutrient and water flow, sediment trapping during floods, water storage, wildlife migration, floral dispersal, biodiversity, and sustainability (NRCS 1998).

We have recommended stream corridor restoration efforts in nearly all subwatersheds in the Pigeon Creek watershed. This restoration is a complex endeavor that begins with the recognition that human-induced changes have damaged the structure and function of the ecosystem and prevent the recovery of the watershed to a sustainable condition. These human-induced changes include:

- Creation of the Wabash and Erie Canal
- Channelization of first and second order streams to facilitate agricultural drainage
- Draining of wetlands
- Dredging, clearing and snagging of Pigeon Creek to reduce flooding
- Increased watershed imperviousness

- Mineral extraction and massive landscape alteration
- Loss and/or alteration of vegetative cover across the watershed
- Addition of nutrients and other pollutants to the streams

The Pigeon-Highland Watershed Steering Committee, or similar stakeholder galvanizing group, will be required to drive the social, political and financial requirements of a whole-scale corridor restoration program. EWSU and EMC are currently forming a CSO Stakeholder Advisory Committee that may also present opportunities for public education and involvement.

Part of stream corridor restoration that should be supported immediately is conservation buffers in agricultural and urban areas. Besides reducing sediment, nutrients and pesticides in runoff water, conservation buffers can greatly increase wildlife habitat.

The USDA's Conservation Reserve Program (CRP) is an excellent opportunity for establishing conservation buffers in agricultural areas. Costs for installation of conservation buffers ranges widely, as expected given the broad variety of buffer types. The CRP shares in the cost of installation of conservation buffers and provides for long-term contracts for the setting aside of eligible lands.

HIGHLY ERODIBLE LANDS

According to our land use map, soils map, and sediment loss models, subwatersheds 6, 18, 20, 22, 23, 24, 25 and 26 are the priority areas for investing in soil erosion controls. These subwatersheds contain Fairpoint and Alford soils that appear to be tilled. In any case, tillage of the Fairpoint or Alford soil associations will result in very high soil loss rates and special efforts to mitigate these areas will reap significant benefits.

Conservation tillage in 2000 was practiced on approximately one-third of all cropland, being highest (51% of cropland) in Warrick County. In 2000 in Gibson County, farmers practiced conservation tillage on about 25% of croplands. There are large areas of highly erodible Alford soils in Gibson County (Figure 7) that warrant conservation tillage (or CRP set aside).

POINT SOURCE CONTROLS

We examined the available performance records of public and private wastewater treatment plants (WWTP) in the watershed. We also monitored the EWSU's combined sewer system tributary to Pigeon Creek and examined available operational records. Recommendations are presented below.

We have data that examines point sources of pollution throughout the watershed. Permitted point sources include EWSU's eight CSO discharges to lower Pigeon Creek, five industrial discharges, and six municipal wastewater treatment plants (WWTP). The CSOs are addressed below under the context of the SRCER. The five industrial discharges appear to be minor contributors of pollutants to Pigeon Creek, with generally good compliance records. In general, the municipal WWTPs in the watershed do not have acceptable performance records and require expansion, upgrading, and/or additional operator training. Three municipal WWTPs have been upgraded, but more should be studied for possible upgrade or expansion.

- The Chandler WWTP has a history of poor compliance, but has been upgraded, so pollutant discharges from this point source may be reduced in the future.
- The Haubstadt WWTP also had a history of poor compliance. We verified this with our sampling program. This WWTP has been upgraded-since the data was collected- to reduce wet weather overflows and improve effluent quality.
- The Fort Branch WWTP also has noncompliance reports to its records. We measured high coliform bacteria concentrations, high nitrates, and supersaturated dissolved oxygen conditions downstream of this facility. No plans for expansion or upgrade have been made- but it has been discussed for several years.

- The Elberfeld WWTP has numerous noncompliance reports in the EPA's Permit Compliance System database. It is currently being expanded.

