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Little Wildcat Creek Watershed Management Plan

Wildcat Creek Watershed Alliance, Inc.

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Watershed Coordination
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The Wildcat Creek Watershed Alliance is a partnership of concerned citizens dedicated to developing and implementing successful watershed plans to improve and protect water resources in the Wildcat Creek Watershed

July 2001 – June 2003
IDEM 319 Project: ARN # 00-199

Little Wildcat Creek Watershed Management Plan

Wildcat Creek Watershed Alliance, Inc.

Executive Summary

The Little Wildcat Creek Watershed is a 14-digit watershed located in North Central Indiana. It is one of 44 subwatersheds located in the Wildcat Creek Watershed. The Little Wildcat Creek Watershed drains 12,054 acres of predominantly agricultural land in Howard County and Tipton County. While Tipton County plans to keep agriculture as the predominant land use, development pressure from the City of Kokomo is rapidly urbanizing Howard County's portion of the Little Wildcat Creek Watershed.

There are approximately 18.5 miles of natural and constructed waterways in the Little Wildcat Creek Watershed that drain into the North Fork of Wildcat Creek. The streams are small, headwater streams, and in some areas, have a good buffer of trees, shrubs, and grasses beneficial for filtering sediments and pollutants. Areas that lack well-established streamside vegetation show signs of erosion and bank failure. The drainage ditches appear to be well maintained and several generous grassed buffers have been established to filter sediments and pollutants.

Data collected by the Indiana Department of Environmental Management (IDEM) lists high levels of *E.coli* in the East Fork of Little Wildcat Creek and Gord Ditch. Both waterways are on the State's 2002 Impaired Stream List and do not meet water quality standards.

As part of this watershed planning effort, water quality samples were collected from 5 sites in the Little Wildcat Creek Watershed throughout the summer and fall of 2002. Water samples were tested for chemical, physical, and bacteriological parameters. The analysis confirmed water quality impairments listed by IDEM.

In the East Fork of Little Wildcat Creek, excessive pollutants, particularly oxygen consuming wastes, nutrients, and *E.coli* enter the watershed from both point and nonpoint sources. Suspected point sources of pollution include discharge from a combined sewer overflow and/or discharge from one or more of the three semi-public wastewater treatment facilities in the watershed. Nonpoint sources of pollution that may be contributing to water quality impairments include failing septic systems, stormwater runoff from agriculture and urban land uses.

In the West Fork of the Little Wildcat Creek, nutrients and *E.coli* appear to be the pollutants of most concern. There are no point source dischargers within the portion of the watershed, so pollutants in the West Fork of Little Wildcat Creek are generated from nonpoint sources of pollution.

Although water quality problems in this portion of the watershed are less significant that those on the East Fork of the Little Wildcat Creek, an evaluation of land uses reveals that nonpoint sources of nutrients in the watershed are

most likely limited to agriculture, golf courses, failing septic systems, and/or direct septic discharges.

This Watershed Management Plan is the result of 18 months of meetings and discussion among federal, state, and local government staff, local industry, agriculture, developer, environmental, and concerned citizens. Five specific topics related to water quality concerns in the Little Wildcat Creek Watershed were discussed in great detail. The goal for each topic is listed below:

Education Goal: Improve water quality in the Little Wildcat Creek Watershed through education and outreach efforts that focus on changing stakeholders' habits and behaviors.

Septic System Goal: Improve water quality in the Little Wildcat Creek Watershed through proper planning, installation, and long-term maintenance of septic systems.

Agriculture Goal: Improve water quality in the Little Wildcat Creek Watershed through better agricultural practices and management programs.

Land Use Planning Goal: Improve water quality in the Little Wildcat Creek Watershed through better land use planning and land development practices.

Natural & Constructed Waterway Goal: Improve water quality in the Little Wildcat Creek Watershed through better protection and maintenance of streams and drainage ditches.

The Little Wildcat Creek Watershed Management Plan was made possible through a 319 grant from the IDEM. A grant for $109,500 was awarded to the Wildcat Creek Watershed Alliance (WCWA) via the Indiana Soil & Water Conservation District for the period from July 2001 through June 2003. The Little Wildcat Creek Watershed is one of two watershed management plans that the WCWA is preparing as part of this grant.

The WCWA is a partnership of federal, state and local governments, local industry, agriculture, development, and environmental groups. There are currently over 500 individuals and organizations that are members of the WCWA. A 13-member Advisory Board governs the WCWA. There are 4 committees focusing on education, funding, land use, and technical issues.

Information to the membership is disseminated through newspaper articles, a quarterly newsletter, workshops, annual and quarterly membership meetings as well as regularly scheduled Advisory Board and committee meetings. Quarterly Stakeholder or WCWA Membership meetings are held on the second Tuesday of January, April, July, and October

Little Wildcat Creek Watershed Management Plan

Wildcat Creek Watershed Alliance, Inc.

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I. Introduction

In the spring of 2000, an organization assembled by the Indiana Department of Environmental Management (IDEM) called the Wildcat Creek Watershed Alliance (WCWA), formally know as the Wildcat Creek Watershed Network, submitted a Section 319 project proposal through the Indiana Association of Soil and Water Conservation Districts (IASWCD) to address water quality issues in the Wildcat Creek watershed. The Federal Clean Water Act Section 319 program provides funding for various types of projects that work to reduce nonpoint source water pollution (IDEM, 2002). The Section 319 project proposal included the following goals:

1) Hire an Executive Director/Watershed Coordinator,
2) Build upon the recommendations of the Wildcat Creek Watershed Restoration Action Strategy (WRAS),
3) Coordinate planning efforts throughout watershed, and
4) Develop two subwatershed management plans in the Wildcat Creek watershed.

A grant of $109,500 was awarded to the IASWCD from the US EPA through the IDEM. The grant period is from July 1, 2001 through June 30, 2003. Eleven consulting firms and/or individuals responded to the advertisement for an Executive Director/Watershed Coordinator position for the Wildcat Creek Watershed planning effort. Representatives from the Wildcat Creek Watershed Network, the NRCS, and the IDEM selected Goode & Associates, Inc. from Indianapolis as the contractor for the two-year watershed planning project.

The Wildcat Creek Watershed has forty-four subwatersheds. The Little Wildcat Creek Watershed was one of the two subwatersheds that were selected for detailed study and development of a Watershed Management Plan.

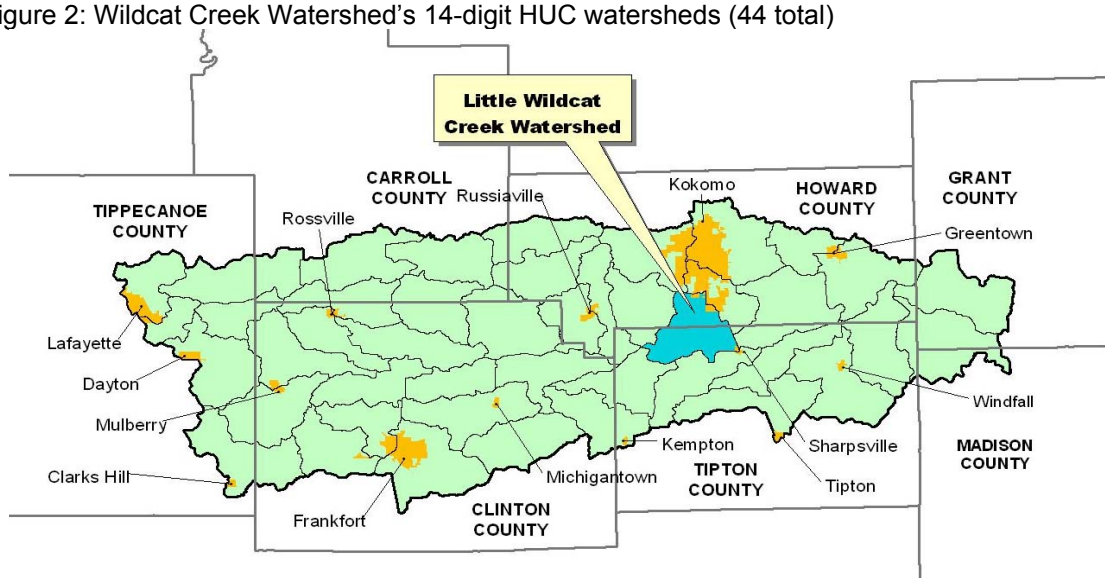
This Watershed Management Plan meets the checklist requirements of the "What Needs to be in a Watershed Management Plan" FFY 2003 (IDEM, 2002).

WATERSHED LOCATION

The Little Wildcat Creek Watershed is a subwatershed within the 8-digit hydrologic unit code (HUC) Wildcat Creek Watershed located in North Central Indiana (Figure 1).

Figure 1: Indiana 8-digit HUC watersheds

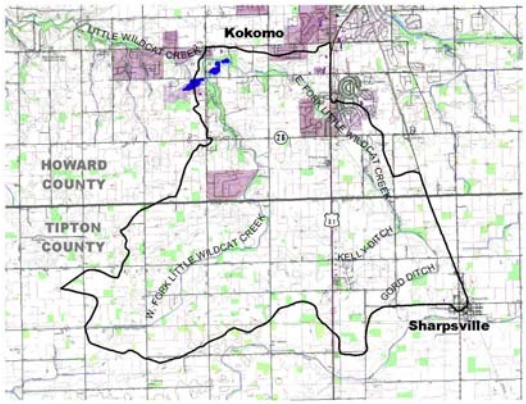
Figure 2: Wildcat Creek Watershed's 14-digit HUC watersheds (44 total)



The Little Wildcat Creek Watershed is one of forty-four 14-digit subwatersheds in the Wildcat Creek Watershed (HUC 05120107020020) (Figure 2).

The drainage area for the Little Wildcat Creek Watershed is 12,054 acres and drains land in Tipton County and Howard County. There are approximately 18.5 miles of perennial streams and drainage ditches in the Little Wildcat Creek Watershed, all of which eventually drain to the North Fork of the Little Wildcat Creek (Figure 3).

Figure 3: Little Wildcat Creek Watershed



DESCRIPTION & HISTORY

The following is an overview of the physical and cultural characteristics of the Little Wildcat Creek Watershed. The WCWA determined that some issues needed to be studied in detail during the two-year grant period. These include: environmental education, septic systems, agriculture, land use planning, and waterways. A detailed assessment of these items is available in the Goals & Decisions section of this Watershed Management Plan.

Watershed Description

The Little Wildcat Creek Watershed is relatively flat and the land use is predominantly in crop production. In Tipton County, residential development is limited and scattered whereas in Howard County, residential subdivisions and clusters of individual houses along county roads dominate the landscape (Figure 4 & 5).

Natural areas are limited to stream corridors and some fragmented woodlots. The streams are small, headwater streams.

Figure 4: Typical residential development in Tipton County.

Figure 5: Typical residential development in Howard County.

Natural History

The Wisconsin Glacier formed the present landscape of the Little Wildcat Creek Watershed. When the glacier receded it deposited as much as 50 to 100 feet of glacial till over the limestone bedrock. The soils found in the Little Wildcat Creek Watershed are the result of direct glacial deposits or materials carried by the streams of melting ice and snow (see discussion on Soils in this section) (USDA, 1971).

Prior to settlement in the mid-1800s, much of the Little Wildcat Creek Watershed was covered in wetlands and woods. The trees removed by the early settlers to make room for farming would have consisted of upland hardwood forest species characteristic of a Maple-Beech association. Plant associations or communities are broad generalizations of vegetation based on a geographic region (Lindsey, 1966). The upland areas of the Little Wildcat Creek Watershed would have been densely covered in sugar maple, basswood, beech, yellow birch, American elm, ironwood, and red maple.
Species such as silver maple, American elm, willow, basswood, sycamore, and ash would have been more abundant in the river corridors and low-lying marsh areas.

According to the 1992 Gap Analysis Program (GAP) datum, only 4% of the Little Wildcat Creek Watershed land use is wooded or wetland (Table 1). Although nonnative and invasive species such as serviceberry now dominate much of the understory of existing wooded areas, evidence of the native hardwood forest still prevails.

Fragmentation of wooded and natural areas caused by increased human settlement as well as trapping and hunting has limited the number of wildcats, bears, foxes, and poisonous snakes that once were abundant in the Little Wildcat Creek Watershed (Odiet, 1994).

Land Use

The land use of the Little Wildcat Creek Watershed began to significantly change from dense woods and wetlands to agriculture following settlement of the Europeans in the mid-1800s.
Historically the upland areas were cleared and drained to facilitate better crop production. Agricultural land uses continue to dominate the Little Wildcat Creek Watershed landscape today.
Seventy-six percent of the watershed is

Table 1: Little Wildcat Creek Watershed Land Use

Land Use Types	Acres	Percentage
Row Crops	8943	74.19 %
Urban Low Density	1955	16.22 %
Park/Golf Course	386	3.20 %
Wetland (several wetland types)	382	3.17 %
Pasture	176	1.46 %
Urban High Density	114	0.95 %
Deciduous Forest (mixed woodland & shrubland)	93	0.77 %
Open Water	5	0.04 %
Total	**12,054**	**100.00 %**

(USGS, 1997; Modified by WCWA Land Use Committee)

in agricultural production. Row crops dominate the land use of the watershed with 8943 acres (74%) in production (Table 1).

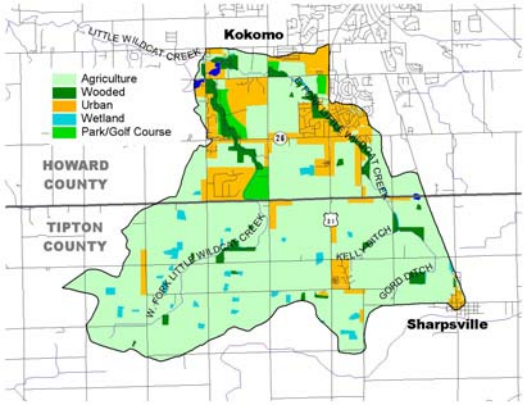
The waterways in the Little Wildcat Creek Watershed are small headwater streams or drainage ditches. Very little of the watershed, 480 acres (4%) is classified as wetland, deciduous forest, or open water.

Approximately 2069 acres (17%) of the watershed has been converted for residential, commercial, and industrial land uses. The City of Kokomo is located just outside, and to the north, of the Little Wildcat Creek Watershed. Several suburban/golf course developments have been built in the watershed and as the City continues to grow, the land use in Howard County will continue to shift from agriculture to urban.

The Plan Commission for Kokomo/Howard County is in the process of updating their Comprehensive Plan and intends to encourage urban development in the southern portion of the County. In contrast, the Tipton County Plan Commission, also updating their Comprehensive Plan, intends for land now in agriculture to remain in agriculture (Figure 6).

The WCWA determined that land use planning has significant impact on the water quality of the Little Wildcat Creek Watershed. A detailed assessment of land use planning is in the Goals and Decisions section of this Plan.

Figure 6: Little Wildcat Creek Watershed Land Use



(USGS, 1997; modified by WCWA)

Soils

The soils of the Little Wildcat Creek Watershed formed from Wisconsin glacial till, glacial outwash, and recently deposited alluvium. According to the Soil Surveys for Howard County and Tipton County, there are five predominant soil associations in the Little Wildcat Creek Watershed. In the low-lying, floodplain areas the Genesee-Shoals and Sloan-Tuscola-Strawn Association dominate, whereas in the upland areas, the Miami Russell-Morley,

Table 2: Soil Associations

Soil Association	Characteristics
Genesee-Shoals	Deep, well-drained and somewhat poorly drained, medium-textured, nearly level soils; on alluvial bottoms
Sloan Tuscola-Strawn	Nearly level to moderately sloping, very poorly drained, moderately well-drained, and well-drained soils that formed in the alluvium, in stratified silty, loamy, and sandy sediments over loamy glacial till, or in loamy glacial till; on floodplains, lake plains, and till plains
Miami Russell-Morley	Deep, well-drained, medium-textured and moderately fine textured, gently sloping to strongly sloping soils; on uplands
Crosby-Brookston	Deep, somewhat poorly drained and very poorly drained, medium textured and moderately fine textured, nearly level soils; on uplands
Patton-Del Rey-Crosby	Nearly level, poorly drained and somewhat poorly drained soils that formed in silty sediments, in silty and sandy sediments, or in a thin mantle of silty material and the underlying loamy and clayey glacial till; on lake plains and till plains

(USDA, 1971; USDA, 1989)

Crosby-Brookston, and Patton-Del Rey-Crosby Association are more prevalent (Table 2) (USDA, 1971; USDA 1989).

The NRCS has assigned a soil erodibility index to each soil type. This value is based on the soils chemical and physical properties, as well as climatic conditions. Highly erodible soils in the Little Wildcat Creek Watershed are primarily from the Miami Russell-Morley association. These include: Fox (FsC3), Hennepin (HeE), Miami (MlC2, MmC3, MmD3), and Morley (MsC3). The WCWA determined that erodible soils were a primary concern in the Little Wildcat Creek Watershed and specifically addresses issues related to erodible soils and water quality in the Goals and Decision section of this Plan.

Septic systems need well-drained soils to properly function. Much of the soil in the Little Wildcat Creek Watershed has severe limitations for septic systems due to seasonal high water table and slow permeability. In the Little Wildcat Creek Watershed, the well-drained Sloan Tuscola-Strawn association is best suited for septic system development. The WCWA recognized the impact failing septic systems can have on water quality and addresses these issues in detail in the Goals and Decisions section of this Plan.

Agriculture is the predominant land use in the Little Wildcat Creek Watershed. Soil is a determining factor in agriculture production. The Crosby-Brookston association including Del Rey, Patton, Pella, Sloan, Tuscola, and Williamstown are soils in the Little Wildcat Creek Watershed that represent prime agricultural soils.

Topography

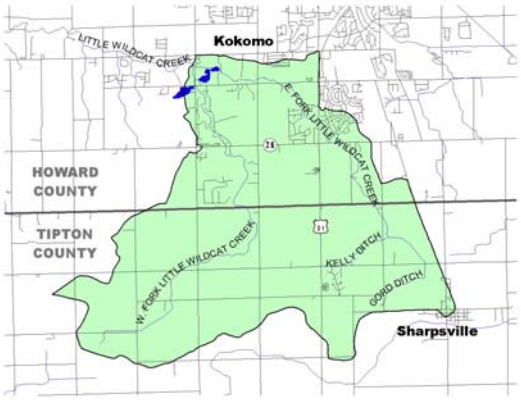
The topography of the Little Wildcat Creek Watershed is relatively flat. The

change in elevation from the highest point of the watershed to the lowest point at the confluence of the Little Wildcat Creek with the Wildcat Creek is only 68 feet (0.3% slope). The waterways of the Little Wildcat Creek Watershed are small headwater streams resulting in little topographical change along the waterways.

Hydrology

There are approximately 18.5 miles of waterways in the Little Wildcat Creek Watershed. The East and West Fork of Little Wildcat Creek are the major waterways and drain into the North Fork of Wildcat Creek. These natural waterways total 13 miles and are small, headwater streams. There are 3.5 miles of drainage ditches including Kelly Ditch and Gord Ditch. At the mouth of the watershed are 3 small bodies of water created many years ago by gravel extraction operations (Figure 7).

Figure 7: Major streams and drainage ditches in the Little Wildcat Creek Watershed



Only 4% of the watershed is classified as open water or wetland (USDA, 1992). Natural drainage in the Little Wildcat Creek Watershed is poor. Prior to settlement in the mid-1800s, marshes and swamps were common and subsurface drains remain a necessity for crop production (USDA, 1989).

The WCWA conducted a windshield survey of the drainage ditches and stream corridors in the Little Wildcat Creek Watershed. Filter strips along drainage ditches and riparian corridors adjacent to natural streams are an effective technique to improve water quality by trapping and filtering sediments and pollutants carried by stormwater runoff. A substantial number of the drainage ditches, especially in Tipton County had filter strips (Figure 8). The riparian corridor along the natural streams appeared to be healthy with little evidence of erosion. However, streambank erosion problems were evident were the floodplain of the Little Wildcat Creek had been encroached upon by development, lawn mowing, and depositing of leaf litter (Figure 9).

The WCWA identified streambank erosion as an area that needed to be addressed in more detail. Recommendations specific to streambank erosion issues can be found in the Goals and Decisions section of this Plan.

Figure 8: Filter strips along drainage ditches in the Little Wildcat Creek Watershed

Figure 9: Eroded streambank due to urbanization

Land Ownership

The land in the Little Wildcat Creek Watershed is privately owned except for the City of Kokomo's Jackson Morrow Park. The Park includes 100 acres and is located at the northern edge of the watershed. There are no significant holdings of land by the State, land trust, or military.

Cultural Resources

David Foster first settled the area around the Little Wildcat Creek Watershed in 1842. Foster selected a location on the Wildcat Creek to establish a trading post. Foster traded firearms, ammunition, blankets, small tools, and whiskey for furs from the Miami Indians (Blanchard, 1883). Treaties signed with the Miami Indians in the mid-1800s made it possible for an influx of white settlers. In 1855, the Town of Kokomo, with a population of 600, was established as the County Seat of Justice for Howard County (previously known as Richardville). The population of Kokomo continued to grow rapidly and in 1865, with a population of 2,000, Kokomo was incorporated as a city (Odiet, 1994).

