VFC Index - Watershed (Plan)

Program: Watershed

IDEM Document Type: Plan

Document Date: 4/5/2006

Security Group: Public

Project Name: Prairie Creek WMP

Plan Type: Watershed Management Plan

HUC Code: 05120202 Lower White

Sponsor: Daviess County SWCD

Contract #: 4-152

County: Daviess

Cross Reference ID: 16182108

Comments: Martin

Additional WMP Information

Checklist: 2003 Checklist

Grant type: 319

Fiscal Year: 2004

IDEM Approval Date: 4/5/2006

EPA Approval Date:

Project Manager: Pamela Brown

Prairie Creek Watershed Plan

Developed By:
The Daviess County
Soil & Water Conservation District

August 1, 2005

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Executive Summary

Prairie Creek watershed, HUC 05120202-080, which drains into the West Fork of the White River, is located in southwestern Indiana's Daviess County. Since 1998, the majority of the waterways within the Prairie Creek watershed have been listed on the Indiana Department of Environmental Management's 303(d) List of Impaired Waters for repeated violations of state Water Quality Standards (WQS) due to high levels of the bacterium Escherichia coli (E. coli). WQS violations have also been issued due to high levels of the nutrients nitrogen and phosphorous, as well as impaired Biotic Community Status. In December of 2004, the Prairie Creek Watershed Planning Committee convened its first public meeting to list stakeholder issues and concerns regarding water quality. A second public meeting was held in January of 2005 to further discuss water quality issues. A third public meeting was held in April of 2005 to prioritize issues and concerns, identify sub-watershed hotspots, and set goals. After examination of historical and current land use data, IDEM's 305(b) and 303(d) data, the Lower White River Restoration Action Strategy, preliminary data from a Indiana Geological Survey (IGS) study being conducted in the watershed, data collected through the Hoosier Riverwatch program by the Daviess County Soil and Water Conservation District (SWCD), Long-Term Hydrologic Impact Assessment (L-THIA) and data from the National Pollutant Discharge and Elimination System (NPDES), it is believed that violations for E. coli are being caused primarily by agricultural practices and failed or failing septic systems. Nutrient pollution is largely due to agricultural practices while septic systems and home garden fertilizer application may be a secondary source. A major goal of the current plan is to reduce the amount of E. coli and nutrients reaching the streams and tributaries of the watershed by constructing manure staging facilities in accordance with NRCS standards. These manure staging facility facilities will provide livestock operators the ability to properly stage manure and therefore control E. coli and nutrient dispersal until conditions for field application are suitable. A second goal of the plan is an education/outreach program targeted at farmers, homeowners, and both small and large-scale livestock operators to inform them of the health and environmental issues caused by E. coli and nutrient pollution. Conservation practices such as grass waterways, buffer/filter strips, cover crops, and no till will be promoted and implemented in coordination with the litter staging facility construction and education/outreach programs. Success of the plan will be determined through future monitoring of chemical, biological, and physical parameters of the Prairie Creek watershed.

Acronyms

AFO -Animal Feeding Operation
CAFO -Confined Animal Feeding Operation
CFO -Confined Feeding Operation
DNR -Department of Natural Resources
FOG -Fuel, Oil, Gas
HUC -Hydrologic Unit Code
IBI -Index of Biotic Integrity
IDEM -Indiana Department of Environmental Management
K -Potassium
N -Nitrogen
NPDES-National Pollution Discharge Elimination System
NPS -Non point source (pollution)
NRCS -Natural Resources Conservation Service
OWQ -Office of Water Quality
P -Phosphorus
QHEI -Qualitative Habitat Evaluative Index
SWCD -Soil and Water Conservation District
TMDL -Total Maximum Daily Load
TNC -The Nature Conservancy
USDA -United States Department of Agriculture
USGS -United States Geological Survey
WASCOB- Water and Sediment Collection Basin
WQS -Water Quality Standards
L-THIA- Long-Term Hydrologic Impact Assessment
AI - Avian Influenza
MS4 - Municipal Separate Storm Sewer System
SCS - Soil Conservation Service
BMP - Best Management Practice
WRAS – Watershed Restoration Action Strategy
NO_3 - Nitrate
NO_2 - Nitrite
CWA - Clean Water Act
EPA - Environmental Protection Agency
ECHO - Enforcement and Compliance History Online
IGS - Indiana Geological Survey
IAC - Indiana Administrative Code

List of Advisory Board and Committee Members

2004 Daviess County Soil and Water Conservation Board:

Chairman- Scott Nally
Vice Chairman- Phil Flint
Secretary- Bob Cornelius
Member- Todd Allison
Member- Nolan Ryan

2005 Daviess County Soil and Water Conservation Board:

Chairman- Phil Flint
Vice Chairman- Todd Alison
Member- Bob Cornelius
Member- Pete Slowick
Member- Wes Cornelius

Figure 1: Prairie Creek Watershed HUC 05120202-080

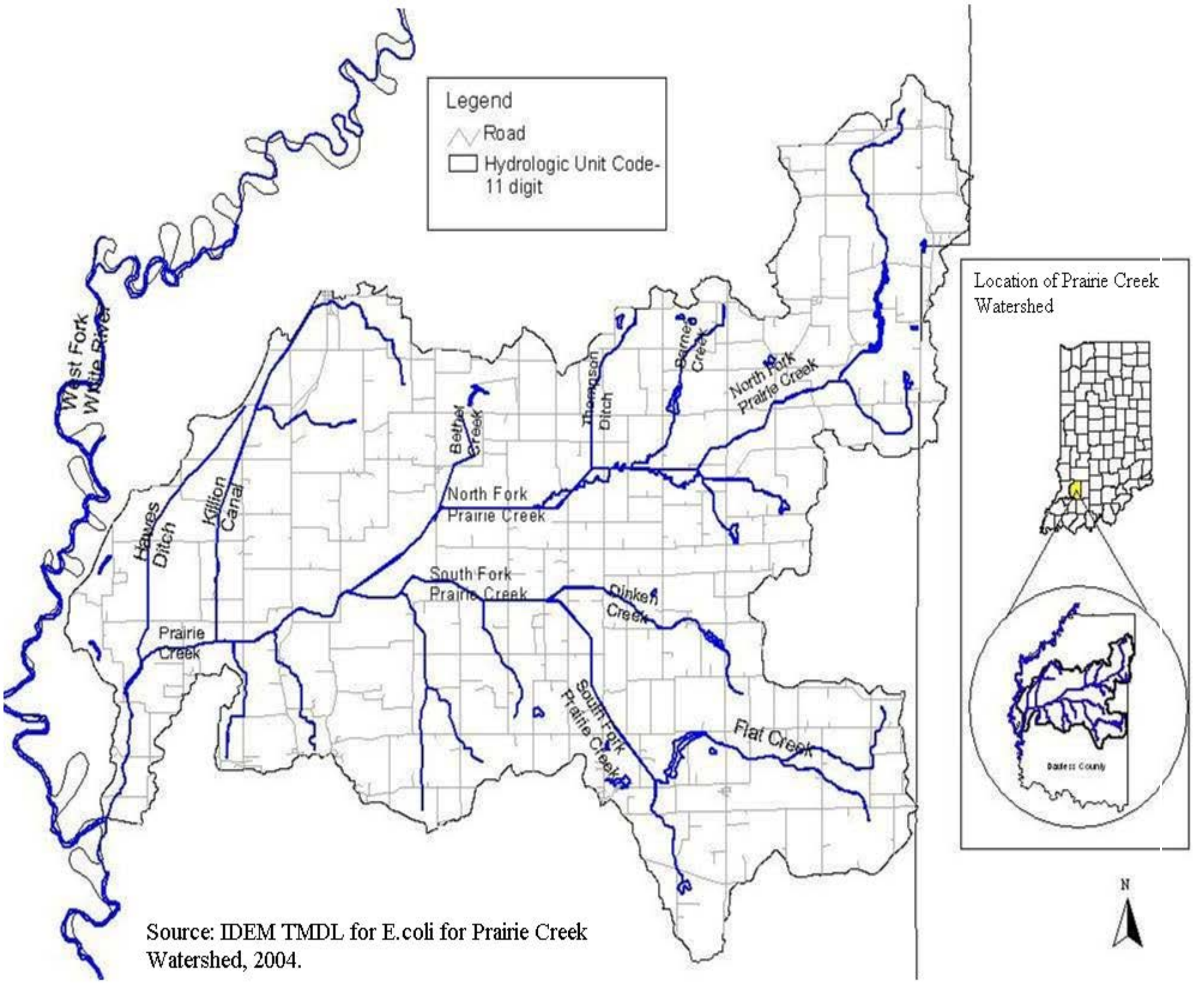


Figure 1. Map of Prairie Creek Watershed: Displays the boundaries of the Prairie Creek watershed within Daviess County, Indiana.

1.0 Introduction

The Prairie Creek watershed, HUC 05120202-080, is located in about the middle of Daviess County in southwestern Indiana. It lies between Odon and Loogootee on the east, and Plainville and its confluence with the White River on the west. The watershed consists of 97,235.2 acres, which amounts to about 3.5% of the White River (West Fork) Watershed at the confluence.

The North and South Forks of Prairie Creek were listed on the 1998 and 2002 303(d) List of Impaired Water Bodies for not attaining state Water Quality Standards (WQS). Both North and South Forks of Prairie Creek, as well as Barnes Creek, Bethel Creek, Flat Creek, Dinken Creek, Antioch Creek, Killion Canal, Eagan Ditch, Prairie Creek, and other smaller tributaries within the watershed are listed on the 2004 303(d) List of

Impaired Water Bodies for not meeting state WQS for primary contact/recreational uses. All of the creeks are listed as impaired by *Escherichia coli*; however, Eagan Ditch is impaired by both *E. coli* and nutrients. *E. coli,* a bacterium capable of causing dysentery after contact through swimming in or drinking *E. coli* contaminated water, is used as an indicator that other waterborne disease causing organisms may be present. *E. coli* is used for pathogen identification in a water body due to the relatively low cost of identification. Water quality violations in the categories of Sediment/Siltation/Habitat (QHEI) and Biotic Community Status have also been reported by IDEM officials.

In September 2004 Total Maximum Daily Load (TMDL) requirements for *E. coli* were reported for the Prairie Creek watershed by the Indiana Department of Environmental Management (IDEM). To address the issue of poor water quality and obtain monetary assistance for water quality remediation and maintenance purposes, the stakeholders within the Prairie Creek watershed convened to discuss issues, concerns, causes, and possible solutions for dealing with the watershed's poor water quality. The planning of watershed management practices for Prairie Creek are integrated with the TMDL plans to achieve required wasteload and load allocations of non point sources of *E. coli* by implementing best management practices. Implementation of best management practices in the watershed as a method of reducing levels of *E. coli* was recommended in IDEM's Office of Water Quality's TMDL report for Prairie Creek Watershed.

1.1 Public Participation/Watershed Partnerships

In February 1997, the Daviess County SWCD convened a meeting of Daviess County stakeholders as part of their locally led conservation program. Those involved were Perdue Farms, Farbest Foods Inc., Purdue Cooperative Extension, Daviess County SWCD, Natural Resources Conservation Service (NRCS), the Indiana Department of Natural Resources (IDNR) Division of Soil, and the Prairie Creek Conservancy, the drainage board for Prairie Creek. This meeting produced many areas of concern including livestock concentrations and river and stream management. Three additional public meetings held under the group name, Prairie Creek Watershed Planning Committee, were conducted during December 2004, January 2005, and April 2005. Stakeholders that were known to have interest in the Prairie Creek Watershed Plan were sent invitations to the public meetings. To include any stakeholders that may have been forgotten, the public meetings were advertised prior to the meeting in the *Washington Times Herald* newspaper. The Prairie Creek watershed stakeholders have developed a structure in which the Daviess County SWCD Board provides sponsorship. Consensus among stakeholders regarding water quality concerns and priority issues was reached through open discussions at the public meetings. The public meetings were facilitated by Daviess County SWCD chairperson, Scott Nally, IDEM Watershed Specialist, Bonny Elifritz, and Watershed Plan Author, Eric Roberts.

<u>Mission Statement</u>

The mission of the Prairie Creek Watershed Planning Committee is to compose and implement a comprehensive watershed management plan by taking into account all stakeholder concerns or issues. The watershed plan will serve as a “living document” to be used as a resource for current and future projects that may affect the quality of physical, biological, or chemical parameters found within Prairie Creek and its tributaries.

We hope to provide service, direction, and leadership for all stakeholders linked to the Prairie Creek watershed in order to maintain a clean and wholesome environment in which to work and live for current and future generations.

We will accomplish this through compliance with environmental rules and regulations, adherence to sound environmental practice, and support from stakeholders and local community leaders.

Vision Statement

The stakeholders will work together with the common goal of providing a cleaner watershed for current and future generations.

Two outreach activities were held in the form of open discussion public meetings at the Daviess County SWCD/USDA building in Washington, Indiana during the months of December 2004 and January 2005. Participants at the meetings represented Perdue Farms, Farbest Foods, Inc., Purdue Cooperative Extension, Daviess County SWCD, NRCS, IDNR Division of Soil, the Prairie Creek Conservancy, as well as landowners in the Prairie Creek Watershed. Initial water quality concerns and issues discussed regarding Prairie Creek Watershed included:

- Excess water caused by increased impervious areas due to increased development within the watershed, farming practices, and the removal of water control structures.
- High nitrogen levels due to commercial farming practices (over application of fertilizers, farming to edge of tributaries, eradication of natural riparian filter strips to facilitate water movement, lack of cover crops to control erosion, etc.), livestock, residential fertilizer, MS4, and home septic systems.
- High phosphorus levels due to farming practices, livestock manure application and mortality disposal, residential fertilizing, MS4, and home septic systems.
- E. coli presence due to livestock manure, homes with improperly functioning or managed septic systems, homes without septic systems, MS4, natural fauna, and soil types.
- Avian Influenza (AI) presence causing increased poultry livestock mortality, wild fowl mortality, and insects.
- Increased need for field tiles and WASCOBs to reduce erosion and sedimentation.
- Sediment dispersion due to residential and proposed highway construction, farm practices, terraces, non-vegetative ditches and waterways, soil type, and improper ditching practices.
- I-69 construction causing a loss of watershed due to environmental footprint, Fats, Oils, Greases (FOG)/Vehicular material, trash, Rule 5 (a state regulation

attempting to reduce offsite water quality damages from construction site stormwater runoff) and increased development.

- Future loss of crop ground to development.

A third public meeting was held on April 18, 2005 to prioritize the initial concerns and issues listed above. After group discussion the stakeholders prioritized the issues into the following order:

1. *E. coli* contamination from livestock operations, farming practices, and failed/failing septic systems.
2. Nitrogen and Phosphorous pollution from livestock operations, farming practices, as well as failed/failing septic systems.
3. Increased need for WASCOBs and field tiles to reduce sedimentation and channel erosion.
4. Farm practices including tillage practices and livestock management, loss of crop ground, and I-69 conflicts.

The initial concerns of excess water caused by increased impervious areas due to increased development within the watershed and Avian Influenza (AI) presence causing increased poultry livestock mortality, wild fowl mortality, and insects are relevant concerns; however, they are not able to be addressed within the current plan. Therefore, these will be concerns that will be dealt with in future projects.

2.0 The Watershed

2.1 Watershed location

The Prairie Creek watershed is located in about the middle of Daviess County in southwestern Indiana. (Refer to Figure 1: Prairie Creek Watershed HUC 05120202-080) It lies between Odon and Loogootee on the east, and Plainville and its confluence with the White River on the west. The watershed consists of 97,235.2 acres, which amounts to about 3.5% of the White River (West Fork) Watershed at the confluence.

Prairie Creek is formed by the confluence of the main channel and its south fork. The main drainage way rises just west of Raglesville, and flows in a northerly direction for about two miles. It then makes a broad bend and flows south, just east of Raglesville, and continues in a southwesterly direction. The drainage way of the south fork of Prairie Creek rises just west of Loogootee and flows in a northwesterly direction. It joins the main drainage way about three miles northeast of Washington. Prairie Creek then continues in a westerly direction. It is joined at intervals from the north by two constructed drainage ditches, the Killion Canal Ditch and the Hawes Ditch. Prairie Creek then flows south about three miles into the west fork of the White River. This confluence is about three and one-half miles west of Washington, Indiana. The watershed is approximately 22 miles long with an average width of eight miles.

2.2 Description and History

The Prairie Creek channel was first dredged between 1918 and 1920 after World War I and again in the early 30's. Both dredging operations were for drainage purposes. Although the channel had been dredged for drainage purposes, the channel was not capable of carrying flood waters and thus had planned periods of overflow. During the early 1950s flooding of the channel was estimated at 11,000 acres of crops due largely in part to tree growth in the channel (Cochran).

In the early 1950s a petition for reconstruction was submitted to the Daviess Circuit Court by the local people. Due to significant opposition by a large number of property owners who did not feel the reconstruction plan was adequate to solve the flooding problem while at the same time offsetting the cost of the plan, the action became only semi-active (Cochran).
When the Soil Conservation Service of the U.S. Department of Agriculture gained interest in soil management via the watershed approach in the early 1950s, the Concerned People of Prairie Creek presented their issue to the Supervisors of the Daviess County SWCD. The Daviess County SWCD helped them prepare an application for Federal assistance and on September 20, 1954 the chairman of the Daviess County SWCD signed the application. The application was also signed by both protesters of and petitioners for reconstruction by means of the semi-active drainage petition filed at the Daviess Circuit Court (Cochran).

In order for the citizens of the Prairie Creek Watershed to create a legal organization to carry out maintenance of the watershed, they had to wait until the State of Indiana passed the Conservation Act. After the passage of the Conservation Act, the Prairie Creek Conservancy, one of the current participants in the creation of the watershed plan, was created (Cochran).

2.3 Natural History

An Indiana University anthropological research project discovered that Native Americans used the land of the Prairie Creek watershed as early as 6000 B.C. (Allison, personal communication, February 18, 2005). The natives would collect resources such as fish, mussels, and fresh water to provide sustenance for their families. European settlers began to modify the land of the Prairie Creek watershed when they began establishing homesteads in the early 1800s. The land within the watershed originally had forests composed of tulip-poplar, numerous species of oak, hickory, elm, maples and ash trees (Allison, personal communication, February 18, 2005). After the timber on the land was felled, residents of the area needed a method to drain the land for agricultural purposes. By the late 1800s, a major effort to control the hydrology was established through the use of tile drainage and ditch creation (Mike Homoya, personal communication, February 2, 2005). Manipulation of the watershed's hydrology continues today through similar means.

2.4 Land Use

There are about 26 miles of Federal and State Highways in the watershed (US Hwy 50 & 150 and Indiana State Hwy 45, 57, and 58). There are about 300 miles of hard surfaced and improved roads maintained by the county highway department. Although not a completed project, Interstate-69 is proposed to cut directly through the middle of the Prairie Creek watershed. Refer to Appendix 1: Map of the Proposed I-69 Route.

The watershed area of 97,235.2 acres (151.93 square miles) includes 22,022.4 acres in developed pasture/grassland; 64,556.8 acres in row crop agriculture, and 102.4 acres in wet area agriculture. There are 185.6 acres in low and high density urban development. There are 11,050 acres of bottomland in the watershed. Coal has been mined both past and present by means of shaft and strip operations in various parts of the watershed. Refer to Figure 2: Land Use in Prairie Creek Watershed for a map of the Prairie Creek watershed detailing the locations of various land uses. Refer to Table 1 for a breakdown of the land uses within the Prairie Creek watershed. Refer to Figure 3 for a map of coal mining activities in the Prairie Creek watershed.

Figure 2: Land Use in Prairie Creek Watershed

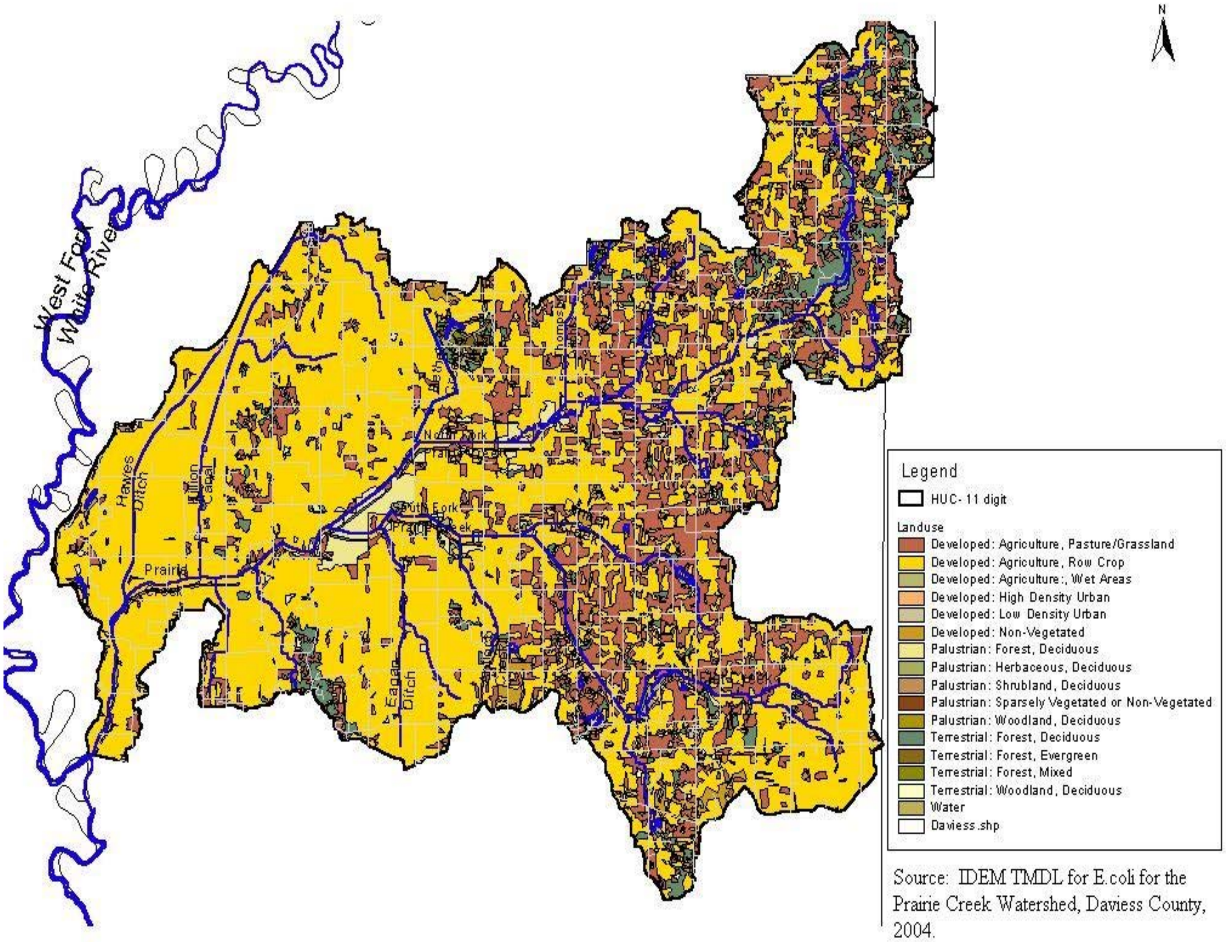


Figure 2. Map of Land use: Displays land use within the Prairie Creek watershed.

Table 1. Land use breakdown: Provides description of land uses within the Prairie Creek watershed in square miles and as a percent of the total watershed.

Land Use Breakdown in Prairie Creek watershed		
Land use	**sq. miles**	**% of total**
Developed: Agriculture, Pasture/Grassland	34.41	22.66
Developed: Agriculture, Row Crop	100.87	66.44
Developed: Agriculture, Wet Area	0.16	0.11
Developed: High Density Urban	0.11	0.07
Developed: Low Density Urban	0.18	0.12
Developed: Non-Vegetated	1.73	1.14
Palustrian: Forest, Deciduous	3.07	2.02
Palustrian: Herbaceous, Deciduous	0.26	0.17
Palustrian: Shrubland, Deciduous	0.6	0.4
Palustrian: Sparsely Vegetated or Non-Vegetated	0.01	0.007
Palustrian: Woodland, Deciduous	0.05	0.66
Terrestrial: Forest, Deciduous	8.16	5.34
Terrestrial: Forest, Evergreen	0.27	0.18
Terrestrial: Forest, Mixed	0.33	0.22
Terrestrial: Woodland, Deciduous	0.87	0.57
Water	0.85	0.56
Total	**151.93**	

(Source: Jennifer Hutchison, IDEM personal communication, February 2005)

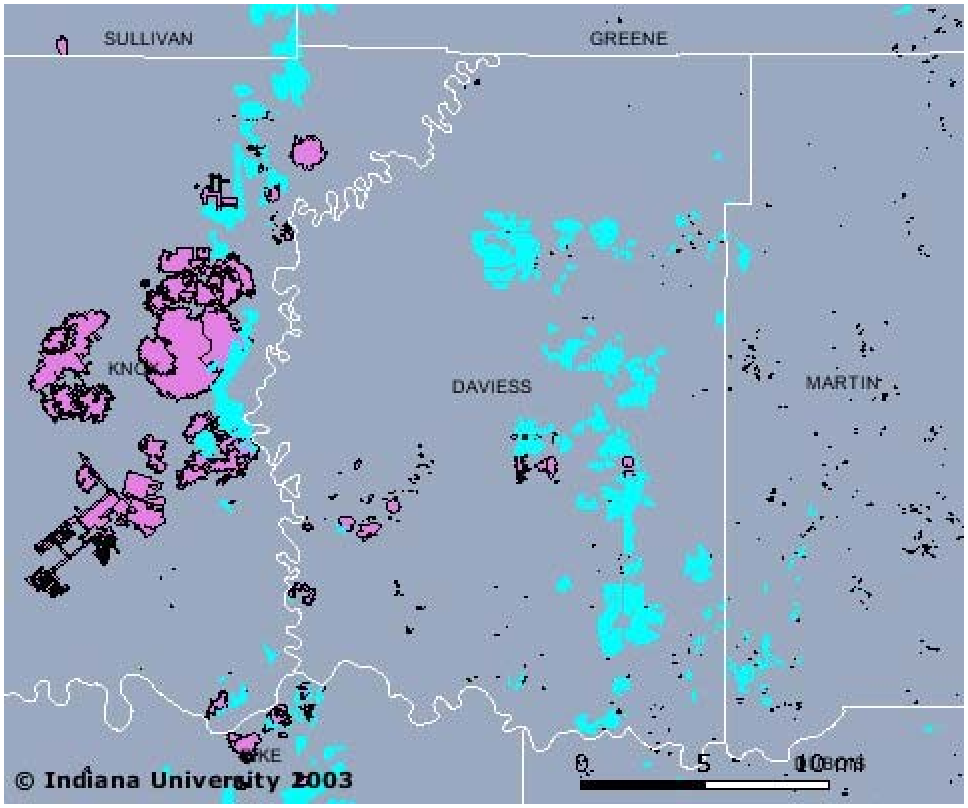


Figure 3. Map of Coal Mines: Displays the locations of surface coal mines (blue) and underground coal mines (pink) in Prairie Creek watershed. Large portions of the eastern half of the Prairie Creek watershed are speckled with surface mines. Source: Indiana Geological Survey July 2005.

2.5 Soils and 2.6 Topography

The topography of the watershed ranges from nearly flat glacial till plains to strongly rolling slopes of residual soils, and windblown sands and silts.

In the southeast and eastern portions of the watershed, as well as a small portion southwest of Raglesville, Hosmer-Cincinnatti-Iva soil associations are documented. These soils are deep, well drained to poorly drained. They are normally found on nearly level to strongly sloping soils on uplands (USDA 1974).

Ragsdale-Iva-Reesville soil associations are located in the south-central and central portions of the watershed, as well as a small section southwest of Odon. Here the underlying bedrock has been blanketed with deeper windblown silt. These soils are deep, very poorly to poorly drained. Wetness is the major limitation; however, with adequate drainage, crops can be cultivated. These soils are normally found on level to strongly sloping upland areas (USDA 1974).

Hummocks and dunes of windblown sand occupy the west part of the watershed. Lyles-Ayrshire-Princeton soil associations are deposited in the "V" section at the confluence of the North and South Forks of Prairie Creek and continue to the west and northwest of the watershed. These soils are deep, very poorly drained to well drained.

Drainage is extremely important for agriculture uses. The soils are normally found on nearly level to strongly sloping soils on uplands and terraces. These soils are best suited to melons but must be carefully managed to conserve soil and fertility (USDA 1974).

In a small section within the northwest portion of the watershed, east of the Killion Canal, and also in the extreme southwest portion of the watershed, Bloomfield-Princeton-Ayrshire association soils are deposited. These soils are deep, somewhat excessively drained to somewhat poorly drained. Erosion control is key to management of these soils since they are listed as “Potentially Highly Erodible” in the USDA NRCS Indiana Technical Guide Section IIC. These soils are normally found on level to steep uplands (USDA 1974).

In the center of the watershed, continuing along the banks of the North and South Forks of Prairie Creek until meeting with the Lyles-Ayrshire-Princeton soils in the “V” confluence of the two forks, Haymond-Nolin-Petrolia soil associations have been deposited. These soils are well drained to poorly drained on nearly level bottomlands. More specifically, a type of soil called King predominates in this area. Water deposited on King soils takes a long time to percolate through the soil. Flooding and wetness tend to be the major factors inhibiting agricultural practices on these soils (USDA 1974).

All soils of the watershed are underlain by rocks of the Pennsylvanian Age. The rock formation dips in a southwesterly direction and outcrop in the northeast part of the watershed. They are represented by sequences of interbedded sandstones, shales, limestones, coals, and underclays. Elevations range from 432 feet above seal level at the junction of Prairie Creek and the West Fork of White River to around 720 feet above sea level east of Odon. The main alluvial valley of Prairie Creek ranges in width from about 1.5 miles wide just above the junction of the North and South forks to about 260 feet at the constriction near Highway 57 (Watershed 1957).

2.7 Hydrology

Forty nine miles of Prairie Creek were dredged and channalized and fifteen miles of levees were constructed in the early 60s for increased water flow and to decrease the incidence of flooding. At the same time, twelve flood control structures were constructed (Watershed 1957). These structures, mostly small ponds and lakes, were built to serve as sediment collection basins for the watershed. Near the lower limits of the watershed, levees protect a small portion of this land from floodwaters of both Prairie Creek and the West Fork of the White River. This land is included within the limits of the Bennington Levee District which primarily protects terrace soils of White River. Under present conditions about 89 % of this bottomland area would be inundated by the design storm. This storm is considered to be of 6-hour duration occurring with average soil moisture conditions and at average intervals of once in 50 years. The watershed protection project completed in the early 60s decreased the occurrence of flooding on an estimated 5,000 acres of floodplain land (USDA 1974). Numerous field tiles have been constructed over the years to further facilitate water movement and to decrease soil erosion.

Water for urban and domestic use is supplied largely from wells. During glacial times Prairie Creek served as an outlet for glacial waters and the sand and gravel they carried. Because of this a large supply of water exists under parts of the present floodplain. Water for livestock and other farm uses is also supplied by springs, stock water ponds, and small streams.

There are about 26 miles of Federal and State Highways in the watershed (US Hwy 50 & 150 and Indiana State Hwy 45, 57, and 58). There are about 300 miles of hard surfaced and improved roads maintained by the county highway department (Watershed 1957). These impervious areas contribute to overland water flow which might increase the amount of water carried by the streams within the watershed. Although the plans are not finalized, Interstate 69 is proposed to cut directly through the Prairie Creek watershed. This will likely add to an increase of water laden with non point source pollution from the roadway to the channels of the watershed.