COMBINED SEWER OVERFLOWS

We monitored wet weather CSO discharges for eight months. From the water quality data, the waterway is most affected by the discharges of *E. coli* bacteria. That water quality standard is regularly exceeded during wet weather both within and upstream of the CSO discharge area. The inflow/infiltration monitoring program should be expanded in the CSS. Since more overflows appear to occur in areas with high concentrations of commercial/industrial customers it is recommended that inspection of all commercial and industrial structures be undertaken to identify any additional sources of inflow and infiltration to the sewer system. Efforts should be made to disconnect such direct sources of inflow as far as possible.

Existing flow monitoring efforts should be greatly expanded in order to confirm the capacities of major sanitary sewers and to verify the results of the capacity analyses conducted earlier.

In view of the fact that overflows continue to be significant and are perhaps causing deterioration of Pigeon Creek, Evansville should continue to investigate the feasibility of providing in-line storage in 11 sub-systems and detention/ retention basins at various sites. A gate control system, which would control the non-automated CSOs to Pigeon Creek and the Ohio River, would allow the storage of combined sewerage in the interceptors tributary to the diversions. This gate control system could provide about 154,5000 cubic feet (11.6 MG) of storage. To obtain the maximum storage, available, additional weirs, gates, etc. may be necessary. A study to investigate the feasibility of such a system and the condition of the sewers at the storage sites (to avoid damage from surcharging) is warranted and should be implemented.

Evaluation of a runoff control program to store and control runoff before it enters the combined system is also recommended. The feasibility and effectiveness of this alternative requires development of a system model, scheduled for completion as part of the long-term CSO control plan LTCP.

Elements of the LTCP are (USEPA 1995):

1. Characterization, monitoring and modeling activities for selecting and designing effective CSO controls
2. Public participation programming to involve stakeholders in decision-making for long-term controls
3. Consideration of sensitive areas as the highest priority for controlling overflows
4. Evaluation of alternatives to select controls that meet the Clean Water Act requirements
5. Cost and performance considerations
6. Operational plan revisions to include the selected long-term control measures
7. Maximization of treatment at the existing treatment plants for wet weather flows
8. An implementation schedule
9. A post-construction compliance monitoring program

The watershed management plan for Highland-Pigeon watershed has been prepared by watershed coordinator Rick Obenshain, an employee of Four Rivers Resource Conservation & Development Area, Inc., with assistance from: Amy Steeples and Gary Seibert- Resource Specialists with Indiana Dept. of Natural Resources, Div. Of Soil Conservation; Dennis Angel, Posey Co. SWCD chairman, PHWSC chairman; Ethel Osborn, Gibson Co. SWCD Coordinator; and Jane Bruce, Warrick Co. SWCD Coordinator. Members of the ad hoc Watershed Management Plan committee include those people listed above, and: Darrell Rice, NRCS District Conservationist for Vanderburgh Co.; Norma Duckworth, SWCD Water Quality Specialist for

Vanderburgh Co.; and Jeri Ziliak, Posey Co. SWCD Coordinator. Geographic Information System (GIS) files and assistance were provided by Larry Hazelwood, SW Indiana Brine Coalition.

The members of the Pigeon-Highland Watershed Steering Committee are: Greg Obert and Travis Nolcox, Gibson Co.; Mike Watson and Gerry Howard, Warrick Co.; Dave Ellison, Tom Nicksch and Joy Fitzgerald, Vanderburgh Co.; Dennis Angel and Jim Droege, Posey Co. Administrator of IDEM's Section 319 grants for the watershed was Dave Elgin, Coordinator of Four Rivers RC&D Area, Inc.

The information, data and recommendations found within this document draw heavily from "Pigeon Creek Watershed Diagnostic Study" written by Harza Engineering Company, October, 2000, commissioned by Evansville Water & Sewer Utility(EWSU) and Four Rivers RC&D Area, Inc., and paid for by EWSU and grants from In. Dept. of Environmental Management and In. Dept. of Natural Resources Lake & River Enhancement.