The discovery of natural gas in 1886 rapidly transformed the City of Kokomo into a regional industrial center. Early inventors gravitated toward the area and soon coined Kokomo as the "City of Firsts". Some of these first inventions include: the first automobile (by Elwood Haynes in 1893); the first pneumatic tire (by D.C. Spraker in 1893); and the first carburetor (by George Kingston in 1902). The first all metal lifeboat (1941) and life raft (1943) were invented by Kokomo based industries. Delco Radio Corporation continued the tradition with the invention of the first push button radio (1938), first signal-seeking car radio (1947), and the first all transistor car radio (1957) (Ratio Architects, 2001).

Since the mid-1930's, Daimler-Chrysler Corporation (formerly Chrysler Corporation) and Delphi Delco Electronic Systems (formerly Delco Radio Corporation) have maintained successful operations in Kokomo. Both corporations directly employ a significant number of individuals themselves as well as sustain a number of support businesses and industries in the north central Indiana region (Ratio Architects, 2001).

According to the 2000 Census, the population of Kokomo has increased 3% to 46,113. Howard County has experienced a change of 5% (84,964) and Tipton County's population has changed 3% (16,577) (US Census, 2000). The Census data does not provide information by watershed but based on the increase in population in Kokomo, Howard County, Tipton County, and the desire of the Howard County Plan Commission to continue to develop the US 31 corridor toward Indianapolis, the WCWA assumes the

population in the Little Wildcat Creek Watershed will continue to grow as well.

Endangered Species

There are a number of endangered, threatened, and rare plants and animals that have been identified in Howard and Tipton Counties (Table 3). The WCWA did not conduct a detailed study to verify if these plants and animals were located in the Little Wildcat Creek Watershed.

Table 3: Endangered, Threatened and Rare Species for Howard and Tipton Counties.

Species Name	Common Name	State Listing	Federal Listing
Carex atherodes	Awned Sedge	Endangered	Not Listed
Crataegus pedicellata	Scarlet Hawthorn	Threatened	Not Listed
Crataegus prona	Illinois Hawthorn	Endangered	Not Listed
Crataegus succulenta	Fleshy Hawthorn	Rare	Not Listed
Glyceria grandis	American Manna-grass	Extirpated	Not Listed
Linum sulcatum	Grooved Yellow Flax	Rare	Not Listed
Panicum leibergii	Leiberg's Witchgrass	Threatened	Not Listed
Thamnophis butleri	Butler's Garter Snake	Endangered	Not Listed
Ardea herodias	Great Blue Heron	Warrants Concern	Not Listed
Lynx rufus	Bobcat	Endangered	Not Listed
Myotis sodalis	Indiana Bat or Social Myotis	Endangered	Endangered
Forest – Flatwoods	Central Till Plain Flatwoods	Significant	Not Listed

(IDNR, 1999)

WATERSHED PARTNERSHIPS

The WCWA is a partnership of concerned citizens. Currently, over 500 individuals representing local government, industry, agriculture, development, environmental, and concerned citizens are active in the WCWA (Figure 10). Membership into the WCWA is open to:

1) Any individual person over the age of 18 who resides in, owes real property in, or does business in the watershed,
2) Any business, community or industry group concerned about water resources in the watershed, or
3) Any governmental entity whose geographic jurisdiction lies in the whole or part in the watershed.

The mission of the WCWA is to develop and implement successful watershed plans to improve and protect the water resources of the Wildcat Creek Watershed.

The efforts of the WCWA are led by a 13-member Advisory Board. Each member of the Advisory Board is elected at the WCWA Annual Meeting and serves a 3-year term. There are four officer positions including President, Vice President, Treasurer, and Secretary (Table 4). According to the WCWA By-laws, the Advisory Board must consist of one representative from Tippecanoe, Carroll, Clinton, Howard, and Tipton Counties and one from either Madison or Grant Counties. The 4 remaining members can be from any of the 7 counties in the Wildcat Creek watershed as long as 2 represent the public education system, universities, or colleges; 2 represent businesses or industries; 2 represent the agricultural businesses, farm bureau, or related agricultural related associations; and the remaining 5 from any vocational field.

The WCWA has 4 committees that are open to the general membership. The Education & Outreach Committee focuses its efforts on educating the general public and decision-makers in the Little Wildcat Creek Watershed through workshops, newspaper articles, and field days. The Funding Committee is working toward securing long-term funding sources for the entire Wildcat Creek Watershed. The Land Use

Figure 10: Distribution of membership in the Wildcat Creek Watershed Alliance

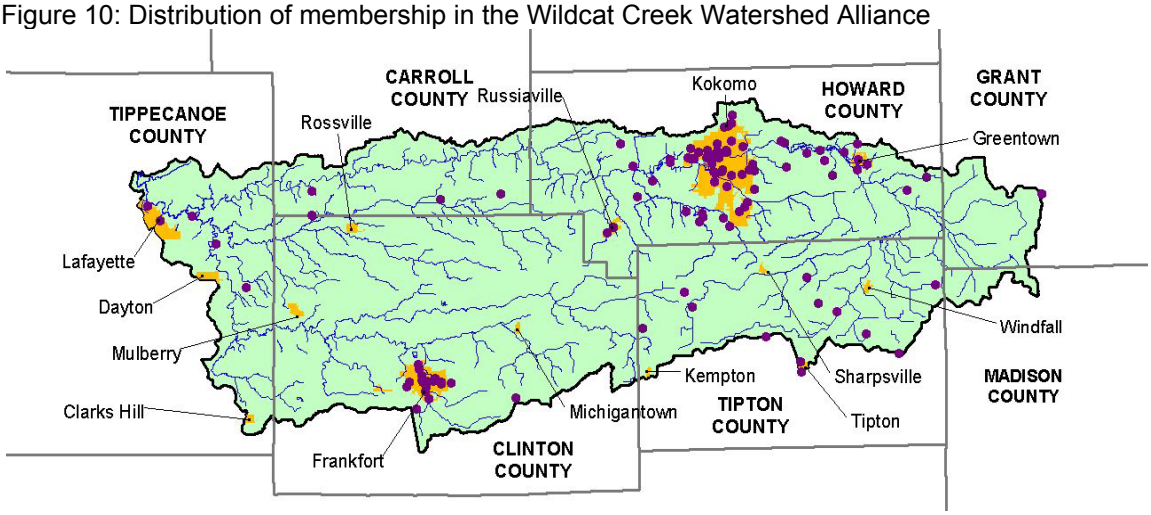
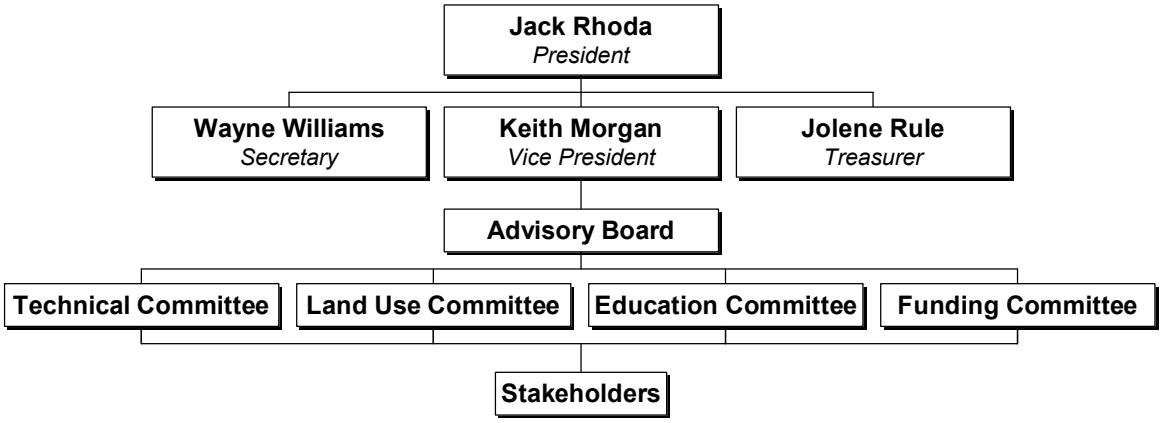


Table 4: Wildcat Creek Watershed Alliance organization chart



Committee targets land use and water quality issues and the Technical Committee coordinates, collects and analyzes water quality data throughout the Little Wildcat Creek Watershed. A full list of Advisory Board and Committee Members is available in the Appendix.

PUBLIC PARTICPATION

The WCWA is volunteer-based and public participation is essential to maintaining the strength of the organization. Education and outreach efforts can effectively change the general public's behaviors and habits toward water quality and make a strong connection between land use and water quality and how the decisions people make everyday directly affect water quality.

Information to the membership is disseminated through the WCWA webpage, newspaper articles, a quarterly newsletter, workshops, annual and quarterly membership meetings as well as regularly scheduled Advisory Board and committee meetings (Figure 11, 12, & 13).

The Annual Meeting for the general membership is held the first quarter of each year. Quarterly Stakeholder or Membership meetings are held on the second Tuesday of January, April, July, and October. These meetings typically alternate between Kokomo (east) and Frankfort (west) to maintain interest and membership throughout the entire Wildcat Creek Watershed.

Figure 11: Informative displays were prepared for community events.

During this two-year grant period, two of the seven Quarterly Stakeholder meetings were held in the Little Wildcat Creek Watershed. Prior to each meeting, three hundred postcards were mailed to residents and landowners in the Little Wildcat Creek Watershed (Figure 14 & 15).

Figure 12: WCWA webpage has proven to be a good venue to distribute information.

www.wildcatalliance.org

Figure 13: Quarterly Newsletters are distributed via email and mail to keep membership aware of WCWA activities.


Wildcat Creek Watershed Alliance, Inc.
Newsletter
Summer 2002 Volume 1, Issue 4

"Wildcat Creek Watershed Alliance is a partnership of concerned citizens dedicated to developing and implementing successful watershed plans to improve and protect water resources in the Wildcat Creek Watershed."

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Wildcat Creek Watershed Alliance Advisory Board Members
Jack Rhoda, President
Keith Morgan
Joiene Rule
Glen Boise
Tony Bonaccorsi
Garry Hill
Bill Hillman
Ralph Kirkpatrick
Joe O'Donnell
Rex Schnapp
Tony Yun
Wayne Williams

WCWA Hosts a Successful Developers' Workshop

On Wednesday, May 15, 2002, the Wildcat Creek Watershed Alliance hosted a Developers' Workshop at the Johanning Center in Kokomo. This free workshop was well attended by developers, builders, contractors, and plan commission members from the Wildcat Creek Watershed.

The Developers' Workshop featured a wide range of speakers and development-related topics, informative displays from local vendors, and a tour of a local residential development under construction.

The speakers included:
- Bob McCormick, Purdue University, presented an overview of the Planning with POWER (Protecting Our Water & Environmental Resources) program,
- Sherry Fulk-Bringman, Purdue University, lead an interactive discussion on soils,
- Brent Ladd, Purdue University, provided pollution prevention techniques specifically for homeowners,
- Bob Kleinops, Normandy Farms Development Company, discussed residential development design and implementation to minimize impacts on the local water resources,
- Gwen White, IDNR, presented the relationship of development on fish and wildlife habitats, and
- Don Cree, Howard County SWCD and Chuck Westfall, IDNR, led a tour of Abbey Place, and demonstrated sediment and erosion control techniques.

Sponsors for the Developers' Workshop included: Turfscape, J.F. New & Associates, NuTex Supply, IOWPA, ASHCO, and the Howard County SWCD.

Upcoming Wildcat Creek Watershed Alliance Meetings

Quarterly Stakeholder Meetings	7/9/02 Jackson Morrow Park & 10/8/02 Location TBA (7pm)
Advisory Board Meetings	7/24/02 Russiaville Library, 8/28/02 Rossville Bennett Center, 9/25/02 Russiaville Library (6:30pm)
Technical Committee Meetings	7/1/02, 8/05/02, 9/17/02 Kokomo South Library (10am)
Land Use Committee Meetings	7/4/02 meeting cancelled, 8/1/02 Russiaville Library, 9/5/02 Rossville Library, 10/3/02 Russiaville Library (5:30pm)
Education Committee Meetings	7/17/02 Rossville Bennett Center, 8/21/02 Russiaville Library, 9/18/02 Rossville Bennett Center (1pm)

The purpose of these meetings was to present known water quality data and collect local information specific to the Little Wildcat Creek Watershed. Table 5 highlights the issues discussed at the meetings. This Plan is an attempt to address many of these concerns. A full summary of the Little Wildcat Creek Watershed Stakeholder meetings is available in the Appendix.

Figure 14: Town Hall type meeting to share important background information at Stakeholder meetings.

Figure 15: Small groups were used to facilitate better discussion during the Stakeholder meetings.

As part of this 319 grant, the WCWA sponsored two educational workshops. These included a Developers' Workshop and Environmental Education Workshop for Kids. Both of these workshops were advertised throughout the entire Wildcat Creek Watershed.

The Developers' Workshop was held in May 2002 at the Johanning Civic Center in Kokomo. The Workshop provided valuable water quality and land development information to developers, builders, contractors, and plan commission members in the Wildcat Creek Watershed.

Topics of discussion included tools for better land use planning; an overview of soil basics for good development practices; the impact of urbanization and development on natural stream systems; pollution prevention techniques; and successful conservation design case studies (Figure 16, 17, & 18).

Figure 16: The Developers' Workshops provided an opportunity for focused education for developers and decision-makers

Figure 17: A variety of planning and development issues were presented during the Developers' Workshop.

The Kids Workshop, "Ready, Set, Get Wet" was held in May 2003 at Camp Cullom near Frankfort. The Workshop focused on environmental education for the entire family. Several interactive stations of water-related games, activities, and story telling were used to raise awareness about the chemical, physical, and biological qualities of water (Figure 19, 20, & 21).

Figure 18: A demonstration during the Developers' Workshop on installation of BMPs during construction activities.

Figure 19: Flyer distributed to membership, media, local schools, and scout troops.

Figure 20: Rainsticks were personalized with photos, yarn, and colored markers.

Figure 21: Educational displays. Frito Lay and Perrier Group donated snacks and drinks.

In addition to the Quarterly Stakeholder meetings, members of the WCWA have been active and have participated in a number of speaking engagements and events sponsored by other organizations.

These include:

- Presentation to the Tecumseth Middle School (October 2001),
- Presentation to the Howard County Builder's Association (May 2002),
- Participation in the Wildcat Guardian's "Celebrate the Wildcat" event in Lafayette and Kokomo (June 2002 & June 2003),
- Presented at the Wildcat Creek Foundation Annual Meeting (June 2002 & June 2003),
- Presentation to the Kokomo Kiwanis Club (July, 2002),
- Participation in the National Wildlife Federation and Alcoa "Workday for Wildlife" in Lafayette (October 2002),
- Participation in the Kokomo Parks Community Day (October 2002), and
- Participation in the Wildcat Foundation's "Conservation Easement Seminar" (March 2003).

Table 5: Comments gathered at Stakeholder Meetings in the Little Wildcat Creek Watershed

Information Requested	Summary of Public Comments Received
How do you use the water in the Little Wildcat Creek Watershed and what is your perception of the water quality?	• Recreation – fishing, canoeing, kayaking • Drainage - runoff, flooding, carries debris • Aesthetic - enjoy beauty of creek • Don't allow kids to be in Little Wildcat Creek • Okay, but needs improvement
What do you think may be the cause of the water quality issues in the Little Wildcat Creek Watershed?	• Noticed changes in flow due to increased development • Wastewater Treatment Plant at SR 31 & Miller Furniture • Kelly West Ditch – massive algae blooms • Unregulated dumping • Failing septic systems • Sedimentation – creek shallower now than before • Loss of natural meander • Loss of wooded corridor • Streambank erosion • Technique for tiling farm fields • 16th Green (Woodhaven Subdivision) erosion problems • Golf Course mowing to edge of creek
Identify critical areas for improving water quality in the Little Wildcat Creek Watershed.	• Along stream • Wetlands • Wooded areas • Linkages for isolated wooded/wet areas for wildlife

Information Requested	Summary of Public Comments Received
What recommendations would you suggest for improvement and enhancement of water quality in the Little Wildcat Creek Watershed?	• Eco-friendly landscaping/mowing techniques • Better data collection for water quality monitoring • More sensitive clearing/dredging of creek • Better enforcement to prevent illegal dumping • More education/outreach • Limit use of septic systems in new construction • Form a County septic district to maintain septic systems • Protect floodplain from development • Maintain natural areas along creek
What are priorities for the Little Wildcat Creek Watershed Management Plan?	• Control illegal dumping (especially chemicals) • Specific water quality education/notification of (potential) contamination through newspapers, signage, etc. • General water quality education through schools, field days, workshops, etc. • Stabilize eroded/failing stream banks • Limit construction using septic systems • Repair failing septic systems • Protect natural areas along creeks/maintain floodplain

II. Identifying Water Quality Problems

The Indiana Department of Environmental Management (IDEM) is the primary agency involved in surface water quality monitoring and assessment in the State of Indiana. In conjunction with the requirements of the Clean Water Act and the State's goals for protecting its natural and recreational resources, the IDEM operates several monitoring programs designed to monitor and assess the chemical, physical, and biological conditions of Indiana's rivers, streams, and lakes. In addition, several volunteer water quality monitoring programs have been actively conducting chemical and biological monitoring within the Little Wildcat Creek.

KNOWN WATER QUALITY PROBLEMS

The following section provides a summary of water quality monitoring efforts, summarizes historical water quality assessment reports, and identifies water quality impairments documented in studies of the Little Wildcat Creek Watershed.

Historically the Indiana Department Environmental Management (IDEM) Assessment Branch conducted multiple surveys of water quality within the larger Upper Wabash River Basin and the Wildcat Creek Watershed. However, for the purpose of this project, it was determined that since significant improvements in wastewater collection and wastewater treatment infrastructure have occurred in the watershed within the past five years, chemical water monitoring data no older than five years would be used to evaluate water quality in the watershed. Consequently, the Surveys Section's data from the 1998 Upper Wabash Basin Survey provided the most current chemical water quality for evaluating water quality.

IDEM 1998 Upper Wabash Basin Survey

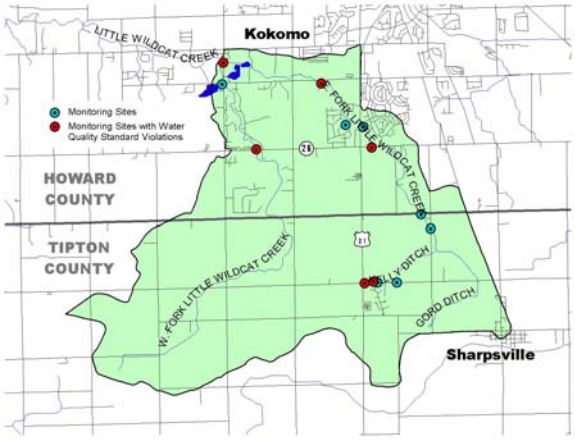
In 1998, the IDEM's Assessment Branch, Office of Water Management (OWM), operated multiple surface water quality monitoring programs within the Upper Wabash River Basin. These programs, operated in concordance with the Assessment Branch Surface Water Quality Monitoring Strategy (IDEM, 1996), included the Watershed Monitoring Program, the Fixed Station Monitoring Program, the *E. coli* Monitoring Program (via contract with the United States Geological Survey), and an intensive Total Maximum Daily Load (TMDL) study of the Wildcat Creek Watershed.

These programs were designed to collect chemical surface water quality data from both targeted and probabilistically (randomly) selected sites that were used for making comprehensive assessments of the surface water quality in the Upper Wabash River Basin. In all, the IDEM monitored fifteen sites within the Little Wildcat Creek Watershed, via the TMDL Program, for a variety of bacteriological, chemical, and physical indicators of water quality (Figure 11).

Although the IDEM's 1998 Upper Wabash Basin Survey is the most thorough study of the watershed completed within the past five years, the data collected in this study are somewhat limited in spatial extent, depth, and duration as described as follows:

1) All samples were collected on a single day (September 11, 1998); therefore, the data are not representative of seasonal characteristics,
2) Samples are not representative of diurnal (day vs. night time) characteristics; especially important where dissolved oxygen violations were observed,
3) No samples were collected upstream of SR 26 on the West Fork of Little Wildcat Creek, and
4) No samples were collected from Gord Ditch on the East Fork of Little Wildcat Creek.

Figure 22: IDEM Monitoring Sites in the Little Wildcat Creek Watershed



(IDEM, 1998)

The data in this study indicate a general concern regarding violations of state water quality standards for *E.coli* bacteria. The data indicate exceedance of the existing water quality standard (WQS) of 235 colony forming units/ 100ml of sample water at many monitoring locations throughout the Little Wildcat Creek Watershed. In addition, elevated concentrations of Total Dissolved Solids (TDS) and Chloride were observed, as well as low concentrations of dissolved oxygen (Table 6).

The IDEM's 1998 Upper Wabash River Basin Report did not identify the causes or sources of the *E.coli*, dissolved oxygen, chloride, and total dissolved solids violations observed within the Little Wildcat Creek Watershed. However, comments listed in the data summary for the basin study listed confined animal feeding operations and semi-public wastewater treatment plant discharges as concerns. Additional concerns likely include failing septic systems, storm water runoff, and sanitary sewer overflows (Figure 22) (IDEM, 2000).

Table 6: Summary of IDEM Water Quality Data for Little Wildcat Creek

5120107	SITE	PGM	LOCATION	VIOLATIONS	CONC.	UNIT	DATE	COMMENTS
020020	23-070A	TMDL	Unnamed Trib at US31	*E. coli*	>800	100mL	9/11/98	Exotic animal confined feeding operation
		TMDL		DO	2.74	mg/L	9/11/98	Low D.O.
		TMDL		TDS	790	mg/L	9/11/98	Confined feeding and semi-public outfall
	23-070B	TMDL	Unnamed Trib at Michael Lane	*E. coli*	300	100mL	9/11/98	
		TMDL		Chloride	330	mg/L	9/11/98	
		TMDL		DO	2.45	mg/L	9/11/98	Low D.O.