2.8 Climate

Mean temperatures range from 23.1 degrees Fahrenheit in January to 88.6 in July. The extremes recorded are 19 degrees below zero and the highest is 113 degrees. The average date of the last freeze is April 13 and that of the first freeze is October 23. The mean precipitation for the area is about 42.8 inches. The heaviest rainfall comes in the months of March, April, May, and June. The minimum annual rainfall recorded by Washington Station is 30.7 inches, the maximum is 63 inches (USDA 1974).

2.9 Land Ownership

Although the vast majority of the land within the watershed is privately owned and managed, the Prairie Creek Barrens Nature Preserve and the Thousand Acre Woods, are lands of significant size that are managed by state or private agencies. Refer to Figure 4 to view the locations of these properties.

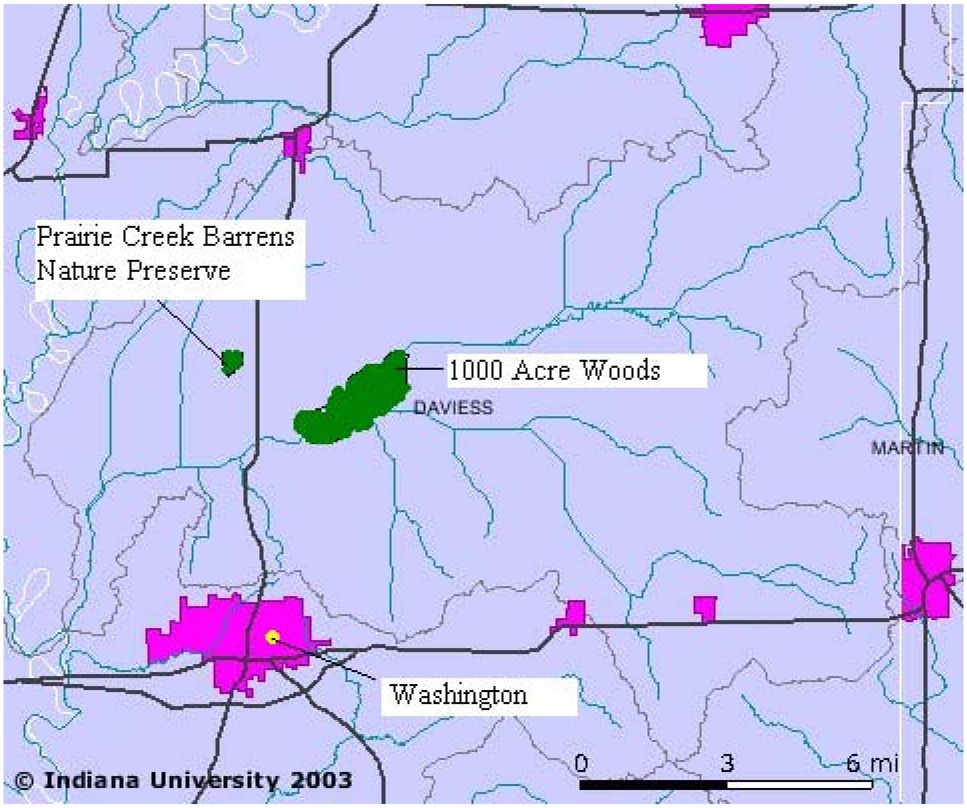


Figure 4. Map of Land Ownership: Displays the locations of the Prairie Creek Barrens Nature Preserve, 1000 Acre Woods, and the City of Washington. The 1000 Acre Woods is located at the confluence of the North and South Forks of the Prairie Creek. Source: Indiana Geologic Survey, July 2005.

Prairie Creek Barrens Nature Preserve, located east of the Killion Canal and north of Prairie Creek in Steel Township, is an 85 acre state owned nature preserve. Managing and restoring the site to barrens and prairie vegetation that had thrived there prior to and during the early 1800's was the main objective of the state when purchasing the site. Landowners within a three mile radius surrounding the nature preserve allowed seed collection of various native plants; most of the seeds have now been planted in the upland sections within the preserve boundaries (Mike Homoya, personal communication, February 2, 2005).

The Thousand Acre Woods, located in the "V" formed at the confluence of the North and South Forks of Prairie Creek, is owned and managed as a silver maple (*Acer saccharinum*) and elm *(Ulmus americana)* wet floodplain forest by The Nature Conservancy (TNC) (Gailey 1999). Currently TNC owns 961 acres; however, the conservancy is hoping to acquire 71 more acres to make the entire property 1032 acres. Dominant tree species include green and black ash, sweet gum, silver, red and ash-leafed maple, pin oak, cotton wood, sycamore, and American elm. Historically, farmers were unable to drain the soils of this area to levels suitable to agriculture; this eventually aided the continued existence of one of the last and largest remaining wet floodplain forests in this region of southwestern Indiana (Gailey 1999).

2.10 Cultural Resources

Montgomery Recreational Park, located on the north eastern edge of the town of Montgomery, is a significant cultural resource located directly within the Prairie Creek watershed. The pond at the recreational park was created during the Prairie Creek watershed project of the 1960's. The pond serves as both a place for recreational water activities and also as a sediment collection basin within the watershed.

2.11 Endangered Species

The Prairie Creek Barrens Nature Preserve and Daviess county contain many federally and state endangered or threatened species of fish, mollusks, plants, mammals, reptiles, birds, insects and high quality natural communities. Refer to Appendix 2: List of Threatened or Endangered Species created by the Indiana Natural Heritage Data Center within the IDNR for Daviess County. The Oklahoma sedge (*Carex oklahomensis*), also identified in the preserve, is endemic to this part of the state of Indiana. The American badger (*Taxidea taxus*), which is state endangered, as well as a species of special concern, the Eastern spadefoot (*Scaphiopus holbrookii*), have been documented on or near the Prairie Creek Barrens Nature Preserve (Mike Homoya, personal communication, February 2, 2005).

3.0 Identifying Water Quality Problems

Section three is divided into subsections based on individual water quality projects and computerized models which contributed water quality data to be analyzed for the creation of the watershed plan. These data reports will aid in identifying water quality problems and causes. Eventually, when Best Management Practices (BMPs) have been implemented, these data reports can serve as baseline data to which newly collected data can be compared to determine the effectiveness of the implemented BMPs.

Prioritized problems listed by stakeholders at April 2005 public meeting:

1. *E. coli* contamination from livestock operations, farming practices, and failed/failing septic systems.
2. Nitrogen and Phosphorous pollution from livestock operations, farming practices, as well as failed/failing septic systems.
3. Increased need for WASCOBs and field tiles to reduce sedimentation and channel erosion.
4. Farm practices including tillage practices and livestock management, loss of crop ground, and I-69 conflicts.

3.1 305(b) Water Quality Report

Section 305(b) of the Clean Water Act mandates states to compose and present a water quality assessment report of the states' waters to the United States Environmental Protection Agency every two years (IDEM 2004). Nearly one-fifth of the states' streams are assessed each year for support of aquatic life use, primary contact, and fish consumption. The formal 305(b) Water Quality Report is presented to the U.S.EPA in even numbered years while a more informal report is presented in odd numbered years (IDEM 2004).

All water bodies in Indiana are designated for Aquatic Life Use, Primary Contact (recreational use), and Fish Consumption use as outlined in 327 IAC Article 2 (Jody Arthur, personal communication, February 2005). Some waters are designated as a source of drinking water. Water quality assessments are designed to determine how well a body of water fulfills its designated usage (Jody Arthur, personal communication, February 2005). If a water body is determined to not be supporting the designated use, then further investigation is completed to determine the cause of the impairment. Refer to Appendix 3: IDEM Site Specific Waterbody Assessment to view a list of all streams in the Prairie Creek watershed that have been assessed, as well as the cause of the streams impairment. All waterways within the Prairie Creek watershed listed on the 305(b) report were assessed for Primary contact (recreational use). No waterways in the watershed were assessed for Fish Consumption or as a source of drinking water. Six water bodies were assessed for Aquatic Life usage. Data collected for the 305(b) report identified impairments in the Prairie Creek watershed in the categories of *E. coli*/Pathogens, Sedimentation/Siltation/QHEI, Impaired Biotic Communities, and Nutrients.

3.1.1 E. coli/ Pathogens Category

E. coli bacteria are associated with the intestinal tract of warm-blooded animals. They are widely used as an indicator of the potential presence of waterborne disease causing bacteria, protozoa, and viruses because they are easier and less costly to detect than the actual pathogenic organisms. The presence of waterborne disease causing organisms can lead to outbreaks of such diseases as typhoid fever, dysentery, cholera, and cryptosporidiosis.

The current IDEM 305(b) Water Quality Report, mandated by the Clean Water Act, contains baseline data collected within the first six months of 2003 for many of the streams contained within the Prairie Creek watershed. With the exception of Hawes Ditch and Eagan Ditch Basin, all of the streams within the Prairie Creek watershed listed on the 305(b) Water Quality Report are rated as "Highly Impaired" in the Pathogen category. Eagan Ditch Basin was rated as "Moderately Impaired" in the Pathogen category while Hawes Ditch had no recorded entry. The labels "Highly Impaired and Moderately Impaired" indicate the degree to which a water body does not support one or more of the water body's designated uses (IDEM 2004). The Pathogen category, which is measured by the presence of *E. coli* in cfu/100mL, is used to determine Primary contact impairment. The standards for Primary Contact (recreational use) as stated in 327 IAC 2-6-1 are as follows:

"E. coli bacteria, using membrane filter (MF) count, shall not exceed one hundred twenty-five (125) per one hundred (100) milliliters as a geometric mean based on not less than five (5) samples equally spaced over a thirty (30) day period nor exceed two

hundred thirty-five (235) per one hundred (100) milliliters in any one (1) sample in a thirty (30) day period."

Hawes Ditch was the only stream recorded as "Fully Supporting" in the Primary Contact category while all other listed streams were rated as "Not Supporting."

E. coli is a documented water quality problem within Prairie Creek watershed. Previous water quality studies performed by IDEM have resulted in listing the North and South Forks of Prairie Creek on the 1998, 2002, and 2004 303(d) list of impaired waters. In 2004 Prairie Creek, Barnes Creek, Bethel Creek, Flat Creek, Dinken Creek, Antioch Creek, Killion Canal, Eagan Ditch, as well as many smaller unnamed tributaries, were added to the 303(d) list of impaired waters in addition to the North and South Forks of Prairie Creek. Using the most recent and official data from IDEM OWQ, a TMDL report was composed to address the issue of *E. coli* water contamination. Data collected and analyzed by IDEM, Daviess County SWCD, Lower White River WRAS, and the Town of Montgomery Wastewater Treatment Plant all document contamination from *E. coli.* The Long Term Hydrologic Impact Assessment (L-THIA), which will be discussed more thoroughly later in this section, estimates the losses of *E. coli* through non point source pollution on various land uses.

3.1.2 Sediment/ Siltation/ Habitat (QHEI) Category

The North Fork of Prairie Creek was listed as "Moderately Impaired" in the categories of Siltation and Other Habitat Alterations for 2004 305(b) report from IDEM. Habitat assessments were calculated by using the Qualitative Habitat Evaluation Index (QHEI), a set of six separate metrics designed to assess specific portions of the stream site. QHEI total scores of less than 51 indicate a poor habitat quality, signifying that the poor habitat quality could result negatively on the biological community present in the water body (Sobat, personal communication February 2, 2005) If the biological community is of poor quality and the habitat is assessed to be in good condition, then further examination of water chemistry parameters will be conducted to determine the cause of the poor biological community. For a more detailed explanation of how a QHEI is calculated, contact IDEM, Office of Water Quality (OWQ), Assessment Branch, Biological Studies Section.

3.1.3 Impaired Biotic Community Category

In the category of Biotic Community Status, the North Fork of Prairie Creek and a segment of Prairie Creek were rated as "Moderately Impaired" while another segment of Prairie Creek was rated as "Slightly Impaired" in the 2004 IDEM 305(b) report. The 1998 Lower White River WRAS also indicated impairment in the support of aquatic life usage. Biotic Community Status is based on the streams scoring on the Index of Biotic Integrity (IBI). IBI scores are calculated with 12 metrics that assess fish community and trophic composition, fish health and condition (IDEM 2001). Indiana narrative for biological criteria [327 IAC 2-1-3(2)] states that "all waters, except those designated as limited use, will be capable of supporting a well-balanced, warm water aquatic community." The water quality definition of a "well-balanced aquatic community" is "an aquatic community which is diverse in species composition, contains several different trophic levels, and is not composed of strictly pollution tolerant species" [327 IAC 2-1-9(49)] (Sobat, personal communication February 2, 2005).

3.1.4 Nutrients Category

The North Fork of Prairie Creek and Eagan Ditch Basin were both rated as “Moderately Impaired” in the Nutrients category. Benchmarks used in accordance with the best professional judgment of IDEM scientists to classify a water body as impaired for nutrients are:

- Total Phosphorus (P) - one or more values greater than or equal to 0.3 mg/l
- Nitrogen (N) (measured as $NO_3 + NO_2$) - one or more values greater than 14 mg/l
- Dissolved Oxygen - values below the water quality standard of 4.0 mg/l or values consistently at/close to the standard, in the range of 4.0 - 5.0 mg/l.
- pH - values above the water quality standard of 9.0 or values consistently close to the standard, 8.7 or above.
- Algae described as "excessive" based on field observations by trained staff.

In most cases, it requires two or more of these conditions to be met in order to classify a water body as impaired (Jody Arthur, personal communication, February 2005).

The assessment of the North Fork of Prairie Creek resulted in one sample (of three samples taken) equal to 18 mg/l for nitrogen, and three phosphorus samples equaling 0.4, 0.3, and 0.45 mg/l (Jody Arthur, personal communication, February 2005). The levels of N and P found in the North Fork of Prairie Creek violated the above benchmarks used to determine nutrient pollution.

The assessment of Eagan Ditch Basin resulted in three of three samples with P levels between 0.3 and 0.5mg/l. One of three samples for N resulted in an N level of 25mg/l (Jody Arthur, personal communication, February 2005). The levels of N and P detected in Eagan Ditch Basin were sufficient to validate nutrient impairment given the benchmarks listed above.

3.2 303(d) List of Impaired Waters

Section 303(d) of the Clean Water Act (CWA) requires states to identify waters not satisfying state WQS. The 303(d) list is created using the 305(b) water quality Assessment Database (303(d) listing methodology). A priority ranking of waters based on the degree to which a water body supports its designated use is also required by Section 303(d) of the CWA. This ranking places water bodies into one of five categories. Refer to Appendix 4: 303(d) List Categories for a detailed description of each category. If a body of water does not meet or is not expected to meet Indiana Water Quality Standards (WQS) and is placed in Category 5, then it will be added to the 303(d) list of impaired waters. After the listing and ranking of the waters is completed, states are required to establish Total Maximum Daily Loads (TMDL) for specific water bodies listed in Category 5A in an effort to attain state WQS for the specified water body's intended use.

The North and South Forks of Prairie Creek were listed on the 1998 and 2002 303(d) list of impaired water bodies for not attaining state WQS. Both North and South Forks of Prairie Creek, as well as Barnes Creek, Bethel Creek, Flat Creek, Dinken Creek, Antioch Creek, Killion Canal, Eagan Ditch, Prairie Creek, and other smaller tributaries are listed on the 2004 303(d) list of impaired water bodies for not meeting state WQS. All of the creeks are listed as impaired by *E. coli*; however, Eagan Ditch is listed as impaired by both *E. coli* and nutrients (TMDL 2004). North Fork Prairie Creek is on the 305b report for nutrient impairment and will be included on the 2006 303d list for nutrients (Jody Arthur, personal communication, February 2005). Refer to Figure 5* to view a map of impaired waters within Prairie Creek watershed.

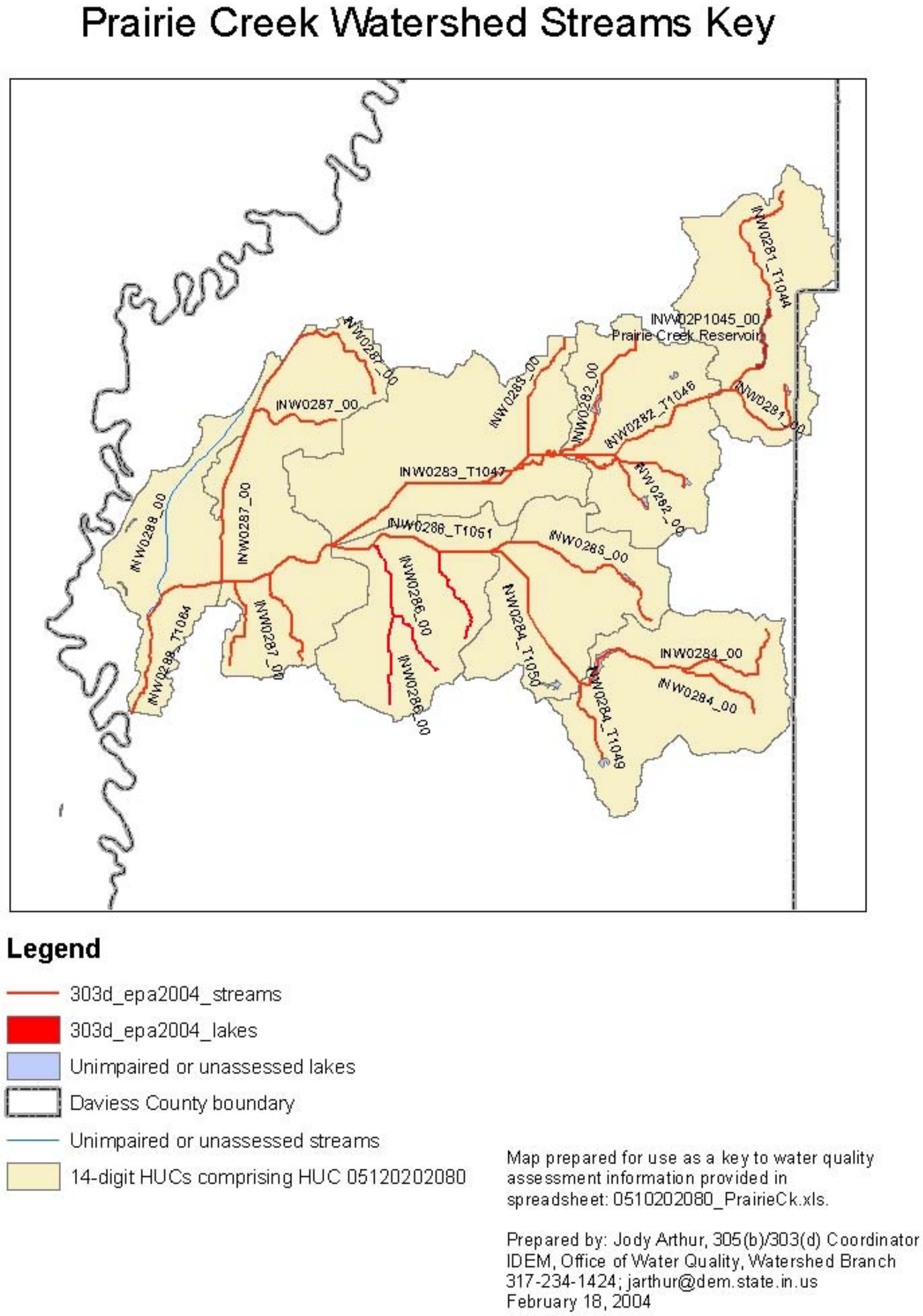


Figure 5. Map of Impaired Streams: Displays impaired and unimpaired/unassessed streams and lakes within the Prairie Creek watershed for the 2004 303(d) List of Impaired Waters. *NOTE: Hawes Ditch was assessed after this figure was prepared and is now listed as impaired for E. coli. See Figure 6.

In 2002, IDEM conducted a comprehensive *E. coli* survey of both forks of the Prairie Creek watershed. Review Figure 6 for a map of the sampling sites in Prairie Creek

Watershed. During the thirty day period of April 23, 2002 to May 21, 2002, IDEM sampled 31 sites five times ensuring that all sampling dates were evenly spaced apart. All thirty-one sites failed the single sample maximum standard for *E. coli* on at least one occasion throughout this sampling event conducted during Indiana's recreational season (April 1st until October 31st).

Due to unusable samples or samples not being collected, the geometric mean for five of the sampling sites could not be calculated. The geometric mean value was calculated for the remaining 26 sites concluding that only one site, Site 29, was not in violation of the geometric mean standard. The state WQS regarding *E. coli* is 125 cfu/100mL. Supported by the data collected during the comprehensive study in 2002, IDEM concluded that an *E. coli* TMDL plan should be created (TMDL 2004). To obtain and review raw data collected by IDEM regarding *E. coli* contact IDEM Office of Water Quality.

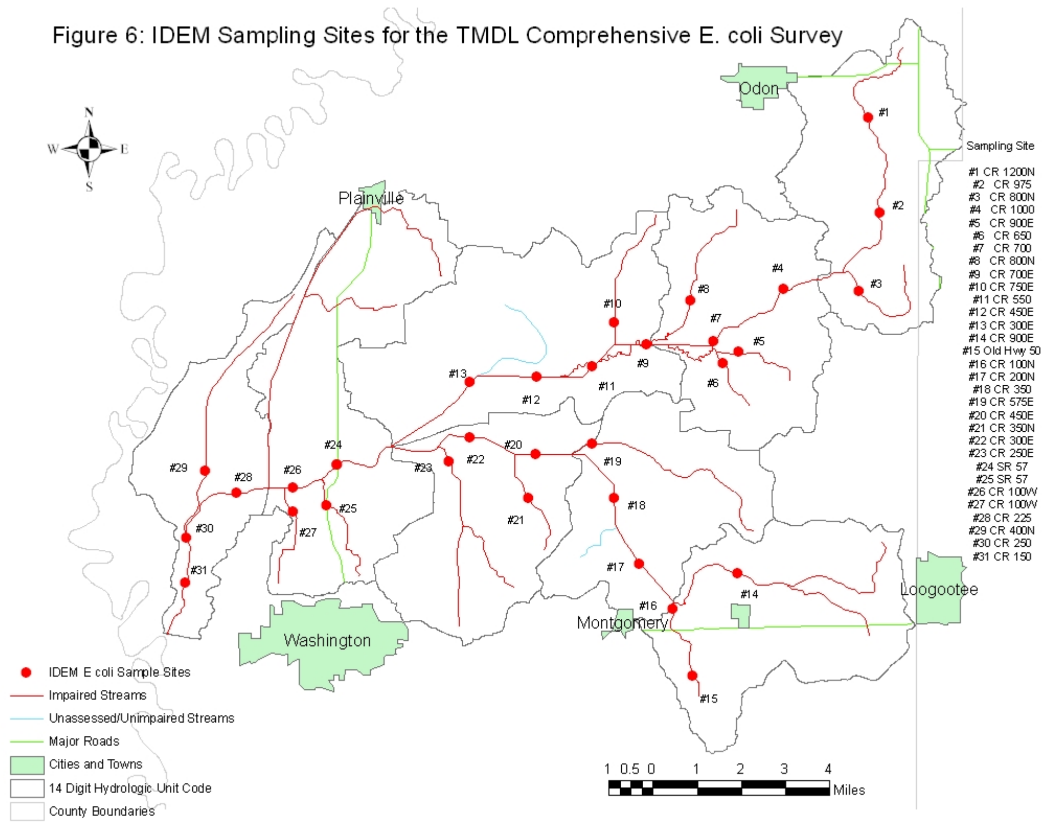


Figure 6. Map of IDEM Sampling Points: Displays IDEM sampling sites for the TMDL for E. coli in Prairie Creek watershed.

3.3 <u>Indiana Geological Survey Ground Water Data</u>

Currently, a study titled "An evaluation of the storage and movement of potential contaminants in soils at a CFO where manure is applied to highly permeable sands" is being conducted just west of Hawes Ditch by Greg A. Olyphant of the Indiana University Department of Geological Sciences and the Center for Geospatial Data Analysis. The study is part of the Section 104(b)(3) Grant Program, which aims to determine the performance of the National Pollution Discharge Elimination System (NPDES). The study hypothesizes that nutrients from commercial fertilizers and animal wastes are percolating through the soil zone and into the groundwater aquifers before plants have the ability to use the nutrients (Olyphant 2004). Figure 7 displays a map of Daviess County where the soils are prone to ground water contamination by nitrates. Substantial portions of the western half of the Prairie Creek watershed are contained within the highlighted areas of the map. Through the projects monitoring procedures, the scientists hope to track the effects that current manure application practices have on the groundwater quality in the area (Olyphant 2004). Although the results reviewed for the watershed plan are preliminary, current data suggests that "natural recharge (of groundwater aquifers), via unsaturated groundwater flow induced by infiltration, is occurring in the project area and that the recharge water contains substantial concentrations of nitrate and other nutrients (Olyphant 2004)."

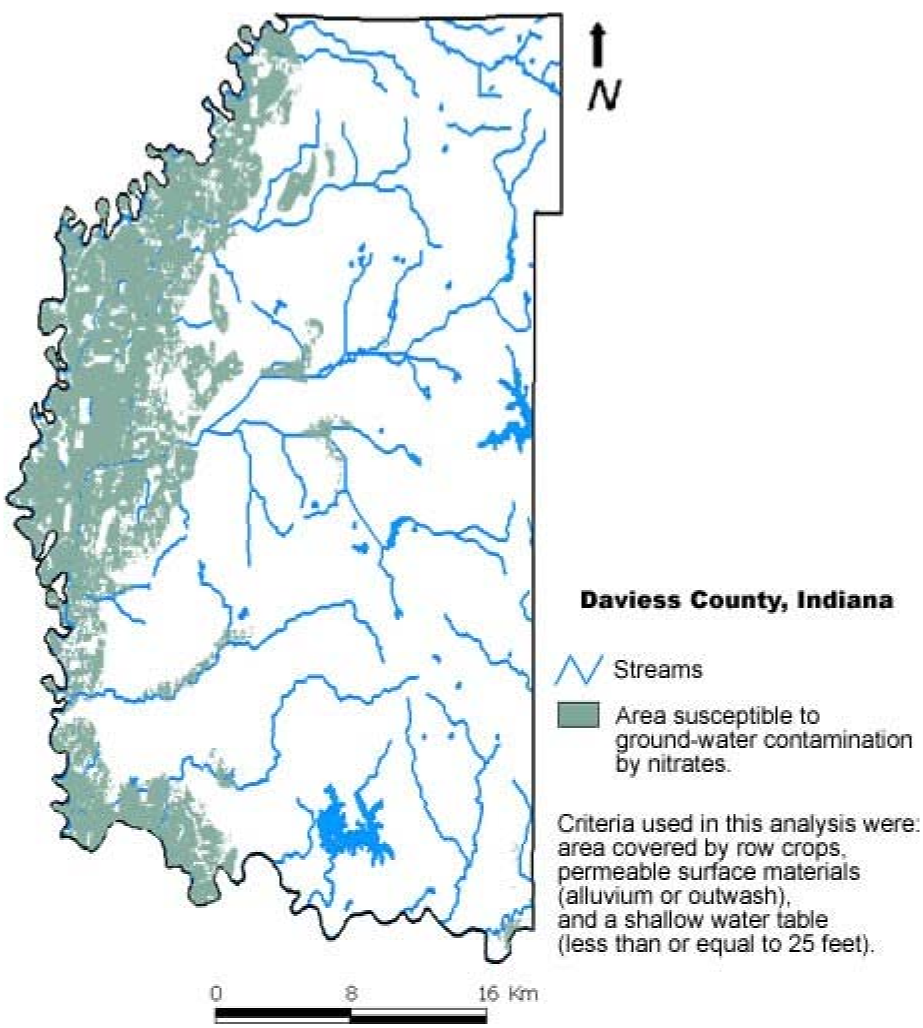


Figure 7. Map of Lands Susceptible to Nutrient Contamination: Displays land area below which aquifers are prone to contamination by nitrates. A large portion of the western half of Prairie Creek watershed is within the highlighted regions. Source: Letsinger, July 2005.

3.4 Lower White River Watershed Restoration Action Strategy

The Lower White River Watershed Restoration Action Strategy's (WRAS) main goal is to serve as a point of reference for stakeholders to improve the water quality of the Lower White River by implementing strategies in sub watersheds such as the Prairie Creek watershed (IDEM WRAS 2001). Data utilized in the composition of the 1998 Lower White River WRAS was from IDEM's Office of Water Quality. The White River WRAS concludes that 100 percent of Prairie Creek did not support recreational uses in 1998 due to pathogens. The WRAS also determined that 92% of the assessed streams in the watershed support aquatic life use while the remaining 8% only partially support aquatic life usage (IDEM WRAS 2001).

3.5 Daviess County SWCD/Hoosier Riverwatch Program

In October 2004 and June 2005 the Daviess County SWCD performed water quality testing using the Hoosier Riverwatch Program (non-quality assured). Refer to Appendix 5: Daviess County Prairie Creek E. coli Sampling Data to view the raw data from the water quality testing. Refer to Figure 8 to view a map of the SWCD sampling sites. The line graph below labeled Figure 9 shows that sites four, five, and nine violated state WQS for *E. coli* levels in colonies/100mL during the 2004 data collection. Sampling site number five also recorded elevated levels of *E. coli* during the 2005 data collection. The graph shows two sites that did not record any *E. coli* present during either of the data collection months. Since non point source pollution often requires rainfall to aid in the movement of a contaminant, variations in the levels of *E. coli* detected between the two sampling periods can be attributed to the amount of rainfall received during the sampling periods.

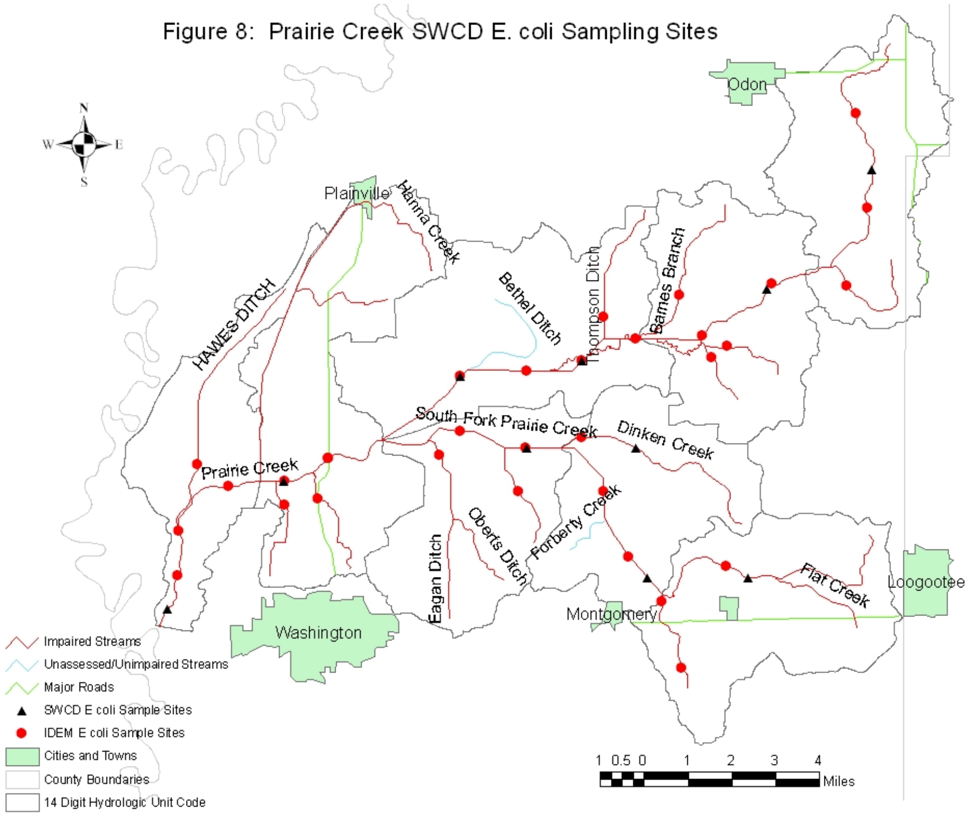


Figure 8. Map of SWCD E. coli Sampling Sites.