Highland-Pigeon Watershed HUC 05140202

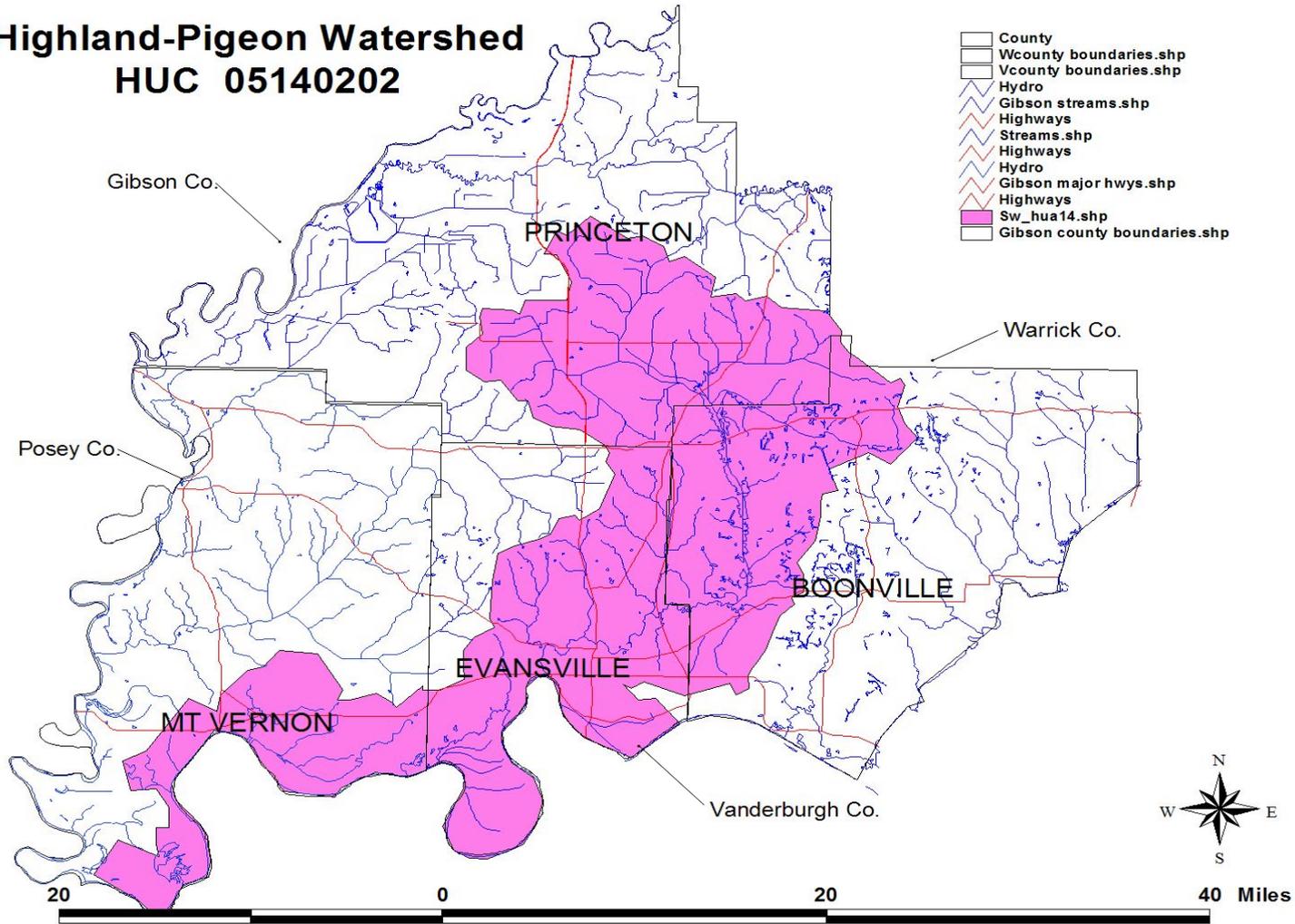


Figure 1: Highland – Pigeon watershed