5120107	SITE	PGM	LOCATION	VIOLATIONS	CONC.	UNIT	DATE	COMMENTS
		TMDL		TDS	850	mg/L	9/11/98	Applies to industrial intake
	23-070	TMDL	Kelly West Ditch at CR600N	None				
	23-071	TMDL	East Fork Little Wildcat Creek at CR500W	*E. coli*	670	100mL	9/11/98	
	23-072	TMDL	East Fork Little Wildcat Creek at CR500S	*E. coli*	720	100mL	9/11/98	
	23-073	TMDL	East Fork Little Wildcat Creek at SR26	E. coli	500	100mL	9/11/98	
	23-073B	TMDL	Indian Hts Lift Station Trib upstream of US31	None				
	23-073A	TMDL	Unnamed Trib at Yale Blvd	None				
	23-074	TMDL	East Fork Little Wildcat Creek at CR300S	*E. coli*	410	100mL	9/11/98	
	23-075	TMDL	East Fork Little Wildcat Creek at CR200W	*E. coli*	540	100mL	9/11/98	
	23-076	TMDL	West Fork Little Wildcat Creek at SR26	*E. coli*	340	100mL	9/11/98	
	23-077	TMDL	West Fork Little Wildcat Creek at CR200W	None				

(IDEM Upper Wabash Basin Study, 1998)

1998 303(d) List of Impaired Waters

In addition to the Upper Wabash Basin Study, the IDEM also produced its biennial list of streams with water quality "impairments", as required by Section 303(d) of the Clean Water Act.

According to Indiana's 1998 303(d) list, Kelly West Ditch (a small tributary to the East Fork of Little Wildcat Creek) was the only impaired stream identified in the Little Wildcat Creek Watershed. Kelly West Ditch was considered to be impaired due to low dissolved oxygen measurements.

2000 Water Quality Report

Indiana 2000 Water Quality Report Section 305(b) of the Clean Water Act) requires states to prepare and submit to the U.S. Environmental Protection Agency (USEPA) a water quality assessment report of state water resources every two years.

The Indiana Department of Environmental Management (IDEM), Office of Water Management (OWM) prepared the Indiana 2000 Water Quality Report (305(b) Report) to meet this reporting requirement. Data collected through the IDEM's 1998 Upper Wabash Basin study were used to assess water quality for the Little Wildcat Creek Watershed (Table 7) (IDEM, 2000).

2002 303(d) List of Impaired Waters

Section 303(d) of the Clean Water Act (CWA) requires that surface waterbodies not meeting or not expected to meet water quality standards after the implementation of regulatory controls (NPDES permits) be compiled and listed as "impaired waters" by IDEM. Impaired waters are considered to be those waterbodies that do not meet the state's water quality standards for one or more designated uses.

The statewide list of impaired streams was recently updated in February of 2002 and includes the portion of the waterbody that is impaired, the pollutant(s) not meeting water quality standards thus causing the impairment, and a schedule for development of a Total Maximum Daily Load (TMDL) for the pollutant causing the impairment (Table 8). In addition, Figure 12 illustrates the locations of 303(d) listed streams within the Little Wildcat Creek that will be required to undergo TMDL development (Figure 23).

Table 7: IDEM's 2000 Waterbody Assessments

LITTLE WILDCAT CREEK EAST AND WEST FORKS	Aquatic Life	Drinking Supply	FCA	Contact Recreation	Cause/ Stressor
Little Wildcat Creek - east fork	F	N/A	X	N	Pathogens
Kelly West Ditch	F	N/A	X	F	
Unnamed tributary	N	N/A	X	P	Low DO, Pathogens, Chloride
Little Wildcat Creek - west fork	F	N/A	X	F	

F-Full support, P-Partial support, N-Non support, X-Not Assessed, N/A –Not Applicable

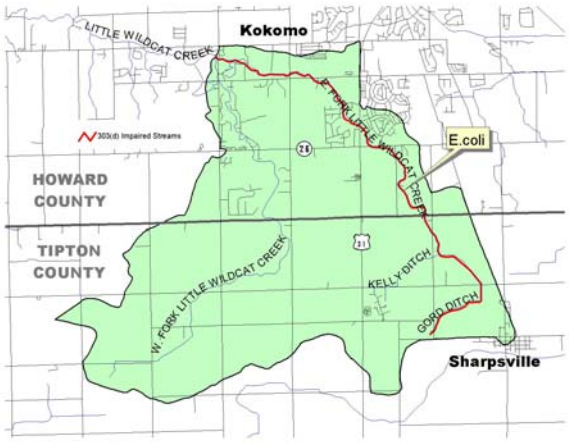
Table 8: 2002 303(d) Listed Streams in the Little Wildcat Creek Watershed

Waterbody Name	County	Major Basin	Parameter of Concern	TMDL Development Schedule	303(d) #
Little Wildcat Creek – Mainstem	Howard	UPPER WABASH	E. coli	2003 – 2005	78
Little Wildcat Creek – East Fork	Howard	UPPER WABASH	*E. coli*	2003 – 2005	328

A TMDL is a process that leads to the quantification of the amount of a specific pollutant discharged into a waterbody that can be assimilated and still meet the water quality standards. What constitutes a pollutant is described in Section 502(6) of the Clean Water Act, and includes materials such as sewage, chemical wastes, biological materials, and industrial, municipal, and agricultural waste. The definition also encompasses drinking water contaminants that are regulated under Section 1412 of the Safe Drinking Water Act.

A TMDL will identify how much of a pollutant is coming from point sources and nonpoint sources. It will also specify the amount of pollutant reduction necessary from each source in order to meet the water quality standard set for that pollutant. A plan to reduce the amount of the pollutant coming from each source will be developed and implemented by the IDEM.

Figure 23: Impaired streams in the Little Wildcat Creek Watershed



(IDEM, 2002)

At the time of writing this Watershed Management Plan, the IDEM's Office of Water Quality has begun the process to develop TMDLs for the Wildcat Creek Watershed. Staff within the Office of Water Quality has solicited water quality information from groups working in the watershed and held a stakeholder meeting. Fieldwork for the Little Wildcat Creek Watershed TMDL is scheduled to begin in 2003. Several of the Wildcat Creek Watershed Alliance members attended the TMDL stakeholder meeting on May 29, 2003 in Kokomo. All members of the Advisory Board and Technical Committee are on the IDEM's mailing list to receive future meeting dates and project updates.

Fish Consumption Advisory (FCA)

Each year since 1972, three agencies have collaborated to create the Indiana Fish Advisory. These agencies include the Indiana Department of Environmental Management (IDEM), the Indiana Department of Natural Resources (IDNR), and the Indiana State Department of Health (ISDH). Each year, members from these agencies meet to discuss the findings of recent fish monitoring data and to develop the new statewide fish consumption advisory.

The 2001 advisory is based on levels of polychlorinated biphenyls (PCBs) and mercury found in fish tissue. In each area, samples were taken of bottom-feeding fish, top-feeding fish, and fish feeding in between. More than 1,600 fish tissue samples were analyzed for polychlorinated biphenyls (PCBs), pesticides, and heavy metals. Of those samples, the majority contained at least some mercury. However, not all fish tissue samples had mercury at levels considered harmful to human health. If they did, they are listed in the fish consumption advisory.

Because of past, widespread agricultural and industrial use of these materials, their great stability and persistence in the environment, and the potential for bioaccumulation, it is not surprising that concentrations exceeding safe levels have been found in some species.

Criteria for the statewide 2000 Indiana Fish Consumption Advisory are developed from the Great Lakes Task Force risk-based approach.

Although there are no specific fish consumption advisory listings for the Little Wildcat Creek, a statewide PCB advisory for carp in all Indiana streams, the Indiana portion of Lake Michigan, and inland lakes is in effect. Fish Consumption Advisories that are currently in effect for the Little Wildcat Creek are listed in Table 9. Indiana State Department of Health (ISDH) criteria for fish consumption advisory groups are outlined in Table 10 (ISDH, 2002).

Table 9: FCA for the Little Wildcat Creek

Fish Species	Size	Contaminant	FCA Group (Table 10)
Carp	15-20 inches	Mercury, PCB	3
Carp	20-25 inches	Mercury, PCB	4
Carp	25+ inches	Mercury, PCB	5

Table 10: ISDH Definitions for FCA Groups

FCA Group	Description
1	Unrestricted consumption
2	One meal per week (52 meals per year) for adult males and females. One meal per month for women who are pregnant or breastfeeding, women who plan to have children, and children under the age of 15.
3	One meal per month (12 meals per year) for adult males and females. Women who are pregnant or breastfeeding, women who plan to have children, and children under the age of 15 do not eat.
4	One meal every two months (six meals per year) for adult males and females. Women who are pregnant or breastfeeding, women who plan to have children, and children under the age of 15 do not eat.
5	No consumption (DO NOT EAT)

(ISDH, 2002)

Unified Watershed Assessment (UWA)

The federal Clean Water Action Plan, released in February 1998, presented a plan and certain incentives directed toward accelerating the control of nonpoint source pollution in America. States were requested, as one of the 111 Action Items presented in the Plan, to prepare a Unified Watershed Assessment.

This Assessment was developed through the cooperation of state, federal, and local agencies and the public. The guidance for completing the UWA, published by the USEPA in June 1998, charged the USDA Natural Resources Conservation Service (NRCS) and the state water quality agency (the IDEM) with convening the assessment process. The following lists the data layers and decision criteria:

- Lake Fishery (game fish) Condition
- Eurasian Milfoil Problems
- Mussel Diversity
- Stream Biodiversity
- ALUS Status
- Fish Consumption Advisories
- Recreation/Swimming Status
- Index of Biological Integrity (fishes)
- Index of Biological Integrity (macro-invertebrates)
- Qualitative Habitat Evaluation Index
- Lake Trophic Status
- Stream (game fish) Fishery Status
- Sediment Delivery Potential

The data provided information about the water column, organisms living in the water, or the suitability of the water for supporting aquatic ecosystems. Each layer of data was partitioned by percentiles into 5 scores, with

"1" being indicative of good water quality or minimal impairment, and "5" indicating heavily impacted or degraded water quality.

Scores for each 8-digit watershed were compiled, and the watersheds were sorted into four categories as required by the USEPA guidance. The four categories are as follows:

1) Watersheds in need of restoration, waters do not meet designated uses or other natural resource goals. 25% or more of the waters that have been assessed do not meet state water quality standards. (Note that in some watersheds, only a very small percentage of waters have been recently assessed.)
2) Watersheds that on average meet state water quality goals and require attention to sustain water quality. In most of these watersheds, there is habitat that is recognized as critical for threatened or endangered species.
3) Watersheds with pristine or sensitive aquatic systems on federal or state managed lands.
4) Watersheds with insufficient data to make an assessment.

What sets this assessment apart from other lists and reports regarding watersheds is the involvement of numerous organizations and the recognition of both impaired and healthy watersheds (USDA, 2000).

1999-2000 UWA

During the summer of 1999, the UWA workgroup used additional layers of information to identify resource concerns and stressors for each of the 361 11-digit watersheds in Indiana. This time, the UWA examination included more information about human activities that have the potential to impact ecosystems and information to help planners to focus on those areas where restoration may be most critical.

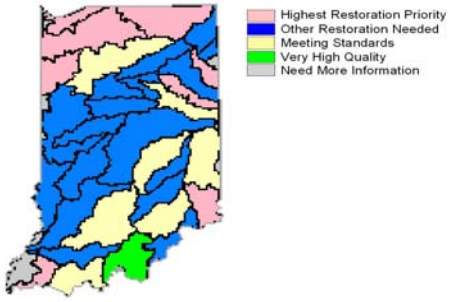
The UWA process was conducted to identify areas where the interests of two or more partner agencies may converge. It was intended that this would lead to more effective allocation of resources for restoration and protection activities. At the local level, it was hoped that the UWA could assist groups in prioritizing watershed activities and providing discussion points for planning.

The amended UWA assessment was seen to provide the following benefits:

1) Provided a logical process for targeting funds, which may be expanded or updated without changing the basic framework.
2) Provided information at a finer resolution (11-digit HUC) to agencies and local groups interested in watershed assessment.
3) Identified data gaps could be used as a complement to other assessments, such as the 305(b) Report and 303(d) List.

According to the 1999-2000 UWA fact sheet, the entire Wildcat Creek Watershed, and surrounding 8-digit watersheds in Central Indiana are classified as “Other Restoration Needed” (Figure 24) (USDA, 2000).

Figure 24: 1999-2000 UWA classifications.



(1999-2000 UWA Fact Sheet)

Table 11: Hydrologic Unit Scores for 2000-2001 Unified Watershed Assessment Parameters for North Fork Wildcat Creek Watershed (11-digit HUC 05120107020)

Parameter	Score
Mussel Diversity and Occurrence	Not Determined
Aquatic Life Use Support	Not Determined
Recreation Use Attainment	Not Determined
Stream Fishery	Not Determined
Lake Fishery	4
Eurasian Milfoil Infestation Status	Not Determined
Lake Trophic Status	3
Critical Biodiversity Resource	2
Aquifer Vulnerability	4
Population Using Surface Water for Drinking	2
Residential Septic System Density	4
Degree of Urbanizations	2
Density of Livestock	4
Percent Cropland	5
Mineral Extraction Activities	2

(2000-2001 Unified Watershed Assessment)

2000-2001 UWA

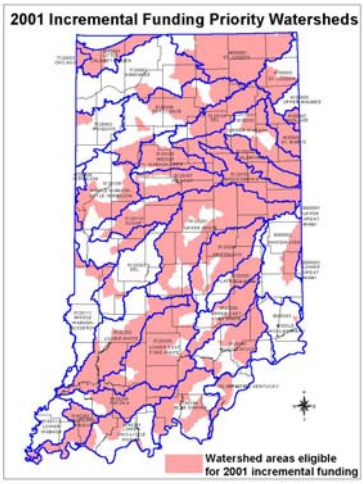
In order to target the allocation of FFY 2001-2002 Section 319 funds that were made available through the Clean Water Action Plan, 11-digit hydrologic units with the greatest indication of existing or potential problems were given a higher priority. Based on the additional information gathered in this iteration of the UWA, all watersheds in the state are now considered to be in Category I.

Watersheds (11 HUC) with two or more scores of 5, one score of 5 and two or more scores of 4, or three or more scores of 4 (in any category) were given a higher priority. Figure 25 illustrates which 11-digit watershed are priorities to incremental funding in 2001 (USDA, 2000).

According to this ranking system, the North Fork Wildcat Creek Watershed received one "5" score for percent cropland and four "4" scores for lake fishery, aquifer vulnerability, residential septic system density, and density of livestock that placed it in a higher priority for funding (Table 11). This funding targeting process is known to be imperfect, but used the best information available at the time.

The Little Wildcat Creek Watershed falls within the portion Wildcat Creek Watershed that is eligible for 2001 incremental funding.As a committee, the WCWA identified what they felt were the major sources of pollution in the Little Wildcat Creek Watershed (Table 12). The WCWA used this laundry list as the basis of the water quality discussion and to formulate the goals for this Watershed Management Plan.

Figure 25: Funding priorities based on 2000-2001 Unified Watershed Assessment.



(2000-2001 UWA)

These include:

1. **Agricultural Practices**
   a) Row Crop (nutrients, pesticides, erosion/sediment, conservation tillage, conservation buffers)
   b) Livestock (bacteria/pathogens, pasture)
2. **Urban Development**
   a) Human & Animal Waste (failing septic systems and wildlife/pet waste)
   b) Household & Yard Waste (toxic substances and lawn/garden practices)
   c) Development Practices & Encroachment (erosion/sediment control, streamside forests, impervious areas)

Table 12: Committee derived list of pollutants in the Little Wildcat Creek Watershed

Land Use	Suspected Source of Pollution
Agriculture	• Tillage practices • Livestock • Highly erodible lands • Nutrient & pest management • Tile systems • Failing septic systems • Lack of riparian buffers • Chemical storage & handling • Manure storage & handling
Residential and Urban	• Erosion from construction • Topsoil removed from developments • Illegal dumping • Household hazardous waste • Pet wastes • Over application of fertilizers & pesticides • Failing septic systems • Impermeable surfaces • Vehicular fluids (oils, greases, gasoline) • De-icing salt & sand • Road construction • Golf course
Streams	• ATV access • Livestock access • Streambank erosion • Floodplain development • Streamside dumping • Fisherman and litter

FOUND WATER QUALITY PROBLEMS

In an attempt to further evaluate the status of water quality within the Little Wildcat Creek Watershed, the Wildcat Creek Watershed Alliance (WCWA) and the City of Kokomo developed a partnership to conduct additional water quality monitoring. Monitoring for this project included both chemical and biological monitoring components

Chemical Monitoring

The terms of the partnership dictated that the WCWA Coordination Team (Goode & Associates) would collect stream samples from selected sites within the watershed and that staff at the Kokomo Wastewater Treatment Plant (KWWTP) Laboratory would analyze the samples.

Monitoring locations were selected based upon the input of the WCWA Technical Committee, KWWTP staff, and the WCWA Coordination Team. Sites were selected to target areas of concern based upon historical documentation of water quality impairments and/or suspicions of emerging water quality problems. Figure 26 illustrates the monitoring sites selected for this project. Narrative descriptions of these sites are included in Table 13.

Monitoring parameters were selected to characterize pollutants generally associated with nonpoint sources of pollution, the KWWTP's capabilities for internal parameter analysis, and the costs of outsourcing laboratory work. The parameters selected for analysis are listed in Table 14.

Figure 26: WCWA Monitoring Sites in the Little Wildcat Creek Watershed, 2002

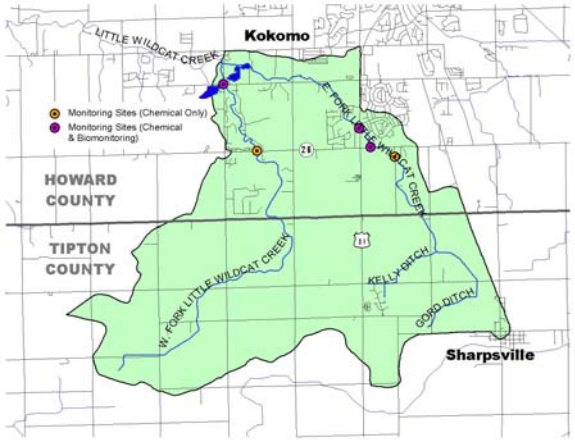


Table 13: WCWA Monitoring Sites in the Little Wildcat Creek Watershed, 2002

Site Number	Location Description
Site # 1	US 31, Kokomo
Site # 2	SR 26 East
Site # 3	CR 50 East
Site # 4	CR 300 West
Site # 5	SR 26 West

Sites were monitored on a monthly basis (last Wednesday of every month) over a six-month period from June to November 2002. Sample collections and laboratory analyses were completed according to Standard Methods by trained and experience staff members of the WCWA Coordination Team and the KWWTP Laboratory.

Table 14: Monitoring Parameters for Water Quality Samples collected in the Little Wildcat Creek

Chemical	Physical	Bacteriological
Ammonia	PH	*E.coli*
Phosphorus	Temperature	
Biochemical Oxygen Demand (BOD)	Dissolved Oxygen	
	Total Suspended Solids	

The chemical monitoring conducted by this project for the Little Wildcat Creek Watershed confirmed continuing water quality impairments in the watershed, particularly for the East Fork of Little Wildcat Creek. Monitoring results indicate that the sites on the East Fork are consistently experiencing low concentrations of dissolved oxygen, likely due to nutrient enrichment (ammonia and phosphorus) and above average loadings of biochemical oxygen demand (BOD). In addition, 100% of all samples collected from the East Fork of the Little Wildcat Creek exceeded water quality standards for E.coli bacteria.

The causes of these impairments are due to contributions from multiple sources of pollution, but are most likely associated with the presence of failing septic systems, agricultural runoff, and a semi-public wastewater treatment plant discharge. The causes and sources of these impairments are discussed in detail in the next section of this Plan. Details of the water quality data collected for chemical monitoring is available in the Appendix.

Biological Monitoring

Fish community sampling was also conducted within the Little Wildcat Creek Watershed as an additional service paid for by the City of Kokomo. Three sites were monitored within the watershed. Figure 26 illustrates the monitoring sites selected for this project. Narrative descriptions of these sites are included in Table 15.

Table 15: Biomonitoring Sites in the Little Wildcat Creek Watershed, 2002

Site Number	Location Description
Site # 1	US 31, Kokomo
Site # 2	SR 26 East
Site # 3	CR 300 West

The inclusion of fish community monitoring in this study was vitally important to the City of Kokomo due to the presence of a single combined sewer overflow (CSO) that discharges into the East Fork of the Little Wildcat Creek just downstream of US 31 in Kokomo. Consequently, monitoring locations were identified both upstream and downstream of the CSO in order to best characterize the impact of the CSO discharge on the creek. An additional monitoring location on the West Fork of Little Wildcat Creek, near the confluence of the West and East Forks of the creek, was included to evaluate health of this stem of Little Wildcat Creek.