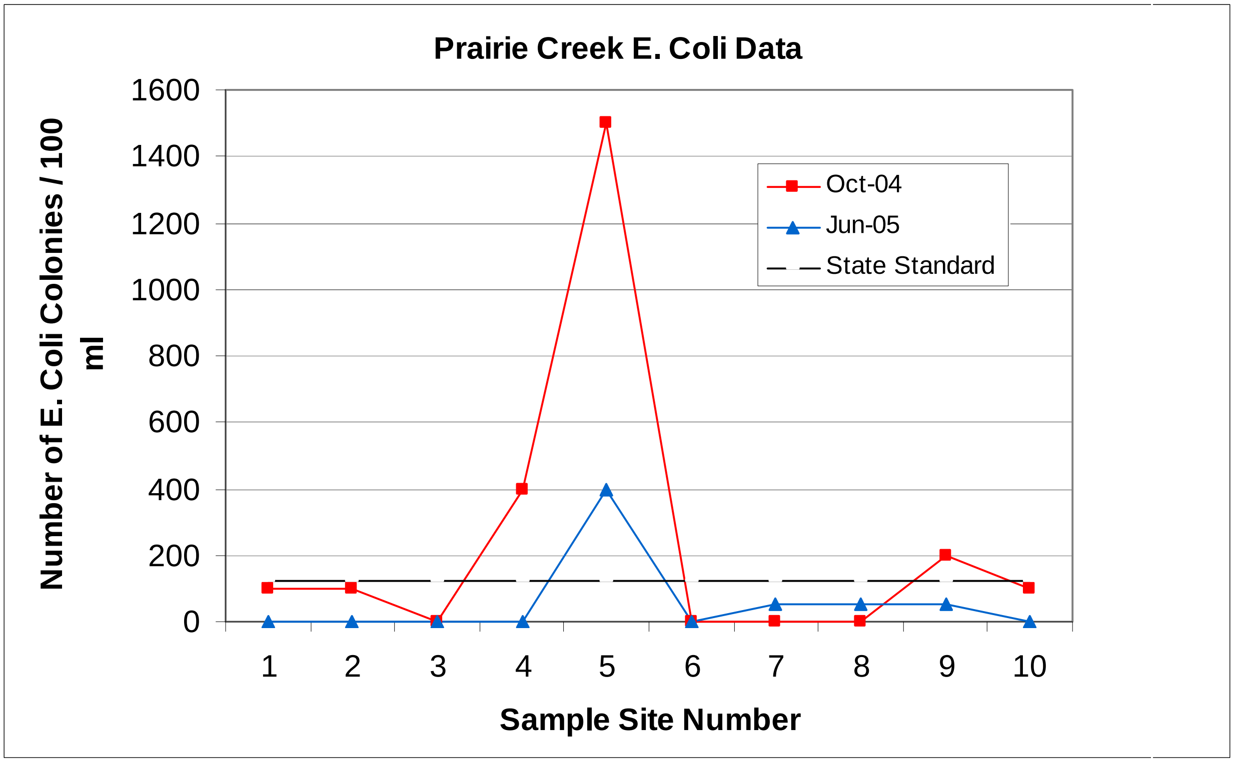


Figure 9. SWCD *E. coli* Data: The state water quality standard (125 colonies/100mL) is represented by the black line with white marks. The orange line with squares represents the number of *E. coli* colonies/100mL that was documented for each site during the October 2004 water quality study. The blue line with triangles represents *E. coli* levels collected and documented during the June 2005. Data used to create this graph was collected by the Daviess County Soil and Water Conservation District using Hoosier Riverwatch methodology.

3.6 Long-Term Hydrologic Impact Assessment (L-THIA)

The Long Term Hydrologic Impact Assessment (L-THIA) is an analysis tool developed by Purdue University in conjunction with the U.S. EPA and U.S. Army Corps of Engineers which allows the user to estimate site-specific changes in runoff, recharge, and nonpoint source pollution for past, present, or planned land uses. The estimations are derived from analysis of soil type, land use, and long-term precipitation data. In a scenario based on data from the Prairie Creek Watershed (Refer to Figure 10: NPS Fecal Coliform Losses, Figure 11: NPS Nitrogen Losses, and Figure 12: NPS Phosphorous Losses) the L-THIA has estimated that agriculture would be the largest contributor of nonpoint source pollution of fecal coliform (*E. coli*), nitrogen, and phosphorous non point source pollution. Rough data used to create the pie charts can be found in Appendix 6: L-THIA Data.

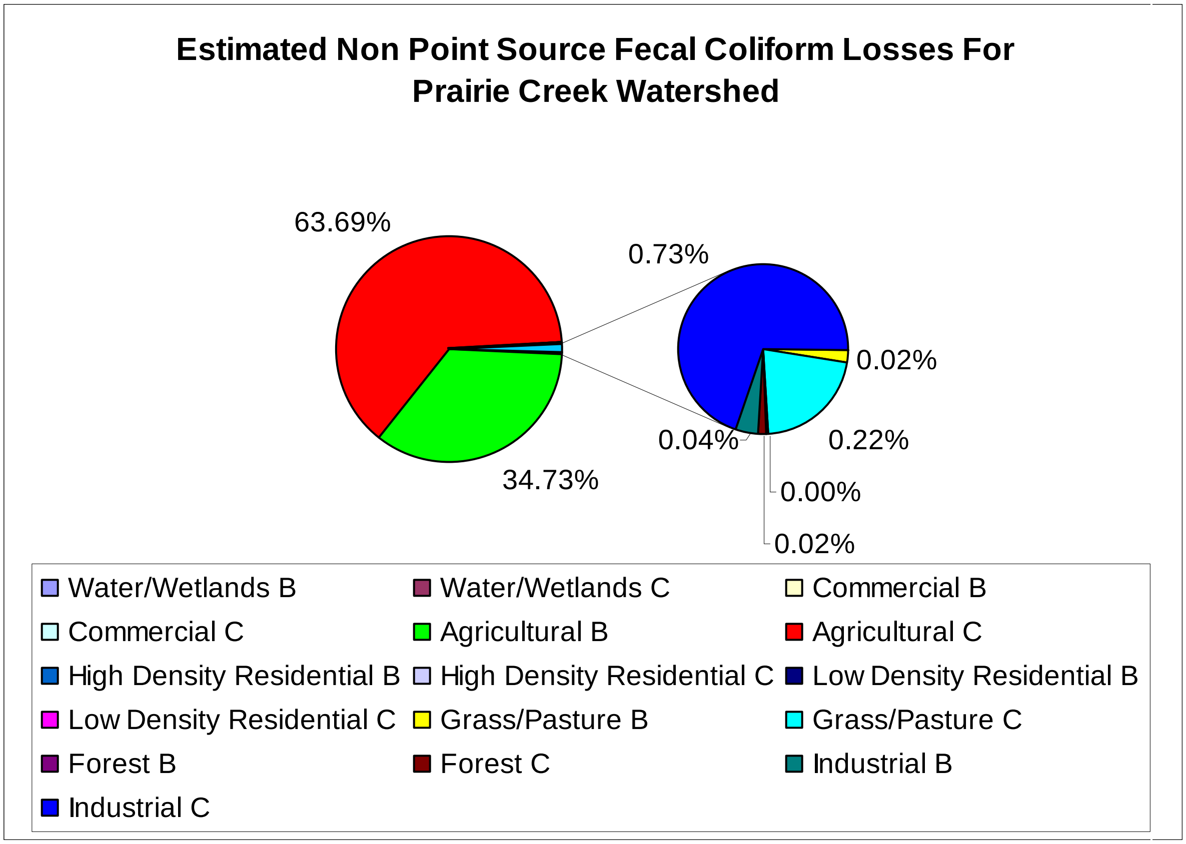


Figure 10. Estimated Fecal Coliform Losses: Pie charts were created using the data derived from the Long Term Hydrologic Impact Analysis (L-THIA) program. Pie chart illustrates the estimated percentage of non point source fecal coliform losses from current land uses and soil types for the Prairie Creek watershed. Agricultural land use on hydrologic soil group C is estimated to create 64 percent of NPS pollution while agricultural land use on hydrologic soil group B is estimated at only 35 percent. Industrial land use on hydrologic soils group C is estimated to create one percent of the NPS fecal coliform pollution.

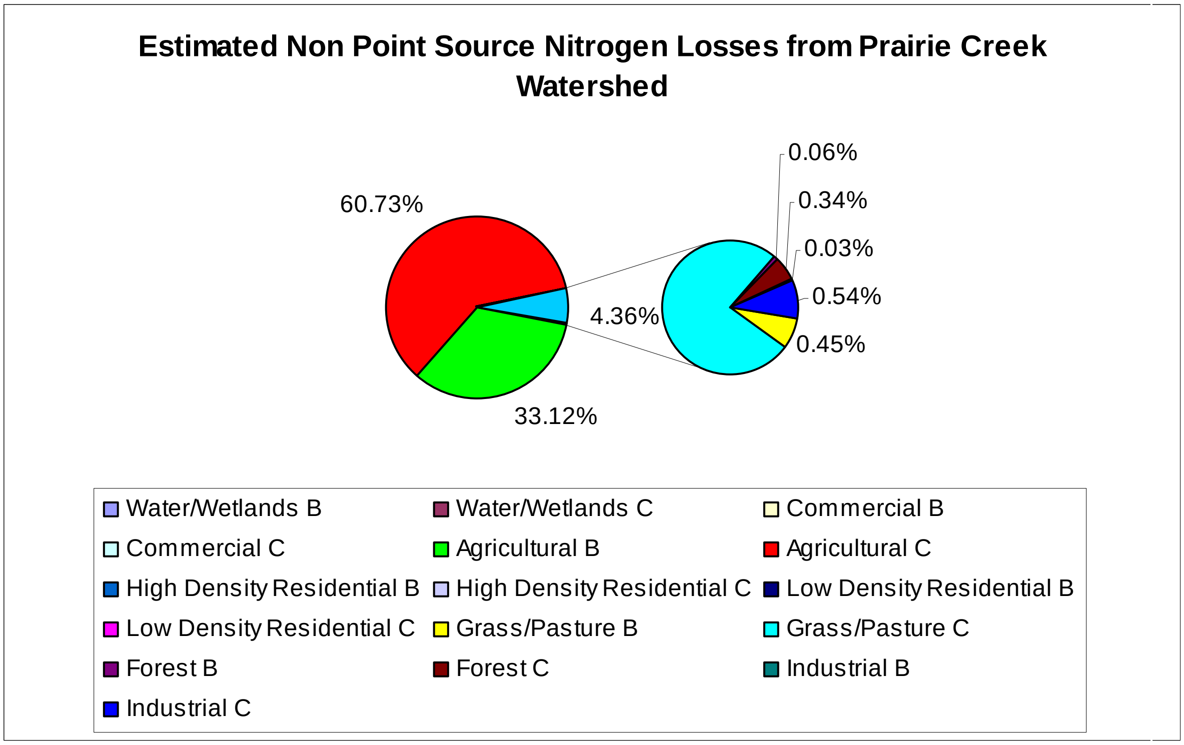


Figure 11. Estimated Nitrogen Losses: Pie charts were created using the data derived from the Long Term Hydrologic Impact Analysis (L-THIA) program. Pie chart illustrates the estimated percentage of non point source Nitrogen losses from current land uses and soil types for the Prairie Creek watershed. Agricultural land use on hydrologic soil group C is estimated to create 62 percent of NPS pollution while agricultural land use on hydrologic soil group B is estimated at only 33 percent. Grass/Pasture land use on hydrologic soils group C is estimated to create four percent of the NPS Nitrogen pollution. One percent of the NPS Nitrogen pollution is estimated to come from industrial land uses on hydrologic soils group C.

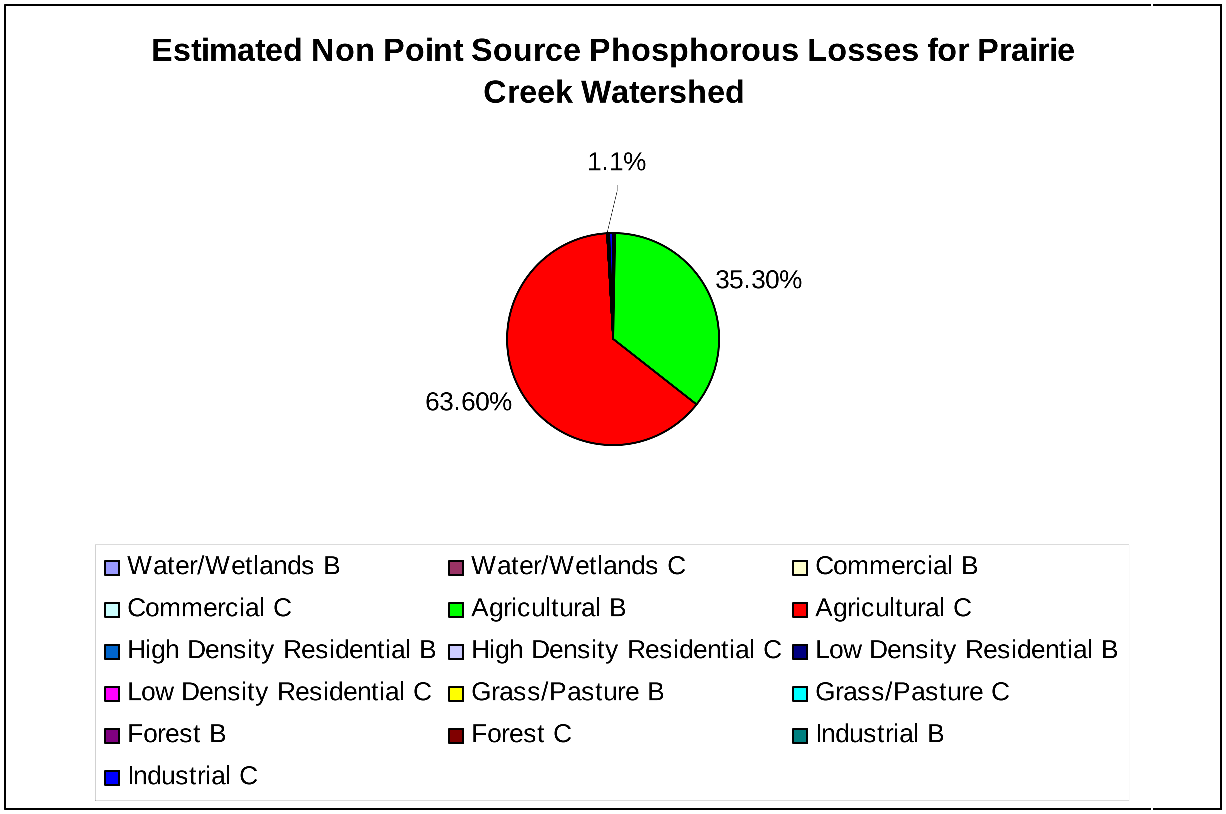


Figure 12. Estimated Phosphorous Losses: Pie charts were created using the data derived from the Long Term Hydrologic Impact Analysis (L-THIA) program. Pie chart illustrates the estimated percentage of non point source Phosphorous losses from current land uses and soil types for the Prairie Creek watershed. Agricultural land use on hydrologic soil group C is estimated to create 65 percent of NPS pollution while agricultural land use on hydrologic soil group B is estimated at only 35 percent. All other land uses, represented by the thick black vertical line, combined contributed 1.1 percent of the Phosphorous NPS pollution.

3.7 National Pollutant Discharge Elimination System (NPDES) Discharge Info

The Town of Montgomery Wastewater Treatment Plant, permit IN0034932, has reported *E. coli* violations for the months of April, May, and June of 2004 (EPA ECHO). The concentrated averages of the amount of *E. coli* discharged during these months ranged from 531 cfu/100mL to 4070 cfu/100mL geometric mean. The concentrated maximum levels of *E. coli* reported during these months ranged from 2350 cfu/100mL to 4400 cfu/100mL (EPA ECHO). All reported *E. coli* violations from the Town of Montgomery Wastewater Treatment Plant can be viewed in Table 2. The Town of Montgomery Wastewater Treatment Plant discharges directly into the South Fork of Prairie Creek.

Table 2. Montgomery Wastewater Treatment Plant Report: Details all reported *E. coli* violations reported between April 2004 and June 2004 by the Montgomery Wastewater Treatment Plant. Units: cfu/100mL. (Source: EPA ECHO)

Town of Montgomery Wastewater Treatment Plant Reported *E. coli* Violations		
Monitoring Period End Date	Concentrated Maximum	Concentrated Average
30-April-2004	2350.0	531.0
31-May-2004	3700.0	1929.0
30-June-2004	4400.0	4070.0

3.8 <u>Section 3 Summary</u>:

Data collected by IDEM for the 305(b) Water Quality Report supports stakeholder concerns of *E. coli*/Pathogen contamination, sedimentation/siltation/QHEI, as well as nutrient impairment. In accordance with state water quality standards, the 305(b) report also proposed a concern, Impaired Biotic Communities, which had not been previously listed by stakeholders. The 303(d) List of Impaired Waters, the Lower White River Watershed Restoration Action Strategy, and data collected by the Daviess County SWCD provide further support for stakeholder concern regarding *E. coli* pollution. The L-THIA estimates that agricultural land uses are the major contributors of non point source pollution for fecal coliform bacteria (*E. coli*), Nitrogen, and Phosphorous. The preliminary data of the IGS ground water study supports the project's hypothesis, as well as stakeholder concern, that excess nutrients applied to agricultural fields may be percolating through the soils, eventually contaminating underground fresh water aquifers. The NPDES discharge data reports direct discharges of *E. coli* into surface waters.

4.0 Probable Causes of Water Quality Problems

<u>Prioritized Problem Statements</u>

After reviewing and discussing the data that has been collected within the watershed, problem statements were created based on the list of prioritized issues the stakeholders created. The following problem statements will aid in focusing the goals and objectives during the planning process:

1. Improper storage and disposal of manure by livestock facilities, in conjunction with failed/failing septic systems and percolation rates of local soils, is believed to be causing high levels of *E. coli* contamination throughout the waters of the Prairie Creek Watershed.

2. Livestock production facilities lacking proper storage and disposal areas for manure and mortality wastes, agricultural fertilizing practices, as well as failed/failing septic systems may be causing nutrient pollution within the watershed.

3. The lack of field tiles and WASCOBs may be contributing to increased levels of sedimentation and channel erosion within the streams and tributaries of the watershed.

4. Farming practices, the loss of crop ground to development, and the proposed creation of Interstate 69 through the middle of the watershed will likely present significant future issues for water quality within the watershed.

Water quality can be diminished by a variety of substances including bacteria, nutrients, metals, and toxic substances. Refer to Table 3 for a list of causes of pollution and their contributing factors. Pollution sources are divided into two broad categories: Non point source (NPS) pollution and point source pollution.

Point source pollution refers to pollution which results from a defined, easily documented source. An example of point source pollution would be a wastewater treatment plant that is permitted to release effluent. To release specific amounts of effluent, facilities in Indiana must obtain a National Pollution Discharge Elimination System (NPDES) permit. Point sources of pollution are normally measurable.

Non point source pollution refers to pollution that has no defined, easily documented source. NPS pollution can be caused by contaminated storm water runoff of agricultural fields or city streets, or even by atmospheric deposition. An example of NPS pollution occurs when rainwater falls on improperly stored animal waste contaminating the water with the bacterium *E. coli*. Next, the contaminated water travels across the landscape as runoff until it is deposited into a stream. The contaminated water that enters the stream raises the level of *E. coli* in the stream to levels that exceed state WQS. Non point sources of pollution are difficult to measure accurately due to the number of variables that can affect the concentrations and sources of NPS pollution.

Table 3. General Causes of Water Pollution: Details general causes and contributing activities of water pollution.

Causes of Water Pollution and Contributing Activities	
Cause	Activity associated with cause
Nutrients	Fertilizer on agricultural crops and residential/commercial lawns, animal wastes, leaky sewers and septic tanks, direct septic discharge, atmospheric deposition, wastewater treatment plants
Toxic Chemicals	Pesticide applications, disinfectants, automobile fluids, accidental spills, illegal dumping, urban stormwater runoff, direct septic discharge, industrial effluent
Oxygen-consuming Substances	Wastewater effluent, leaking sewers and septic tanks, direct septic discharge, animal waste
E. coli	Failing septic systems, direct septic discharge, animal waste (including runoff from livestock operations and impacts from wildlife) improperly disinfected wastewater treatment plant effluent.

(Source: IDEM Lower White River Watershed Restoration Action Strategy 2001)

5.0 Sources of Water Pollution in Prairie Creek Watershed

5.1 NonPoint Source Pollution in Prairie Creek Watershed

Section five will briefly discuss sources of water quality problems associated with the Prairie Creek watershed. There might be more sources that could potentially affect the water quality of the watershed; however, only those that are known or believed to be a source of poor water quality in the watershed have been mentioned.

5.1.1 Agricultural Crop Production

Agricultural non point source pollution has repeatedly been documented to be the main source of impairment of surface waters by state water quality assessments (EPA Nonpoint). The most prevalent sources of NPS pollution are nutrients, sediment, animal wastes, salts, and pesticides resulting from agricultural practices (EPA Nonpoint, Carpenter et. al. 1998).

Since eighty-nine point two (89.2) percent (135.44 square miles) of the land area within Prairie Creek watershed is used for agricultural purposes, it is highly likely that the water quality impairments identified in Section 3 by the 305(b) Water Quality Report, 303(d) List of Impaired Waters, Lower White River Watershed Restoration Action Strategy, preliminary data from the USGS study, Daviess County SWCD water quality data, and the L-THIA are caused by agricultural practices. All of the streams assessed in the watershed, except for Hawes Ditch, were impaired to some degree by *E. coli*, which presumably has come primarily from animal wastes but may also be caused by failed or failing home septic systems as well as wild fauna.

The North Fork of Prairie Creek and Eagan Ditch were documented for impairment by nutrients. The two major nutrients associated with agricultural NPS are phosphorus (P) and nitrogen (N). These nutrients are applied to agricultural land within the Prairie Creek watershed in the form of commercial fertilizers and manure from livestock operations in order to increase productivity of the field. Excess application of the commercial fertilizers and manure is likely to be a source for the high levels of N and P found within the watershed's channels. The IDEM 305(b) Water Quality Report, the L-THIA data, and the preliminary data from the IGS study provide support that high nutrient levels may be the result of agricultural operations. Numerous other studies conducted outside of the watershed have found that the primary cause of nutrient non point source pollution is from agricultural land use (EPA Nonpoint, Carpenter et. al. 1998).

In freshwater systems, P is normally the limiting factor for plant growth; although, sometimes N will act as the limiting factor (EPA Nonpoint). When extra P or N is added to an aquatic ecosystem via NPS pollution, eutrophication, or the rapid growth of plants or algae, may occur. Eutrophication and the eventual decomposition of plant materials cause oxygen levels in the water to drop, thus potentially affecting the biotic communities present in the ecosystem negatively (EPA Nonpoint).

5.1.2 Livestock Production

Confined Feeding Operations (CFO) and confined animal feeding operations (CAFO) are regulated to properly remove and dispose of (often through land application as an organic fertilizer) manure, litter, dead stock, and processed wastewater generated from the operations of the CFO or CAFO. Prairie Creek watershed contains 43 CFOs of which two are permitted as CAFOs (IDEM TMDL 2004). There are also many livestock operations in the watershed that are unregulated due to the size of the operation. Many of the regulated and unregulated operations are located close to waterways of the Prairie Creek watershed. Refer to Figure 13 to see the location of regulated CFOs in the watershed. Refer to Appendix 7: Permitted CFOs and CAFOs to see the number of approved animals. These operations are believed to be a source of pathogens such as *E. coli*. Approximately 107 miles of the Prairie Creek watershed are contaminated with *E. coli* (IDEM TMDL 2004). Data from IDEM, which can be obtained by contacting the TMDL section within IDEM, can attest to the widespread non point source contamination of *E. coli* likely emitted from these operations. Nutrient pollution is also potentially caused by livestock operations because of improper storage and land application of operation wastes.

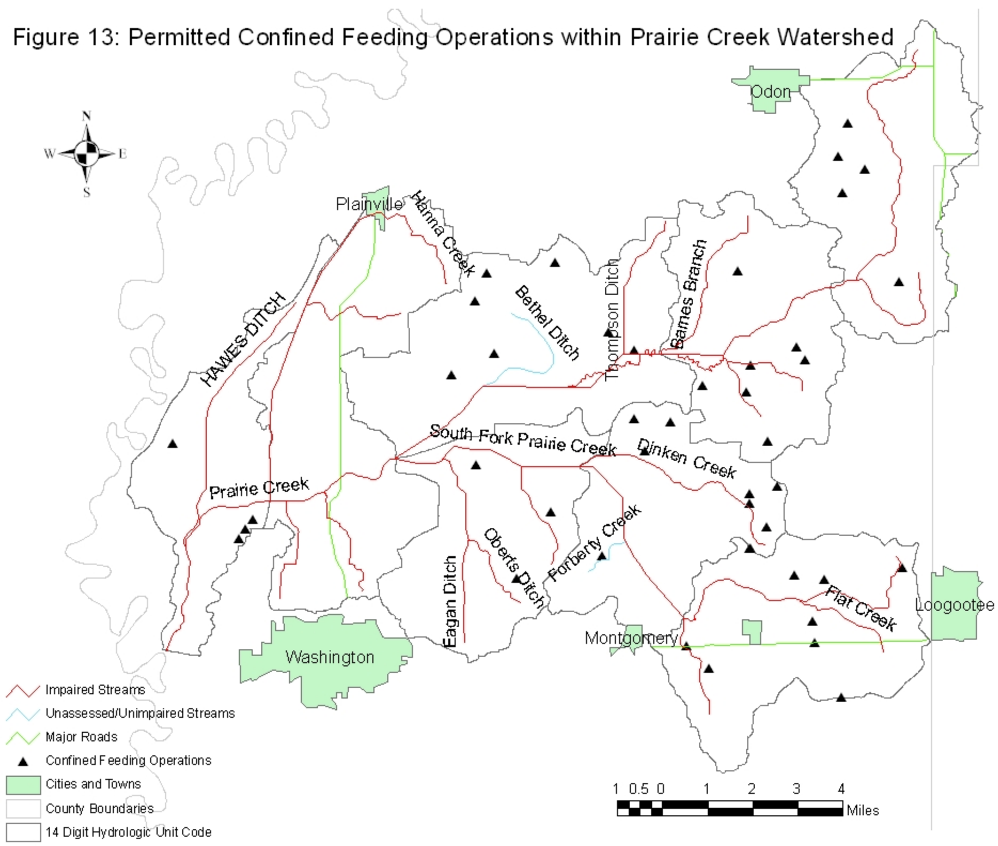


Figure 13. Map of Confined Feeding Operations: Displays the permitted Confined Feeding Operations found within the Prairie Creek watershed.

The nutrient and pathogen pollution is believed to be caused primarily by the improper storage and application of CFO/CAFO wastes. Poultry operations, of which there are 13 located within the Prairie Creek watershed, in particular create vast amounts of waste that must be properly staged and distributed. Currently, many of the poultry operations in the watershed lack the facilities to properly store manure until field application. While producers are waiting for favorable conditions to apply wastes to fields as a source of organic fertilizer, poultry wastes are inadequately stockpiled close to barns or near the land application sites. These temporary staging areas are often near ditches, streams, and other surface waters, which increases the potential for nutrient or pathogen runoff. Ultimately, the improper staging of manure or land application during adverse weather conditions increases the potential for negative environmental and economical impacts. For example, over application of manure can contribute to groundwater contamination, increased potential for contaminated surface runoff, and soil compaction (Carpenter et. al. 1998). Manure staging facilities will ensure that owners of these facilities will be able to land apply manure in a timely manner when the time and field conditions permit.

5.1.3 Septic System Failures

E. coli can be caused by NPS pollution from failing septic systems (IDEM TMDL 2004). The Daviess County Health Department conducted a study on septic systems in homes sold on the open market in Daviess County. The department reported a 40-45% septic system failure rate for older homes and recently built homes in Daviess County. The majority of the homes in the Prairie Creek watershed are on septic systems (IDEM TMDL 2004). Homes with failing septic systems are likely to be a source of both *E. coli* and nutrient pollution within the watershed.

5.1.4 General Conditions in Prairie Creek facilitating Non Point Source pollution

The lack of adequate buffer/filtration strips, grass waterways, low frequency of use of cover crops, no till, and other agricultural conservation practices around the channels and tributaries within the watershed further facilitate the movement of water quality contaminants.

5.2 Point Source Pollution in Prairie Creek Watershed

The state of Indiana controls point sources of pollution by issuing National Pollution Discharge Eliminations System (NPDES) permits to those facilities that have a need to discharge effluent. Two NPDES permitted facilities, the Town of Montgomery Wastewater Treatment Plant and the Black Beauty Coal Company, Viking Mine, are located within the Prairie Creek watershed. Refer to Figure 14 to view the locations of the NPDES permitted facilities in the Prairie Creek watershed. The Black Beauty Coal Company, Viking Mine, NPDES permit number ING040162, is not considered a source of *E. coli* because the facility does not have a sanitary component to their discharge.

However, the Town of Montgomery Wastewater Treatment Plant, NPDES permit number IN0034932, is a documented point source of *E. coli* contamination. As stated in the Prairie Creek Watershed TMDL for *E. coli*, "The *E. coli* values ranged from 531 cfu/100mL to 4070 cfu/100mL geometric mean and 2350 cfu/100mL to 4400 cfu/100mL daily maximum." These levels are substantially above state WQS for *E. coli* and can therefore qualify the treatment plant as a source of *E. coli* within the South Fork of Prairie Creek. (Please refer to Table 2 for a review of *E. coli* violations reported by the Town of Montgomery Wastewater Treatment Plant.)

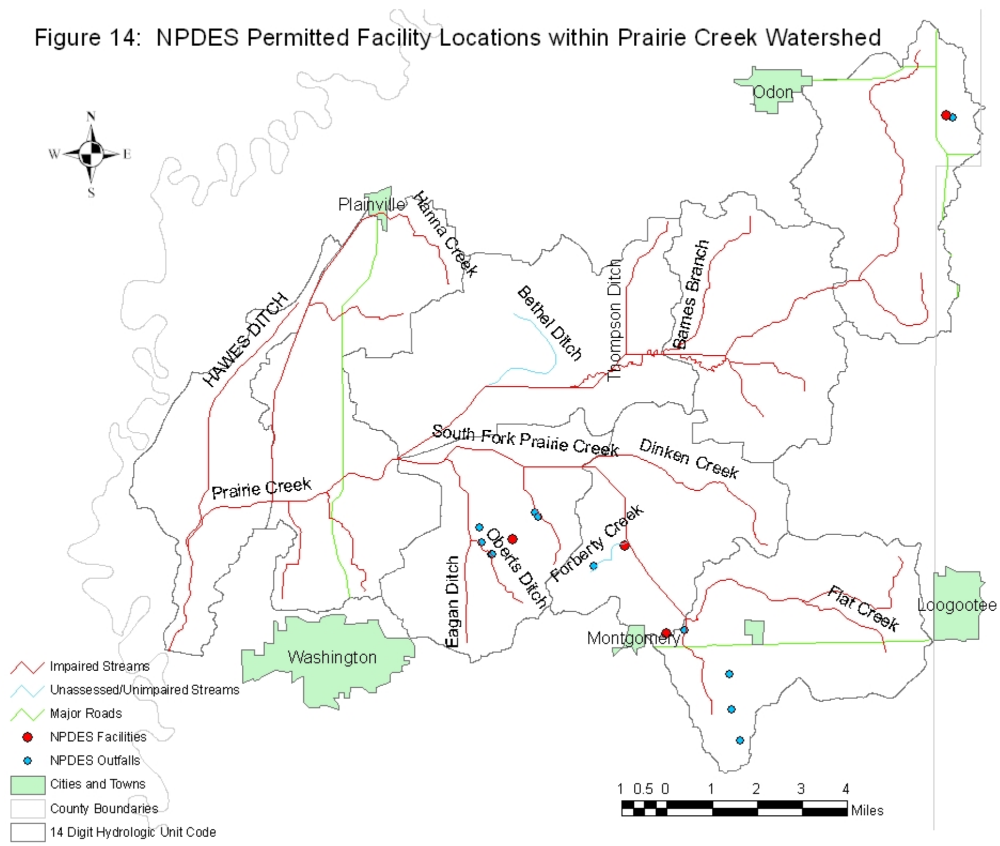


Figure 14. Map of NPDES Facilities: Displays NPDES permitted facilities located within Prairie Creek watershed. The Viking Mine owned by Black Beauty Coal does not have a sanitary component to its NPDES permit; however, the Montgomery Municipal Wastewater Treatment Plant does have a sanitary component to its NPDES permit.

6.0 Identifying Critical Target Areas

Pollutant loading information was calculated for the watershed and subwatersheds in order to assist in identification of critical areas. Target Loads to represent desired conditions were estimated for the watershed to indicate the amount of pollutant reduction needed and to serve as a guide for measuring success. As estimated in the Prairie Creek *E. coli* TMDL, median annual stream discharge for Prairie Creek at the outlet is estimated at 91.3 cubic feet per second. This streamflow average was multiplied by average measured concentrations of *E. coli*, N and P to calculate average load rates. These current load estimates were then compared to target loads to determine the reductions needed to meet water quality standards or desired levels (table below). The water quality standard of 235 cfu/100ml for a single sample for *E. coli* was used to calculate the target *E. coli* load. For phosphorous, 0.3 mg/l was used as the target criteria based on Indiana impairment criteria. For Nitrogen (Nitrate +Nitrite) a target concentration of 2.75 mg/l was used. 2.75 mg/l N is the national average for US watersheds 50 – 75% agriculture (Omernik, 1977). These estimates indicate the average values expected based on current sampling data and median annual streamflow estimates for Prairie Creek.

Table 4. Load Reductions needed for E. coli, Nitrogen and Phosphorus

	E. coli (cfu/day)	N (lbs/year)	P (lbs/year)
Current load	3.2×10^{12}	1,365,248	61,077
Target	5.2×10^{11}	494,004	53,891
Reduction needed to meet target (%)	84 %	64%	12%

Load duration curves illustrate the extent of most single sample violations for *E. coli*.

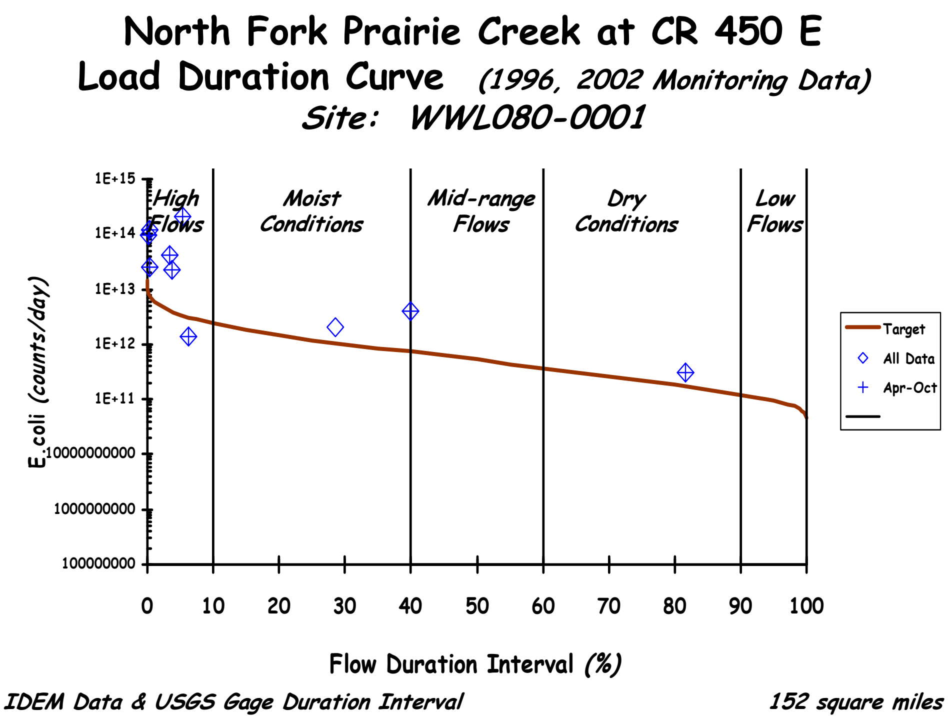


Figure 15. North Fork Prairie Creek Load Duration Curve

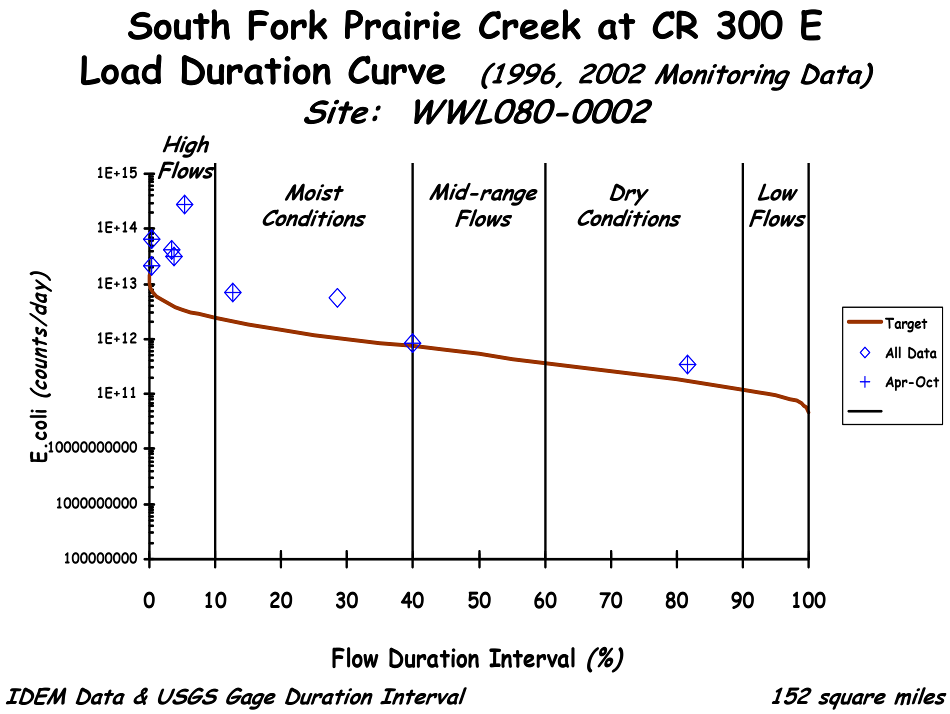


Figure 16. North Fork Prairie Creek Load Duration Curve

Prioritization of sub watersheds was conducted to identify sub watersheds where we believed that time and money put into the project would have the greatest effect. Sub watershed target areas have been identified by analyzing previous water quality samples and poultry facilities needing manure staging facilities in the watershed. If two sub watersheds were rated equal after analysis of the water quality data, then the number of CAFOs of CFOs in the sub watershed was determined to decide which sub watershed had a higher priority. Finally, identified sub watersheds having a greater number of willing cost share participants were ranked higher in the prioritization due to increased probability of waste management system implementation. The following is a prioritized list of the targeted sub watersheds for the construction of manure staging facilities (list order subject to change depending on identification of willing cost share participants):

1. North Fork Prairie Creek-Barnes Creek Sub Watershed HUC 05120202-080-020
2. South Fork Prairie Creek-Flat Creek Sub Watershed HUC 05120202-080-040
3. North Fork Prairie Creek-Bethel Creek Sub Watershed HUC 05120202-080-030
4. North Fork Prairie Creek Headwaters Sub Watershed HUC 05120202-080-010
5. Prairie Creek-Hawes Ditch Sub Watershed HUC 05120202-080-080
6. South Fork Prairie Creek-Dinken Creek Sub Watershed HUC 05120202-080-050
7. South Fork Prairie Creek-Eagan Ditch Sub Watershed HUC 05120202-080-060

8. Prairie Creek-Killion Canal Sub Watershed HUC 05120202-080-070

Utilizing measuring tools and a one (1) meter resolution aerial photo taken June 1, 2003 provided by an on-line imagery company, Terraserver.com, estimations of the percentage of woody vegetation riparian buffer zones surrounding the waters of each sub watershed were made.

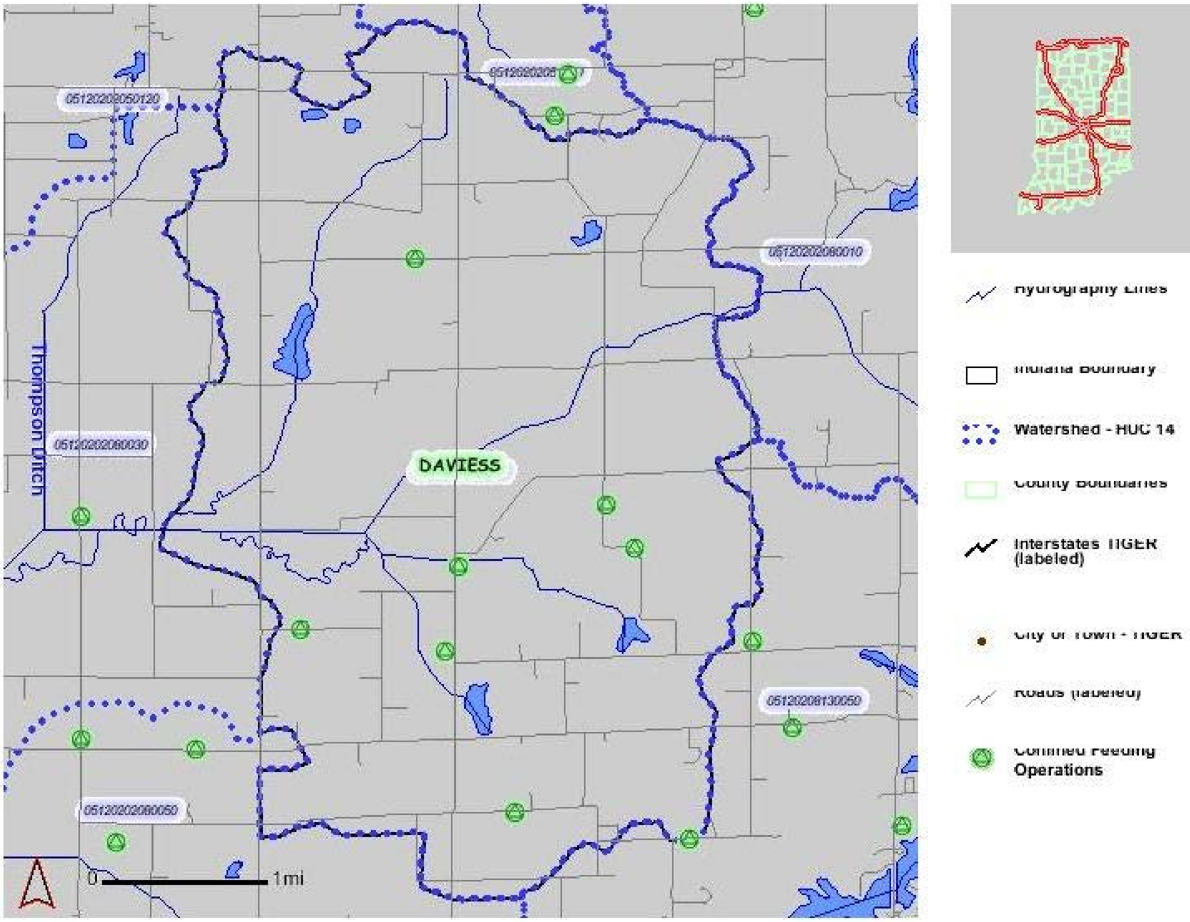
The IDEM/USEPA Region 5 Waste Load Reduction Model* was used to estimate reductions in Phosphorous and Nitrogen loads for each prioritized sub watershed. To complete the calculations, the L-THIA was first used to determine the number of acres in the watershed as well as the percent impervious area of the watershed.** Second, CFOs in the watershed were identified by using a query tool within the Indiana Water Quality Atlas. After the CFOs were identified, the number of animals at each CFO was determined using data provided by the Daviess County SWCD. The type of animals and their numbers were then entered into the Model. Design Weights of the animals were equal to the general weights provided within the Model. Finally the Best Management Practice of Waste Management Systems was selected and the model returned estimated the load before BMPs were installed, the actual load reduction, and also the load after the construction of the BMPs. Calculations assume that BMPs are installed at every CFO in every sub watershed.

* Note: An animal lot refers to an open lot or combination of open lots intended for confined feeding, breeding, raising or holding animals. It is specifically designed as a confinement area in which manure accumulates or where the concentration of animals is such that vegetation cannot be maintained. The purpose of these calculations is to represent Biological Oxygen Demand (BOD), phosphorus (P), and nitrogen reductions after an animal waste system is installed. This method has two assumptions: 1) the feedlot is adjacent to a receiving hydrological system without any buffering areas; and 2) installing the animal waste system will prevent any further pollutants from the lot from reaching the hydrologic system. Feedlots that cannot show impact to the hydrologic system being protected should not be evaluated with this computation.

** Note: Estimations of the area in acres and the percent of impervious ground of the watershed were computed using L-THIA, while the location and identification of the CFOs within the sub watersheds was determined using the Indiana Water Quality Atlas. This was done because the L-THIA program did not locate CFOs and the Indiana Water Quality Atlas did not compute areas or percent of impervious ground within a watershed. Due to the differences in the two programs, the boundaries of the watersheds were not exactly the same in both programs; therefore, the number of CFOs, area in acres, and percent of impervious ground used for the computation of the loads may be greater or lesser depending on which programs' watershed boundary one was examining.

6.1 North Fork Prairie Creek-Barnes Creek Sub Watershed HUC 05120202-080-020

North Fork Prairie Creek-Barnes Creek Sub Watershed HUC 05120202-080-020



North Fork Prairie Creek-Barnes Creek Sub Watershed HUC 05120202-080-020

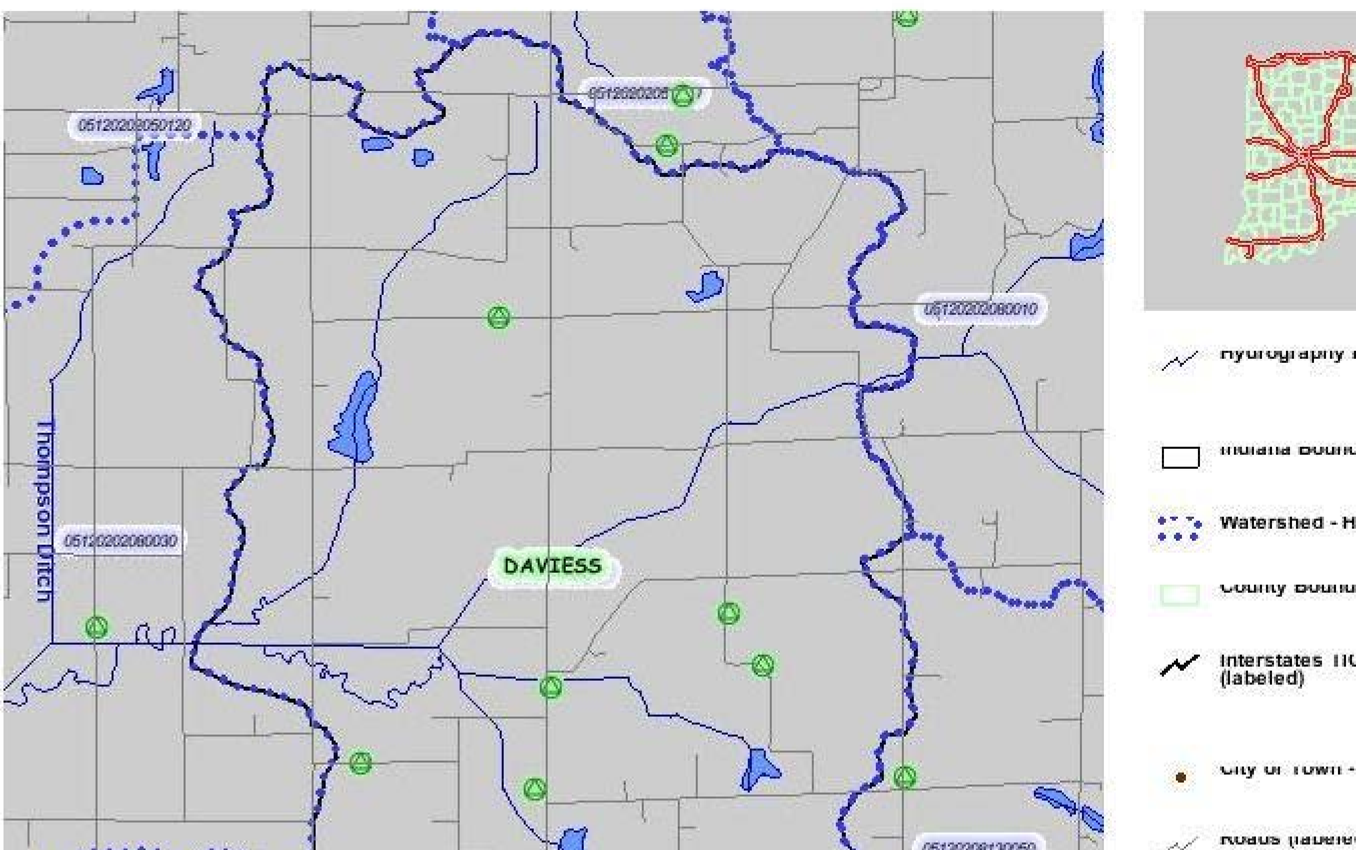


Figure 17. North Fork Prairie Creek-Barnes Creek sub watershed map: Displays the boundaries of the North Fork Prairie Creek-Barnes Creek sub watershed and locations of CFOs. Source: Indiana Water Quality Atlas, July 2005.

Estimations of riparian buffer in the North Fork Prairie Creek-Barnes Creek sub watershed resulted in 45% of the surface water lacking any woody plant buffer zones, 37% of the surface water having moderate woody plant riparian buffer, and 18% consisting of substantial woody riparian buffer. Refer to Figure 16 to view a map of the North Fork Prairie Creek-Barnes Creek sub watershed. The land use surrounding the waters of the North Fork Prairie Creek-Barnes Creek sub watershed consist of three main uses: row crops (47%), pasture/hay (48%), and deciduous forest (4%). A more detailed description of land use within the North Fork Prairie Creek-Barnes Creek sub watershed can be viewed in Figure 18.

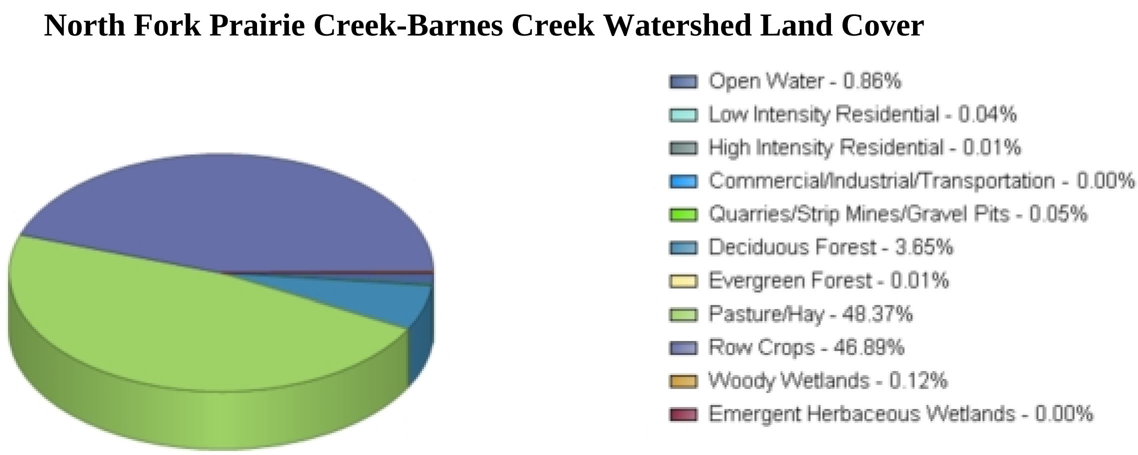


Figure 18. North Fork Prairie Creek Barnes Creek Land use Pie: Pie chart represents the land uses found within the North Fork of Prairie Creek-Barnes Creek sub watershed. Percentages of the land uses may be viewed to the right of the color key. Source: Indiana Water Quality Atlas, July 2005. Data used to compose pie chart was from a 1993 United States Geological Survey (USGS) land use survey.

Estimated loads of pollutants phosphorous and nitrogen before the implementation of waste management systems (i.e., manure staging facility construction), the load, and the load after implementation of BMP were calculated for the North Fork Prairie Creek-Barnes Creek sub watershed and can be viewed in Table 4. The estimated load reduction for phosphorous and nitrogen were 40,575 pounds per year and 123,669 pounds per year, respectively.

Table 5. Estimated load reductions for North Fork Prairie Creek-Barnes Creek sub watershed: Details the pollutant loads of phosphorous and nitrogen before and after implementation of a waste management system such as a manure staging facility for the North Fork Prairie Creek-Barnes Creek sub watershed.

Estimated Load and Load Reductions for North Fork Prairie Creek-Barnes Creek Sub Watershed HUC 05120202-080-020			
Pollutants	Load before BMP	Load Reduction	Load after BMP
Phosphorus load (lbs/yr)	45,083	40,575	4,508
Nitrogen load (lbs/yr)	154,586	123,669	30,917

6.2 South Fork Prairie Creek-Flat Creek Sub Watershed HUC 05120202-080-040

South Fork Prairie Creek-Flat Creek Sub Watershed HUC 05120202-080-040

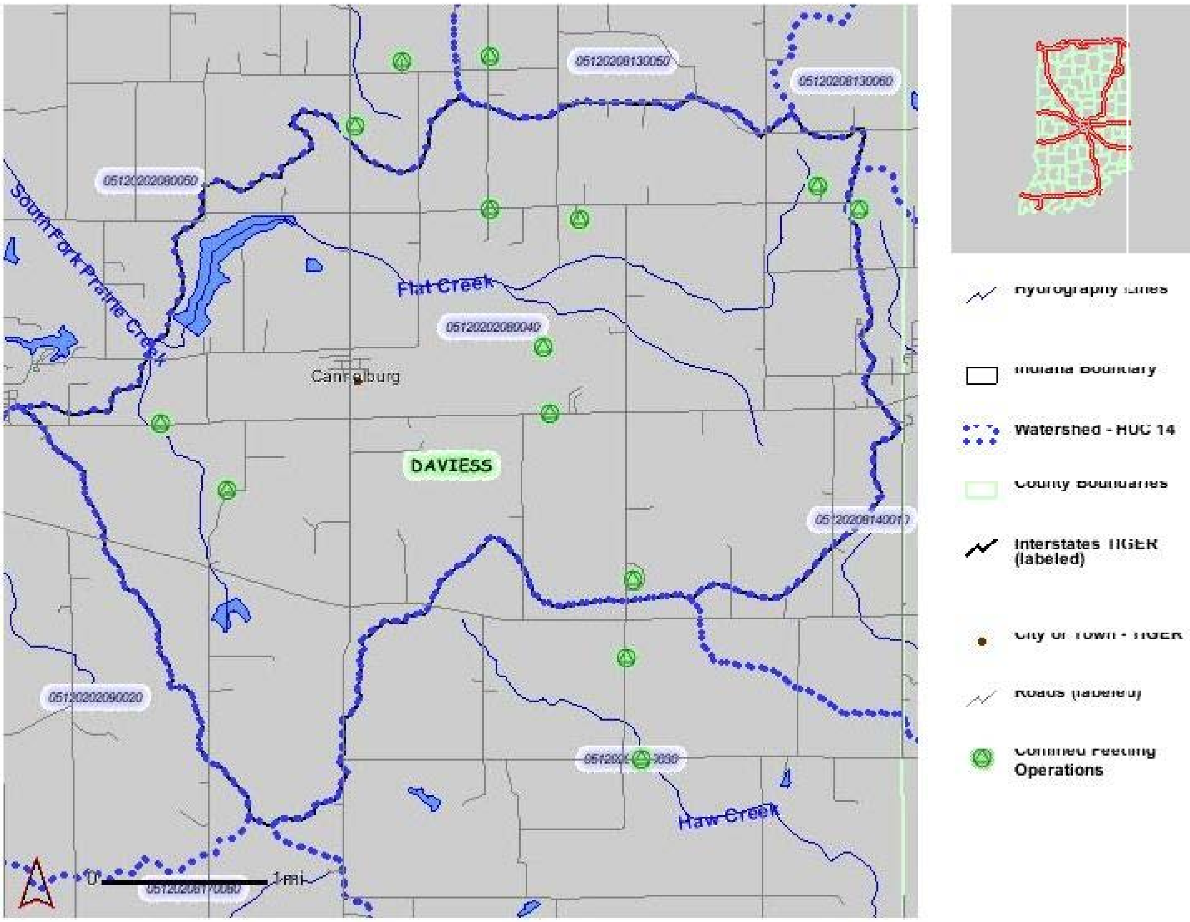


Figure 19. South Fork Prairie Creek-Flat Creek sub watershed map: Displays South Fork Prairie Creek-Flat Creek sub watershed boundary and locations of CFOs. Source: Indiana Water Quality Atlas, July 2005.

Estimations of riparian buffer in the South Fork Prairie Creek-Flat Creek sub watershed resulted in 41% of the surface water lacking any woody plant buffer zones, 14% of the surface water having moderate woody plant riparian buffer, and 45% consisting of substantial woody riparian buffer. Refer to Figure 18 to view a map of the South Fork Prairie Creek-Flat Creek sub watershed. The land use surrounding the waters of the South Fork Prairie Creek-Flat Creek sub watershed consist of three main uses: row crops (52%), pasture/hay (39%), and quarries/strip mines/gravel pits (3%). A more detailed description of land use within the South Fork Prairie Creek-Flat Creek sub watershed can be viewed in Figure 20.

South Fork Prairie Creek-Flat Creek Watershed Land Cover

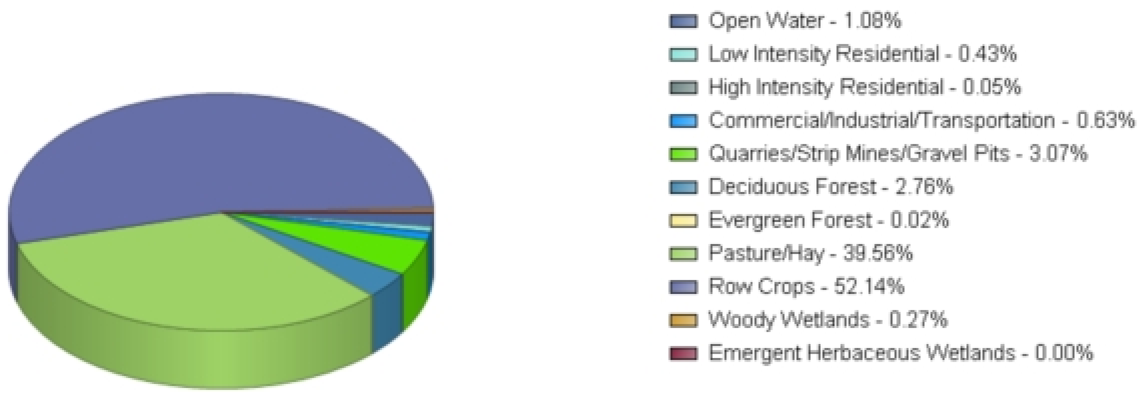


Figure 20. South Fork Prairie Creek-Flat Creek Land use Pie: Pie chart represents the land uses found within the South Fork Prairie Creek-Flat Creek sub watershed. Percentages of the land uses may be viewed to the right of the color key. Source: Indiana Water Quality Atlas, July 2005. Data used to compose pie chart was from a 1993 United States Geological Survey (USGS) land use survey.

Estimated loads of pollutants Phosphorous and Nitrogen before the implementation of Waste Management Systems (i.e., Litter Staging Facility construction), the load reduction, and the load after implementation of BMP were calculated for the South Fork Prairie Creek-Flat Creek sub watershed and can be viewed in Table 5. The estimated load reduction for phosphorous and nitrogen were 26,229 pounds per year and 89,759 pounds per year, respectively.

Table 6. Estimated Load Reductions for South fork Prairie Creek-Flat Creek sub watershed: Details the pollutant loads of Phosphorous and Nitrogen before and after implementation of a Waste Management System, such as a Litter Staging Facility, for the North Fork Prairie Creek-Barnes Creek sub watershed.

Estimated Load and Load Reductions for South Fork Prairie Creek-Flat Creek Sub Watershed HUC 05120202-080-040			
Pollutants	Load before BMP	Load Reduction	Load after BMP
Phosphorus load (lbs/yr)	29,143	26,229	2,914
Nitrogen load (lbs/yr)	112,199	89,759	22,440

6.3 North Fork Prairie Creek-Bethel Creek Sub Watershed HUC 05120202-080-030

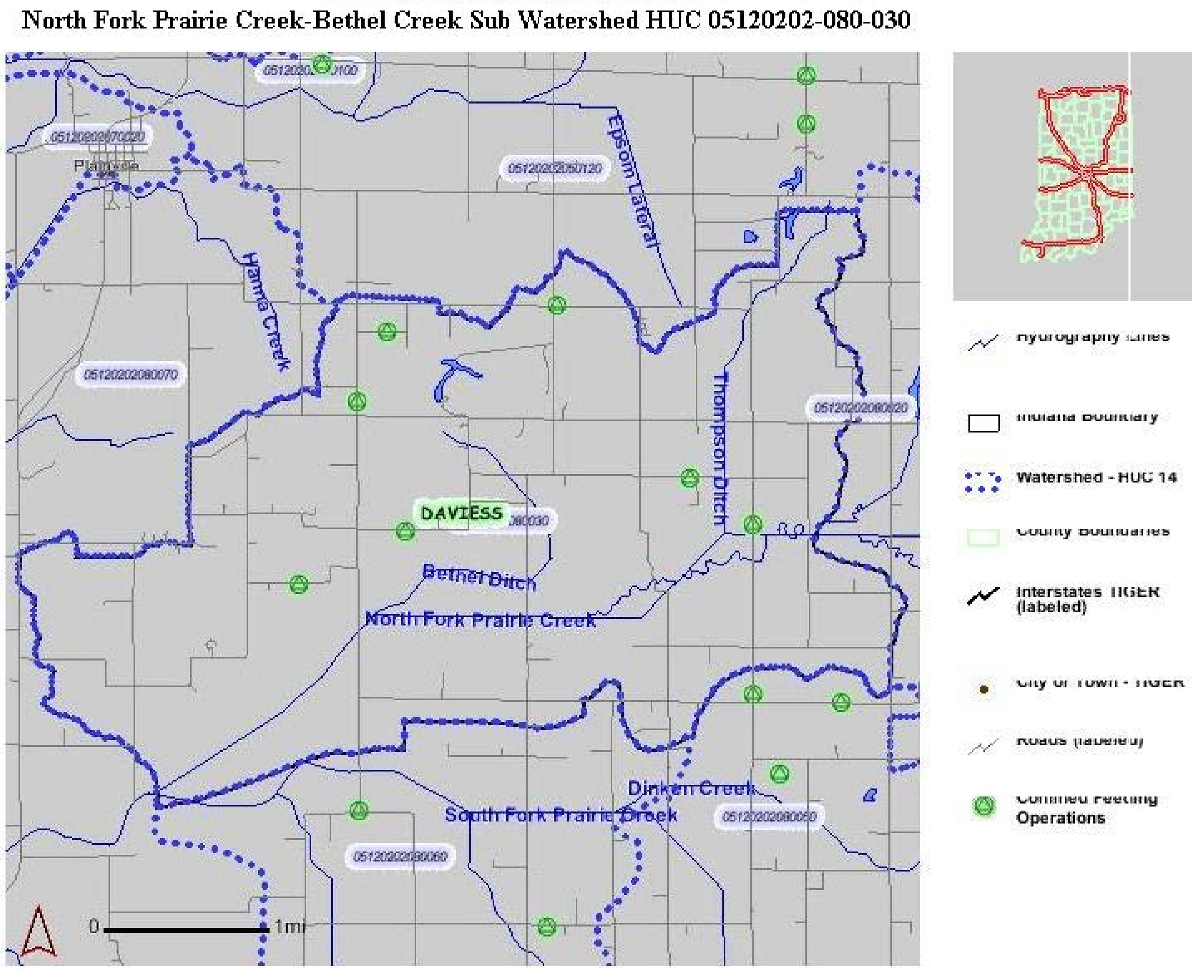


Figure 21. North fork Prairie Creek-Bethel Creek sub watershed map: Displays North Fork Prairie Creek-Bethel Creek sub watershed boundary and locations of CFOs. Source: Indiana Water Quality Atlas, July 2005.