Greg Bright of Commonwealth Biomonitoring, Inc completed sample collection and data analysis under contract with Strand Associates, Inc. Sample collection was completed through the use of backpack electrofishing equipment and fish community analysis was completed according to IDEM Fisheries IBI criterion. Habitat evaluations were also completed at each monitoring site.

Overall, fish community data for the West Fork of Little Wildcat Creek appear to show the presence of healthy aquatic communities, whereas the data for the East Fork of Little Wildcat Creek indicate the presence of impaired fish communities both upstream and downstream of the CSO discharge (Table 16).

Summary of the Little Wildcat Creek 2002 Water Quality Monitoring Project

Monitoring within the Little Wildcat Creek Watershed during the summer and fall of 2002 confirms the presence of impaired streams within the watershed. Significant impairments were documented, particularly in the East Fork of Little Wildcat Creek, for ammonia, phosphorus, and *E.coli* bacteria.

Although data for the West Fork of Little Wildcat Creek indicates minor exceedance of the *E.coli* water quality standard, a need to prioritize stream segments for limited water quality improvement funding dictates that the East Fork of the Little Wildcat should be the priority for future ecological restoration efforts within the watershed.

Additional monitoring upstream of CR 50 East in Howard and Tipton Counties is necessary for positively identifying the causes and sources of these impairments. However, land use evaluations conducted by research and windshield survey of the watershed suggests that failing septic systems, agriculture (row crop and domestic livestock), and an improperly operated semi-public wastewater treatment plant are the most likely sources of these pollutant loads.

Table 16: Little Wildcat Creek Biomonitoring Results

Species	**East Fork (US 31)**	**East Fork (SR 26)**	**West Fork (CR 300 W)**
ROCK BASS	3		17
GREEN SUNFISH		4	2
PUMPKINSEED			5
LONGEAR			5
SMALLMOUTH BASS			2
BLACK REDHORSE			1
COMMON WHITE SUCKER	1	3	5
SPOTTED SUCKER			1
NORTHERN HOGSUCKER			1
REDFIN SHINER		1	2
BLUNTNOSE MINNOW	16	20	1
CREEK CHUB	24	26	
CENTRAL STONEROLLER	2	17	1
BLACKSTRIPE TOPMINNOW			12
JOHNNY DARTER	5	10	
ORANGETHROAT DARTER	1	3	
RAINBOW DARTER		6	5
GREENSIDE DARTER		2	4
FANTAIL DARTER			13
YELLOW BULLHEAD		4	
TOTAL FISH	**52**	**96**	**77**
TOTAL FISH SPECIES	**7**	**11**	**16**
IBI	**24**	**32**	**54**
QHEI	**61**	**76**	**76**

CAUSES OF WATER QUALITY PROBLEMS

A number of substances including oxygen demanding wastes, nutrients, bacteria, metals, and toxic substances, cause water pollution. Sources of these pollution causing substances are divided into two broad categories: point sources and nonpoint sources (IDEM, 2002). Point and nonpoint sources of pollution are described as follows:

Point source pollution refers to discharges that enter surface waters through a pipe, ditch, or other well-defined point of discharge. The term applies to wastewater and stormwater discharges from a variety of sources. Wastewater point source discharges include municipal (city and county) and industrial wastewater treatment plants and small domestic wastewater treatment systems that may serve schools, commercial offices, residential subdivisions and individual homes. Stormwater point source discharges include stormwater discharges associated with industrial activities and stormwater discharges from municipal separate storm sewer systems (MS4s) for municipalities that meet the requirements of 327 IAC 15-13.

The primary pollutants associated with point source discharges are oxygen demanding wastes, nutrients, sediment, toxic substances, ammonia and metals. Point source dischargers in Indiana must apply for and obtain a National Pollutant Discharge Elimination System (NPDES) permit from the state. Discharge permits are issued under the NPDES program, which is delegated to Indiana by the US Environmental Protection Agency (EPA).

Nonpoint source pollution refers to runoff that enters surface waters by stormwater runoff, contaminated ground water, snowmelt or atmospheric deposition. There are many types of land use activities that can serve as sources of nonpoint source pollution due to the presence of impervious surfaces, including land development, construction, mining operations, crop production, animal feeding lots, agricultural drainage tiles, timber harvesting, failing septic systems, landfills, roads and paved areas, and wildlife.

Sediment and nutrients are major pollution causing substances associated with nonpoint source pollution. Others include *E.coli* bacteria, heavy metals, pesticides, oil and grease, and any other substance that may be washed off the ground or removed from the atmosphere and carried into surface waters. Unlike point sources of pollution, nonpoint pollution sources are diffuse in nature and occur at intervals depending on rainfall events.

Causes of pollution refer to the specific substances that enter surface waters from point and nonpoint sources and result in water quality degradation and/or impairment. Major causes of water quality impairment include biochemical oxygen demand (BOD), nutrients, toxic substances (such as polychlorinated biphenyls [PCBs] and ammonia), and *E.coli* bacteria (IDEM, 2002). The following discussion provides a general overview of causes of impairment and the activities that may have led to their introduction into the surface waters of Little Wildcat Creek.

Oxygen Consuming Wastes

Since maintaining sufficient levels of dissolved oxygen in a waterbody is critical to the survival of most forms of aquatic life, evaluating oxygen-consuming wastes in a river or stream is central to diagnosing the health of a river system. Pollutants

associated with oxygen consuming wastes are typically composed of either decomposing organic matter or chemicals that bind with available in stream oxygen to reduce the available concentrations of dissolved oxygen in the water column. Organic causes of oxygen consuming wastes are measured as biochemical oxygen demand (BOD) and chemical causes of oxygen consuming wastes are measured as chemical oxygen demand (COD); however, the concentration of dissolved oxygen in a waterbody is used as a common indicator of the general health of an aquatic ecosystem.

327 IAC Section 6 (b)(3) states that concentrations of dissolved oxygen shall average at least five milligrams per liter per calendar day and shall not be less than four milligrams per liter at any time. Dissolved oxygen concentrations are affected by a number of factors. Physical conditions, such as lower water temperatures generally allow for retention of higher dissolved oxygen concentrations. In addition, higher dissolved oxygen concentrations can be naturally or artificially produced by turbulent actions, such as by in stream riffles or by the cascading effect of a waterbody spilling over a dam, which inject air into surface waters. Low dissolved oxygen levels tend to occur more often in warmer, slow moving waters. In general, the lowest dissolved oxygen concentrations occur during the warmest summer months and particularly during low flow periods.

As illustrated in Chart 1, monitoring results indicate that the East Fork of Little Wildcat Creek (Sites 1-3) experienced low dissolved oxygen concentrations during the months of July, September, and October. In addition, Chart 2 illustrates elevated BOD concentrations, particularly for the East Fork of Little Wildcat Creek, during the project period.

Chart 1: Dissolved Oxygen (DO) Results, 2002

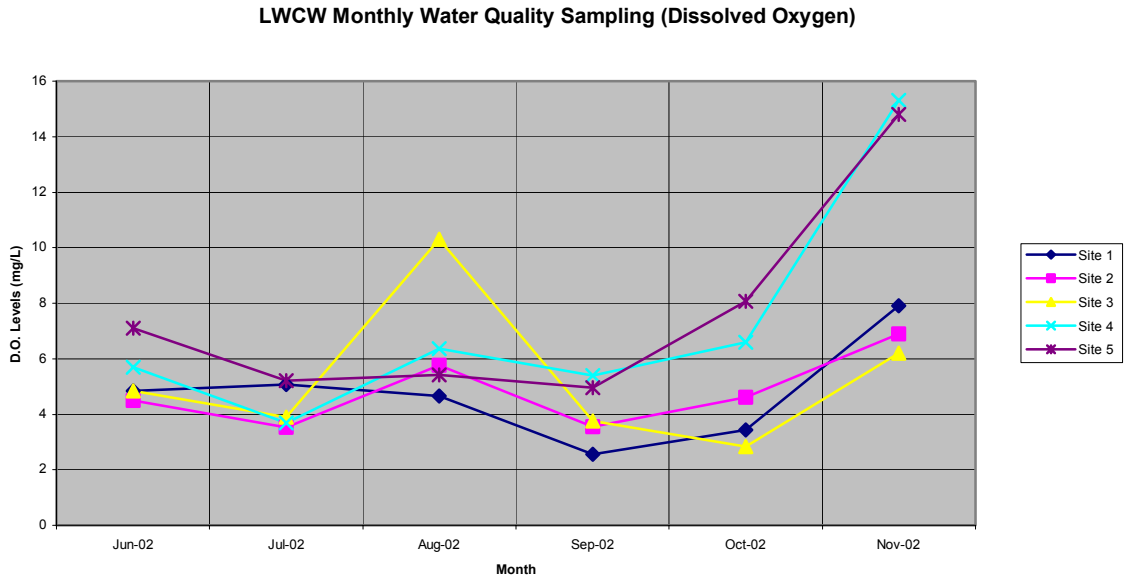


Chart 2: Biochemical Oxygen Demand (BOD) Results, 2002

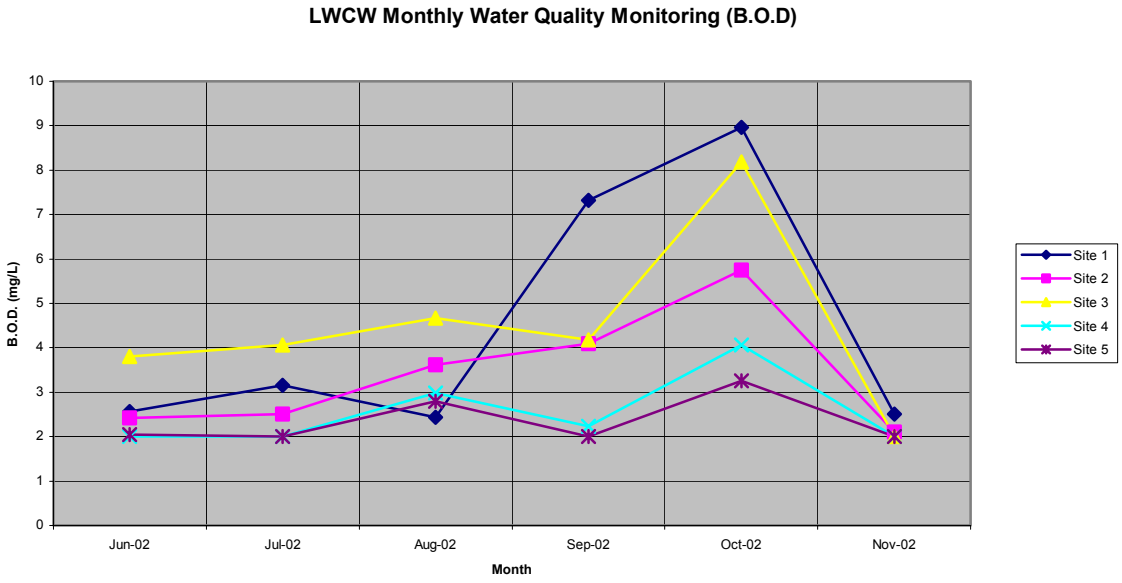


Table 17: Average and Median Dissolved Oxygen Concentrations in the Little Wildcat Creek Watershed, 2002

Site Number	Dissolved Oxygen Average	Dissolved Oxygen Median
Site # 1: US 31	4.74 mg/L	4.74 mg/L
Site # 2: SR 26 E	4.81mg/L	4.55 mg/L
Site # 3: CR 50 E	5.3 mg/L	4.37 mg/L
Site # 4: CR 300 W	7.18 mg/L	6.04 mg/L
Site # 5: SR 26 W	7.59 mg/L	6.26 mg/L

Table 17 shows that two of the three sites on the East Fork had an average dissolved oxygen values of less than 5 mg/L, which are violations of water quality standards. In contrast, sites monitored on the West Fork of the Little Wildcat Creek had average dissolved oxygen concentrations above 7 mg/L.

An additional cause of low dissolved oxygen concentrations during the warmer months of the year may be diurnal fluctuations of oxygen in the water column due to conditions of nutrient enrichment, as illustrated in Chart 3 and Chart 4. These charts indicate the presence of elevated concentrations of nutrients in sufficient quantities to support an overabundance of algae growth within the stream. Although the process of photosynthesis in the algae produces a large volume of oxygen during periods of daylight, respiration by algae during the nighttime hours absorbs more oxygen than the water column can maintain, resulting in times when dissolved oxygen concentrations are significantly reduced or depleted. This situation can be is intensified in hot weather and low flow conditions due to the reduced capacity of water to retain dissolved oxygen.

Toxic Substances

327 IAC 2-1-9(45) identifies toxic substances as substances that are or may become harmful to plant or animal life, or to food chains when present in sufficient concentrations or combinations. Toxic substances include those pollutants

identified as toxic under Section 307 (a)(1) of the Clean Water Act. Indiana's standards for individual toxic substances are listed in 327 IAC 2-1-6. Toxic substances frequently encountered include chlorine, ammonia, organic pollutants, heavy metals, and pH. These substances can be toxic to aquatic organisms and their effects may be evident immediately or may only be manifested after long-term exposure or accumulation in living tissue (IDEM, 2002).

Whole effluent toxicity testing is required for major NPDES dischargers (discharge over 1 million gallons per day or population greater than 10,000). This test shows if the effluent from a treatment plant is toxic, but it does not identify the specific cause of toxicity. If the effluent is found to be toxic, further testing is done to determine the specific cause. Other testing, or monitoring, done to detect a toxicity problem includes fish tissue analyses, chemical water quality sampling, and biological monitoring.

Polychlorinated biphenyls (PCBs)

Polychlorinated biphenyls (PCBs) were first created in 1881 and subsequently began to be commercially manufactured around 1929 (Bunce, 1994). Because of their fire-resistant and insulating properties, PCBs were widely used in transformers, capacitors, and in hydraulic and heat transfer systems. In addition, PCBs were used in products such as plasticizers, rubber, ink, and wax. In 1966, PCBs were first detected in wildlife, and were soon found to be ubiquitous in the environment (Bunce, 1994). PCBs entered the environment through unregulated disposal of products such as waste oils, transformers, capacitors, sealants, paints, and carbonless copy paper. In 1977, production of PCBs in North America was halted. Subsequently, PCB contamination present in our surface waters and environment today is the result of historical waste disposal practices (IDEM, 2002).

Although there are no waterbodies within the Little Wildcat Creek Watershed specifically listed for PCB contamination, there is statewide fish consumption advisory for carp greater than 15 inches in length.

Nutrients

The term "nutrients" primarily refers to the two major plant macronutrients, phosphorus and nitrogen. These nutrients are common components of fertilizers, animal and human wastes, vegetation, and some industrial processes. Nutrients in surface waters come from both point and nonpoint sources. Nutrients are beneficial to aquatic life in small amounts. However, in over abundance and under certain conditions, they can stimulate the occurrence of algal blooms and excessive plant growth in quiet waters or low flow conditions. Algae blooms and excessive plant growth often reduce the dissolved oxygen content of surface waters through plant respiration and the decomposition of dead algae and other plants (IDEM, 2002).

Phosphorus

Nonpoint source discharges are the major sources of phosphorus in most watersheds. Phosphorus can be present as organic matter (living or dead organisms and excreted organic material) and can be either dissolved or suspended in the water column. Phosphorus may also occur in inorganic compounds released from various minerals, fertilizers or detergents that may also be either dissolved or suspended in the water column. Phosphorus is the primary nutrient associated with production of algae and macrophytes (plants) in waterbodies, as it is generally the nutrient in shortest supply in aquatic systems (Phillips et al, 2000).

Elevated phosphorus concentrations are a cause of pollution in the Little Wildcat Creek Watershed. In the absence of a specific surface water quality standard for phosphorus, results from the 2002 monitoring project were compared to the results of a statistically based study of the Upper Wabash River Basin study completed by the IDEM in 1998. The "*1998 Watershed Monitoring Program Study of the Upper Wabash River Basin*" was a probabilistic monitoring study that consisted of a one-time sampling of 64 randomly chosen sites designed to gain an understanding of ambient water quality during low flow conditions in the basin. The data from this study were statistically evaluated to create a classification metric based on quartile ranges (IDEM, 1999). The classifications were high, upper ambient, ambient, lower ambient, and low and summary statistics were developed appropriate for establishing metrics for each eight digit HUC watershed within the basin, as well as for the compiled dataset from all seven eight digit HUC watersheds.

In order to best evaluate the phosphorus data collected during the WCWA's monitoring project, 2002 monitoring results were compared to the summary statistics and classification metrics from the IDEM's 1998 study. An evaluation of the 1998 study's summary statistics indicated that the median concentration of phosphorus for samples collected in the Wildcat Creek watershed was 0.12 mg/L, while the median concentration of phosphorus for samples collected within the entire Upper Wabash Basin was 0.13 mg/L. In addition, concentrations of phosphorus exceeding 0.22 mg/L in the Wildcat Creek watershed were considered to be significantly elevated, while concentrations of phosphorus exceeding 0.18 mg/L within the entire were considered to be significantly elevated or "high".

A comparison of 2002 monitoring results to the median values observed in 1998 reveals that 94% of the samples collected from the East Fork of Little Wildcat Creek were above the median concentration for phosphorus and that 61% of the samples exceeded the "high' classification metric score for phosphorus. In contrast, 42% of the samples collected from the West Fork of Little Wildcat Creek were above the median concentration for phosphorus; however, only one sample (8%) exceeded the "high' classification metric score for phosphorus. Phosphorus concentrations in the East Fork of the Little Wildcat Creek Watershed are illustrated in Chart 3.

Ammonia (NH_3)

Point source dischargers, such as wastewater treatment plants, can be a significant source of ammonia in surface waters; however, nonpoint source discharges of untreated septic effluent, decaying organisms, and bacterial decomposition of animal waste from improper disposal or fertilizers in stormwater runoff can also contribute to the level of ammonia in a waterbody.

Ammonia is also a significant source of pollution in the Little Wildcat Creek Watershed. 67% of the samples collected from the East Fork of Little Wildcat Creek had violations of the state water quality standard for Ammonia while 17% of the samples collected from the West Fork of Little Wildcat Creek had violations of the Ammonia standard violations. The data collected via project monitoring indicates that the greatest ammonia concentrations were contributed

Chart 3: Phosphorus Results, 2002

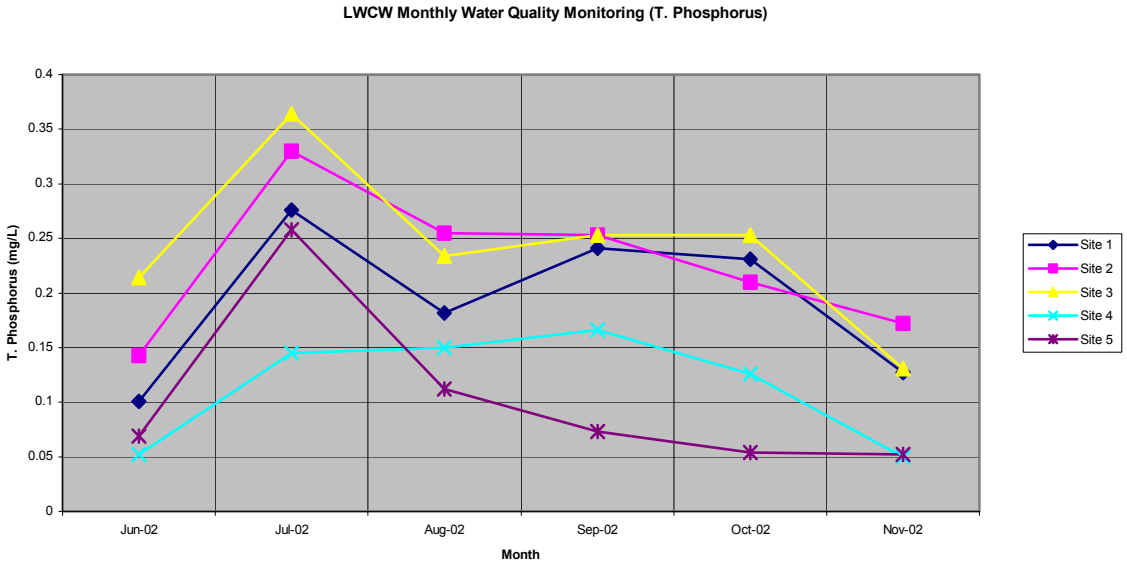
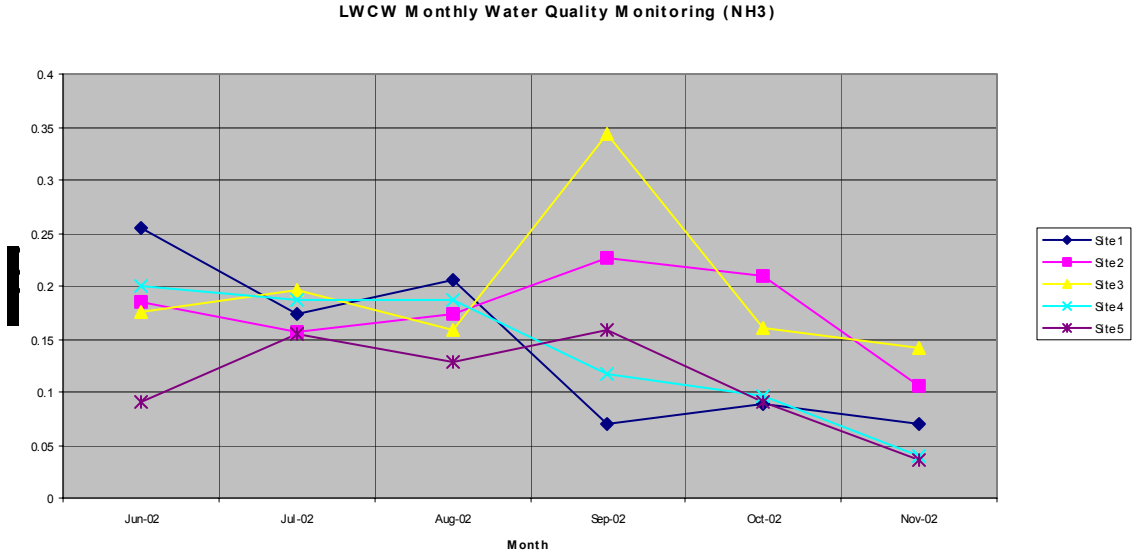


Chart 4: Ammonia Results, 2002



from the East Fork of the Little Wildcat Creek Watershed, as illustrated in Chart 4.

During dry weather conditions, ammonia concentrations in the East Fork of Little Wildcat Creek typically increased in samples downstream of CR 50 E. When exposed to oxygen and common nitrogen fixing bacteria, ammonia is rapidly converted to nitrite and then to nitrate in a process known as nitrification. Consequently, the detection of increasing concentrations of ammonia in a river system suggests that the source of the ammonia is very close to the monitoring location. Land use evaluations in the watershed reveal

presence of primarily residential and agricultural land uses in the areas closest to the monitoring sites on the East Fork of Little Wildcat Creek. Sources of ammonia from these land uses are most likely failing septic systems, but an additional source may be from the use of residential or commercial applications of ammonia in the form of fertilizer.

In wet weather conditions, additional sources of ammonia can enter rivers and streams from stormwater runoff from agricultural uses of nitrogen. Rain events can also exacerbate runoff of fertilizers from residential and commercial land uses and saturate soils, which raises the groundwater table and causes additional flushing pollutants from failing systems.

The West Fork of Little Wildcat Creek only experienced exceedance of the Ammonia standard during October 2002, the period of lowest stream flow for the year. In this case, ammonia loadings are less diluted than during other times of the year, which is the likely cause of these ammonia violations.

Due to the homogenous nature of the land uses within the watershed, sources of ammonia in the West Fork of Little Wildcat are typically the same as those sources in the East Fork of Little Wildcat Creek. However, a noticeable difference in land uses exists due to the presence of two golf courses that border the creek. Since residential and commercial sources of ammonia are more scare in this portion of the watershed and agricultural uses of ammonia are more typically active prior to spring planting season, the golf courses use of fertilizers in the fall may be primary source of ammonia in the West Fork of Little Wildcat Creek.

E.coli Bacteria

E.coli bacteria are associated with the intestinal tract of warm-blooded animals. Although not a pollutant in itself, *E.coli* is widely used as an indicator of the sewage pollution, which may harbor additional waterborne disease causing (pathogenic) bacteria, protozoa, and viruses.

E.coli is also used as an indicator because it is easier and less costly to monitor and detect than the actual pathogenic organisms, such as *Giardia*, *Cryptosporidium*, and *Shigella*, which require special sampling protocols and very sophisticated laboratory techniques. The presence of waterborne disease-causing organisms can cause outbreaks of diseases, such as typhoid fever, dysentery, cholera, and cryptosporidiosis.

Water quality standards (WQS) for *E.coli* have been established in order to ensure safe use of waters for drinking water supplies and recreation. 327 IAC 2-1-6 Section 6(d) states that *E.coli* bacteria, using membrane filter count (MF), shall not exceed 125 per 100 milliliters as a geometric mean based on not less than five samples equally spaced over a 30 day period nor exceed 235 per 100 milliliters in any one sample in a 30 day period.

E.coli bacteria may enter surface waters from nonpoint source runoff from failing septic systems, straight pipe discharges from septic tanks, livestock, domestic pets, and wildlife. In addition, *E.coli* can also come from improperly treated discharges of domestic wastewater. Common sources of *E. coli* bacteria include leaking or failing septic systems, direct septic discharge, leaking sewer lines or pump station

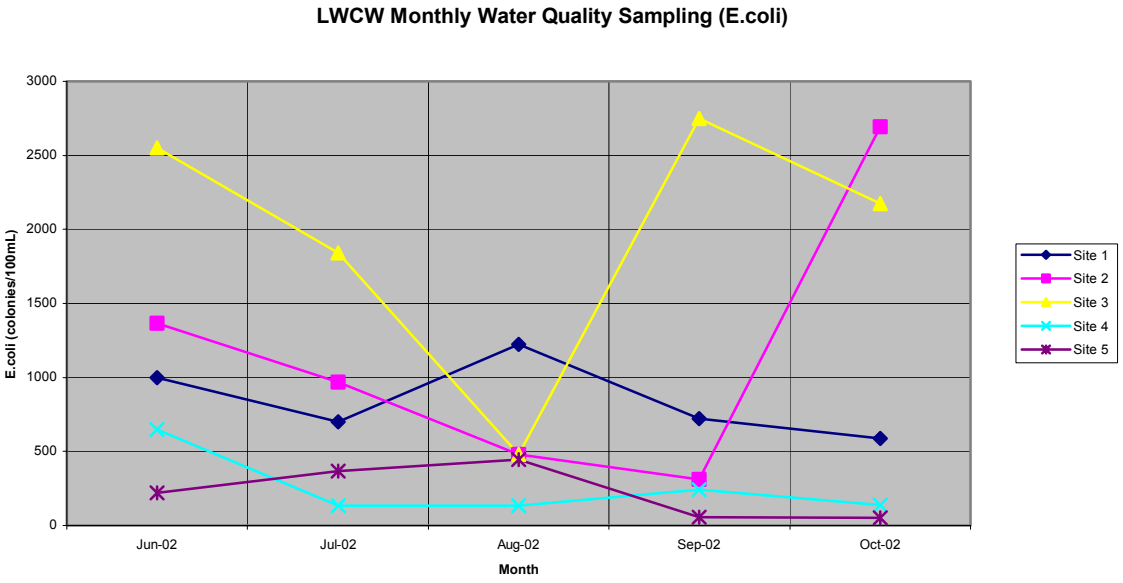
overflows, runoff from livestock operations, urban stormwater and wildlife. *E.coli* bacteria in treatment plant effluent are controlled through disinfection methods including chlorination, ozonation or ultraviolet light radiation.

E.coli monitoring by the IDEM in the Little Wildcat Creek Watershed identified several locations where the WQS for *E.coli* was violated during 1998. Two stream segments are listed as impaired by *E.coli* on the 2002 Indiana 303(d) list. These waterbodies include the Mainstem and the East Fork of Little Wildcat Creek. These stream segments are scheduled for TMDL development from 2003-2005.

In addition to the IDEM's monitoring data, water quality monitoring conducted for this project confirmed the presence of ongoing *E.coli* violations at several locations on the East Fork of Little Wildcat Creek.

Violations of the *E.coli* water quality standard were also detected at monitoring sites on the West Fork of Little Wildcat Creek; however, only 30% of the samples collected on the West Fork were in violation, while 100% of the samples collected on the East Fork violated the E.coli water quality standard (Chart 5).

Chart 5: *E.coli* Sampling Results, 2002



SOURCES OF WATER QUALITY PROBLEMS

Point Sources of Pollution

As of November 2001, there were three active and one inactive NPDES permitted facilities directly within the Little Wildcat Creek Watershed. In addition, the City of Kokomo holds an NPDES permit allowing them to maintain a point source discharge from a combined sewer overflow (CSO) within the watershed. A CSO is the discharge from a combined sewer system at a point prior to the wastewater treatment plant. CSOs are point sources subject to NPDES permit requirements including both technology and water quality based requirements of the Clean Water Act.

In addition to the NPDES permitted dischargers in the watershed, there may be unpermitted, illegal discharges to the Little Wildcat Creek Watershed. Illegal discharges of residential wastewater (septic tank effluent) to streams and ditches from straight pipe discharges and old inadequate systems are a problem within the watershed as documented in the Wildcat Creek Watershed Restoration Action Strategy (IDEM, 2000). NPDES facilities in the Little Wildcat Creek are listed in Table 18 and illustrated in Figure 27.

Stormwater from urban areas and from certain industrial and construction sites is also considered a point source since NPDES permits are required for discharges of stormwater from these areas. By March of 2003, it is anticipated that the State of Indiana will adopt regulations implementing phase two of the federal Stormwater NPDES Program.

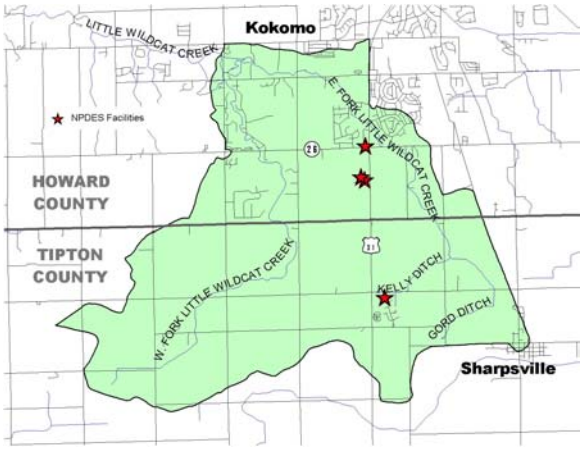
The Storm Water Phase II program will require designated entities to develop stormwater management programs. The City of Kokomo is the primary Storm Water Phase II entity within the Little Wildcat Creek Watershed.

Table 18: NPDES Facilities in the Little Wildcat Creek Watershed

#	PERMIT NUMBER	FACILITY NAME	CITY	COUNTY	RECEIVING STREAM
1	IN0039497	Village Green Mobile Home Park	Kokomo	Howard	East Fork Little Wildcat Creek via Tributary
2	IN0041866	Prairie Utilities, Inc.	Sharpsville	Tipton	Wildcat Creek via Kelly West Ditch
3	IN0055921	Billy Bob Mobile Home Park	Kokomo	Howard	East Fork Little Wildcat Creek via Tributary
4	IN0056138	Amoco Oil Company ST. #20152	Kokomo	Howard	Wildcat Creek via East Fork Little Wildcat Creek

(IDEM, 2002)

Figure 27: NPDES Facilities in the Little Wildcat Creek Watershed



(IDEM, 2002)

The City of Kokomo operates a large Publicly Owned Wastewater Treatment Works (POTW) that has one CSO discharge within the Little Wildcat Creek Watershed. CSO discharges are regulated under Indiana's National Pollution Discharge Elimination System (NPDES) Program. The CSO is located upstream of US 31 on Little Wildcat Creek and has been considered by the City of Kokomo for under the city's more broad CSO Long Term Control Planning effort, as mandated by the IDEM's CSO Strategy.

The impact of this CSO on the Little Wildcat Creek was monitored by the City of Kokomo for inclusion in the city's Stream Reach Characterization and Evaluation Report (SRCER) as required by the IDEM. This report is not yet complete, but will provide additional insights into the overall status of water quality within the watershed.

Semi-public wastewater treatment plants or "package plants" are typically much smaller versions of a POTW that are used to treat sewage for subdivisions, schools, or mobile home parks that are located too far away from a POTW to be cost effectively connected to a larger centralized wastewater treatment facility. These facilities are also regulated through the IDEM's NPDES Program. Although much smaller in size and discharge volume than POTWs, semi-public wastewater treatment facilities are common sources of water quality impairments for oxygen consuming wastes, nutrients, and *E.coli* bacteria.

As noted in Table 16, there are three permitted semi-public wastewater treatment facilities within the Little Wildcat Creek Watershed. All three of these facilities discharge into the East Fork of Little Wildcat Creek; however, water quality monitoring conducted for this study was of an ambient nature and was not sufficient or specific enough for assessing the contributions of pollutants from these facilities to the watershed. Additional monitoring would be necessary to properly assess the impact of these facilities on Little Wildcat Creek.

Nonpoint Sources of Pollution

Sediment, nutrients, and *E.coli* bacteria are major pollution causing substances associated with nonpoint source pollution (NPS). Others include heavy metals, pesticides, oil and grease, and any other substance that may be washed off the ground or removed from the atmosphere and carried into surface waters. The following discussion on NPS pollution in the Little Wildcat Creek Watershed is divided into sources of pollution from agricultural practices and sources from urban development.

1. Agricultural Sources

Agriculture and the Environment

The National Water Quality Inventory (NWQI), sponsored by the United States Environmental Protection Agency (US EPA), reports that agricultural nonpoint source (NPS) pollution is the leading source of water quality impacts to surveyed rivers

and lakes, the third largest source of impairments to surveyed estuaries, and a major contributor to ground water contamination and wetlands degradation (EPA, 2002).

Nonpoint source pollutants that result from agricultural activities are nutrients, pesticides, and sediment (Table 19). Nutrients, pesticides, and sediment can migrate from agricultural lands to surface and ground waters through processes including surface runoff, erosion, and infiltration. It is important to note that these pollutants are not specific to agriculture and can originate from residential and urban lands as well.

Table 19: Nonpoint Source Pollution and Agriculture

Pollutants	Agriculture Sources
Nutrients	Commercial Fertilizers and Manure
Toxic Chemicals	Herbicides, Insecticides, Fungicides
Sediment	Tillage, sheet, rill, gully and streambank erosion
Animal Waste	Manure runoff from fields, pastures, and feedlots

(EPA, 2002)

There are a number of activities associated with agriculture that can serve as potential sources of water pollution.

1) Land clearing and tilling make soils susceptible to erosion, which can then cause stream sedimentation.
2) Pesticides and fertilizers (including synthetic fertilizers and animal wastes) can be washed from fields or improperly designed storage or disposal sites.
3) Construction of drainage ditches on poorly drained soils enhances the movement of oxygen consuming wastes, sediment and soluble nutrients into groundwater and surface waters (IDEM, 2002).

Despite development pressures, the Little Wildcat Creek watershed remains primarily agricultural in land use. According to GAP data, there are approximately 9,332 acres of row crop and 207 acres of pasture in the watershed, accounting for 80% of the land uses within the watershed (USGS, 1997). Table 20 summarizes the percentage of the Howard and Tipton County agricultural acres that comprise the Little Wildcat Creek Watershed.

The discussion on agricultural practices is separated into crop production and livestock production.

Crop Production

Like most of Indiana, corn and soybeans dominate the crops grown in Howard and Tipton Counties. The 2002 corn and soybean statistics for Howard and Tipton Counties are detailed in Tables 21 and 22 (National Agricultural Statistics, 2002).

Table 20: Percentage of Howard and Tipton County Agricultural Acres in the Little Wildcat Creek Watershed (LWC)

County	Total County Ag Acres	Total Ag Acres in the LWC	Row Crop Acres in the LWC	Pasture Acres	% LWC Ag Acres	% County Ag Acres in the LWC Watershed
Howard	147,750	2334.5	2244.6	89.9	25%	1%
Tipton	158,440	6997.1	6880.3	117.1	75%	4%

Table 21: Howard County 2000 Crop Statistics

2000 Crop	Acres Planted	State Ranking
Corn	70,800	33 of 92
Soybeans	71,900	38 of 92

(National Agricultural Statistics, 2002)

Table 22: Tipton County 2000 Crop Statistics

2000 Crop	Acres Planted	State Ranking
Corn	72,500	25 of 92
Soybeans	75,500	24 of 92

(National Agricultural Statistics, 2002)

Nutrients

Nutrients such as phosphorus (P) and nitrogen (N) in the form of commercial fertilizers, manure, sludge, legumes, and crop residues are applied to enhance crop production. In small amounts, N and P are beneficial to aquatic life, however, in over abundance, they can stimulate the occurrence of algal blooms and excessive plant growth.

Algal blooms and excessive plant growth often reduce the dissolved oxygen content of surface waters through plant respiration and decomposition of dead algae and other plants. This situation can be accelerated in hot weather and low flow conditions because of the reduced capacity of the water to retain dissolved oxygen.

Since fish and aquatic insects need the oxygen that is dissolved in water to live, and when decaying algae uses up that oxygen, fish kills can result. Massive fish kills can devastate the aquatic ecosystem.

The Office Of Indiana State Chemist annually publishes the total tonnages of commercial fertilizers sold in each Indiana County. The 2000 figures for Howard and Tipton County were used below to calculate the estimated pounds of nitrogen and phosphorus applied on agricultural lands in the Little Wildcat Creek Watershed (Table 23).

Pesticides

Pesticides include a broad array of chemicals used to control plant growth (herbicides), insects (insecticides), and fungi (fungicides). These chemicals have the potential to enter and contaminate water through direct application, runoff, wind transport, and atmospheric deposition. They can kill fish and wildlife, contaminate food and drinking water sources, and destroy the habitat that animals use for protective cover.

While some pesticides undergo biological degradation by soil and water bacteria, others are very resistant to degradation. Such nonbiodegradable compounds may become "fixed" or bound to clay particles and organic matter in the soil, making them less available. However, many pesticides are not permanently fixed by the soil. Instead they collect on plant surfaces and enter the food chain, eventually accumulating in wildlife such as fish and birds. Many pesticides have been found to negatively affect both humans and wildlife by damaging the nervous, endocrine, and reproductive systems or causing cancer (Kormondy 1996).

The Office of Indiana State Chemist does not track pesticide sales within Indiana counties. A rough estimate of pesticide application for the Little Wildcat Creek Watershed was calculated using Purdue Extension's Guide for Watershed Partnerships (Table 24).

Table 23: Estimate of Nutrient Applications in the Little Wildcat Creek Watershed

County	% of county in the LWC watershed	x	Total Nutrients (tons)		X 2,000 lbs/ton	Nutrients in watershed (lbs)	
			N	P2O5		N	P2O5
Howard	.023	x	3,491	1,920	X 2000	160,586	88,320
Tipton	.045	x	3,883	1,435	X 2000	349,470	129,150
Total						510,056	217,470

(Purdue University, 2000)

Table 24: Estimate of Pounds of Pesticides Applied in the Little Wildcat Creek Watershed

Crop	Crop Acres	X	Pesticide	1998 Fraction of Acres Treated in Indiana	X	1998 Average Rate of Application	=	Estimated Pounds of Pesticides Applied
Corn	4562	X	Atrazine	.89	X	1.36	=	5521.8
			Metolachlor	.42		2.04		3908.7
			Acetochlor	.32		1.97		3774.6
			Primisulfuron	.14		0.03		19.2
			Cyanazine	.13		1.43		848.1
Soy-bean	4562		Glyphosate	.55		.85		2132.7
			Chlorimuronethyl	.27		0.02		24.6
			2,4-D	.26		0.39		462.6
			Imazethapyr	.25		0.04		45.6
			Paraquat	.19		0.89		771.4
Total								17,509.3

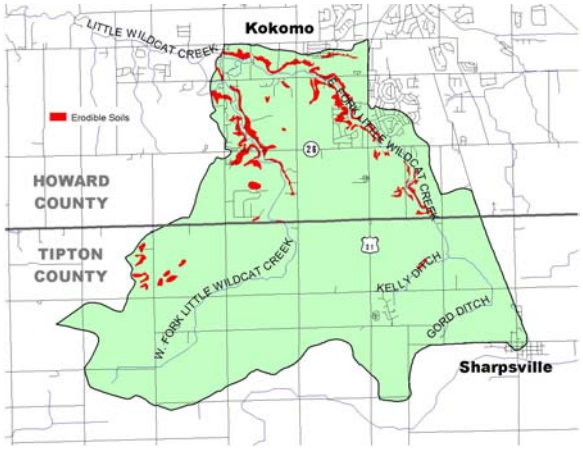
(Purdue University, 2000)

Erosion and Sedimentation

Sedimentation occurs when wind or water runoff carries soil particles from an area, such as a farm field or stream bank, and transports them to a water body, such as a stream or lake. Excessive sedimentation clouds the water, which reduces the amount of sunlight reaching aquatic plants; covers fish spawning areas and food supplies; and clogs the gills of fish. In addition, other pollutants like phosphorus, pathogens, and heavy metals are often attached to the soil particles and wind up in the water bodies with the sediment.

According to the Howard and Tipton County Soil Surveys, the highly erodible soils in the Little Wildcat Creek are depicted in Table 25. Highly erodible lands, if not managed properly can erode at a rate far higher than the tolerable rate.

Figure 28: Highly Erodible Lands in the Little Wildcat Creek Watershed



The Land Use Committee identified erosion from agricultural lands as a primary concern. Highly erodible soils in the Little Wildcat Creek Watershed were digitized utilizing GIS as an aid to the Howard County and Tipton County SWCDs (Figure 28). These digitized soils will serve as an

Table 25: Highly Erodible Lands in the Little Wildcat Creek Watershed

Symbol	Soil Name	T-Value	% Slope Minimum	% Slope Maximum	Slope Length Minimum	Slope Length Maximum
FSC3	FOX	4	6	12	50	250
HEE	HENN-EPIN	4	25	60	50	300
MLC2	MIAMI	5	6	12	50	400
MMC3	MIAMI	4	6	12	50	400
MMD3	MIAMI	4	12	18	50	300
MSC3	MOR-LEY	2	6	12	50	300

(USDA, 1971; USDA, 1989)

Table 26: Percent of Crop Acres in No-Till Production

County	No-till production	1990	1998	2000	2000 State Ranking
Howard	Corn	1%	2%	4%	87 of 92
	Beans	N/A	28%	39%	81 of 92
Tipton	Corn	2%	4%	0%	89 of 92
	Beans	2%	38%	43%	73 of 92

(Indiana Tillage Statistics, 2000)

Table 27: Estimated No-Till Acres in the Little Wildcat Creek Watershed, 2000

County	2002 LWC Corn and Soybean Acres Planted		X	% of 2002 County No-Till Acres		Estimated LWC No-Till Acres	
	C	SB		C	SB	C	SB
Howard	1123	1123		.04	.39	44.9	438
Tipton	3440.2	3440.2		0	.43	0	3440.6
Total						44.9	3878.6

(Indiana Tillage Statistics, 2000)

aid to the SWCD staff when targeting landowners and producers for conservation practices.