Estimations of riparian buffer in the North Fork Prairie Creek-Bethel Creek sub watershed resulted in 95% of the surface water lacking any woody plant buffer zones, 4% of the surface water having moderate woody plant riparian buffer, and 1% consisting of substantial woody riparian buffer. Refer to Figure 21 to view a map of the North Fork Prairie Creek-Bethel Creek sub watershed. The land use surrounding the waters of the North Fork Prairie Creek-Bethel Creek sub watershed consist of three main uses: row crops (62%), pasture/hay (29%), and deciduous forest (6%). A more detailed description of land use within the North Fork Prairie Creek-Bethel Creek sub watershed can be viewed in Figure 22.

North Fork Prairie Creek-Bethel Creek Watershed Land Cover

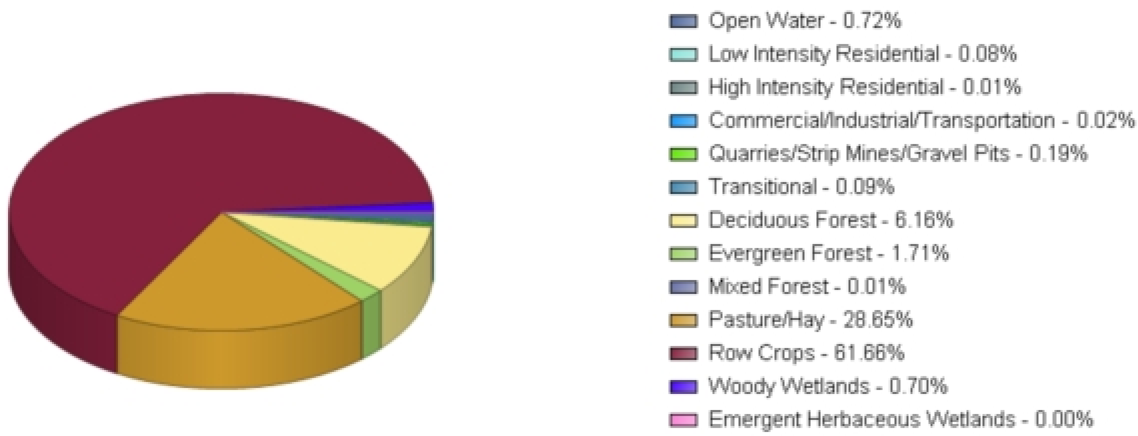


Figure 22. North Fork Prairie Creek-Bethel Creek Land use Pie: Pie chart represents the land uses found within the North Fork Prairie Creek-Bethel Creek sub watershed. Percentages of the land uses may be viewed to the right of the color key. Source: Indiana Water Quality Atlas, July 2005. Data used to compose pie chart was from a 1993 United States Geological Survey (USGS) land use survey.

Estimated loads of pollutants Phosphorous and Nitrogen before the implementation of Waste Management Systems (i.e., Litter Staging Facility construction), the load reduction, and the load after implementation of BMP were calculated for the North Fork Prairie Creek-Bethel Creek sub watershed and can be viewed in Table 6. The estimated load reduction for phosphorous and nitrogen were 13,567 pounds per year and 47,213 pounds per year, respectively.

Table 7. Estimated Load Reductions for North Fork Prairie Creek-Bethel Creek sub watershed: Details the pollutant loads of Phosphorous and Nitrogen before and after implementation of a Waste Management System, such as a Litter Staging Facility, for the North Fork Prairie Creek-Bethel Creek sub watershed.

Estimated Load and Load Reductions for North Fork Prairie Creek-Bethel Creek Sub Watershed HUC 05120202-080-030			
Pollutants	Load before BMP	Load Reduction	Load after BMP
Phosphorus load (lbs/yr)	15,074	13,567	1,507
Nitrogen load (lbs/yr)	59,016	47,213	11,803

6.4 North Fork Prairie Creek Headwaters Sub Watershed HUC 05120202-080-010

North Fork Prairie Creek Headwaters Sub Watershed HUC 05120202-080-010

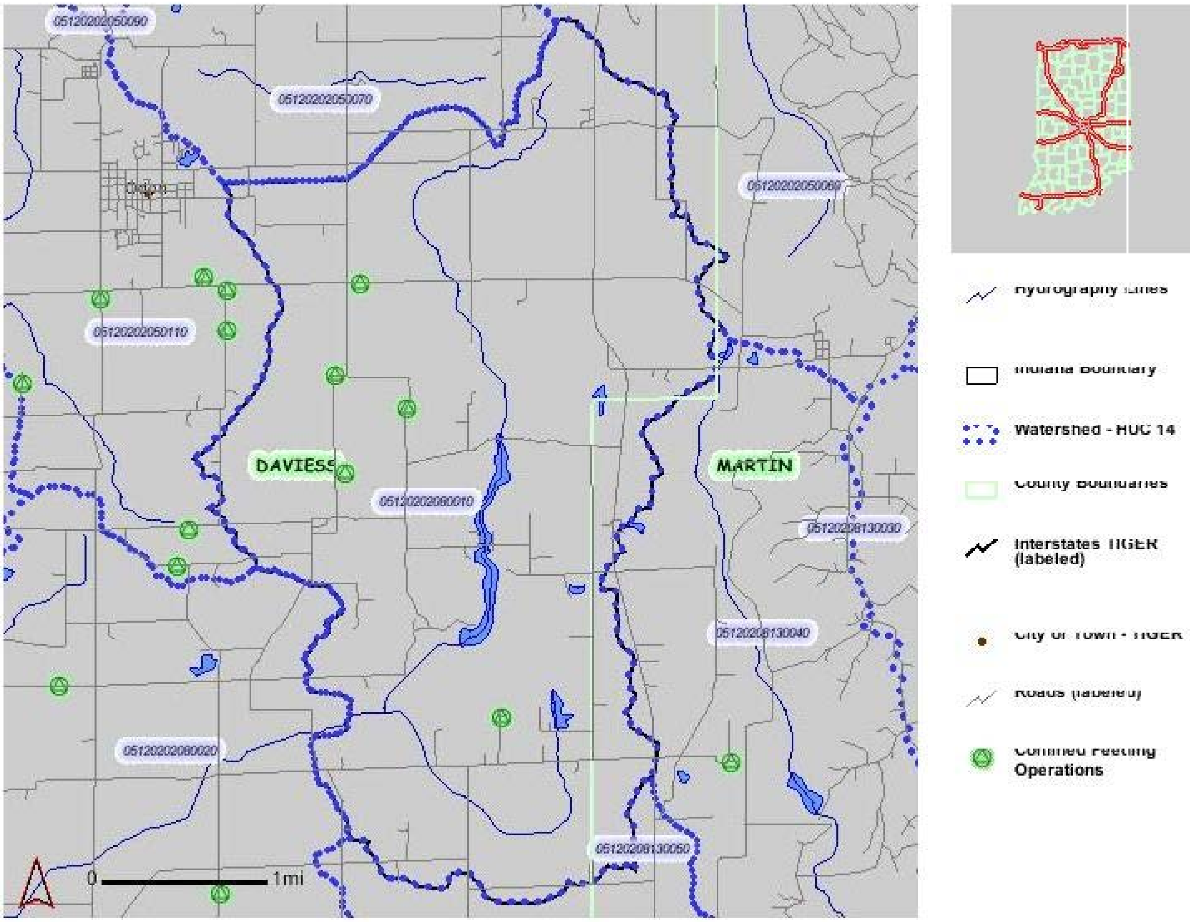


Figure 23. North Fork Prairie Creek Headwaters sub watershed map : Displays North Fork Prairie Creek Headwaters sub watershed boundary and locations of CFOs. Source: Indiana Water Quality Atlas, July 2005.

Estimations of riparian buffer in the North Fork Prairie Creek Headwaters sub watershed resulted in 21% of the surface water lacking any woody plant buffer zones, 10% of the surface water having moderate woody plant riparian buffer, and 69% consisting of substantial woody riparian buffer. Refer to Figure 22 to view a map of the North Fork Prairie Creek Headwaters sub watershed. The land use surrounding the waters of the North Fork Prairie Creek Headwaters sub watershed consist of three main uses: row crops (62%), pasture/hay (29%), and deciduous forest (6%). A more detailed description of land use within the South Fork Prairie Creek-Eagan Ditch sub watershed can be viewed in Figure 24.

North Fork Prairie Creek-Headwaters Watershed Land Cover

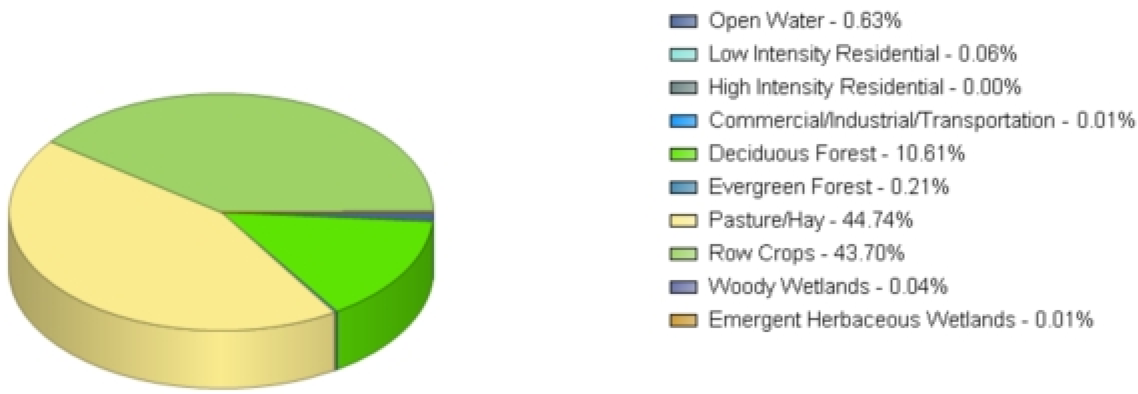


Figure 24. North Fork Prairie Creek Headwaters Land use Pie: Pie chart represents the land uses found within the North Fork Prairie Creek Headwaters sub watershed. Percentages of the land uses may be viewed to the right of the color key. Source: Indiana Water Quality Atlas, July 2005. Data used to compose pie chart was from a 1993 United States Geological Survey (USGS) land use survey.

Estimated loads of pollutants Phosphorous and Nitrogen before the implementation of Waste Management Systems (i.e., Litter Staging Facility construction), the load reduction, and the load after implementation of BMP were calculated for the North Fork Prairie Creek Headwaters sub watershed and can be viewed in Table 7. The estimated load reduction for phosphorous and nitrogen were 6,298 pounds per year and 25,676 pounds per year, respectively

Table 8. Estimated Load Reductions for North Fork Prairie Creek Headwaters sub watershed: Details the pollutant loads of Phosphorous and Nitrogen before and after implementation of a Waste Management System, such as a Litter Staging Facility, for the North Fork Prairie Creek Headwaters sub watershed.

Estimated Load and Load Reductions for North Fork Prairie Creek Headwaters Sub Watershed HUC 05120202-080-010			
Pollutants	Load before BMP	Load Reduction	Load after BMP
Phosphorus load (lbs/yr)	6,998	6,298	700
Nitrogen load (lbs/yr)	32,095	25,676	6,419

6.5 Prairie Creek-Hawes Ditch Sub Watershed HUC 05120202-080-080

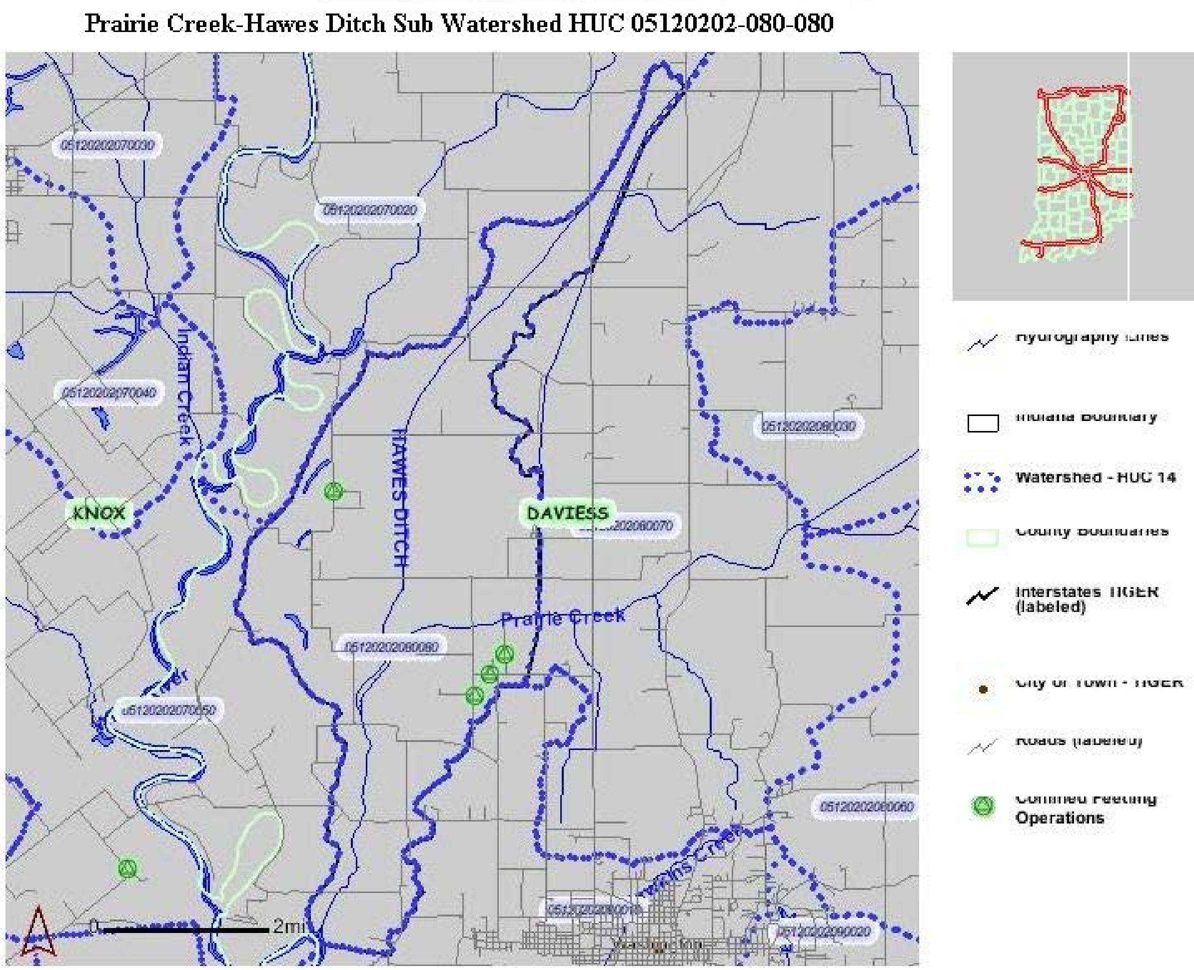


Figure 25. Prairie Creek-Hawes Ditch sub watershed map: Displays Prairie Creek-Hawes Ditch sub watershed boundary and locations of CFOs. Source: Indiana Water Quality Atlas, July 2005.

Estimations of riparian buffer in the Prairie Creek-Hawes Ditch sub watershed resulted in 95% of the surface water lacking any woody plant buffer zones, 4% of the surface water having moderate woody plant riparian buffer, and 1% consisting of substantial woody riparian buffer. Refer to Figure 24 to view a map of the Prairie Creek-Hawes Ditch sub watershed. The land use surrounding the waters of the Prairie Creek-Hawes Ditch sub watershed consist of two main uses: row crops (88%), pasture/hay (10%). A more detailed description of land use within the Prairie Creek-Hawes Ditch sub watershed can be viewed in Figure 26.

Prairie Creek-Hawes Ditch Watershed Land Cover

Figure 26. Prairie Creek-Hawes Ditch Land use Pie: Pie chart represents the land uses found within the Prairie Creek-Hawes Ditch sub watershed. Percentages of the land uses may be viewed to the right of the color key. Source: Indiana Water Quality Atlas, July 2005. Data used to compose pie chart was from a 1993 United States Geological Survey (USGS) land use survey.

Estimated loads of pollutants Phosphorous and Nitrogen before the implementation of Waste Management Systems (i.e., Litter Staging Facility construction), the load reduction, and the load after implementation of BMP were calculated for the Prairie Creek-Hawes Ditch sub watershed and can be viewed in Table 8. The estimated load reduction for phosphorous and nitrogen were 35,180 pounds per year and 107,632 pounds per year, respectively.

Table 9. Estimated Load Reductions for Prairie Creek-Hawes Ditch sub watershed : Details the pollutant loads of Phosphorous and Nitrogen before and after implementation of a Waste Management System, such as a Litter Staging Facility, for the Prairie Creek-Hawes Ditch sub watershed.

Estimated Load and Load Reductions for Prairie Creek-Hawes Ditch Sub Watershed HUC 05120202-080-080			
Pollutants	Load before BMP	Load Reduction	Load after BMP
Phosphorus load (lbs/yr)	39,089	35,180	3,909
Nitrogen load (lbs/yr)	134,540	107,632	26,908

<u>6.6 South Fork Prairie Creek-Dinken Creek Sub Watershed HUC 05120202-080-050</u>

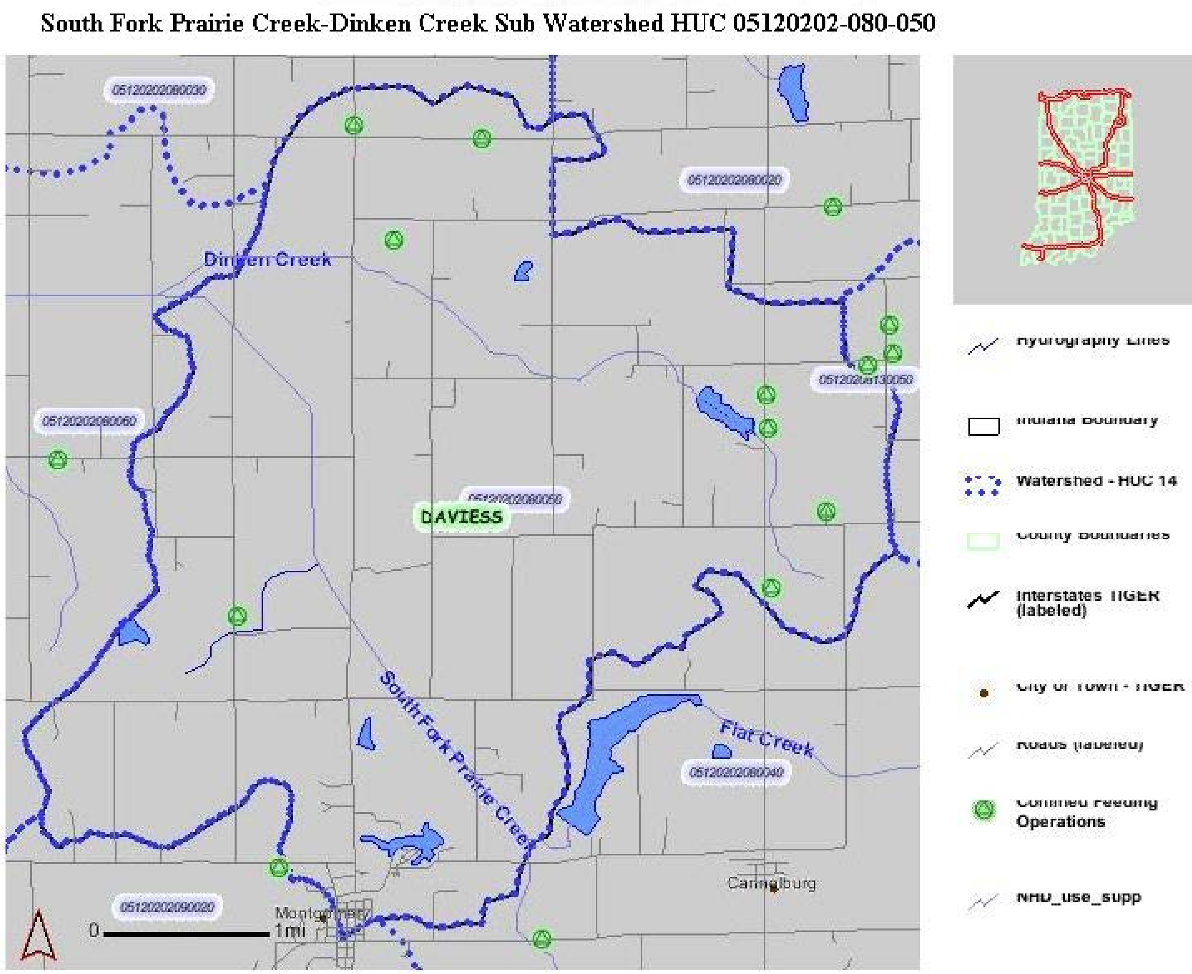


Figure 27. South Fork Prairie Creek-Dinken Creek sub watershed map: Displays the boundaries of the South Fork Prairie Creek-Dinken Creek sub watershed and locations of CFOs. Source: Indiana Water Quality Atlas, July 2005.

Estimations of riparian buffer in the South Fork Prairie Creek-Dinken Creek sub watershed resulted in 72% of the surface water lacking any woody plant buffer zones, 10% of the surface water having moderate woody plant riparian buffer, and 18% consisting of substantial woody riparian buffer. Refer to Figure 26 to view a map of the South Fork Prairie Creek-Dinken Creek sub watershed. The land use surrounding the waters of the South Fork Prairie Creek-Dinken Creek sub watershed consist of three main uses: row crops (47%), pasture/hay (48%), and deciduous forest (4%). A more detailed description of land use within the North Fork Prairie Creek-Barnes Creek sub watershed can be viewed in Figure 28.

South Fork Prairie Creek-Dinken Creek Watershed Land Cover

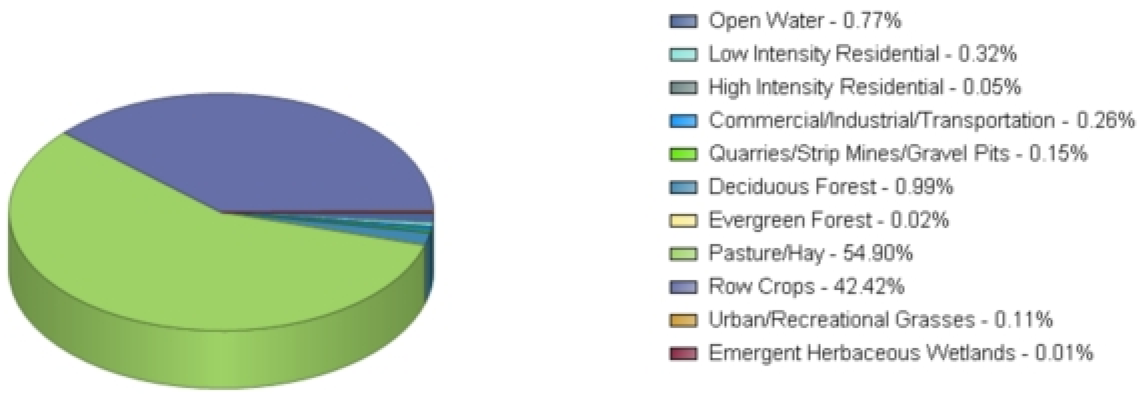


Figure 28. South Fork Prairie Creek-Dinken Creek Land use Pie: Pie Chart represents land uses within the South Fork Prairie Creek-Dinken Creek sub watershed. Percentages of land uses maybe viewed to the right of the color key. Source: Indiana Water Quality Atlas, July 2005. Data used to compose pie chart was from a 1993 United States Geological Survey (USGS) land use survey.

Estimated loads before BMP installation of waste management systems for Phosphorous were 50,640 pounds per year, the actual calculated load reduction of Phosphorous was 45,576 pounds per year, and the load of Phosphorous after the construction of the BMPs for the South Fork Prairie Creek-Dinken Creek sub watershed was estimated to be 5,064 pounds per year. The load reduction for nitrogen within the identified sub watershed was equal to 51,470 pounds per year. View Table 9 for a summary of the estimated load and load reductions of both Phosphorous and Nitrogen.

Table 10. Estimated Load Reductions for South Fork Prairie Creek-Dinken Creek sub watershed: Details estimated load and load reductions for the South Fork Prairie Creek-Dinken Creek sub watershed.

Estimated Load and Load Reductions for South Fork Prairie Creek-Dinken Creek Sub Watershed HUC 05120202-080-050			
Pollutants	Load before BMP	Load Reduction	Load after BMP
Phosphorus load (lbs/yr)	16,287	14,659	1,629
Nitrogen load (lbs/yr)	64,338	51,470	12,868

6.7 South Fork Prairie Creek-Eagan Ditch Sub Watershed HUC 05120202-080-060

South Fork Prairie Creek-Eagan Ditch Sub Watershed HUC 05120202-080-060

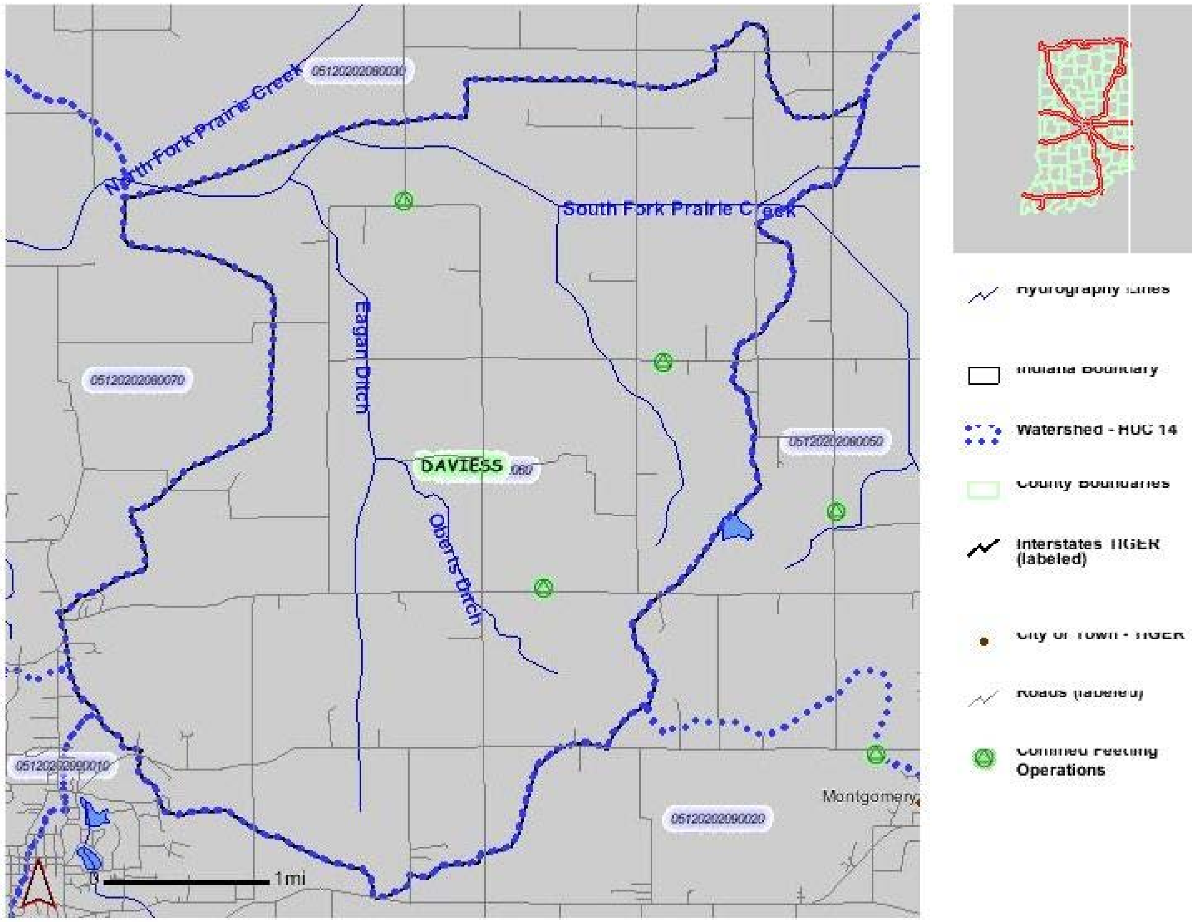


Figure 29. South Fork Prairie Creek-Eagan Ditch sub watershed map: Displays South Fork Prairie Creek-Eagan Ditch sub watershed boundary and locations of CFOs. Source: Indiana Water Quality Atlas, July 2005.

Estimations of riparian buffer in the South Fork Prairie Creek-Eagan Ditch sub watershed resulted in 77% of the surface water lacking any woody plant buffer zones, 12% of the surface water having moderate woody plant riparian buffer, and 11% consisting of substantial woody riparian buffer. Refer to Figure 28 to view a map of the South Fork Prairie Creek-Eagan Ditch sub watershed. The land use surrounding the waters of the South Fork Prairie Creek-Eagan Ditch sub watershed consist of three main uses: row crops (62%), pasture/hay (29%), and deciduous forest (6%). A more detailed description of land use within the South Fork Prairie Creek-Eagan Ditch sub watershed can be viewed in Figure 30.

South Fork Prairie Creek-Eagan Ditch Watershed Land Cover

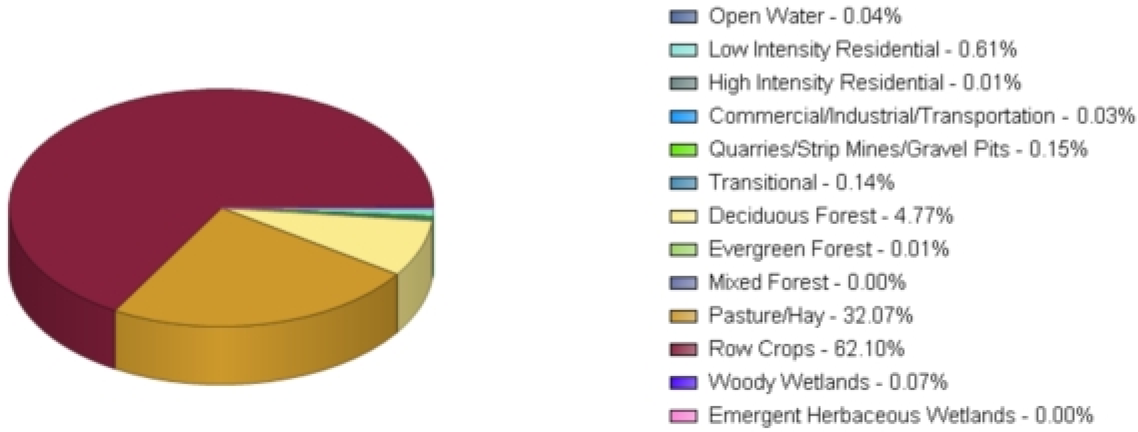


Figure 30. South Fork Prairie Creek-Eagan Ditch Land use Pie: Pie chart represents the land uses found within the South Fork Prairie Creek-Eagan Ditch sub watershed. Percentages of the land uses may be viewed to the right of the color key. Source: Indiana Water Quality Atlas, July 2005. Data used to compose pie chart was from a 1993 United States Geological Survey (USGS) land use survey.

Estimated loads of pollutants Phosphorous and Nitrogen before the implementation of Waste Management Systems (i.e., Litter Staging Facility construction), the load reduction, and the load after implementation of BMP were calculated for the South Fork Prairie Creek-Eagan Ditch sub watershed and can be viewed in Table 10. The estimated load reduction for phosphorous and nitrogen were 11,667 pounds per year and 39,642 pounds per year, respectively

Table 11. Estimated Load Reductions for South Fork Prairie Creek-Eagan Ditch sub watershed: Details the pollutant loads of Phosphorous and Nitrogen before and after implementation of a Waste Management System, such as a Litter Staging Facility, for the South Fork Prairie Creek-Eagan Ditch sub watershed.

Estimated Load and Load Reductions for South Fork Prairie Creek-Eagan Ditch Sub Watershed HUC 05120202-080-060			
Pollutants	Load before BMP	Load Reduction	Load after BMP
Phosphorus load (lbs/yr)	12,963	11,667	1,296
Nitrogen load (lbs/yr)	49,553	39,642	9,911

6.8 Prairie Creek-Killion Canal Sub Watershed HUC 05120202-080-070

Prairie Creek-Killion Canal Sub Watershed HUC 05120202-080-070

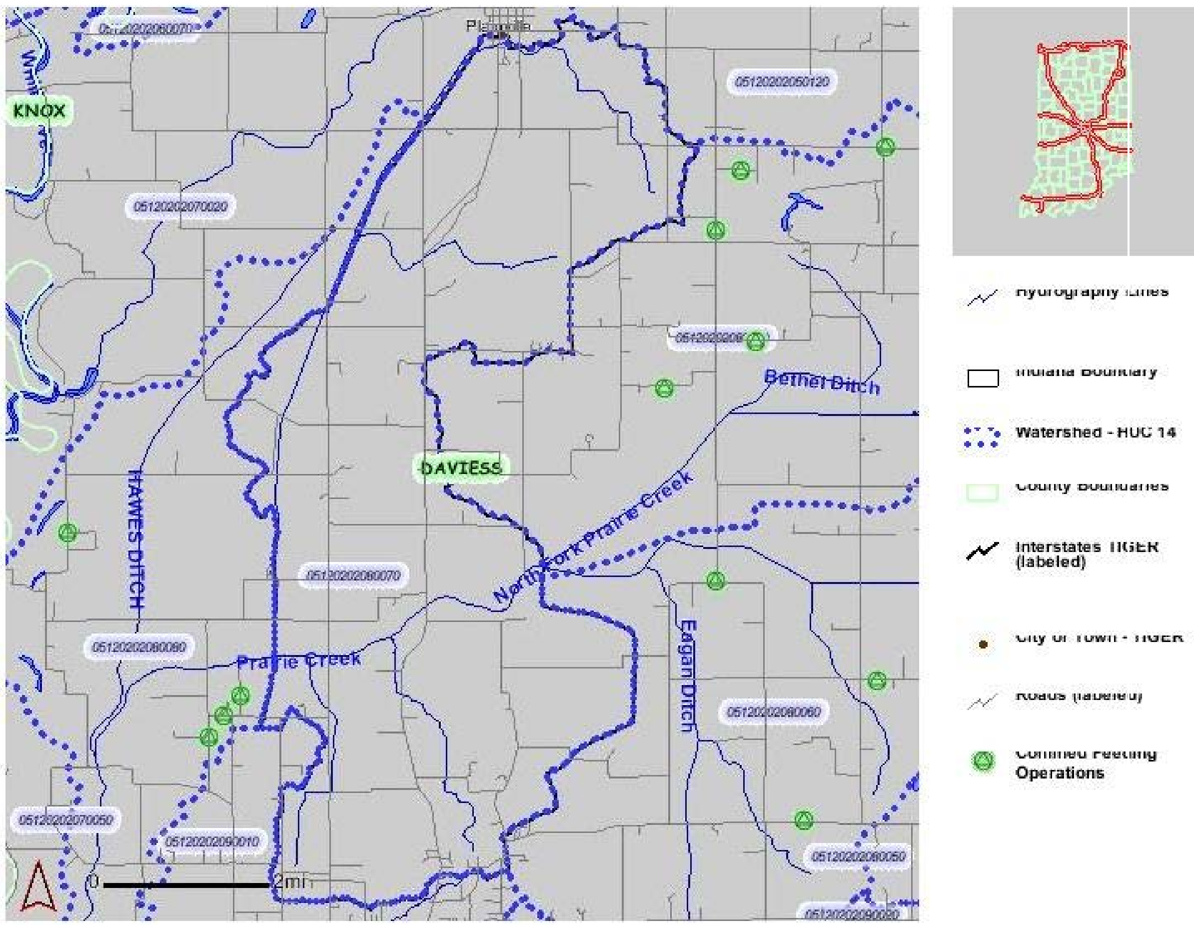


Figure 31. Prairie Creek/Killion Canal sub watershed map: Displays Prairie Creek/Killion Canal sub watershed boundary and locations of CFOs. There are no CFOs in the Prairie Creek/Killion Canal sub watershed. Source: Indiana Water Quality Atlas, July 2005.

Estimations of riparian buffer in the Prairie Creek-Killion Canal sub watershed resulted in 72% of the surface water lacking any woody plant buffer zones, 10% of the surface water having moderate woody plant riparian buffer, and 18% consisting of substantial woody riparian buffer. Refer to Figure 30 to view a map of the Prairie Creek-Killion Canal sub watershed. The land use surrounding the waters of the Prairie Creek-Killion Canal sub watershed consist of three main uses: row crops (76%), pasture/hay (22%), and deciduous forest (2%). A more detailed description of land use within the South Fork Prairie Creek-Flat Creek sub watershed can be viewed in Figure 32.

Prairie Creek-Killion Canal Watershed Land Cover

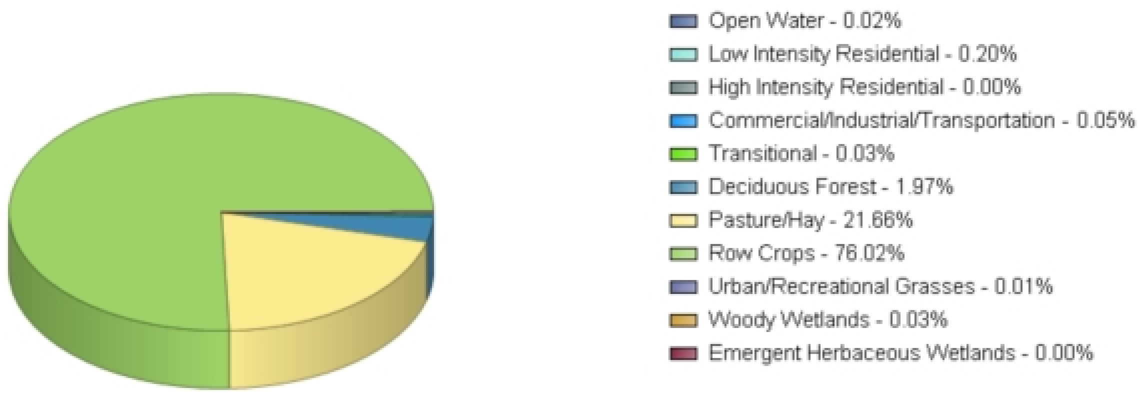


Figure 32. Prairie Creek/Killion Canal Land use Pie: Pie chart represents the land uses found within the Prairie Creek-Killion Canal sub watershed. Percentages of the land uses may be viewed to the right of the color key. Source: Indiana Water Quality Atlas, July 2005. Data used to compose pie chart was from a 1993 United States Geological Survey (USGS) land use survey.

Since there are no CFOs located in the Prairie Creek-Killion Canal sub watershed, pollutant load reduction calculations were not computed.

7.0 Prioritization of Water Quality Problems and Associated Goals and Decisions

Problem 1:
Improper storage and disposal of manure from livestock facilities, in conjunction with failed/failing septic systems and percolation rates of local soils, is believed to be causing high levels of *E. coli* contamination throughout the waters of the Prairie Creek Watershed.

Goal #1: Reduce *E. coli* pollution within sub-watershed target areas by 50% within three to five years through construction of manure staging facilities and composting facilities, buffer/filter strips, fencing to exclude livestock from waterways, and enforcement of laws pertaining to septic systems. *E. coli* sampling will be conducted to monitor pathogen levels and track progress.

Goal #2: Enroll new landowners living within target areas into cost-share programs, such as the Conservation Reserve Program, which will provide funding for buffer/filter strips. Progress will be monitored by tracking changes in land-use.

Goal #3: Educate 350 community members on environmental and health risks of elevated pathogen levels in local waterways from improperly stored animal wastes and failed/failing septic systems. Progress will be evaluated through number of people in attendance as well as stakeholder knowledge surveys.

Problem 2: Livestock production facilities lack of proper staging areas for storage and disposal of manure and mortality wastes, agricultural fertilizing practices, as well as failed/failing septic systems may be causing nutrient pollution within the watershed.

Goal #1: Reduce nitrogen and phosphorous pollution within the sub-watershed target areas by 50% in three to five years through construction of buffer/filter strips, manure staging facilities and composting facilities, and implementation of other conservation strategies such as no till and cover crops. Progress will be measured through sampling and monitoring of chemical parameters within sub-watershed channels.

Goal #2: Enroll new landowners within the target areas into cost-share programs to construct or implement grass waterways, buffer/filter strips, and conservation strategies such as no till and cover crops. Progress will be monitored by tracking changes in land-use.

Goal #3: Educate 350 community members on the negative impacts of nutrient pollution as well as how to apply fertilizers at rates conducive to good water quality or overall environmental health. Progress will be monitored through number of people in attendance at educational events and stakeholder knowledge surveys.

Problem 3: Lack of WASCOBs and field tiles to control erosion and sedimentation.

Problem 4: Farming practices, the loss of crop ground to development, and the proposed creation of Interstate 69 through the middle of the watershed will likely present significant future issues for water quality within the watershed.

After practices to alleviate problems one and two have been implemented, goals for problems three and four will be established and critical areas of severe erosion and sedimentation will be pinpointed in Phase 2 of the plan.

8.0 Management Measures, Action Plan, Resources and Legal Matters

To obtain the goals set for the Prairie Creek watershed, Best Management Practices (BMPs) for Agriculture, Livestock, and Residential homeowners must be implemented. This section ties together the priority issues and concerns held by all involved stakeholders and recommends management strategies. Refer to Appendix 8: Action Register for a breakdown of goals, action items, and responsible parties.

To reduce pathogen contamination (E. coli) from agricultural operations:

- Properly store and dispose of animal wastes by constructing manure staging facilities (Refer to Photo 1) and mortality composters in compliance with NRCS standards.
- Host educational/outreach programs to inform livestock owners and farmers who utilize manure as a form of fertilizer of the environmental and health problems

associated with pathogen pollution, as well as ways they can reduce their contribution to the problem.

- Exclude livestock from stream areas.
- Increase contact with livestock owners who practice open bank grazing and owners whose operations are small enough to avoid governmental regulations for CFOs or CAFO's.
- Seek additional sources of funding for livestock fencing and alternative drinking water supply systems.
- Promote the continued use of, and also the increased use of, livestock manure management plans to prevent excess application of manure as fertilizer.
- Promote the use of woody buffer/filter strips, grass waterways, cover crops, and no till practices on cropland.
- Utilize cost-share options such as the Conservation Reserve Program (CRP), Environmental Quality Incentives Program (EQIP), Lake and River Enhancement (LARE), Wildlife Habitat Incentives Program (WHIP), Wetlands Reserve Program (WRP), and State Revolving Fund Loan Program.

Photo 1. Manure Staging Facility: Constructed to protect manure from environmental elements which cause the transport of *E. coli* and nutrients into surrounding lands and water sources. Source: Daviess County SWCD July, 2005.

To reduce pathogen contamination (E. coli) from residential sources:

- Host educational/outreach programs for homeowners to inform them of proper septic system maintenance and pet waste disposal, as well as the health and environmental risks associated with improper septic system maintenance and waste disposal.
- Enforce legal code 327 IAC 5-1-1.5 which declares straight pipe discharges from septic tanks and septic tanks connected to drainage tiles as illegal; strictly enforce local ordinances to help correct existing problems.
- Endorse or establish local planning, zoning, and health ordinances to address pollution from septic systems during new development projects.
- Seek funding for cost-share programs to replace or repair outdated septic systems.
- Collaborate with Office of Water Management, Indiana State Department of Health, local health department, and other stakeholders.
- Utilized funding sources such as State Revolving Fund Loan Programs

To reduce nitrogen and phosphorous pollution from livestock operations, farming practices, as well as failed/failing septic systems:

- Construct manure staging facilities and mortality composters in compliance with NRCS standards which will properly store and dispose of animal wastes while decreasing the potential for nitrogen and phosphorous leaching into waterways.
- Host educational/outreach programs to inform farmers, as well as residential homeowners, of the environmental risks associated with high levels of nitrogen and phosphorous from sources such as fertilizers and septic systems as well as what they can do to prevent nutrient pollution.
- Exclude livestock from waterways.
- Promote the continued use of, and also the increased use of, livestock manure management plans and nutrient management plans.
- Promote the use of buffer/filter strips, grass waterways, and other conventional conservation strategies such as no till and cover crops on row crop land.
- Utilize cost-share options such as the Conservation Reserve Program (CRP), Environmental Quality Incentives Program (EQIP), Lake and River Enhancement (LARE), Wildlife Habitat Incentives Program (WHIP), Wetlands Reserve Program (WRP), State Revolving Fund Loan Program.

To address the issue of increased need for WASCOBs and field tiles to reduce sedimentation and erosion.

- Promote the use of WASCOBs as a method to decrease soil erosion and the subsequent deposition of eroded soils within the channels of the Prairie Creek watershed.
- Apply for monetary assistance for stream bank stabilization projects.

To address the future issues of farming practices, the loss of crop ground to development, and the proposed creation of Interstate 69 through the middle of the watershed presenting future issues for water quality.

- Revise and update Prairie Creek Watershed Management Plan as needed.

8.1 Resources

The Prairie Creek Watershed Planning Committee will continue its efforts and partnerships with the IDNR, TNC, NRCS, local Soil and Water Conservation District, local Department of Health, and other stakeholders. Eventually, monetary assistance will need to be obtained from other local, state, federal, and private agencies. Programs operated by state and federal agencies that will provide assistance include the Conservation Reserve Program, Environmental Quality Incentives Program, Wildlife Habitat Incentives Program, Wetlands Reserve Program, Indiana's State Revolving Fund, as well as Section 319 grants. A few of the private organizations that may provide funding include the W.K. Kellogg Foundation, Monsanto Fund, Dow Agro Sciences, Patagonia, FishAmerica Foundation, River Network.

9.0 Plan Evaluation

In order to determine if the implemented BMPs have had any significant effects on the biological, chemical, or physical parameters of the watershed, a Quality Assurance Project Plan (QAPP) will be approved by IDEM officials. Key components of the plan will include monitoring and recording water quality upstream and downstream of the implemented BMPs. Upstream and downstream water monitoring should also be conducted during at least 15% of significant precipitation events occurring during the monitoring phase. Success of the promotion of BMPs will be monitored by the number of new landowners implementing BMP and/or by aerial photography before and after implementation of BMPs showing land use changes. Success of the education/outreach campaigns can be measured through the use of surveys evaluating the knowledge of stakeholders and by recording the number of people in attendance at education events.

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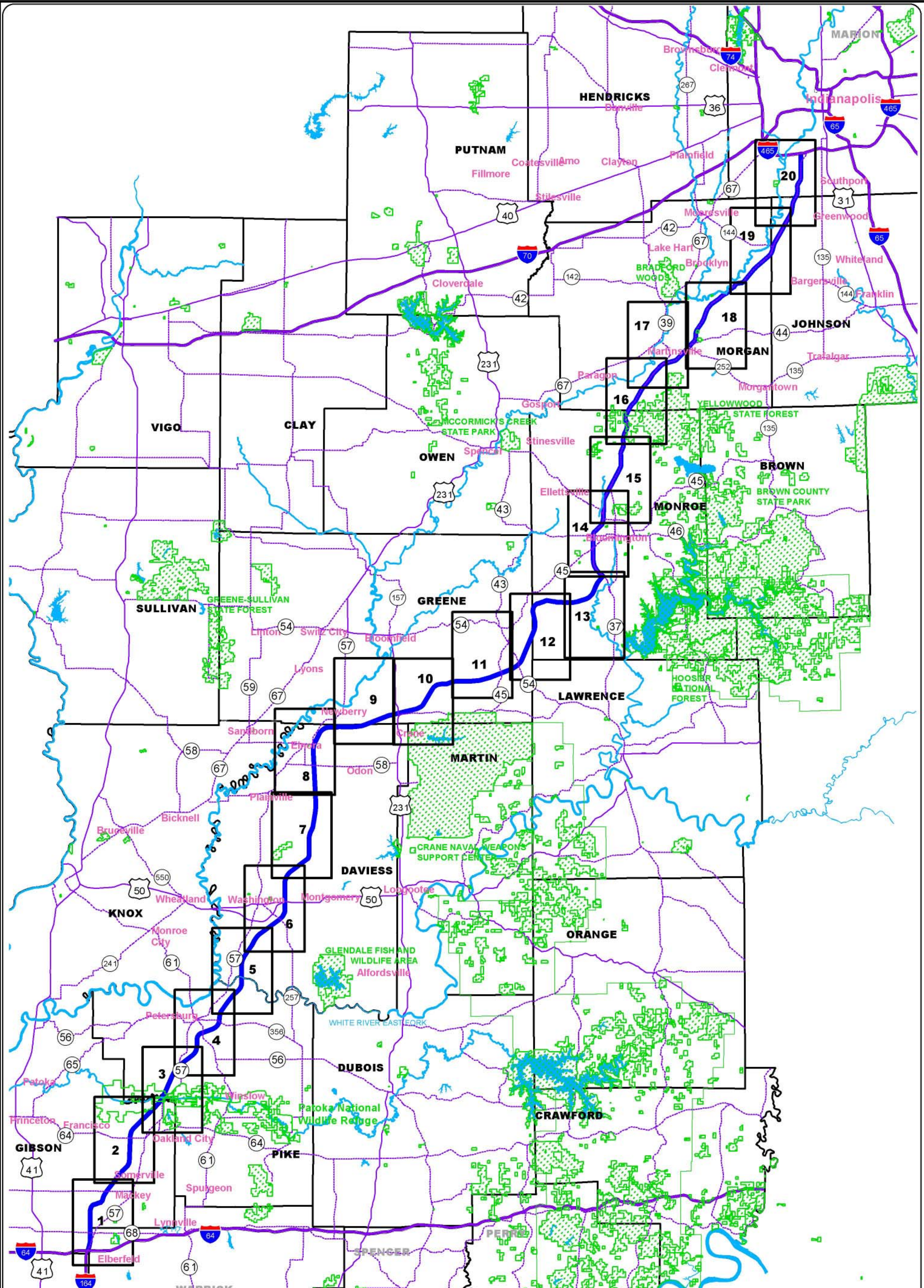


I-69 EVANSVILLE TO INDIANAPOLIS STUDY

Tier 1 Environmental Impact Statement

Preferred Alternative 3C Route Index

Bernardin, Lochmueller & Associates, Inc.
UTM 16, NAD83, meters
DATE: 2003 v.1118

Sheets depicted on this map provide a guide for using Atlas sheets for each route.
Managed areas were obtained from the IDNR Heritage Database and were updated with files from individual areas.

N

1:552,000
inch = 46,000 feet

0 5 10 15 20 25 Miles

0 30000 60000 90000 120000 Feet

0 10000 20000 30000 40000 Meters

Index Legend

- Preferred Alternative 3C
- Interstate
- US Highway
- State Highway
- Water Bodies

CITIES

- County
- Map Sheets
- Managed Lands
- Acquirement Boundary

ENDANGERED, THREATENED AND RARE SPECIES DOCUMENTED FROM DAVIESS COUNTY, INDIANA

SPECIES NAME	COMMON NAME	STATE	FED	SRANK	GRANK
VASCULAR PLANT					
ARMORACIA AQUATICA	LAKE CRESS	SE	**	S1	G4?
CAREX LUPULIFORMIS	FALSE HOP SEDGE	SR	**	S2	G3G4
CARYA PALLIDA	SAND HICKORY	ST	**	S2	G5
CHRYSOPSIS VILLOSA	HAIRY GOLDEN-ASTER	ST	**	S2	G5
CORNUS AMOMUM SSP AMOMUM	SILKY DOGWOOD	SE	**	S1	G5T?
FIMBRISTYLIS PUBERULA	CAROLINA FIMBRY	SE	**	S1	G5
GAURA FILIPES	SLENDER-STALKED GAURA	ST	**	S2	G5
GYMNOPOGON AMBIGUUS	BROADLEAF BEARDGRASS	SX	**	SX	G4
HYPERICUM ADPRESSUM	CREEPING ST. JOHN'S-WORT	SE	**	S1	G2G3
HYPERICUM DENTICULATUM	COPPERY ST. JOHN'S-WORT	ST	**	S2	G5
ISOETES MELANOPODA	BLACKFOOT QUILLWORT	SE	**	S1	G5
PANICUM YADKINENSE	A PANIC-GRASS	ST	**	S2	G?
PENSTEMON TUBAEFLORUS	TUBE PENSTEMON	SX	**	SX	G5
RHEXIA MARIANA VAR MARIANA	MARYLAND MEADOW BEAUTY	SE	**	S1	G5T5
RUDBECKIA FULGIDA VAR FULGIDA	ORANGE CONEFLOWER	SR	**	S2	G5T?
SABATIA CAMPANULATA	SLENDER MARSH PINK	SX	**	SX	G5
MOLLUSCA: BIVALVIA (MUSSELS)					
CYPROGENIA STEGARIA	EASTERN FANSHELL PEARLYMUSSEL	SE	LE	S1	G1
EPIOBLASMA TORULOSA TORULOSA	TUBERCLED BLOSSOM	SE	LE	S1	G2TX
FUSCONAIA SUBROTUNDA	LONG-SOLID	SE	**	S1	G3
LAMPSILIS OVATA	POCKETBOOK	**	**	S2	G5
LAMPSILIS TERES	YELLOW SANDSHELL	**	**	S2	G5
OBOVARIA RETUSA	RING PINK	SX	LE	SX	G1
OBOVARIA SUBROTUNDA	ROUND HICKORYNUT	SSC	**	S2	G4
PLEUROBEMA CLAVA	CLUBSHELL	SE	LE	S1	G2
PLEUROBEMA CORDATUM	OHIO PIGTOE	SSC	**	S2	G3
PLEUROBEMA PYRAMIDATUM	PYRAMID PIGTOE	SE	**	S1	G2
PTYCHOBRANCHUS FASCIOLARIS	KIDNEYSHELL	SSC	**	S2	G4G5
QUADRULA CYLINDRICA CYLINDRICA	RABBITSFOOT	SE	**	S1	G3T3
ARTHROPODA: INSECTA: EPHEMEROPTERA (MAYFLIES)					
SIPHLOPLECTON INTERLINEATUM	A SAND MINNOW MAYFLY	**	**	S1	G?
FISH					
ETHEOSTOMA PELLUCIDUM	EASTERN SAND DARTER	SSC	**	S2	G3
REPTILES					
TERRAPENE ORNATA	ORNATE BOX TURTLE	SE	**	S2	G5
BIRDS					
CIRCUS CYANEUS	NORTHERN HARRIER	SE	**	S2	G5

STATE: SX=extirpated, SE=endangered, ST=threatened, SR=rare, SSC=special concern, WL=watch list, SG=significant,** no status but rarity warrants concern

FEDERAL: LE=endangered, LT=threatened, LELT=different listings for specific ranges of species, PE=proposed endangered, PT=proposed threatened, E/SA=appearance similar to LE species, **=not listed

November 16, 1999

ENDANGERED, THREATENED AND RARE SPECIES DOCUMENTED FROM DAVIESS COUNTY, INDIANA

SPECIES NAME	COMMON NAME	STATE	FED	SRANK	GRANK
HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	SE	LT	S2	G4
IXOBRYCHUS EXILIS	LEAST BITTERN	SE	**	S3B	G5
LANIUS LUDOVICIANUS	LOGGERHEAD SHRIKE	SE	**	S3B,SZN	G5
PHALACROCORAX AURITUS	DOUBLE-CRESTED CORMORANT	SX	**	SHB,SZN	G5
TYTO ALBA	BARN OWL	SE	**	S2	G5
MAMMALS					
LYNX RUFUS	BOBCAT	SE	**	S1	G5
TAXIDEA TAXUS	AMERICAN BADGER	SE	**	S2	G5
HIGH QUALITY NATURAL COMMUNITY					
FOREST - FLOODPLAIN WET	WET FLOODPLAIN FOREST	SG	**	S3	G3?
WETLAND - FLAT SAND	SAND FLAT	SG	**	S1	G2
WETLAND - SEEP CIRCUMNEUTRAL	CIRCUMNEUTRAL SEEP	SG	**	S1	GU

STATE: SX=extirpated, SE=endangered, ST=threatened, SR=rare, SSC=special concern, WL=watch list, SG=significant,** no status but rarity warrants concern

FEDERAL: LE=endangered, LT=threatened, LELT=different listings for specific ranges of species, PE=proposed endangered, PT=proposed threatened, E/SA=appearance similar to LE species, **=not listed

Waterbody Segment ID	Hydrologic Unit Code	Waterbody Segment Name	Size	Units	Draft Year 303(d)	Aquatic Life Support	Drinking Water Supply	Fish Consumption	Primary Contact	Biotic Community Status	Pesticides	Atrazine	PAHs	PCBs	Dioxins	Cadmium	Copper	Lead	Mercury	Nickel	Zinc	Unionized Ammonia	Cyanide	Sulfates	Other Inorganics	Nutrients	pH	Siltation	Organic Enrichment	Low Dissolved Oxygen (DO)	Total Dissolved Solids (TDS)	Chlorides	Thermal Modifications	Other Habitat Alterations	Pathogens	Oil and Grease	Taste and Odor	Algal Growth/Chlorophyll a	Exotic Species	Assessment Date (yyyymmdd)
INW0281_00	05120202080010	NORTH FORK PRAIRIE CREEK-HEADWATER TRIBUTARYS	3.1	Miles	2004	X		X	N																										H					20030421
INW0281_T1044	05120202080010	NORTH FORK PRAIRIE CREEK	5.6	Miles	1998	X		X	N																										H					20030218
INW0282_00	05120202080020	BARNES CREEK AND OTHER TRIBUTARYS	###	Miles	2004	X		X	N																										H					20030421
INW0282_T1046	05120202080020	NORTH FORK PRAIRIE CREEK	4.4	Miles	1998	X		X	N																										H					20030218
INW0283_00	05120202080030	BETHEL CREEK AND OTHER TRIBUTARYS	5.9	Miles	2004	X		X	N																										H					20030421
INW0283_T1047	05120202080030	NORTH FORK PRAIRIE CREEK	7.4	Miles	1998	N		X	N	M																M		M						M	H					20030630
INW0284_00	05120202080040	FLAT CREEK AND OTHER TRIBUTARYS	9.3	Miles	2004	X		X	N																										H					20030421
INW0284_T1049	05120202080040	SOUTH FORK PRAIRIE CREEK	2.3	Miles	1998	X		X	N																										H					20030219
INW0285_00	05120202080050	DINKIN CREEK AND OTHER TRIBUTARYS	5.4	Miles	2004	X		X	N																										H					20030421
INW0285_T1050	05120202080050	SOUTH FORK PRAIRIE CREEK	4.4	Miles	1998	X		X	N																										H					20030219
INW0286_T1051	05120202080060	SOUTH FORK PRAIRIE CREEK	4.4	Miles	1998	X		X	N																										H					20030219
INW0286_T1166	05120202080060	ANTIOCH CREEK	2.5	Miles	2004	X		X	N																										H					20030219
INW0286_T1167	05120202080060	EAGAN DITCH BASIN	6.4	Miles	2004	N		X	N																	M				T					M					20030630
INW0287_00	05120202080070	KILLION CANAL AND OTHER TRIBUTARIES	###	Miles	2004	F		X	N																										H					20030219
INW0287_T1063	05120202080070	PRAIRIE CREEK	3.3	Miles	2004	P		X	N	M																									H					20030219
INW0288_00	05120202080080	HAWES DITCH	6.4	Miles		F		X	F																															
INW0288_T1064	05120202080080	PRAIRIE CREEK	5.0	Miles	2004	P		X	N	S																									H					20030219

All waterbodies in Indiana are designated for Aquatic Life Use, Primary Contact (Recreational Use), and Fish Consumption Use.
Some are designated for Drinking Water use as well. Water quality assessments indicate how well a specific waterbody supports these uses.