Tillage Practices

The Indiana 2000 Tillage Statistics for Howard and Tipton County are detailed below in Table 26. The low no-till corn numbers can be attributed to the fact that many of the soils within the Little Wildcat Creek Watershed are not conducive to no-till farming due to their naturally hydric conditions. Hydric soils covered by crop residue delays the drying time of soils potentially creating an unsuitable seedbed for spring planting. (Howard and Tipton NRCS, 2001).

In order to understand the no-till activities in the Little Wildcat Creek Watershed, a rough estimate of no-till acres for corn and soybeans was calculated utilizing Howard and Tipton County 2000 no-till figures (Table 27).

Conservation Buffers

Conservation buffers are vegetated corridors along natural waterways and drainage ditches. Such buffers are an integral part of the form and function of a healthy waterway system. Although the appearance of conservation buffers differs between natural streams and drainage ditches, the functions remain the same - to improve water quality by filtering and trapping sediments and pollutants carried by stormwater; to store large quantities of stormwater and gradually

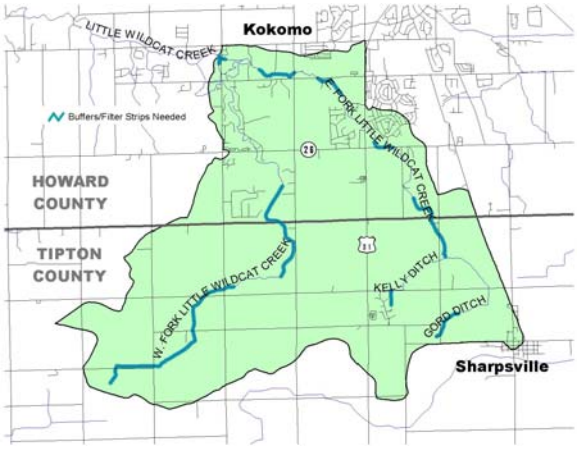
release it to receiving waterways; and to create important aquatic and terrestrial habitats.

Conservation buffers along natural streams consist of a natural and dense network of grasses, shrubs, and trees. Whereas buffers along drainage ditches are swaths of mowed cool season grasses, regularly maintained to prevent the development of woody plants.

Farmers in Howard and Tipton County have made significant efforts to reduce the amount of sediment leaving their farm fields through the adoption of conservation buffer strips. Tipton County has a very successful filter strip program that many of the landowners, especially along Kelly Ditch and Gord Ditch, have implemented.

In an effort to determine natural streams and drainage ditches that lacked sufficient conservation buffers, the WCWA conducted a windshield survey of the waterways and carefully reviewed the most recent aerial photography (Purdue, 1999).

Figure 29: Stretches of waterways needing conservation buffers



Of the 18.5 miles of waterways in the Little Wildcat Creek Watershed, the WCWA estimated 7 miles (62%) of natural stream and 0.5 of a mile (14%) of drainage ditch that lacked sufficient conservation buffers (Figure 29).

Livestock Production

As illustrated in Table 28, Howard County ranked 17 out of the 92 Indiana counties in the 1997 Indiana hog inventory with 73,529 head while Tipton County ranked 25 of 92 with 56,821 head (Census of Agricultural, 1997).

Hog operations in excess of 600 hogs are required, by IAC 16-2-5, to obtain a permit from the Office of Land Quality at the Indiana Department of Environmental Management (IDEM). Based on a review of the IDEM's Confined Animal Feeding Operation (CAFO) records, there are no regulated hog facilities within the Little Wildcat Creek Watershed. Based on a windshield survey conducted by the Watershed Coordination Team, there were no hog operations identified within the Little Wildcat Creek Watershed. According to Tipton County NRCS, the majority of the hog operations lie to the south and east of the Little Wildcat Creek Watershed.

In 1997, Howard County ranked 67 out of the 92 Indiana counties in the Indiana cattle and calf inventory with approximately 5,000 head while Tipton County ranked 25 of 92 with 2,004 head (Table 29). The limited cattle production that does exist within these two counties involves both beef and dairy cattle (Census of Agricultural, 1997).

Cattle operations in excess of 300 head are required by IAC 16-2-5, to obtain a permit from the Office of Land Quality at the Indiana Department of Environmental Management (OLQ IDEM). Based on a review of the IDEM's Confined Animal Feeding Operation (CAFO) records, there are no regulated cattle facilities within the Little Wildcat Creek Watershed. Based on a

windshield survey conducted by the no cattle operations identified within the Little Wildcat Creek Watershed.

As illustrated in Table 30, Tipton County ranked 50 out of the 92 Indiana counties in Indiana sheep and lamb inventory with approximately 445 head in 1997 (Indiana Agricultural Census, 1997). The Indiana Agricultural Census did not include information on Howard County sheep populations. One can only assume that the sheep populations in Howard County are either non-existent or insignificant.

Sheep operations in excess of 600 head are required by IAC 16-2-5, to obtain a permit from the Office of Land Quality at the Indiana Department of Environmental Management. Based on a review of the IDEM's Confined Animal Feeding Operation (CAFO) records, there are no regulated sheep facilities within the Little Wildcat Creek Watershed. In fact, based on a windshield survey conducted by the Watershed Coordination Team, there were no sheep operations identified within the Little Wildcat Creek Watershed.

Watershed Coordination Team, there were
As illustrated in Table 31, in 1997 Howard County ranked 65 out of the 92 Indiana counties in the Indiana horse and pony inventory with approximately 294 head while Tipton County ranked 78 of 92 with 200 head (IN Agricultural Census, 1997).

Horse operations in excess of 300 head are required by IAC 16-2-5, to obtain a permit from the Office of Land Quality at the Indiana Department of Environmental Management (OLQ IDEM). Based on a review of the IDEM's Confined Animal Feeding Operation (CAFO) records, there are no regulated horse facilities within the Little Wildcat Creek Watershed. In fact, based on a windshield survey conducted by the Watershed Coordination Team, there were no horse operations identified within the Little Wildcat Creek Watershed.

The one evident livestock facility within the Little Wildcat Creek Watershed is Kesling Alpaca's of Indiana that is home to more than fifty alpacas. According to stakeholders participating in the watershed planning process, manure management and conservation grazing are lacking at the facility.

Table 28: 1997 Howard County and Tipton County Hog Production Statistics

County	Head of Hogs	State Ranking
Howard	73,529	17 of 92
Tipton	56,821	25 of 92

(Census of Agriculture, 1997)

Table 29: 1997 Howard County and Tipton County Cattle Production Statistics

County	Head of Cattle	State Ranking
Howard	5,000	67 of 92
Tipton	2,004	88 of 92

(Census of Agriculture, 1997)

Table 30: 1997 Howard County and Tipton County Sheep Production Statistics

County	Head of Sheep	State Ranking
Howard	N/A	N/A
Tipton	445	50 of 92

(Census of Agriculture, 1997)

Table 31: 1997 Howard County and Tipton County Horse and Pony Statistics

County	# of Horses	State Ranking
Howard	294	65 of 92
Tipton	200	78 of 92

(Census of Agriculture, 1997)

Bacteria & Pathogens

Manure, whether applied for crop nutrition or simply the by-product of grazing is a water quality concern in the Little Wildcat Creek Watershed. The nitrogen and phosphorus that make manure so productive on farm fields and pastureland can create an over-fertilized "soup" when they run off into the water, leading to undesirable algae blooms. These effects are not only unpleasant for recreation and aesthetics, but they also deteriorate the underwater habitat necessary for fish and other aquatic organisms to live.

Pasture

Pasture management leads to better weed control, better soil structure, increased productivity over longer periods of time, and healthier animals. It helps the soil absorb excess water, manure, nutrients and other pollutants and ultimately protects water quality by reducing the amount and improving the quality of runoff.
Pastures can be grazed intensively during peak periods of growth, but they need regular attention. Rest periods are critical to proper pasture growth. A grazing rotation that allows 21 to 28 days of regrowth between grazing periods is usually best.

Pasturing too many animals on a given parcel of land or allowing them to graze for too long in the same area reduces plant vigor and compacts soils, reducing absorption capacity and pasture recovery. Overgrazing can lead to additional runoff and a poorer quality of runoff.

It is important to note that horses are especially hard on pastures. They graze plants down to the soil surface, so regrowth takes more time. They do not graze evenly and trample much of the forage area. Facilities with horses should develop pasture management plans that include controlled grazing and rotation.

2. Sources from Urbanization

A change in land use, especially from field or forest to urban development, has a significant impact on water quality. Not only is the permeability of the soil affected by construction compaction and impervious coverage such as rooftops, driveways, and parking areas but there is an increase of biological and chemical waste from human use. The sources of water quality pollution from urbanization focus on three main topics: human & animal waste, household & yard waste, and development practices.

Human & Animal Waste

Urban sources of *E.coli* bacteria are most commonly associated with point source discharges from municipal wastewater treatment plants and regulated stormwater programs; however, failing septic systems and waste from wildlife and pets are additional contributors of NPS pollution to the Little Wildcat Creek Watershed.

Failing Septic Systems

Septic systems can be a safe and effective method for treating wastewater if they are sized, sited, and maintained properly. However, if the tank or absorption field malfunctions or if they are improperly sited, constructed or maintained, nearby wells and surface waters may become contaminated (IDEM, 2002). Septic systems will be discussed more thoroughly later in this

report. Some of the potential problems from malfunctioning septic systems include polluted groundwater, bacteria, nutrients, toxic substances, and oxygen consuming wastes. In addition, nearby wells can become contaminated by failing septic systems.

Pollutants associated with onsite wastewater disposal may also be discharged directly to surface waters through direct pipe connections between the septic system and surface waters (straight pipe discharge). Although, 327 IAC 5-1-1.5 specifically states that "point source discharge of sewage treated or untreated, from a dwelling or its associated residential sewage disposal system, to the waters of the state is prohibited", many cities, towns, and county health departments are overwhelmed by the magnitude of the failing septic system problem.

During the planning process for the Little Wildcat Creek Watershed, stakeholders made many comments regarding suspected instances of failing septic systems or straight pipe discharges. Discussions with staff from the Howard and Tipton County Health Departments confirmed that failing septic systems were considered to be a significant problem in both counties. The City of Kokomo's sewer service area serves the majority of the area north of SR 26 within the watershed; however, septic systems provide the primary mechanism for wastewater treatment for the southern portion of the watershed.

Data from IDEM and project monitoring identified *E.coli* concentrations in the East Fork of Little Wildcat Creek to be of concern, as monitoring indicates both dry and wet weather violations. Both the IDEM's monitoring and the monitoring completed from this project showed the highest concentrations of *E.coli* to be from the US 31 monitoring site; however, violations were consistently measured at CR 50 East, indicating that significant *E.coli* loadings are be contributed from upstream of this location as well.

The magnitude of dry weather violations of the *E.coli* standard observed on the East Fork of Little Wildcat Creek during this project seem to suggest a more continuous discharge of *E.coli* similar to discharges associated with failing septic systems. This observation is also supported by the fact that *E.coli* concentrations at Sites 2 and 3 on the East Fork decreased during the wet weather monitoring (August 2002), most likely due to dilution, while Site 1 experienced an increase in *E.coli* concentrations due to additional nonpoint source inputs.

Wildlife and Pet Waste

Wildlife and pet wastes contribute significantly to the numbers of bacteria and organic matter in stormwater runoff.

Habitually, ducks and geese nest in colonies located in trees and bushes around rivers, streams, and lakes. The presence of waterfowl has been shown to result in elevated levels of ammonia, organic nitrogen, and *E.coli* bacteria (USGS 1997). In addition, waterfowl activity can increase sediment loadings by pulling up grasses and sprouts and trampling emergent vegetation along streambanks and shorelines, significantly impacting erosion and sediment.

Recent studies have shown that pet waste is the third or fourth most common source of bacteria in contaminated waters (Watson, 2002). Pet wastes can be controlled through ordinances requiring collection and removal of the waste from curbsides, yards, parks, roadways and other areas where the waste

can be washed directly into receiving waters.

Household & Yard Waste

Every home, regardless of size or age, has potential pollution sources that can impact ground and surface water quality. These may include the use, storage and disposal of pesticides, solvents, and petroleum products. In Howard County, the Solid Waste District sponsors a tox-drop and recycling program for the safe dispose of household hazardous waste. Also, the Purdue Cooperative Extension has created a "Home-A-Syst" program that allows homeowners to conduct a confidential self-assessment of the environmental risks of their home.

Toxic Materials

Proper use, storage, and disposal of household waste such as used motor oil, paints, furniture stains, and mercury thermostats for example are important to prevent contamination of ground and surface water. The Howard County Solid Waste District has an excellent education and tox-drop program for residents in the Little Wildcat Creek Watershed.

Lawn & Garden Practices

Urban activities may create conditions that result in higher-than-normal concentrations of ammonia and phosphorus in water bodies downstream.

While professional lawn and garden chemical applicators receive training and are required to maintain application records, the average homeowner does not. This results often in over-application of lawn and garden chemicals and contributes to significant nutrient loads to urban waterbodies (USGS, 1995).

Yard waste such as grass clippings, leaves, and dead plants are high in organic matter. Yard waste that is piled or dumped on nearby streambank results in:

1. Smothering of the vegetation that is naturally stabilizing the bank and preventing soil erosion, and
2. The decomposition of yard waste in nearby streams can rapidly deplete dissolved oxygen levels of the water affecting aquatic habitats.

The Howard County Solid Waste District has information on the benefits of composting or mulching yard waste as opposed to disposing of it.

Development Practices & Encroachment

Nationwide, more than 1.5 million acres of land is developed each year (Schueler, 1998). Even through very little of that development is occurring in the Little Wildcat Creek Watershed development practices and encroachment directly impact water quality and should to be discussed as a source of pollution. Planning and development practices are effective methods to control not only where development occurs but also how it occurs.

Land Use Planning

Comprehensive Plans, Zoning Ordinances, and Subdivision Control Ordinances are documents that almost every community uses to guide growth and development. These same documents can also be used to effectively protect natural resources and improve water quality.

The Tipton County Plan Commission has done a good job of controlling haphazard and unplanned growth outside of existing urban areas. In Tipton County, agriculture is recognized as the predominant land use and non-farm related development and public services including sewers are discouraged on prime agricultural soils.

However, increased development pressure to the south and west of Kokomo has made preserving open space and agricultural land more difficult in Howard County. Open fields, river corridors, and wooded areas have become targets for residential development. Increased development and depletion of natural drainage and filtration systems will have an adverse effect on water quality.

Erosion & Sediment Control

Soil erosion from construction activities can contribute to filling of nearby waterways affecting water quality, aquatic habitats and recreational opportunities. There are a number of best management practices (BMP) including silt fencing, straw bales, and turf seeding, that when installed and maintained properly, can successfully limit sediment from leaving the site.

Streambank erosion is a natural process. However in developing areas, the process is accelerated by alterations to the streams natural hydrology such as more frequent and larger stormwater flows. Sedimentation from streambank erosion is compounded by increased imperviousness, loss of floodplain, and loss of riparian corridor.

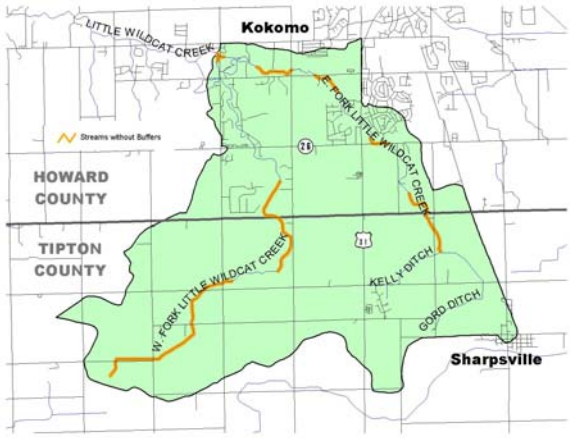
Riparian Corridors

Interchangeably called streamside forests, riparian corridors are an integral part of the stream ecosystem. These areas consist of large overstory trees, smaller woody shrubs, and herbaceous groundcover. Riparian corridors naturally function to filter and trap sediments and pollutants; anchor the streambank to prevent erosion; and shade the creek making it more habitable for aquatic species.

In the Little Wildcat Creek Watershed approximately 38% of the streams are sufficiently covered. Riparian buffers provide a valuable water quality benefit and should be protected from encroaching development or neighboring land uses and stretches lacking sufficient cover should be reforested (Figure 30).

The USDA suggests that riparian corridors measure at least 95 feet in width on both sides of the stream. The corridor is divided into three distinct zones. Zone 1 is 15' minimum in width and composed of undisturbed forest; Zone 2 is 60' minimum in width and contains a managed forest; and Zone 3 is 20' minimum in width and serves to control the velocity and volume of stormwater runoff.

Figure 30: Stretches of Little Wildcat Creek without sufficient riparian corridors



Impervious Areas

Many activities associated with urban or residential land uses can generate NPS pollution. In most urbanized areas, large quantities of impervious or hard surfaces such as roads, driveways, parking lots, and rooftops, cause an increase in stormwater runoff resulting in flash floods and streambank erosion. As a result, managing NPS pollution in urban areas typically includes practices for managing water quantity, as well as water quality. In urban environments, NPS pollutants typically include *E. coli* bacteria, sediments, nutrients, heavy metals, oil and grease, and pesticides.

The amount of imperviousness in a watershed can be directly related to the health of the receiving streams (Schueler, 2000). The Center for Watershed Protection has developed a classification system for managing headwater streams based on the percent of impervious land in the watershed (Table 30). According to the Center for Watershed Protection, watersheds with more than 10% imperviousness are considered impacted and poise an additional challenge to achieve water quality standards.

In the Little Wildcat Creek there are approximately 2070 acres of land classified as high and low density urban (Figure 31). In order to calculate imperviousness, the WCWA assumed that three-quarters of high density urban and half of low density urban is impervious. The estimated imperviousness of the Little Wildcat Creek is 8.8%.

According to Table 32, the streams in the Little Wildcat Creek fall into the most protective category known as "Sensitive Streams". In order to prevent further degradation of these waterways, the Center for Watershed Protection suggests strict zoning, site impervious restrictions, stream buffers, and stormwater practices (Schueler, 2000).

Figure 31: Impervious cover in Little Wildcat Creek Watershed

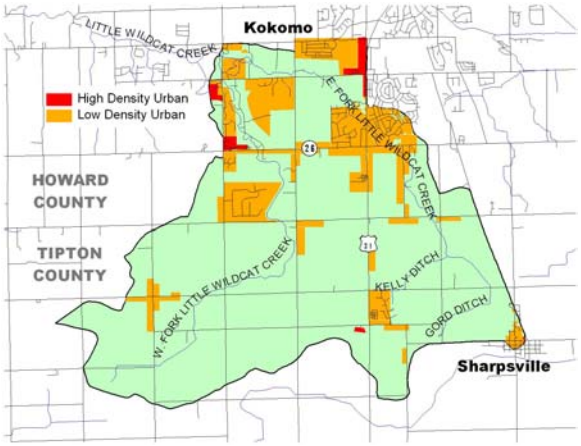


Table 32: Stream Classification based on Imperviousness in Watershed

Urban Stream Classification	**Sensitive Stream (0-10% Impervious)**	**Impacted Stream (11-25% Impervious)**	**Non-supporting Stream (26-100% Impervious)**
Channel stability	Stable	Unstable	Highly Unstable
Water quality	Good	Fair	Fair-Poor
Stream biodiversity	Good-Excellent	Fair-Good	Poor
Resource objective	Protect biodiversity and channel stability	Maintain critical elements of stream quality	Minimize downstream pollutant loads
Water quality objectives	Sediment and temperature	Nutrient and metal loads	Control bacteria
Stormwater practice selection factors	Secondary environmental impacts	Removal efficiency	Removal efficiency
Land use controls	Watershed-wide	Site limits	Additional infill and redevelopment
Monitoring and enforcement	GIS mapping of impervious areas and biomonitoring	GIS mapping of impervious areas and biomonitoring	Pollutant load modeling
Development rights	Transferred out	None	Transferred in
Riparian buffers	Widest buffer network	Average bufferwidth	Greenways

(Schueler, 2000)

Summary of Findings

The limited water quality data available and evaluated for this project indicate that elevated concentrations of both point and nonpoint source pollutants are causing water quality impairments within the Little Wildcat Creek Watershed. Although additional monitoring and modeling efforts are necessary to definitively identify pollutant sources and loading contributions, the following conclusions can be made.

In the East Fork of Little Wildcat Creek, excessive pollutants, particularly oxygen consuming wastes, nutrients, and *E.coli* enter the watershed from both point and nonpoint sources. Confirmed point sources of pollution in the watershed consist primarily of discharges from a combined sewer overflow (CSO) located upstream of US 31; however, additional concerns regarding discharges from semi-public wastewater treatment facilities were generated due to the presence of elevated concentrations of pollutants upstream of project monitoring sites where three semi-public wastewater treatment facilities are also present. Additional water quality monitoring will be necessary to determine the impact of these facilities on the Little Wildcat Creek.

Nonpoint sources of pollution within the watershed are also contributing significantly to water quality impairments within the watershed. Land use evaluations near project monitoring sites leads to the conclusion that failing septic systems or direct septic discharges are additional sources of oxygen consuming wastes, nutrients and E.coli in Little Wildcat Creek Watershed. These suspicions appear to be confirmed due to low concentrations of dissolved oxygen and elevated concentrations of BOD, ammonia, and E.coli in exclusively residential portions of the watershed that are not served by the City of Kokomo's sewer system. Visual surveys of the stream corridor and dye testing of septic systems near stream segments where documented water quality impairments exist will be necessary to identify and confirm failing septic systems as sources of pollution in the watershed.

In addition to these nonpoint sources of pollution, agricultural runoff is also suspected to be contributing nutrients and bacteria to Little Wildcat Creek. Although there is not yet enough data to directly identify the sources of these pollutants, reasonable assumptions can be made regarding the anticipated water quality benefits to the watershed from the addition of a thorough stream buffer system and implementation of conservation tillage practices in the watershed.

Agricultural BMPs planned for this region should be coordinated with the strategies currently supported by the Howard and Tipton County Soil and Water Conservation Districts. In addition, urban BMPs should be coordinated with the City of Kokomo for stormwater management purposes and the Howard and Tipton County's Health Departments efforts to address problematic septic systems.

Based on the water quality data collected and evaluated for this project, management of the East Fork of Little Wildcat Creek should be prioritized due to the greater pollutant concentrations being contributed to this portion of the Little Wildcat Creek Watershed than to the West Fork of Little Wildcat Creek.

In the West Fork of the Little Wildcat Creek, nutrients and *E.coli* appear to be the pollutants of most concern. There are no point source dischargers within the portion

of the watershed, so pollutants in the West Fork of Little Wildcat Creek are generated from nonpoint sources of pollution.

Although water quality problems in this portion of the watershed are less significant that those on the East Fork of the Little Wildcat Creek, an evaluation of land uses reveals that nonpoint sources of nutrients in the watershed are most likely limited to agriculture, golf courses, failing septic systems, and/or direct septic discharges.

Observations of agricultural land uses in this portion of the watershed suggest that water quality benefits to the watershed could be generated from the addition of a thorough stream buffer system and the implementation of conservation tillage practices throughout the watershed.

The three golf courses immediately adjacent to the West Fork of the Little Wildcat Creek may also be contributing sources of nutrients and E.coli to the watershed. The heavy use of fertilizers and consistent watering of turf grasses commonly used to keep golf courses "green" have been known to contribute to nutrient impairments in other watersheds across the Midwest. In addition, the presence of manicured turf grasses near creeks and water hazards in golf courses are very attractive to nuisance waterfowl. Waterfowl, such as Canada Geese, are common sources of E.coli in many watersheds.

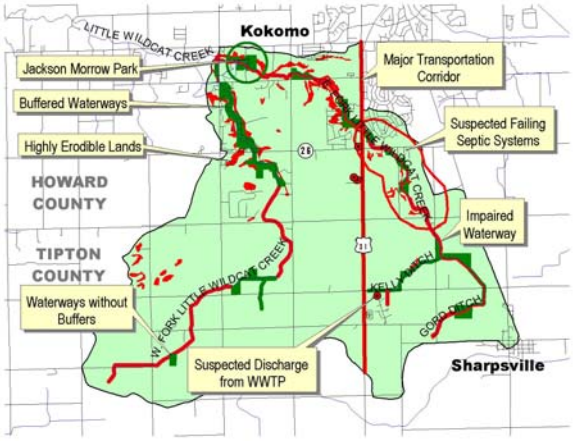
The status of septic systems in this portion of the watershed is largely unknown; however, since it is commonly accepted that all septic systems are eventually subject to failure, it is not unreasonable to suspect that failing systems or direct septic discharges exist within this portion of the watershed. Additional monitoring, stream corridor inspections, or dye testing will be necessary to properly evaluate their impact on the watershed.

PRIORITIZATION OF WATER QUALITY PROBLEMS

The WCWA carefully reviewed the most recent water quality data, trends in land development, and comments from the watershed stakeholders to identify critical areas and establish priorities for the Little Wildcat Creek Watershed Management Plan.

The WCWA decided to identify critical areas that benefited water quality as well as those known or suspected of causing water quality impairments (Figure 32). Critical areas that benefit water quality should be protected and enhanced whereas those resulting in water quality impairments should be mitigated. These issues will be discussed in more detail in the Goals and Decisions section of this Plan.

Figure 32: Critical areas in the Little Wildcat Creek Watershed



Beneficial Critical Areas

Jackson Morrow Park is a 100-acre natural area located along Little Wildcat Creek. The large undeveloped areas along the creek allow for natural infiltration and cleansing of stormwater before draining into Little Wildcat Creek. Buffers along streams and drainage ditches are important for filtering sediments and pollutants from stormwater.

Approximately half (7 miles) of the natural waterways in the Little Wildcat Creek Watershed have sufficient riparian buffer. Riparian buffers or streamside forests are important to water quality since they naturally filter and trap sediments and pollutants carried by overland flow; prevent erosion by stabilizing the streambank; shade and cool the stream creating better aquatic habitats; and although not related to water quality, create more aesthetic environs for human enjoyment. These areas should be protected from further encroachment of agricultural practices or urban development.

Farmers in Howard and Tipton County have made significant efforts to reduce the amount of sediment leaving their farm fields through the adoption of conservation buffer strips along drainage ditches. Tipton County has a very successful filter strip program that many of the landowners, especially along Kelly Ditch and Gord Ditch, have implemented. There is only 0.5 of a mile of drainage ditch that is not sufficiently buffered.

The City of Kokomo and Howard County have both been designated as Stormwater Phase II communities through the Municipal Separate Storm Sewer System Program (MS4). The program requires designated communities to apply and obtain a NPDES permit for stormwater discharge; develop a stormwater management plan; and implement BMPs and control measures for stormwater. The benefit of the MS4 program to the Little Wildcat Creek Watershed will be improved water quality, better land development and planning, as well as, public participation and education about water quality issues.

Critical Areas as a Pollutant Source

The entire length of the East Fork of Little Wildcat Creek as well as Gord Ditch are

listed on the IDEM's 303(d) list of impaired streams. The 303(d) List identifies waterways that do not or are not expected to meet water quality standards. In order to achieve compliance with water quality standards, with the assistance of watershed stakeholders, the IDEM will develop TMDLs for these waterways (IDEM, 2002).

Both the East Fork of Little Wildcat Creek and Gord Ditch are listed for *E.coli*. The IDEM has scheduled TMDL development for 2003-2005 on both waterways.

There are approximately 7.5 miles of drainage ditches and natural streams with insufficient vegetative cover or buffer. Wooded buffers or riparian corridors along natural streams and grassed filter strips along drainage ditches are important for water quality. Both systems filter and trap sediments and pollutants as well as stabilizing the bank and prevent erosion. In natural streams, aquatic species also benefit from the cooling effect of large shade trees.

Failing septic systems and illegal discharge from one or more of the 3 Semi-Public WWTP in the Little Wildcat Creek Watershed are suspected as the root cause of the *E.coli* violation in the East Fork of Little Wildcat Creek and Gord Ditch.

U.S. 31 is a major transportation corridor through the Little Wildcat Creek Watershed. Thousands of cars and trucks travel through the watershed each day, which increases the incidences of an accidental spill and potential contamination of water quality. Impervious areas (roads, drives, parking lots, rooftops, etc.) generate more stormwater runoff than undeveloped areas. Untreated stormwater runoff from impervious areas carries potential pollutants such as vehicular fluids, glass, rubber, and road salt into nearby waterways.

Stormwater runoff also carries pesticides, nutrients, and sediments from neighboring agricultural practices. The Little Wildcat Creek Watershed contains some of the best soil in the State and as a result is intensively farmed. Conservation tillage practices are important especially in areas with known Highly Erodible Lands.

Although the farmers in the Little Wildcat Creek Watershed have made significant improvements in tillage practices and the storage and application of pesticides and nutrients, runoff and erosion is inevitable. Both the Howard County and Tipton County SWCDs work closely with landowners to provide educational materials, training, and access to funds to interested landowners.

Land use is directly related to water quality, especially with when land is converted from field or forest to urban development. The Tipton County Zoning Ordinance does a very good job of protecting prime agricultural lands from non-farm related development. Howard County, on the other hand, allows for growth and development on farmland, river corridors and wooded areas. This is evident in the Little Wildcat Creek Watershed where the majority of development has and continues to occur in the Howard County portion.

The priorities identified here are the foundation for the Goals and Management Measures listed in the Goals and Decision section of this Plan.

III. Goals & Decisions

Setting realistic and measurable goals is key to the successful implementation of this Plan. A goal is the desired change or outcome as a result of the watershed planning effort. Depending on the magnitude of the problem, goals may be general, specific, long-term, or short-term. The goals in this Plan specify a target amount and timeframe for improving water quality. The IDEM suggests watershed groups focus on developing goals, management measures, action plans, resources, and legal matters as part of the watershed planning process.

According to the IDEM, management measures describe what needs to be controlled or changed in order to achieve the goal. The timeline or milestones to accomplish the individual management measure is identified in an action plan. In order to successfully implement the Plan, resources such as people, programs, and money need to be identified. It is important to have the support of individuals identified as resources to successfully execute the goals of the Plan. Successful implementation may require some legal matters such as obtaining permits, purchasing easements or the adoption of an ordinance (IDEM, 2002).

The WCWA developed the goals and management measures for the Little Wildcat Creek Watershed Management Plan based on the known sources of pollution. These include:

1. Agricultural Practices
a) Row Crop (nutrients, pesticides, erosion/sediment, conservation tillage, conservation buffers)
b) Livestock (bacteria/pathogens, pasture)

2. Urban Development
a) Human & Animal Waste (failing septic systems and wildlife/pet waste)
b) Household & Yard Waste (toxic substances and lawn/garden practices)
c) Development Practices & Encroachment (erosion/sediment control, streamside forests, impervious areas)

Table 33: Relationship of land use, pollutant source, and resulting goals.

Land Use	Pollutant Source	Resulting Goal		
Agriculture	Row Crop	Agriculture	Waterways	Education
	Livestock			
Urban	Human & Animal Waste	Septic Systems		
	Household & Yard Waste			
	Development Practices	Land Use Planning		

The WCWA decided to focus on goals that improve water quality in the Little Wildcat Creek Watershed through education, septic systems, agriculture, land use planning, and natural and constructed waterways. Table 33 illustrates the relationship of land use, source of pollution to the resulting goal. The following goals were identified and agreed upon by the WCWA.

Education Goal: Improve water quality in the Little Wildcat Creek Watershed through education and outreach efforts that focus on changing stakeholders' habits and behaviors.

Septic System Goal: Improve water quality in the Little Wildcat Creek Watershed through proper planning, installation, and long-term maintenance of septic systems.

Agriculture Goal: Improve water quality in the Little Wildcat Creek Watershed through better agricultural practices and management programs.

Land Use Planning Goal: Improve water quality in the Little Wildcat Creek Watershed through better land use planning and land development practices.

Natural & Constructed Waterway Goal: Improve water quality in the Little Wildcat Creek Watershed through better protection and maintenance of streams and drainage ditches.

The successful implementation of this Plan requires the continued partnership of the general membership of the WCWA as well as the Clinton County SWCDs, Health Departments, Plan Commissions, and Drainage Board. The following tables identify goals, management measures, action plan, resources, and legal matters for addressing education, septic systems, agriculture, land use planning, and waterways issues in the Little Wildcat Creek Watershed.

Education Goal: Improve water quality in the Little Wildcat Creek Watershed through education and outreach efforts that focus on changing stakeholders' habits and behaviors.

Table 34: Education Management Practices

Management Measures	Action Plan	Resources	Legal Matters
Survey 15% of watershed stakeholders to determine awareness of water quality issues. Total population of stakeholders in watershed estimated at 1550. Fifteen percent is considered statistically rigorous sample size.	• 2004 – Determine initial awareness by distributing a survey using the Internet, newspapers, and newsletters. • 2006 – Determine change in awareness by distributing a survey using the Internet, newspapers, and newsletters. • 2006 – Modify education and outreach efforts (especially in areas that are not showing improvement) until desired improvement obtained.	• Partnership with the WCWA, Wildcat Guardians, Howard & Tipton SWCDs, and local newspapers for survey distribution.	
Submit quarterly articles and updates to the newspapers and community organizations in the Little Wildcat Creek Watershed.	• Quarterly submissions (January, April, July, and October) of each year.		
Maintain communication with watershed stakeholders through Quarterly mailings, meetings, and newsletters.	• Quarterly mailings, meetings, and newsletter (January, April, July, and October) of each year.		

Management Measures	Action Plan	Resources	Legal Matters
Conduct annual field days and workshops that target urban, suburban, and rural landowners. Partner with local government, businesses, and organizations to maximize impact.	• 2002 – Conducted a Developers' Workshop in May 2002 to address land development and conservation practices. • 2004 – Conduct a septic system maintenance workshop to improve operation of system resulting in improved water quality. • 2005 – Conduct a buffer initiative workshop to improve land for filtration and storage along natural stream and drainage ditches. • 2006 – Conduct a workshop for crop and livestock producers addressing nutrient and pest management and manure management to reduce water quality concerns. • 2007 – Conduct a backyard conservation workshop to build residential wildlife habitats, plant native species, and reduce the use of herbicides and pesticides.	• Cooperation of local government, businesses, and organizations (level of participation dependent on workshop topic). • Fundraising, sponsorship, and/or grant writing to cover cost of hosting individual workshops.	

Septic System Goal: Improve water quality in the Little Wildcat Creek Watershed through proper planning, installation, and long-term maintenance of septic systems.

Table 35: Septic System Management Practices

Management Measures	Action Plan	Resources	Legal Matters
Conduct a septic system maintenance workshop to improve operation of system resulting in improved water quality. Invite 25% of homeowners and/or tenants with septic systems, health department staff, development review staff, developers, builders, septic system installers, realtors, and public officials.	• 2004 – Partner with the Howard County and Tipton County Health Departments to conduct a workshop on septic system maintenance.	• Howard County and Tipton County Health Departments. • Fundraising, sponsorship, and/or grant writing to cover cost of workshop.	
Increase detection and enforcement of illicit discharge by 50%.	• 2004 – Review records to determine exact number of failing septic systems. • 2005 – Conduct volunteer dye testing of septic systems to identify failing systems and illicit connections. • 2006 – Require residents to provide proof that their septic system has been cleaned and inspected every five years by a licensed inspector/hauler. • 2007 – Build GIS database to track operational status of septic systems.	• Howard County and Tipton County Health Departments. • Secure additional funds to build GIS database.	Will need access to Health Department records to build GIS database and to track information.

Management Measures	Action Plan	Resources	Legal Matters
Improve planning process to minimize impacts of septic systems on water quality.	• 2003 – Ensure that Health Department participates in development review and approval process. • 2002/2003 – Include language in updated Comprehensive Plan for Howard County and Tipton County (respectively) that addresses potential impacts of septic systems on water quality. • 2004 – Explore feasibility of implementing a Septic Maintenance District. • 2005 – Provide economic incentives to homeowners to repair or replace aging septic systems. • 2007 – Build a GIS layer that identifies land suitable for septic systems.	• Howard County and Tipton County Health Departments and Planning Departments. • Secure additional funds to provide economic incentives for updating failing septic systems.	Legal, financial, and leadership support from municipality to establish a Septic Maintenance District.
Compile comprehensive list of all funding sources available for septic system improvement projects.	• 2004 – Research all available private and public sources of funds for addressing septic systems issues.		

Agriculture Goal: Improve the water quality of the Little Wildcat Creek Watershed through better agricultural practices and management programs.

Table 36: Agriculture Management Practices

Management Measures	Action Plan	Resources	Legal Matters
Increase nutrient management and pest management practices among crop producers.	• 2004 – Identify landowners and evaluate current manure/nutrient/pest management practices throughout the watershed. • 2006 – Conduct a workshop for crop and livestock producers addressing manure, nutrient, and pest management.	• Howard County and Tipton County SWCD, NRCS, and Purdue Extension staff. • Utilize USDA Farm Bill via EQIP to fund effort.	
Increase the number of acres in conservation tillage by 10% in corn and 20% in soybeans Est. Load Reduction: 417 ton/yr Sediment 644 lb/yr Phosphorus 1286 lb/yr Nitrogen (Load reduction determined using NRCS RUSLE worksheets, see Appendix for more information)	• Participate in the Howard and Tipton County SWCD annual meetings and county fairs to encourage farmers to participate in conservation tillage programs. • 2005 – Research and implement incentive programs to improve participation.	• Howard County and Tipton County SWCD, NRCS, and Purdue Extension staff. • Utilize USDA Farm Bill 2002 via EQIP to fund effort.	
Increase number of agricultural producers actively participating in the Wildcat Creek Watershed Alliance (WCWA) by 50%.	• Continue to reach out to the agricultural community urging their participation and input regarding watershed protection. • 2005 – Prepare fact sheets specifically addressing agricultural and water quality issues.		

Management Measures	Action Plan	Resources	Legal Matters
Establish 3.5 miles of buffer along natural streams and artificial drainage ditches. This will complete 3 of 8 miles of stream that need riparian cover and 0.5 of drainage ditches that need to be buffered. Est. Load Reduction: 31 ton/yr Sediment 94 lb/yr Phosphorus 174 lb/yr Nitrogen (Load reduction determined using NRCS RUSLE worksheets, see Appendix for more information)	• 2005 – Conduct a buffer initiative workshop to improve land for filtration and storage along natural stream and drainage ditches. • 2007 – Use GIS to maintain a graphical database of the installation of buffers. Use the images to illustrate the success of this effort and display at local events.	• Howard County and Tipton County SWCD and NRCS staff. • Utilize USDA Farm Bill 2002 via EQIP to fund effort. • GIS	• Indiana Filter Strip Program
Secure funding for livestock and crop producers that may need financial assistance or assistance implementing appropriate measures.	• 2006 – Research and secure grant opportunities and incentives to assist livestock and crop producers implement programs. • 2007 – Research, build support, and draft Tax Incremental Funding (TIF) District language.		Adoption of TIF District will require the support and approval of the Howard and Tipton County Commissioners.

Land Use Planning Goal: Improve the water quality of Little Wildcat Creek Watershed through better land use planning and land development practices.

Table 37: Land Use Planning Management Practices

Management Measures	Action Plan	Resources	Legal Matters
Update current Comprehensive Plan, Zoning Ordinance, and Subdivision Control Ordinance to address water quality issues including: • Erosion and sediment control ordinance • Stormwater and drainage requirements • Floodplain management • Wetland protection • Riparian corridor protection • Tree preservation/protection • Setbacks and buffer protection • Drainage (ROW) easements • Overlay zoning districts • Treatment of sewage (septic/sewer) • Limit impervious areas • Conservation design • Flexible development standards (PUD) • Sanitation ordinance	• 2002/2003 – Participate in the update of the Comprehensive Plans for Tipton County and Howard County respectively. • 2003/2004 – Participate in the update of the Zoning Ordinance and Subdivision Control Ordinance for Tipton County and Howard County respectively.	• List of definitions, suggested language, and model ordinances. • Cooperation from Howard County and Tipton County Plan Commission.	Approval and adoption of updated planning documents.
Improve water quality through effective storage and treatment of urban, suburban, and rural stormwater runoff including: • On-site stormwater treatment • Constructed wetlands • Detention/retention ponds • Infiltration basins/trenches • Vegetated filters strips/swales • Stream buffers • Limit impervious areas • Road salting and storage facility • Tree conservation/protection	• 2003/2004 – Participate in the update of the Zoning Ordinance and Subdivision Control Ordinance for Tipton County and Howard County respectively. • 2004 – Review drainage ordinance and make recommendations for improvement for Howard County and Tipton County Drainage Board.	• List of BMPs • Cooperation from Howard County and Tipton County Plan Commission and Surveyors	Approval and adoption of updated planning documents and ordinances. Enforcement of existing fines for construction violations.

Management Measures	Action Plan	Resources	Legal Matters
Minimize soil erosion and sediment in waterways with better construction management and practices including: • Education for developers and decision-makers. • Regular inspection of construction sites • Enforce fines for construction violations • Proper installation and maintenance of erosion and sediment controls • Require removed topsoil to be replaced • Tree preservation/protection • Temporary seeding/mulching • Stabilization and vegetation of streambanks	• 2004 – Create a handbook to distribute to contractors, developers, and decision-makers identifying appropriate BMPs. • 2004 – Train building inspectors to conduct erosion and sediment control review.	• List of BMPs • Cooperation of contractors, developers, and landowners. • Support from decision-makers and community leaders. • Support from local Builders Association. • Funds to create a Development Handbook. • Train inspectors	Enforcement of existing fines for construction violations.
Use geographic information system (GIS) and an updated soil information to establish future land use and zoning districts based on appropriateness for: • Development • Agriculture • Wetland • Flood storage • Forest	• 2007 – Support the development of a GIS to support regional cooperation of geographic data between Howard County and Tipton County.	• Funding to develop GIS • Digital soil, property, and drainage layers • Cooperation from Howard County and Tipton County Plan Commission.	Approval and adoption of the updated planning documents.
Determine short-term and long-term impacts of development through Purdue's SedSpec and L-THIA (Long-Term Hydrologic Impact Assessment) programs to identify: • Runoff rates • Erosion problems • BMP effectiveness • Impact of past and proposed development	• 2007 – Support land planning and GIS research at Purdue.	• GIS and digital layers. • Permission to use Purdue programs • Cooperation from Howard and Tipton County Plan Commission.	