F = fully supporting
P = partially supporting
N = not supporting
X = not assessed

the waterbody is partially or not supporting one or more uses, the cause(s) and magnitude of the impairment(s) will appear in the columns to the right:

S = slightly impaired
M = moderately impaired
H = highly impaired

Site Specific Waterbody Assessments

Waterbody Segment ID	Hydrologic Unit Code	Waterbody Segment Name	Size	Units	Draft Year 303(d)	Aquatic Life Support	Drinking Water Supply	Fish Consumption	Primary Contact	Biotic Community Status	Pesticides	Atrazine	PAHs	PCBs	Dioxins	Cadmium	Copper	Lead	Mercury	Nickel	Zinc	Unionized Ammonia	Cyanide	Sulfates	Other Inorganics	Nutrients	pH	Siltation	Organic Enrichment	Low Dissolved Oxygen (DO)	Total Dissolved Solids (TDS)	Chlorides	Thermal Modifications	Other Habitat Alterations	Pathogens	Oil and Grease	Taste and Odor	Algal Growth/Chlorophyll a	Exotic Species	Assessment Date (yyyymmdd)
White River, West Fork Basin																																								
INW0281_00	05120202080010	NORTH FORK PRAIRIE CREEK-HEADWATER TRIBUTARYS	3.1	Miles	2004	X		X	N																										H					20030421
INW0281_T1044	05120202080010	NORTH FORK PRAIRIE CREEK	5.6	Miles	1998	X		X	N																										H					20030218
INW0282_00	05120202080020	BARNES CREEK AND OTHER TRIBUTARYS	10.0	Miles	2004	X		X	N																										H					20030421
INW0282_T1046	05120202080020	NORTH FORK PRAIRIE CREEK	4.4	Miles	1998	X		X	N																										H					20030218
INW0283_00	05120202080030	BETHEL CREEK AND OTHER TRIBUTARYS	5.9	Miles	2004	X		X	N																										H					20030421
INW0283_T1047	05120202080030	NORTH FORK PRAIRIE CREEK	7.4	Miles	1998	N		X	N	M																M		M						M	H					20030630
INW0284_00	05120202080040	FLAT CREEK AND OTHER TRIBUTARYS	9.3	Miles	2004	X		X	N																										H					20030421
INW0284_T1049	05120202080040	SOUTH FORK PRAIRIE CREEK	2.3	Miles	1998	X		X	N																										H					20030219
INW0285_00	05120202080050	DINKIN CREEK AND OTHER TRIBUTARYS	5.4	Miles	2004	X		X	N																										H					20030421
INW0285_T1050	05120202080050	SOUTH FORK PRAIRIE CREEK	4.4	Miles	1998	X		X	N																										H					20030219
INW0286_T1051	05120202080060	SOUTH FORK PRAIRIE CREEK	4.4	Miles	1998	X		X	N																										H					20030219
INW0286_T1166	05120202080060	ANTIOCH CREEK	2.5	Miles	2004	X		X	N																										H					20030219
INW0286_T1167	05120202080060	EAGAN DITCH BASIN	6.4	Miles	2004	N		X	N																	M				T					M					20030630
INW0287_00	05120202080070	KILLION CANAL AND OTHER TRIBUTARIES	18.0	Miles	2004	F		X	N																										H					20030219
INW0287_T1063	05120202080070	PRAIRIE CREEK	3.3	Miles	2004	P		X	N	M																									H					20030219
INW0288_00	05120202080080	HAWES DITCH	6.4	Miles		F		X	F																															
INW0288_T1064	05120202080080	PRAIRIE CREEK	5.0	Miles	2004	P		X	N	S																									H					20030219
INW02P1045_00	05120202080010	PRAIRIE CREEK RESERVOIR NO. A-4-1 (FISHER DAM)	61	Acre	2004	X		X	N																										H					20040301
INW02P1048_00	05120202080040	PRARIE CREEK RESERVOIR NO. B-3-2 (PRICE DAM)	22	Acre		X		X	X																															

All waterbodies in Indiana are designated for Aquatic Life Use, Primary Contact (Recreational Use), and Fish Consumption Use. Some are designated for Drinking Water Use as well. Water quality assessments indicate how well a specific waterbody supports these uses:

F = fully supporting P = partially supporting N = not supporting X = not assessed

If the waterbody is partially or not supporting one or more uses, the cause(s) and magnitude of the impairment(s) will appear in the columns to the right:

S = slightly impaired M = moderately impaired H = highly impaired

“T” designation is used as a marker to identify waterbody segments for which results for a parameter suggests a possible impairment or threat of impairment to a designated use but more information is needed in order to evaluate its impact on water quality.

(Source: IDEM 2004; Jody Arthur, Personal Communication, February 2005)

Listing of Waterbodies by Category:

Category 1 **Attaining the water quality standard for all designated uses and no use is threatened**. Waterbodies should be listed in this category if there are data and information that meet the requirements of the state's assessment and listing methodology and support a determination that all water quality standards are attained and no designated use is threatened.

Category 2 **Attaining some of the designated uses; no use is threatened; and insufficient or no data and information are available to determine if the remaining uses are attained or threatened.** Waterbodies should be listed in this category if there are data and information which meet the requirements of the state's assessment and listing methodology to support a determination that some, but not all, designated uses are attained and none are threatened.

Category 3 **Insufficient or no data and information to determine if any designated use is attained**. Waterbodies should be listed in this category where the data or information to support an attainment determination for any use are not available, consistent with the requirements of the State's assessment and listing methodology. States should schedule monitoring on a priority basis to obtain data and information necessary to classify these waters as Category 1, 2, 4, or 5.

Category 4 **Impaired or threatened for one or more designated uses but does not require the development of a TMDL .**

A. **A TMDL has been completed that results in attainment of all applicable water quality standards, and has been approved by U.S. EPA.** Monitoring should be scheduled for these waterbodies to verify that the water quality standards are met when the water quality management actions needed to achieve all TMDLs are implemented.

B. **Other pollution control requirements are reasonably expected to result in the attainment of the water quality standards a reasonable period of time.** Consistent with the regulation under 130.7(b)(i),(ii), and (iii), waterbodies should be listed in this subcategory where other pollution control requirements required by local, state, or federal authority are stringent enough to achieve any water quality standard (WQS) applicable to such waters. Monitoring should be scheduled for these waterbodies to verify that the water quality standards are attained as expected.

C. **Impairment is not caused by a pollutant**. Waterbodies should be listed in this subcategory if the impairment is not caused by a pollutant.

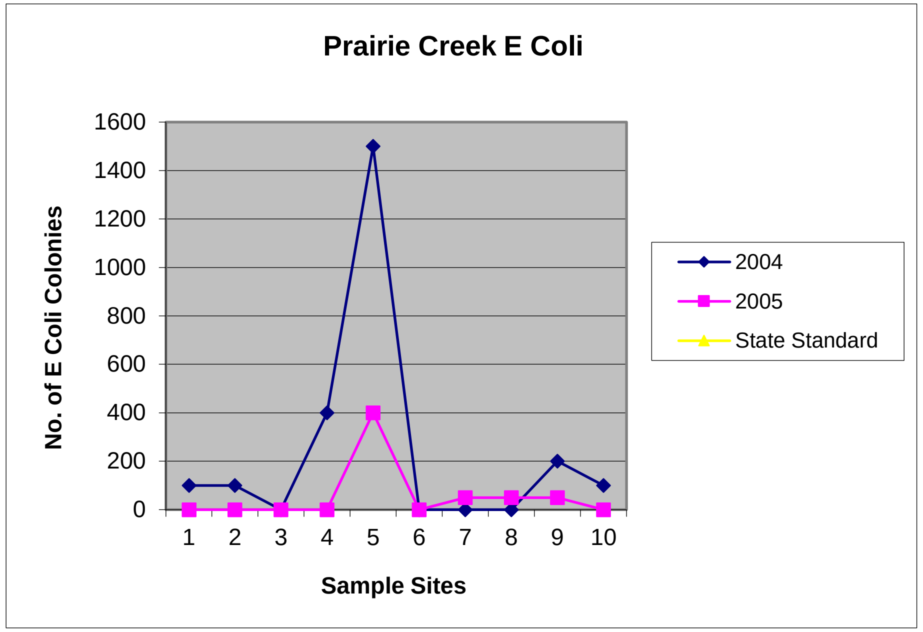
Category 5 **The water quality standard is not attained.** Waterbodies may be listed in both 5A and 5B depending on the parameters causing the impairment.

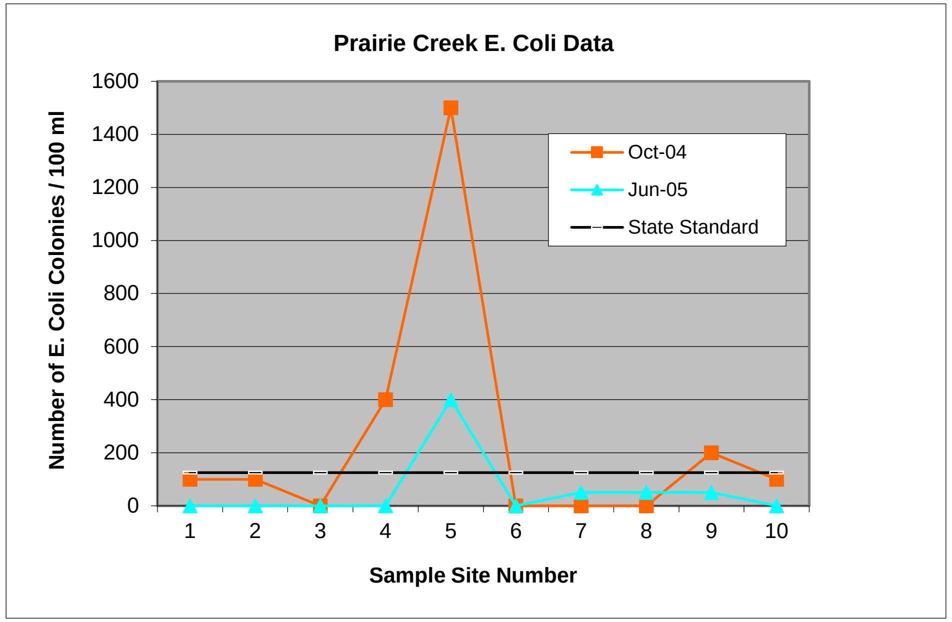
A. **The waterbodies are impaired or threatened for one or more designated uses by a pollutant(s), and require a TMDL**. This category constitutes the Section 303(d) list of waters impaired or threatened by a pollutant(s) for which one or more TMDL(s) are needed. A waterbody should be listed in this category if it is determined, in accordance with the state's assessment and listing methodology, that a pollutant has caused, is suspected of causing, or is projected to cause an impairment. Where more than one pollutant is associated with the impairment of a single waterbody, the waterbody will remain in Category 5 until TMDLs for all pollutants have been completed and approved by U.S. EPA.

B. **The waterbodies are impaired due to a Fish Consumption Advisory for PCB's and/or mercury.** This category also composes a portion of the Section 303(d) list of impaired waters, but the State believes that a conventional TMDL is not the appropriate approach. The State will continue to work with the general public and U.S. EPA on actual steps needed ultimately to address these impairments.

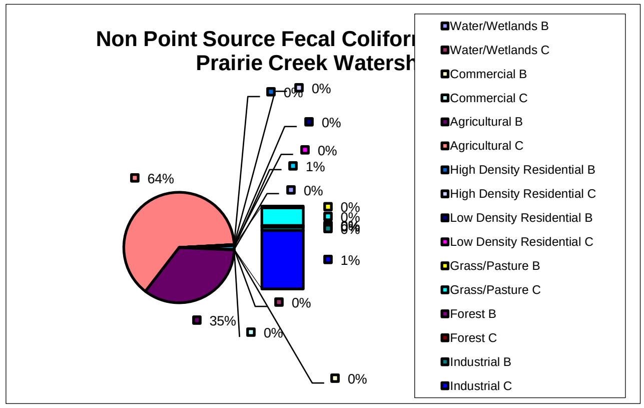
(Source: IDEM 2004)

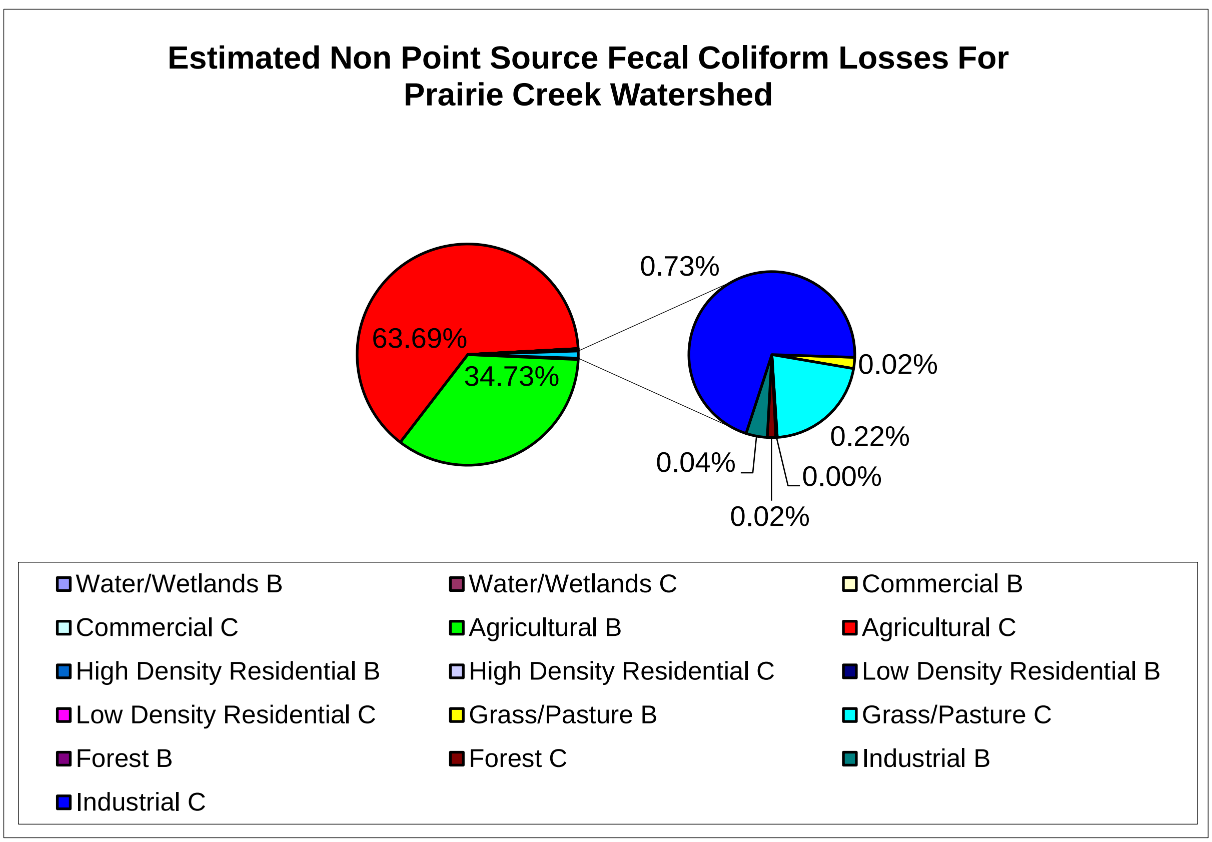
Project	Stream Name	Site	HUC to 14-digit	Latitude	Longitude	Sample No.	E Coli Colonies/mL Oct. 2004	E Coli Colonies/mL June 2005	Water Quality Standard
319	SF Prairie Cr	CR725E	05120202-080-050	N38 40.645'	W87 01.912'	1	100	0	125
319	SFPrairie Cr	CR950E	05120202-080-040	N38 40.643'	W86 59.363'	2	100	0	125
319	NFPrairie Cr	CR1050N	05120202-080-010	N87 48.765'	W86 56.211	3	0	0	125
319	NF Prairie Cr	CR800N	05120202-080-020	N38 46.389'	W86 58.874'	4	400	0	125
319	SF Prairie Cr	CR700N	05120202-080-050	N38 43.234	W87 02.211	5	1500	400	125
319	NFPrairie Cr	CR575E	05120202-080-030	N38 44.957'	W87 03.586'	6	0	0	125
319	SF Prairie Cr	CR450E	05120202-080-060	N38 43.239	W87 04.977'	7	0	50	125
319	NF Prairie Cr	CR300E	05120202-080-030	N38 44.660'	W87 06.661	8	0	50	125
319	Prairie Creek	CR100W	05120202-080-070	N38 42.563	W87 11.131	9	200	50	125
319	Prairie Creek	CR75N	05120202-080-080	N38 40.023'	W87 14.094'	10	100	0	125



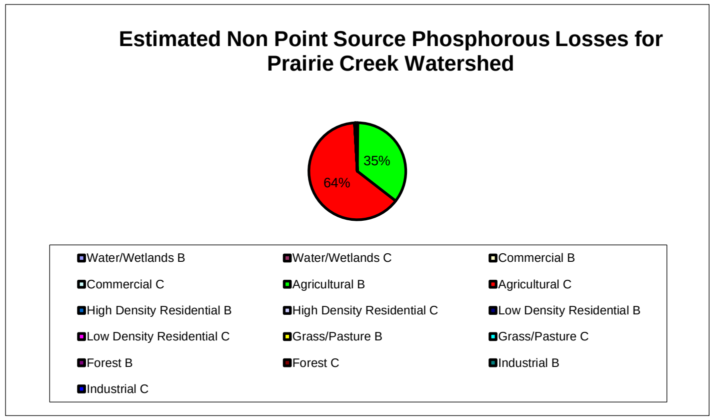


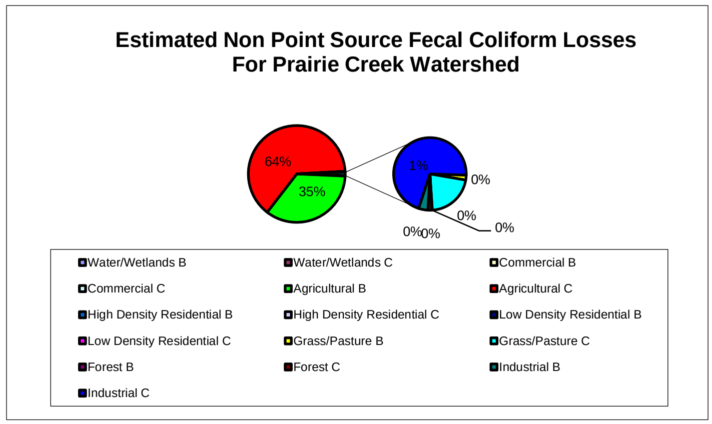
Water/Wetlands B	0
Water/Wetlands C	0
Commercial B	60737
Commercial C	345933
Agricultural B	73232991
Agricultural C	134291394
High Density Residential B	18935
High Density Residential C	91602
Low Density Residential B	228546
Low Density Residential C	384717
Grass/Pasture B	47830
Grass/Pasture C	466501
Forest B	6267
Forest C	35924
Industrial B	90959
Industrial C	1546621

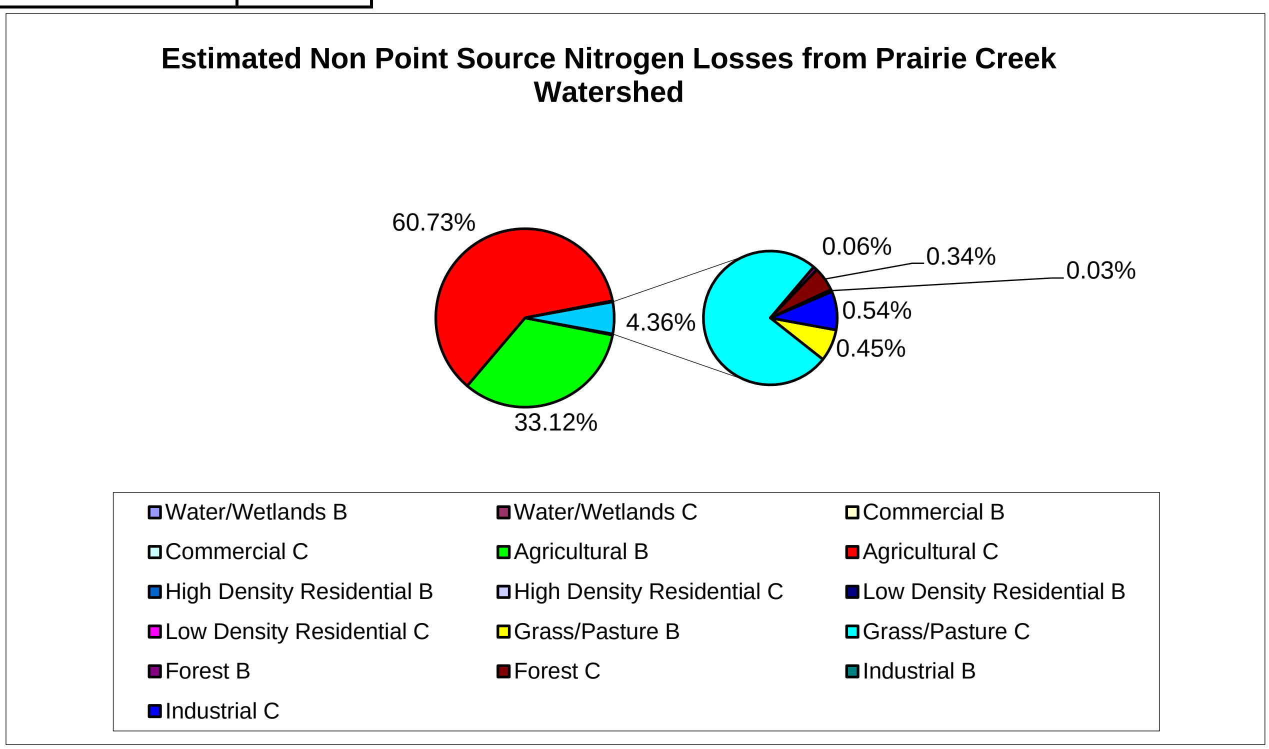




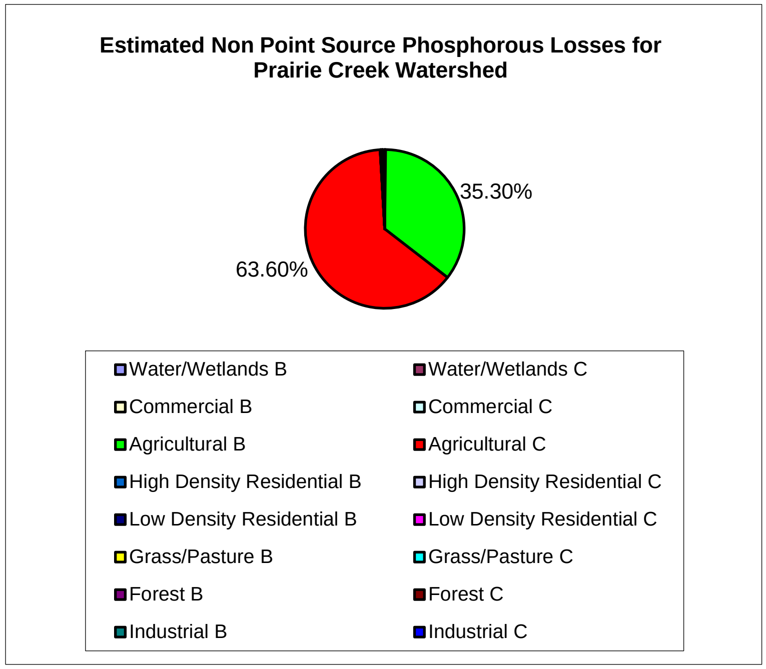
Water/Wetlands B	0
Water/Wetlands C	0
Commercial B	117
Commercial C	671
Agricultural B	123932
Agricultural C	227262
High Density Residential B	17
High Density Residential C	83
Low Density Residential B	207
Low Density Residential C	350
Grass/Pasture B	1674
Grass/Pasture C	16327
Forest B	219
Forest C	1257
Industrial B	118
Industrial C	2009

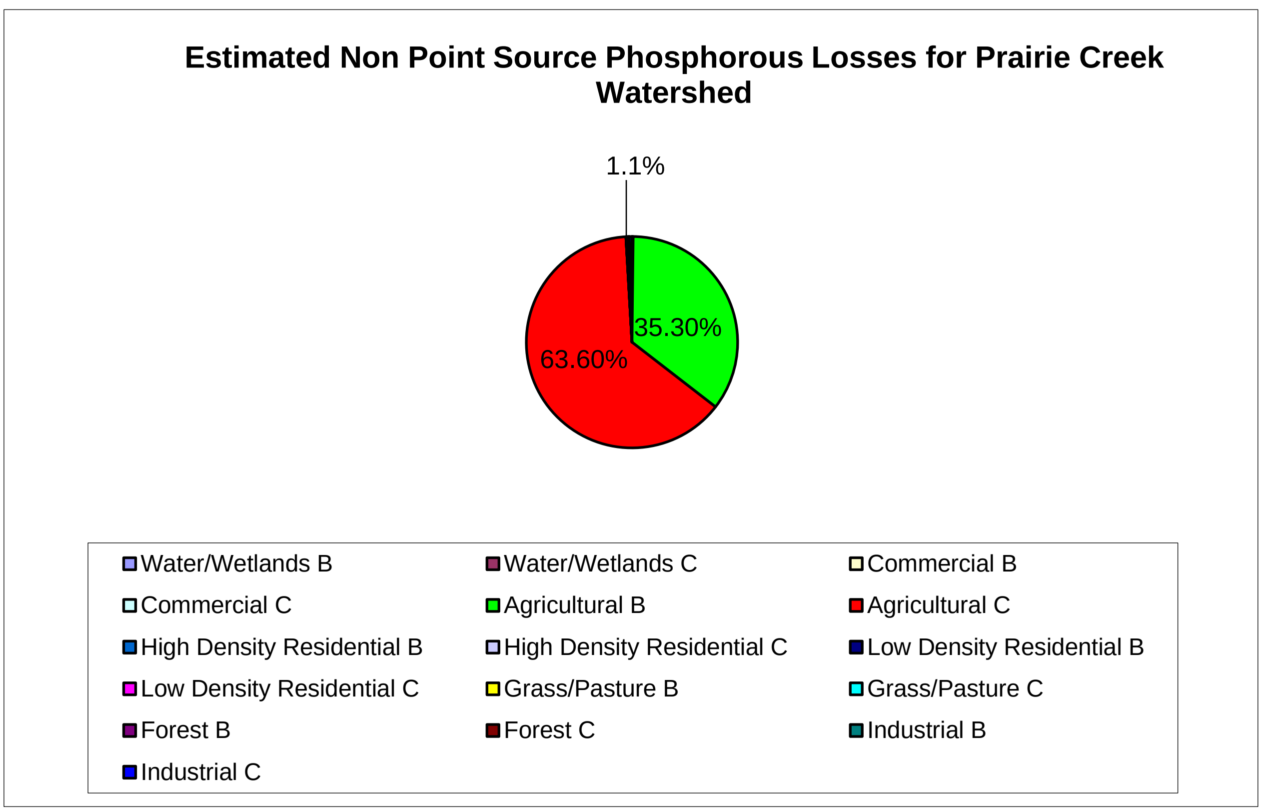






Water/Wetlands B	0
Water/Wetlands C	0
Commercial B	28
Commercial C	160
Agricultural B	36616
Agricultural C	65971
High Density Residential B	5
High Density Residential C	26
Low Density Residential B	65
Low Density Residential C	109
Grass/Pasture B	23
Grass/Pasture C	233
Forest B	3
Forest C	17
Industrial B	26
Industrial C	446
Total/Scenario	104902





Log #	County	Operation	LastNameOwner	FirstNameOwner	AddressOwner	CityOwner	StateOwner	ZipOwner	PhoneOwner	AW#	Issue Date	Nursery Pigs	Hogs (grow./fin.)	Sows	Beef	Calves	Dairy	Calves1	Veal Calves	Layers	Pullets	Broilers	Turkeys	Ducks	Sheep
100	Daviess	KEITH E. GRABER & SON DAIRY	GRABER	KEITH & LES	R 2 BOX 76	LOOGOOTEE	IN	47553	812-295-2810	5051	05/15/01	0	0	0	0	0	205	0	0	0	0	0	0	0	0
101	Daviess	UDDER DELITE DAIRY, INC.	GRABER	AMOS	RR 1, BOX 20	CANNELBURG	IN	47519	812-295-3922	5084	08/02/01	0	0	0	0	0	195	65	0	0	0	0	0	0	0
102	Daviess		SWARTZENTRUBER	BEN	500 SOUTH EAST STREET	ODON	IN	47562	812-636-7392	5030	04/17/01	4,015	900	0	0	0	0	0	0	0	0	0	0	0	0
269	Daviess	R L WILSON FAMILY FARMS	WILSON	ROBERT L	RR 1 BOX 88	MONTGOMERY	IN	47558	812-486-3134	5069	06/20/01	0	960	0	0	0	0	0	0	0	0	0	42,000	0	0
269	Daviess	R L WILSON FAMILY FARMS	WILSON	ROBERT L	RR 1 BOX 88	MONTGOMERY	IN	47558	812-486-3134	5218	07/23/02	0	960	0	0	0	0	0	0	0	0	0	48,000	0	0
285	Martin	FARM #2	TROUTMAN	JAMES M	RR 1 BOX 118 A	SHOALS	IN	47581	812-247-3424	4411	07/22/97	0	4,000	0	0	0	0	0	0	0	0	0	0	0	0
608	Daviess		ARMES GRAIN & LIVESTOCK		RR 2, BOX 237	MONTGOMERY	IN	47558	812-644-7203	5046	05/11/01	1,015	1,000	0	0	0	0	0	0	0	0	0	0	0	0
609	Daviess		GROSS	KENDALL	RR 1 BOX 390	WASHINGTON	IN	47501	812-254-6067	4484	12/04/97	640	1,200	366	0	0	0	0	0	0	0	0	0	0	0
611	Daviess	LAYER OPERATION	RIVER VIEW FARMS, INC.		2262 E 500 N	ORLEANS	IN	47452	812-865-3636	72	04/18/72	0	0	0	0	0	0	0	0	139,000	0	0	0	0	0
754	Daviess		SWARTZENTRUBER	AARON	RR 1 BOX 267	ODON	IN	47562	812-636-4961	4343	05/08/97	150	1,400	88	0	0	0	0	0	0	0	0	0	0	0
793	Daviess		WITTMER	NELSON B	RR 1 BOX 243 B	ODON	IN	47562	812-636-4784	4398	07/15/97	0	1,000	0	0	0	0	0	0	0	0	0	0	0	0
816	Daviess	DALE AND KAREN RACEY FARM	RACEY	DALE & KAREN	RR 2, BOX 221	WASHINGTON	IN	47501	812-254-7108	5215	07/19/02	0	0	0	0	0	0	0	0	0	0	0	37,000	0	0
825	Daviess		EATON	MAX	BOX 147	MONTGOMERY	IN	47558	812-486-3201	634	09/21/71	0	1,000	0	0	0	0	0	0	0	0	0	0	0	0
827	Daviess	KENDALL & SONS INC	KENDALL	GEORGE T	RR 4 BOX 80	WASHINGTON	IN	47501	812-254-5710	2609	03/01/93	500	1,200	556	0	0	0	0	0	0	0	0	0	0	0
880	Martin		DIVINE	RONALD D	RR 4 BOX 199	LOOGOOTEE	IN	47553	812-644-7495	4778	05/05/99	0	900	0	0	0	0	0	0	0	0	0	0	0	0
1032	Martin	FAR-RIVER SWINE, LAND-O-LAKES	FAR RIVER SWINE LLC		2827 EIGHT AVENUE SOUTH	FORT DODGE	IA	50501	888-366-6464	4513	02/09/98	3,000	1,000	1,364	0	0	0	0	0	0	0	0	0	0	0
1168	Daviess		GAINEY	LEE	RR 1	ODON	IN	47562-9801	812-636-7754	394	04/01/74	0	600	0	0	0	0	0	0	0	0	0	0	0	0
1231	Daviess	SLAUBAUGH FARMS	SLAUBAUGH	EDWARD	RR 2 BOX 70	LOOGOOTEE	IN	47553	812-295-2089	2200					275										
1232	Daviess	VEALE CREEK TURKEYS	WAGLER	NELSON	RR 2 BOX 470	MONTOGMERY	IN	47558	812-254-7786	1539	03/15/79	0	0	0	0	0	0	0	0	0	0	0	70,400	0	0
1242	Daviess		MATTINGLY	TIMOTHY	RR 2 BOX 614 B	MONTGOMERY	IN	46558	812-486-3500	457	07/01/74	0	990	60	0	0	0	0	0	0	0	0	0	0	0
1370	Daviess		RIGGINS	STEVE	RR 2 BOX 31	ODON	IN	47568	812-636-4702	633	12/23/74	475	475	0	0	0	0	0	0	0	0	0	0	0	0
1729	Martin	JOHN M. DIVINE	DIVINE	JOHN M.	RR 3 BOX 128	LOOGOOTEE	IN	47553	812-295-2077	2107	07/10/87	600	795	156	0	0	0	0	0	0	0	0	0	0	0
1730	Daviess		FUHRMAN	KENT	RR 1 BOX 64	LOOGOOTEE	IN	47553	812-295-4475	2688	05/21/93	0	2,200	0	0	0	0	0	0	0	0	0	0	0	0
1963	Daviess	REED FARMS	REED	JERRY	RR 4 BOX 134	WASHINGTON	IN	47501	812-644-7233	928	04/29/76	500	300	24	0	0	0	0	0	0	0	0	0	0	0
2025	Martin		ECKERLE	JAMES	211 SYCAMORE	LOOGOOTEE	IN	47553		986	08/20/76	588	550	128	0	0	0	0	0	0	0	0	0	0	0
2051	Daviess	HARRY KERNS FARMS INC.	KERNS	HARRY	1127N BICKNELL RD.	WHEATLAND	IN	47597	812-321-5711	5014	03/02/01	840	650	144	0	0	0	0	0	0	0	0	0	0	0
2340	Martin	DON WALTON ACRES	WALTON	DONALD	RR 4 BOX 329	LOOGOOTEE	IN	47553	812-295-4402	3316	07/29/94	300	640	205	0	0	0	0	0	0	0	0	0	0	0
2536	Daviess		DC SWINE		PO BOX 147	MONTGOMERY	IN	47558	812-486-3201	0	10/20/78	1,700	500	300	0	0	0	0	0	0	0	0	0	0	0
2539	Daviess		MATTINGLY	JOSEPH	RR 2 BOX 258	LOOGOOTEE	IN	47553	812-295-2299	4974	10/17/00	0	1,000	0	0	0	0	0	0	0	0	0	0	0	0
2747	Martin		SWARTZENTRUBER	DON	320 ELM STREET	LOOGOOTEE	IN	47553	812-295-3613	1556	04/19/79	180	180	20	0	0	0	0	0	0	0	0	0	0	0
2806	Daviess		BURRIS	MICHAEL G	RR 1 BOX72	LOOGOOTEE	IN	47553	812-295-2685	1625	05/31/79	420	420	48	0	0	0	0	0	0	0	0	0	0	0
3207	Martin		GREGORY	DAN	RR 4 BOX 176	LOOGOOTEE	IN	47553	812-695-5131	3459	11/29/94	300	840	146	0	0	0	0	0	0	0	0	12,400	0	0
3213	Daviess	VMS HOGS	KNEPP	HARRY	RR 1	MONTGOMERY	IN	47558	812-486-3738	0	09/12/80	275	275	0	175	0	0	0	0	0	0	0	0	0	0
3510	Daviess		GRABER	LOYD	RR 2 BOX 22	ODON	IN	47562	None	4742	02/23/99	500	500	0	0	0	0	0	0	0	0	0	0	0	0
3554	Martin		WEBB	JIM & SUZANNE	3191 GRASSLAND HILLS	JASPER	IN	47546	812-482-9633	4864	10/08/99	0	2,000	0	0	0	0	0	0	0	0	0	0	0	0
3562	Daviess	MYERS VEAL	MYERS	LOUIS & ZACHARY	RR 1 BOX 226	ODON	IN	47562	812-636-5047	2193	08/10/89	0	0	0	0	0	0	0	1,072	0	0	0	0	0	0
3641	Daviess		TAYLOR	GREGORY	RR 1 BOX 96	LOOGOOTEE	IN	47553	812-295-4190	2295	02/04/91	1,680	4,320	630	0	0	0	0	0	0	0	0	0	0	0
3648	Martin	MATHEIS POULTRY #1	MATHEIS	VERNON H.	7182 N US 231	JASPER	IN	47546	812-695-3531	2297	02/25/91	0	0	0	0	0	0	0	0	100,000	0	0	0	0	0
3649	Daviess	JOHN J GRABER	GRABER	IRA J	RR 2 BOX 33	ODON	IN	47562		2312	04/01/91	105	420	64	0	0	0	0	0	0	0	0	0	0	0
3708	Martin		KNEPP	HENRY	RR 5 BOX 461	LOOGOOTEE	IN	47553	812-295-2134	2426	10/29/91	250	385	108	0	0	46	0	0	0	0	0	0	0	0
3801	Martin	SHELLMOUND FARM	BROWN	DALE	RR 1 BOX 71A	SHOALS	IN	47581	812-247-3490	2556	09/02/92	0	0	0	0	0	0	0	0	99,000	0	0	0	0	0
3812	Daviess		STOLL	RON	RR 1 BOX 157	ODON	IN	47562	812-636-7558	2582	11/02/92	400	700	312	0	0	0	0	0	0	0	0	0	0	0
3858	Daviess	4 K SWINE INC	KENDALL	GEORGE T	RR 4 BOX 80	WASHINGTON	IN	47501	812-254-5710	2610	03/01/93	300	300	60	0	0	0	0	0	0	0	0	0	0	0
3878	Daviess		WAGLER	ENOS L	RR 2 BOX 222	ODON	IN	47562		4762	04/09/99	500	0	264	0	0	0	0	0	0	0	0	0	0	0
3887	Daviess		MILLER	AMOS	RR 1 BOX 46	MONTGOMERY	IN	47558	812-486-3107	4753	03/16/99	180	360	79	0	0	0	0	0	0	0	0	0	0	0
3915	Daviess	JOHN BARBER & SONS INC	BARBER	ANDY	RR 2 BOX 181	MONTGOMERY	IN	47558	812-644-7339	4816	06/30/99	730	1,350	234	0	0	0	0	0	0	0	0	0	0	0
3930	Martin	LOTTES FARMS	LOTTES	SCOTT	RR 1 BOX 169 A	LOOGOOTEE	IN	47553	812-644-7682	4839	08/10/99	0	2,400	0	70	0	0	0	0	0	0	0	22,000	0	0
3936	Daviess	PORTERSVILLE FARM	YODER	DWIGHT	RR 3 BOX 378	WASHINGTON	IN	47501	812-254-6233	2736	07/01/93	0	0	0	0	0	0	0	0	0	0	0	44,000	0	0
3961	Daviess	4 K SWINE INC	KENDALL	GEORGE T	RR 4 BOX 80	WASHINGTON	IN	47501	812-254-5710	2769	07/26/93	0	900	0	0	0	0	0	0	0	0	0	0	0	0
3965	Daviess	4 K SWINE INC	KENDALL	GEORGE T	RR 4 BOX 80	WASHINGTON	IN	47501	812/254-5710	2610	03/01/93	240	832	24	0	0	0	0	0	0	0	0	0	0	0
4020	Daviess	SLATE CREEK FARMS	LOTTES	HERBERT J	RR 1 BOX 175	LOOGOOTEE	IN	47553	812-644-7676	5233	09/23/02	2,000	1,150	0	0	0	0	0	0	0	0	0	0	0	0
4057	Martin	SALT LICK RIDGE FARM	VERKAMP	WILLIAM AND DONNA	RR 2 BOX 221	SHOALS	IN	47581	812-936-2589	5204	06/06/02	0	0	0	0	0	0	0	0	0	0	0	19,800	0	0
4070	Daviess		WAGLER	WILLIS	RR 1 BOX 147	MONTGOMERY	IN	47558	812-486-3330	2740	07/01/93	0	820	0	0	0	0	0	0	0	0	0	0	0	0
4071	Daviess	EATON FARM SERVICE #2	EATON	MAX & DARRELL	BOX 147	MONTGOMERY	IN	47558	812-486-3201	3676	04/06/95	0	1,120	0	0	0	0	0	0	0	0	0	0	0	0
4094	Daviess		GRABER	RAYMOND	RR 2 BOX 152	LOOGOOTEE	IN	46553	NONE	4256	02/04/97	0	0	0	0	0	0	0	0	0	0	0	17,200	0	0
4106	Martin	COOK TURKEY FARM	COOK II	RUSSELL E.	RR 4 BOX 180	MITCHELL	IN	47446	812-247-2314	5219	07/24/02	0	0	0	0	0	0	0	0	0	0	0	37,500	0	0
4118	Daviess	BURKHART FARMS	BURKHART	SAM & GARY	RR 3 BOX 219	WASHINGTON	IN	47501	812-486-3315	2827	09/13/93	840	500	191	0	0	0	0	0	0	0	0	0	0	0
4119	Daviess		GRABER	PAUL	RR 3 BOX 226	ODON	IN	47562		2852	08/06/93	350	648	68	0	0	0	0	0	0	0	0	0	0	0
4139	Daviess	NORTH FARM	WITTMER	JOHN	RR 1 BOX 86B	ODON	IN	47562	812-636-7786	4246	01/09/97	0	0	0	0	0	0	0	0	0	0	0	6,000	0	0
4143	Martin	DOVER HILL FARM	WITT	DON	RR 3 BOX 84	SHOALS	IN	47581	812-388-6689	2907	11/01/93	0	0	0	0	0	0	0	0	0	0	0	22,000	0	0
4202	Daviess		O'CONNER	ADRIAN	RR 2 BOX 62 A	MONTGOMERY	IN	47558	812-486-3295	2794	08/10/93	0	0	0	0	0	0	0	0	0	0	0	22,000	0	0
4203	Daviess	STOLL FARM	STOLL	JOEL L	RR 1 BOX 219	ODON	IN	47562	812-636-4967	2793	08/10/93	400	600	120	0	0	0	0	0	0	0	0	0	0	0
4441	Daviess		EATON	EDWIN E	RR 1 BOX 126	PLAINVILLE	IN	47568	812-687-7640	3675	04/06/95	500	750	236	0	0	0	0	0	0	0	0	0	0	0
4442	Daviess		WAGLER	RUDY	RR 1 BOX 61	LOOGOOTEE	IN	47553	812-295-2733	4892	02/28/00	550	1,920	0	0	0	0	0	0	0	0	0	0	0	
4443	Daviess	DAVID E. KNEPP & SONS	KNEPP	DAVID	RR 1 BOX 271	MONTGOMERY	IN	47558	812-486-3180	5162	02/28/02	0	0	0	0	0	0	0	0	0	0	0	54,000		
4447	Martin	MATHEIS POULTRY #2	MATHEIS	VERNON & MIKE	7182 N US 231	JASPER	IN	47546	812-895-3531	4149	07/09/96	0	0	0	0	0	0	0	0	100,000	0	0	0	0	0
4453	Daviess		GRABER	LOREN	RR 1 BOX 239	MONTGOMERY	IN	47558	812-636-4048	5085	08/02/01	0	0	0	0	0	0	0	0	0	0	0	54,000	0	0
4456	Daviess		KNEPP	FANNIE	RR 1 BOX 248 B	LOOGOOTEE	IN	47553	812-295-2799	4703	12/08/98	111	585	94	0	0	0	0	0	0	0	0	0	0	0
4459	Daviess		GRABER	LLOYD	RR 2 BOX 184	LOOGOOTEE	IN	47553	none	4986	11/27/00	1,000	0	0	0	0	0	0	0	0	0	0	0	0	0
4492	Daviess	STEVE AND LISA BOUCHIE FARM	BOUCHIE	STEVEN	RR 2 BOX 214	WASHINGTON	IN	47501	812-254-7918	5143	12/21/01	0	0	0	0	0	0	0	0	0	0	0	44,000	0	0
4497	Daviess		WAGLER	ERVIN	RR 1 BOX 118	PLAINVILLE	IN	47568	812/687-7641	4470	11/12/97	220	740	0	0	0	0	0	0	0	0	0	0	0	0
4499	Daviess		SWARTZENTRUBER	LARRY	RR 2 BOX 234	ODON	IN	47562	812/636-4816	4744	02/23/99	240	780	230	0	0	0	0	0	0	0	0	0	0	0
4502	Daviess		WAGLER	GARY LEE	RR 1 BOX 63	ODON	IN	47562	812-636-4384	4821	06/30/99	0	0	280	0	0	0	0	0	0	0	0	0	0	0
4506	Daviess	TOM BOUCHIE FARM	BOUCHIE	THOMAS A	RR 2 BOX 216	WASHINGTON	IN	47501	812-254-6329	5216	07/19/02	0	0	0	0	0	0	0	0	0	0	0	44,000	0	0
4511	Daviess		WAGLER	DAVID J	RR 2 BOX 24	ODON	IN	47562	None	4745	02/23/99	120	320	46	0	0	0	0	0	0	0	0	0	0	0
4513	Daviess		SWARTZENTRUBER	DARRELL	RR 1 BOX 228	MONTGOMERY	IN	47558	812/486-3636	4740	02/23/99	360	350	195	0	0	0	0	0	0	0	0	0	0	0
4516	Daviess		KNEPP	JOHN R	RR 1 BOX 185	MONTGOMERY	IN	47558		4738	02/22/99	500	0	317	0	0	0	0	0	0	0	0	0	0	0
4517	Daviess		GRABER	SAMUEL N	RR 1 BOX 263	MONTGOMERY	IN	47558		3937	09/06/95	240	360	123	0	0	0	0	0	0	0	0	0	0	0
4527	Daviess		DEMOSS	PAUL WILLIAM	RR 1 BOX 190	ELNORA	IN	47529	812-687-7166	4328	04/18/97	0	0	0	0	0	0	0	0	0	0	0	22,000	0	0
4530	Daviess		STOLL	E DALE	RR 1 BOX 129 A	ODON	IN	47562	812/687-7148	4748	03/03/99	200	300	82	0	0	0	0	0	0	0	0	0	0	0
4531	Daviess	OMER GRABER FARM	GRABER	OMER	RR 2, BOX 198	LOOGOOTEE	IN	47553	812-636-4057	5253	11/22/02	0	0	558	0	0	0	0	0	0	0	0	0	0	0
4533	Martin	TURKEY RUN	WININGER	TODD	RR 1 BOX 160 AA	SHOALS	IN	47581	812-295-2971	4181	08/02/96	100	365	16	0	0	0	0	0	0	0	0	22,000	0	0
4537	Martin	WHITE RIVER FARMS	WININGER	BRIAN	RR 1 BOX 160 A	SHOALS	IN	47581	812-295-2176	4152	07/09/96	0	0	0	0	0	0	0	0	0	0	0	44,000	0	0

Log #	County	Operation	LastNameOwner	FirstNameOwner	AddressOwner	CityOwner	StateOwner	ZipOwner	PhoneOwner	AW#	Issue Date	Nursery Pigs	Hogs (grow./fin.)	Sows	Beef	Calves	Dairy	Calves1	Veal Calves	Layers	Pullets	Broilers	Turkeys	Ducks	Sheep
4540	Martin	SHAWN COOK FARM	COOK	SHAWN	RR 3 BOX 63	SHOALS	IN	47581	812-247-2314	4164	07/17/96	0	0	0	0	0	0	0	0	0	0	0	44,000	0	0
4543	Daviess		WAGLER	IRA	RR 1 BOX 522	MONTGOMERY	IN	47558	812-687-7467	3667	04/03/95	0	540	0	0	0	0	0	0	0	0	0	0	0	0
4550	Martin	FAST LANE FARM INC	WININGER	RANDY L	RR 1 BOX 167	SHOALS	IN	47581	812-295-3527	4151	07/09/96	0	0	0	0	0	0	0	0	0	0	0	44,000	0	0
4551	Daviess		EICHER	NORMAN	RR 2 BOX 192	LOOGOOTEE	IN	47553	NONE	4259	02/04/97	0	0	0	0	0	0	0	0	0	0	0	22,000	0	0
4556	Martin	TIM PEEK & SONS	PEEK	TIM	RR 2 BOX 151	SHOALS	IN	47581	812-247-2981	4176	08/02/96	0	0	0	0	0	0	0	0	0	0	0	44,000	0	0
4562	Daviess	HOLSTINE BROTHERS	HOLSTINE	RALPH D	RR 1 BOX 75	PLAINVILLE	IN	47568-9717	812/254-2477	4714	12/22/98	150	400	68	0	0	0	0	0	0	0	0	0	0	0
4571	Daviess		WITTMER	ENOS	RR 1 BOX 332	MONTGOMERY	IN	47558	812-486-3721	4485	12/04/97	200	710	132	12	0	0	0	0	0	0	0	0	0	0
4574	Daviess		BARBER	DARREL	.	WASHINGTON	IN	47501	812-254-3960	3674	04/06/95	200	650	139	0	0	0	0	0	0	0	0	0	0	0
4581	Daviess		WAGLER	EUGENE	RR 1 BOX 89 A	ODON	IN	47562	812-636-4282	4248	01/09/97	0	0	0	0	0	0	0	0	0	0	0	22,000	0	0
4582	Daviess	G&S HOOVER FARMS	HOOVER	GEORGE	RR 4 BOX 221 AA	WASHINGTON	IN	47501	812-644-7363	5064	06/12/01	0	0	0	0	0	0	0	0	0	0	0	45,000	0	0
4590	Daviess	STOLL FARMS INC	STOLL	NORMAN	RR 1 BOX 129 C	ODON	IN	47562	812/687-7362	4827	07/06/99	200	520	74	0	0	0	0	0	0	0	0	0	0	0
4599	Daviess		MYERS	PHIL	RR 1 BOX 85	PLAINVILLE	IN	47568	812-687-7611	4826	07/06/99	325	570	106	0	0	0	0	0	0	0	0	0	0	0
4603	Daviess	GRABER FEED SERVICE	GRABER	VERNON	RR 3 BOX 338	LOOGOOTEE	IN	47553	812-636-4057	4863	10/07/99	0	750	0	0	0	0	0	0	0	0	0	36,000	0	0
4609	Daviess		WITTMER	LEROY	RR 1 BOX 335	MONTGOMERY	IN	47558	812/486-2906	4912	05/17/00	1,644	400	0	0	0	0	0	0	0	0	0	0	0	0
4612	Martin		WITT	DONALD E	RR 3 BOX 84	SHOALS	IN	47581	812-388-6689	4172	07/22/96	0	0	0	0	0	0	0	0	0	0	0	22,000	0	0
4615	Daviess		WAGLER	DAVID R.	RR 1 BOX 600	MONTGOMERY	IN	47558	812-486-3517	4678	11/13/98	300	400	86	0	0	0	0	0	0	0	0	0	0	0
4618	Martin	HICKORY VALLEY FARM	WITT	ROBERT	RR 3 BOX 51A	SHOALS	IN	47581	812-388-6674	4169	07/17/96	0	0	0	0	0	0	0	0	0	0	0	44,000	0	0
4624	Martin	TAYLOR SWINE	TAYLOR	MARK	RR 3 BOX 511 A	LOOGOOTEE	IN	47553	812-295-4926	3528	01/23/95	900	2,215	308	0	0	0	0	0	0	0	0	0	0	0
4636	Daviess		GRABER	MELVIN W	RR 2 BOX 144	LOOGOOTEE	IN	47553	812-295-4866	4765	04/09/99	200	520	20	0	0	0	0	0	0	0	0	0	0	0
4639	Daviess		KNEPP	ABE A	RR 1 BOX 406	MONTGOMERY	IN	47558	812-486-3407	4743	02/23/99	1,000	1,000	0	0	0	0	0	0	0	0	0	0	0	0
4645	Martin		TROUTMAN	LOLAND	RR 1 BOX 139	SHOALS	IN	47581		4122	06/04/96	0	1,400	0	0	0	0	0	0	0	0	0	0	0	0
4701	Daviess	AIKMAN CREEK FARMS	WAGLER	L. DALE	RR 4 BOX 294 A	WASHINGTON	IN	47501	812-254-5410	5106	09/25/01	0	0	0	0	0	0	0	0	0	0	0	44,000	0	0
4703	Daviess		WAGLER	LARRY	RR 2 BOX 245	LOOGOOTEE	IN	47553	none	4819	06/30/99	160	480	70	0										
4711	Daviess		WAGLER	DARRELL D	RR 3 BOX 205	WASHINGTON	IN	47501	812-254-5410	4808	06/29/99	220	800	106	0	0	0	0	0	0	0	0	0	0	0
4721	Martin	SOUERDIKE TURKEY FARM	SOUERDIKE	WAYNE	RR 4 BOX 324	LOOGOOTEE	IN	47553	812-295-3603	4150	07/09/96	0	0	0	0	0	0	0	0	0	0	0	44,000	0	0
4726	Martin		DANT	MIKE	RR 4 BOX 323	LOOGOOTEE	IN	47553		4153	07/09/96	0	0	0	0	0	0	0	0	0	0	0	44,000	0	0
4739	Daviess		WAGLER	VERLIN	RR 3 BOX 509	LOOGOOTEE	IN	47553	812-295-4825	2853	10/06/93	720	1,020	180	0	0	0	0	0	0	0	0	0	0	0
4816	Daviess		KEMP	DARRELL	RR 3 BOX 293	LOOGOOTEE	IN	47553	812-486-2980	3168	04/20/94	200	630	87	0	0	0	0	0	0	0	0	0	0	0
4856	Martin		ZIEGLER	KENNETH F	RR 4 BOX 217	LOOGOOTEE	IN	47553	812-295-3047	4046	03/01/96	480	1,260	368	0	0	0	0	0	0	0	0	0	0	0
4859	Martin		ARVIN	RICHARD	RR1 BOX 276	LOOGOOTEE	IN	47553	812-295-3812	5086	08/03/01	0	600	85	0	0	0	0	0	0	0	0	0	0	0
4868	Martin		WAGLER	BRIAN K	PO BOX 364	LOOGOOTEE	IN	47553	812/295-9872	4048	03/01/96	200	600	100	0	0	0	0	0	0	0	0	0	0	0
4913	Martin	FARM #1	TROUTMAN	JAMES M	RR 1 BOX 118 A	SHOALS	IN	47581		3463	12/14/94	0	380	0	0	0	0	0	0	0	0	0	40,900	0	0
4928	Daviess		KNEPP	EDWIN	RR 1 BOX 126	PLAINVILLE	IN	47568	812-295-3168	3973	10/27/95	280	275	93	30	30	0	0	0	0	0	0	0	0	0
4930	Daviess		GRABER	LARRY W	RR 1 BOX 294	MONTGOMERY	IN	47558		4173	07/22/96	180	480	83	0	0	0	0	0	0	0	0	0	0	0
4940	Daviess		WAGLER	NORMAN	RR 1 BOX 522	MONTGOMERY	IN	47558	812-486-3475	3651	03/30/95	420	240	159	0	0	0	0	0	0	0	0	0	0	0
4957	Daviess		LENGACHER	RAY	RR 3 BOX 248	LOOGOOTEE	IN	47553	812-295-2970	3956	09/22/95	0	0	0	0	0	100	0	40	0	0	0	0	0	0
4969	Daviess		HOLSTINE	MARVIN	RR 1 BOX 44	PLAINVILLE	IN	47568	812-687-7736	3907	08/01/95	0	0	0	0	0	0	0	0	0	0	0	44,000	0	0
4977	Daviess		WAGLER	WILBUR E	RR 2 BOX 180	LOOGOOTEE	IN	47553	812-486-3189	3931	08/22/95	0	900	66	0	0	0	0	0	0	0	0	0	0	0
5004	Daviess		GRABER	HOMER	RR 1 BOX 197 A	LOOGOOTEE	IN	47553		4360	05/30/97	800	460	0	0	0	0	0	0	0	0	0	0	0	0
5008	Daviess		SWARTZENTRUBER	STEVE	RR 2 BOX 363 A	ODON	IN	47562	812/636-7392	4637	09/18/98	0	1,000	0	0	0	0	0	0	0	0	0	0	0	0
6011	Daviess	TURKEYS-LIKE-US	POWELL	RONALD	516 VANCE STREET	WASHINGTON	IN	47501	812-254-9026	5268	01/29/03	0	0	0	0	0	0	0	0	0	0	0	42,000	0	0
6043	Daviess	EAST FARM	DECKER	GERALD	RR 2 BOX 281	WASHINGTON	IN	47501	812-254-4237	5137	12/03/01	0	0	0	0	0	0	0	0	0	0	0	44,000	0	0
6044	Daviess	WEST FARM	DECKER	GERALD	RR 2 BOX 281	WASHINGTON	IN	47501	812-254-4237	4759	04/09/99	0	0	0	0	0	0	0	0	0	0	0	24,000	0	0
6050	Daviess	ELNORA TURKEY FARM	PLANO	VICTOR R	105 N ELLEN ST	ELNORA	IN	47529	812-692-5685	4779	05/05/99	0	0	0	0	0	0	0	0	0	0	0	66,000	0	0
6082	Daviess	DOUBLE H & T, INC.	HARNER	BERNARD	24 GRAHAM ROAD	WASHINGTON	IN	47501		4878	12/14/99	0	0	0	0	0	0	0	0	0	0	0	42,000	0	0
6084	Martin		BUTCHER	JOHN R	R 1 BOX 272B	LOOGOOTEE	IN	47553	812-295-4167	4877	12/14/99	0	0	0	0	0	0	0	0	0	0	0	38,400	0	0
6090	Daviess	RIDGE FARMS	PERDUE FARMS		PO BOX 539	WASHINGTON	IN	47501	812-254-4030	4900	03/27/00	0	0	0	0	0	0	0	0	0	0	0	14,000	0	0
6094	Daviess		WITTMER	MELVIN	RR 2, BOX 109	ODON	IN	47562	812/636/4640	5079	07/23/01	0	0	0	0	0	0	0	0	0	0	0	36,000	0	0
6104	Daviess	TURKEY DOWNS	FUHS	MICHAEL & PATRICIA	RR 2 BOX 43	MONTGOMERY	IN	47558	812-486-3578	4921	07/21/00	0	0	0	0	0	0	0		0	0	0	44,000	0	0
6105	Daviess	LOTTES FARMS - TURKEY RIDGE	LOTTES	SCOTT	RR 1 BOX 169A	LOOGOOTEE	IN	47553	812-644-7682	4922	07/21/00	300	500	0	0	0	0	0	0	0	0	0	21,000	0	0
6116	Daviess		H KNEPP & SONS		RR 1 BOX 16A	CANNELBURG	IN	47519	812-295-3539	4939	09/01/00	0	0	0	0	0	0	0	0	0	0	0	44,000	0	0
6117	Daviess		HEALY	DONALD	RR 3 BOX 297	LOOGOOTEE	IN	47553	812-636-8357	4938	08/31/00		0	0	0	0	0	0	0	0	0	0	44,000	0	0
6118	Daviess		GRABER	CALVIN L.	RR 1 BOX 243	MONTGOMERY	IN	47558	812-636-7529	4940	09/05/00	0	0	0	0	0	0	0	0	0	0	0	28,000	0	0
6120	Martin	TROUTMAN FARMS	TROUTMAN	LOLAND	RR 1 BOX 139	SHOALS	IN	47581	812-247-2818	4945	09/12/00	0	0	0	0	0	0	0	0	0	0	0	44,000	0	0
6129	Daviess		WAGLER	MIKE	RR1 BOX 208	ODON	IN	47562	812-636-4638	4989	11/28/00	0	725	0	0	0	0	0	0	0	0	0	0	0	0
6133	Daviess	BURRIS FAMILY FARMS	BURRIS	MIKE	RR 1 BOX 70	LOOGOOTEE	IN	47553	812-295-2685	5023	03/28/01	620	1,022	0	0	0	0	0	0	0	0	0	0	0	0
6134	Daviess	K&C SWARTZENTRUBER FARMS	SWARTZENTRUBER	KENNY	RR 1 BOX 87	ELNORA	IN	47529	812-636-7277	5029	04/17/01	0	0	403	0	0	0	0	0	0	0	0	0	0	0
6146	Daviess		BURKHART	MIKE	RR 1, BOX 38A	PLAINVILLE	IN	47568	812-687-7107	5130	11/09/01	150	150	107	0	0	0	0	0	0	0	0	0	0	0
6182	Daviess	WAGLER POULTRY INC.	WAGLER	DARRELL	RR 2 BOX 216 A	LOOGOOTEE	IN	47556	812-295-9440	5059	05/29/01	0	0	0	0	0	0	0	0	0	0	0	44,000	0	0
6196	Daviess		CANARY	JEWEL	201 SHERIDAN STREET	LOOGOOTEE	IN	47553	812-486-3402	5188	03/08/02	0	0	0	300	0	0	0	0	0	0	0	0	0	0
6224	Daviess	A & J EATON TURKEY FARM	EATON	JAY & ANDY	RR 3, BOX 411	WASHINGTON	IN	47501	812-486-2514	5165	03/01/02	0	0	0	0	0	0	0	0	0	0	0	39,000	0	0
6227	Daviess		BURRIS	JARROD	RR 1, BOX 70	LOOGOOTEE	IN	47553	812-295-2305	5164	03/01/02	0	0	0	0	0	0	0	0	0	0	0	20,700	0	0
6243	Daviess	GRABER FARMS	GRABER	LEVI	RR 3, BOX 319 C	LOOGOOTEE	IN	47553		5224	08/02/02	0	0	512	0	0	0	0	0	0	0	0	0	0	0
6244	Martin		BLANKENBAKER	RANDALL J.	RR 4, BOX 102	LOOGOOTEE	IN	47553	812-295-2524	5205	06/06/02	0	0	0	0	0	0	0	0	0	0	0	26,100	0	0
6279	Daviess		GRABER	DELBERT	RR3, BOX 280	LOOGOOTEE	IN	47553	812-486-3711	5301	06/25/03	0	0	0	0	0	60	0	0	0	0	0	0	0	0

Objective	Action Item	Cost Estimate	Target Audience	Responsible Party	Technical Assistance Provided By	Schedule	Progress Indicators	Milestones
Reduce *E. coli* and Nutrient NPS runoff by 50%	Construct drystack manure storage facilities, monitor pathogen and nutrient levels	$45,000 per Structure	Interested Livestock owners in identified sub-watershed locations.	Prairie Creek Watershed Planning Committee, NRCS, SWCD	NRCS and SWCD	1-3 years	Constructed drystacks, levels of *E. coli* and Nutrients within surrounding surface waters	4 buildings the 1st year
Reduce *E. coli* and Nutrient NPS runoff by 50%	Promote agricultural conservation practices	$150 per acre of buffer	Farmers and Livestock owners	SWCD, NRCS, DNR	NRCS and SWCD	Continuous	Number of acres of land in conservation practices, levels of E. coli and nutrients in surface waters.	Contact producers along Prairie Creek via the District newsletter
Improve Riparian Buffers	Provide cost-share funding, education, outreach, demonstrations	$150 per acre of buffer	Landowners with property bordering streams or tributary channels in identified sub watersheds	SWCD, NRCS	NRCS and SWCD	Continuous	Visual Assessment of increased riparian buffers. Number of new landowners within watershed	5 miles of buffer strips in 10 years

Objective	Action Item	Cost Estimate	Target Audience	Responsible Party	Technical Assistance Provided By	Schedule	Progress Indicators	Milestones
							enrolling in CRP.	
Educate homeowners on septic system maintenance and related environmental issues	Educational events	$750	Homeowners in Prairie Creek Watershed	Daviess County Department of Health, SWCD	SWCD	Continuous	Number of people in attendance at events	Contact producers via the District newsletter
Promote the exclusion of livestock from waterways	Increase contact with livestock operators.	$1.65 per foot of fence	Livestock Operators	SWCD, NRCS	NRCS and SWCD	Continuous	E. coli levels in surface waters, number of livestock seen in stream	5 miles of fence in 10 years

Appendix 8: Describes Objectives, Action Items, Target Audience, Responsible Parties, Schedule, and Progress Indicators for achieving the goals stated in the watershed plan.

Repair Failing Septic Systems	Identify and Repair Failed or Failing Septic Systems with assistance from cost-share programs such as the State Revolving Fund Loan Program	$4,000-$5,000 per septic system	Homeowners in Prairie Creek Watershed	Daviess County Department of Health, SWCD	Health Department	Continuous	E. coli levels in surface waters, number of repaired septic systems	Contact those needing assistance via the District newsletter

Appendix 8: Continued