Natural & Constructed Waterway Goal: Improve the water quality of Little Wildcat Creek Watershed through better protection and maintenance of streams and drainage ditches.

Table 38: Waterway Management Practices

Management Measures	Action Plan	Resources	Legal Matters
Establish 3 miles of riparian buffer along natural streams. This will complete 3 of 8 miles that need riparian cover. Est. Load Reduction: 27 ton/yr Sediment 122 lb/yr Phosphorus 229 lb/yr Nitrogen (Load reduction determined using NRCS RUSLE worksheets, see Appendix for more information)	• 2005 – Identify landowners and stretches of natural waterways that need buffered. • 2005 – Conduct a buffer initiative workshop to improve land for filtration and storage along natural waterways. • 2007 – Build partnership with SWCD, landowner, and WCWA to implement riparian corridor program.	• Participation of landowners, NRCS, SWCD, and Wildcat Foundation.	Riparian corridors protected in perpetuity through volunteer participation, conservation easement, or out-right purchase. The Wildcat Foundation or WCWA could hold easements.
Establish 0.5 mile of filter strips along drainage ditches. This will buffer the remaining exposed stretch of drainage ditch. Est. Load Reduction: 6 ton/yr Sediment 24 lb/yr Phosphorus 45 lb/yr Nitrogen (Load reduction determined using NRCS RUSLE worksheets, see Appendix for more information)	• 2005 – Identify landowners and stretches of drainage ditches that need buffered. • 2005 – Conduct a buffer initiative workshop to improve land for filtration and storage along drainage ditches. • 2007 – Build partnership with SWCD, landowner, and WCWA to implement filter strips program.	• Funds from EQIP program to establish filter strips.	
Write a Greenways Plan to establish healthy riparian/aquatic buffers along Little Wildcat Creek and tributaries.	• 2004 – Work with landowners, planners, SWCD staff, and Wildcat Foundation to develop a Greenways Plan.	• Support and interest of landowners, SWCD, and planning departments. Secure additional funds to pay for study writing, and distribution of plan.	Language for Comprehensive Plan and Zoning Ordinance needs to be approved and adopted by Howard and Tipton County Plan Commission.

Management Measures	Action Plan	Resources	Legal Matters
Promote streambank stabilization techniques that utilize a combination of vegetation, soil bioengineering, and structural systems.	• 2004 – Inventory Little Wildcat Creek and tributaries for erosion problems. Work with the SWCD and NRCS staff to determine the best solution. • 2005 – Work with Howard County and Tipton County SWCDs to distribute educational materials to landowners on how to be good neighbors to streams. • 2007 – Identify funding sources to assist with stabilizing eroded banks.	• Participation of Howard County and Tipton County SWCD and NRCS staff.	
Establish watercourse protection overlay zone (or ordinance) to protect the land adjacent to the natural waterways or drainage ditches.	• 2003/2004 – Include watercourse overlay zone in the updated Zoning Ordinance for Howard County and Tipton County. • 2007 – Expand language used in Zoning Ordinance to create a separate Watercourse Protection Ordinance.	• Participation of Howard County and Tipton County Plan Commission.	Ordinances need to be approved and adopted by Howard County and Tipton County Plan Commission before implementation.
Modify design and maintenance of drainage ditches to reduce the amount of sediment being deposited into natural waterways.	• 2006 – Create a design and maintenance manual for drainage ditches.	• Work with Howard County and Tipton County Surveyor, SWCD, and NRCS.	Manual will need to be approved and adopted by Drainage Board.

IV. Measuring Progress

In June 2003, the funding for the Section 319 grant that made this Watershed Management Plan possible will end. The development of this Plan has created awareness and momentum in the Little Wildcat Creek Watershed. The WCWA, with the cooperation of the Howard and Tipton County SWCDs, Health Departments, Drainage Boards, and Plan Commissions as well as the Wildcat Guardians, intends to implement as much of this Plan as possible.

The timeline identified by the Goals and Decisions section of this Plan extends over a 5-year period through 2007. Milestones have been set to ensure that the Plan is implemented in an orderly and systematic process.

This section identifies the four key components, as identified by the IDEM, to successfully implement the goals of this Plan. These include: progress indicators, monitoring progress, operation and maintenance of installed practices, and evaluation of the Plan (IDEM, 2002).

Much of the implementation of the goals and decisions identified in this Plan will require funding from outside sources. The Appendix contains a detailed list of possible funding opportunities for implementing this Plan.

Progress Indicators
Progress indicators are used to identify milestones or benchmarks to gauge the progress, and success, of the watershed planning effort. Indicators may be administrative such as language added to an ordinance, or programmatic, indicating the total acreage added to a filter strip program. Assigning dates to progress indicators is an effective method to ensuring that the implementation of the Plan stays on target.

Monitoring Progress
Monitoring describes how the indicators will be evaluated to determine their success at achieving the goals of this Plan. Monitoring progress can be general or very specific such as increasing the number of participants at quarterly meetings or improving water quality by a specific amount. Maintaining a list of successful programs and policies as a result of this Plan will help keep the momentum this watershed planning effort.

Operation & Maintenance of Installed Practices
Proper operation and maintenance of installed practices is essential to long-term water quality improvement. Much of the land in the Little Wildcat Creek Watershed is privately owned and BMPs installed will be done, as they are currently installed, as either a cost-share or through an incentive program. Structural BMPs that will be installed as a result of this Plan, such as filter strips, conservation tillage practices, and streambank stabilization will directly benefit the landowner. The landowner will assume responsibility for the ensuring that the BMPs are properly maintained. Non-structural BMPs such

as zoning ordinances and educational programs will be operated and maintained by the Howard and Tipton Plan Commissions and the WCWA.

Plan Evaluation

The WCWA Advisory Board will be responsible for the regular review and update of the Little Wildcat Creek Watershed Management Plan. This Plan should be evaluated on an annual basis to document and celebrate progress; assess effectiveness of efforts; modify activities, if needed, to better target water quality issues; and keep implementation of the Plan on track. The Plan should be revised as needed to better meet the needs of the watershed stakeholders and meet water quality goals.

A summary of the goals, indicators, and monitoring progress of indicators can be found in Table 39.

Table 39: Indicators and Monitoring Progress

Priority	Goal	Indicators & Monitoring Progress
#1	**Education Goal:** Improve water quality in the Little Wildcat Creek Watershed through education and outreach efforts that focus on changing stakeholders' habits and behaviors.	• **Indicators:** Conduct surveys on an annual basis to determine increased awareness of water quality issues among watershed stakeholders. Conduct annual workshops on septic systems (2004), buffer initiative (2005), crop & livestock producers (2006), and backyard conservation (2007). Maintain regular communication with stakeholders through quarterly newspaper articles, newsletters, and meetings. • **Monitoring Progress:** Increased participation in quarterly meetings and membership to the WCWA.
#2	**Septic System Goal:** Improve water quality in the Little Wildcat Creek Watershed through proper planning, installation, and long-term maintenance of septic systems.	• **Indicators:** Conduct workshop on septic systems (2004). Compile records of failing septic systems (2004). Research funding opportunities and incentives to improve operation of private septic systems (2004). Conduct volunteer dye testing (2005). Improve planning process and permit process. Conduct an educational demonstration site for data collection of alternative wastewater treatment systems (2007). • **Monitoring Progress:** Reduce illicit discharge from failing septic systems by 60%.
#3	**Agriculture Goal:** Improve water quality in the Little Wildcat Creek Watershed through better agricultural practices and management programs.	• **Indicators:** Conduct workshops on buffers (2005) and nutrient and pest management (2005). Prepare a display booth for SWCD annual meetings and County Fairs. Prepare and distribute fact sheets to farmers (2005). Research funding and incentives to increase participation in programs (2005). Implement a TIF District for crop and livestock producers (2007). • **Monitoring Progress:** Increased participation of farmers at WCWA meetings. Adoption of a TIF District (2007).
#4	**Land Use Planning Goal:** Improve water quality in the Little Wildcat Creek Watershed through better land use planning and land development practices.	• **Indicators:** Distribution of development handbook (2004). Erosion and sediment control training for building inspectors (2004). Recommendations to Drainage Ordinances (2004). Develop land use layers in GIS (2007). • **Monitoring Progress:** Water quality issues addressed in updated Comprehensive Plans/Zoning Ordinances for Tipton County (2002/2003) and Howard County (2003/2004).
#5	**Natural & Constructed Waterway Goal:** Improve water quality in the Little Wildcat Creek Watershed through better protection and maintenance of streams and drainage ditches.	• **Indicators:** Conduct a buffer workshop (2005). Develop a Greenways Plan (2004). Inventory and document locations of erosion (2004). Distribute educational materials (2005). Distribute a manual for cleaning drainage ditches (2006). Identify funding to assist landowners (2007). • **Monitoring Progress:** Increased participation in filter strip program. Adoption of an ordinance (2007) or overlay zone (2003/2004).

V. Practical Matters

Contact Information

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Plan Distribution

Full color, printer-friendly copy of the Little Wildcat Creek Watershed Management Plan is available via the Wildcat Creek Watershed web page at www.wildcatalliance.org

Calendar of Events & Activities

See Table 40.

Acronyms

Table 41: Acronyms

Acronym Used	Represents
BOD	Biochemical Oxygen Demand
BMP	Best Management Practice
CSO	Combined Sewer Overflow
CWA	Clean Water Act
EPA	U.S. Environmental Protection Agency
FCA	Fish Consumption Advisory
GAP	Gap Analysis Program
HUC	Hydrologic Unit Code
IASWCD	Indiana Association of Soil & Water Conservation Districts
IDEM	Indiana Department of Environmental Management
IDNR	Indiana Department of Natural Resources
ISDH	Indiana State Health Department
KWWTP	Kokomo Wastewater Treatment Plant
LWCW	Little Wildcat Creek Watershed
NPS	Nonpoint Source Pollution
NRCS	Natural Resource Conservation Service
SWCD	Soil & Water Conservation District
USDA	U.S. Department of Agriculture
UWEP	Upper Wabash Ecosystem Project
WCWA	Wildcat Creek Watershed Alliance
WRAS	Watershed Restoration Action Strategy

Table 40: Timeline of Events and Activities

Year	Goal	Activity
Quarterly	Education	• Submit articles to the local media. • Conduct quarterly mailings and meetings. • Distribute a quarterly newsletter.
Annual	Education Agriculture	• Participate in the Howard and Tipton County Fair. • Participate in the Howard and Tipton County SWCD annual meeting.
2002	Education Land Use	• Conduct Developers' Workshop • Design webpage • Design and distribute brochures • Participate in update of Comprehensive Plans for Tipton County.
2003	Education Land Use	• Secure funds to produce and distribute 1000 copies of a multi-media CD. • Participate in update of Comprehensive Plans for Howard County. • Participate in update of Zoning Ordinance and Subdivision Control Ordinance for Tipton County.
2004	Education Septic Agriculture Land Use Waterways	• Determine a statistically rigorous sample size for the watershed and an acceptable percentage for survey response as the base number of responses for comparison. • Determine initial awareness by distributing a survey using the Internet, newspapers, and newsletters. • Conduct a workshop on septic system maintenance. • Review records to determine exact number of failing septic systems. • Research all available private and public funds to address septic system issues. • Explore feasibility of implementing a Septic Maintenance District. • Identify landowners and evaluate current manure/nutrient/pest management practices throughout the watershed • Create a handbook to distribute to contractors, developers, and decision-makers identifying appropriate BMPs. • Train building inspectors to conduct erosion and sediment control review. • Participate in update of Zoning Ordinance and Subdivision Control Ordinance Howard County. • Review drainage ordinance and make recommendations for improvement for Drainage Board. • Work with landowners, planners, SWCD staff, and Wildcat Foundation to develop a Greenways Plan. • Inventory Little Wildcat Creek and tributaries for erosion problems. Work with the SWCD and NRCS staff to determine the best solution. • Include watercourse overlay zone in the updated Zoning Ordinance for Tipton County.

Year	Goal	Activity
2005	Septic	• Conduct volunteer dye testing of septic systems to identify failing systems and illicit connections. • Provide economic incentives to homeowners to repair septic systems. • Compile a well-documented list of alternatives to septic systems.
	Agriculture	• Research and implement incentive programs to improve participation in conservation tillage practices. • Conduct a buffer initiative workshop to improve streams and drainage ditches. • Prepare fact sheets specifically addressing agricultural and water quality issues.
	Waterways	• Identify landowners and stretches of natural waterways and drainage ditches that need buffered. • Conduct a buffer initiative workshop to improve streams and drainage ditches. • Distribute educational materials to landowners on how to be good neighbors to streams. • Include watercourse overlay zone in the updated Zoning Ordinance for Howard County.
2006	Education	• Determine change in awareness by distributing a survey using the Internet, newspapers, and newsletters. • Modify education and outreach efforts (especially in areas that are not showing improvement) until targeted improvement of 70% has been reached.
	Septic	• Work with Howard County and Tipton County Health Departments to standardize training and protocol.
	Agriculture	• Conduct a workshop for crop and livestock producers addressing manure, nutrient, and pest management. • Research and secure grant opportunities and incentives to assist livestock and crop producers implement programs. • Create a design and maintenance manual for drainage ditches.
2007	Education	• Conduct workshop on Backyard Conservation
	Septic	• Build GIS database to track operational status of septic systems. • Construct an educational demonstration site for data collection on alternative septic systems.
	Agriculture	• Research, build support, and draft TIF District language for adoption by County Commissioners. • Use GIS to maintain a graphical database of the installation of buffers.
	Land Use	• Support the development of a GIS to support regional cooperation of geographic data between Howard County and Tipton County. • Support land planning and GIS research at Purdue.
	Waterways	• Build partnership with SWCD, landowner, and WCWA to implement riparian corridor and filter strip program. • Identify funding sources to assist with stabilizing eroded banks. • Expand language used in Zoning Ordinance to create a separate Watercourse Protection Ordinance

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Appendices

Advisory Board Member	Affiliation
Jack Rhoda, President	Tippecanoe County & Lafayette Middle School
Keith Morgan, Vice President & Funding Chair	Indiana-American Water Company
Jolene Rule, Treasurer	Wildcat Guardians
Wayne Williams, Secretary	Clinton County Commissioners
Glen Boise, Land Use Committee Chair	Kokomo-Howard County Plan Commission
Tony Bonaccorsi, Education Committee Chair	Daimler Chrysler
Bill Hillman, Technical Committee Chair	Delphi Delco
Garry Hill	Wildcat Guardians
Ralph Kirkpatrick	Grant County SWCD
Joseph O'Donnell	Carroll County NRCS
Tony Vyn	Purdue University Agronomy Department
Chuck Weis	Wildcat Creek Foundation
Vacant	Tipton County

Education & Outreach Committee Member	Affiliation
Tony Bonaccorsi, Chair	Daimler Chrysler
Carrie Kinsey, Chair	Wildcat Guardians
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Stacy Baugh	Frankfort High School
Brett Canaday	Madison County SWCD
Linda Eastman	Tippecanoe County SWCD
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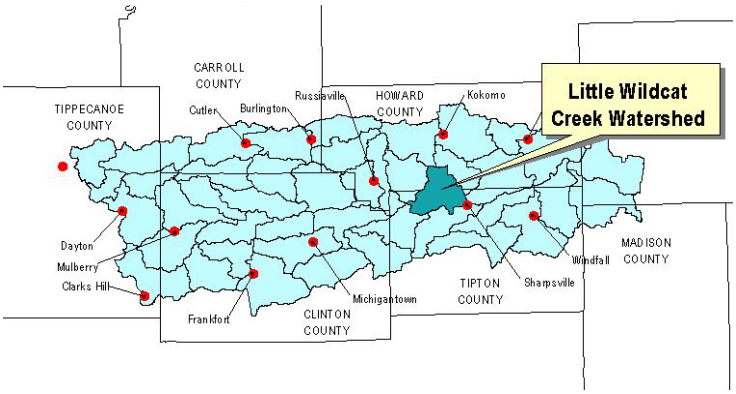
Leah Harden	Clinton County SWCD
Rhonda Hicks	Carroll County SWCD
Mary Hull	Grant County SWCD
Jack Rhoda	Lafayette Middle School
Jolene Rule	Wildcat Guardians
Kenli Schaaf	Purdue University, Forestry Department
Angie Tilton	Tippecanoe SWCD
Chuck Weis	Wildcat Creek Foundation

Funding Committee Member	Affiliation
Keith Morgan, Chair	Indiana-American Water Company
Jack Rhoda	City Council, City of Lafayette

Land Use Committee Member	Affiliation
Glen Boise, Chair	Kokomo-Howard County Plan Commission
Dan Bloodgood	Clinton County Health Department
Sarah Garrison	Howard County SWCD
Garry Hill	Wildcat Guardians
Matt Jarvis	Carroll County USDA/NRCS
Greg Lake	Howard County Health Department
Ben Lambeck	Clinton County SWCD
Rollin Machtmes	Howard County Extension Office
Ed McCabe	Farmcraft Services, Inc.
Robert McCormick	Purdue University, Planning with POWER
Clark McCreedy	IDNR
Bob McKean	Howard County Homebuilders Association
Nolan Pyke	Tipton County Health Department
Sarah Reymann	RCAP
Jack Rhoda	City Council, City of Lafayette
Kenli Schaaf	Purdue University, Forestry Department
Rae Schnapp	Wildcat Creek Foundation
Wayne Williams	Clinton County Commissioners

Technical Committee Member	Affiliation
Bill Hillman, Chair	Delphi Delco
Michelle Arvin	Howard County Health Department
Dale Beal	Delphi Delco
Jeff Blankenberger	Delphi Delco
Tony Bonaccorsi	Daimler Chrysler
Jennifer Bratthauar	IDNR
Sarah Brichford	Wildcat Guardians
Sarah Garrison	Howard County SWCD
Sue Gerlach	IDNR
Leah Harden	Clinton County SWCD
Garry Hill	Wildcat Guardians
Mike Jones	Western High School
Ralph Kirkpatrick	Grant County SWCD
Amber Larimore	Tippecanoe County Health Department
Monty Maggert	Eastern High School
John Maher	Delphi Delco
Jeff Myers	
Rick Parsons	Kokomo High School
Gail Peas	Clinton County NRCS
Nolan Pyke	Tipton County Health Department
Jack Rhoda	Lafayette Middle School
Mark Rowe	Wildcat Guardians
Rae Schnapp	Wildcat Creek Foundation
Jennifer Sobecki	Purdue University
David Wagner	Millennium Environmental
Wayne West	



Little Wildcat Creek Watershed Meeting

Wildcat Creek Watershed Alliance, Inc.

Quarterly Stakeholder Meeting Summary

July 9, 2002 @ 7:00PM
Jackson Morrow Park
Kokomo, Indiana

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1. **Welcome and Introductions**

   Jack Rhoda welcomed everyone to the Little Wildcat Creek Watershed Stakeholder meeting. Jack expressed his gratitude to those in attendance, almost all of whom where new to the Wildcat Creek watershed planning effort. Jack reviewed the Mission Statement of the Wildcat Creek Watershed Alliance and acknowledged members of the Advisory Board that were in attendance.

2. **Little Wildcat Creek Watershed Presentation**

   Sheila McKinley gave a brief overview and purpose of the meeting. The purpose of the meeting was to 1) introduce landowners and residents in the Little Wildcat Creek watershed to the Alliance, 2) to share the land use and water quality information collected to date on the Little Wildcat Creek, and 3) to gather additional information from landowners and residents – the local experts - of the Little Wildcat Creek watershed. Sheila presented background information on the Wildcat Creek Watershed Alliance; it's mission, organizational structure, committees, and funding. Sheila showed an illustration of the 44 subwatershed in the Wildcat Creek Watershed and explained that the Little Wildcat Creek watershed was selected as a targeted watershed since it contained headwater streams and was unable to support aquatic life and recreational use (according to IDEM 305(b) report).

   Wade Amos presented a colored land use map of the Little Wildcat Creek watershed and using several examples, illustrated how all land uses affect

water quality. Wade identified several land use issues in the Little Wildcat Creek watershed including: tillage practices, fertilizer/pesticide use, lack of streamside forests, soil erosion, failing septic systems, livestock/manure management, development/construction practices, and increased impervious surface.

Steve Hall presented water quality impairment issues in the Little Wildcat Creek watershed. Steve highlighted the findings of the 1998 Upper Wabash River Basin Report, the 1998 303(d) Impaired Stream List, the 2000 Water Quality Report, the 2001 Fish Consumption Advisory, and the 2002 303(d) Impaired Stream List. Each report specifies stretches of waterways and their associated water quality impairment. Steve provided some information on the cause and possible source of pollution in the Little Wildcat Creek watershed. These included: 1) E.coli from failing septic systems, animal waste, and plant effluent, 2) Oxygen Consuming Substances from wastewater effluent, leaking sewers, and animal waste, 3) Toxic Chemicals from pesticides, automobile fluids, and illegal dumping, and 4) Nutrients from fertilizers, leaking septic systems, and wastewater treatment plants.

Sheila McKinley explained how the Little Wildcat Creek watershed planning exercise would work and asked the larger group to break into two smaller groups.

3. **Little Wildcat Creek Watershed Planning Exercise**
   The group of participants broke into two smaller groups. Steve Hall and Wade Amos facilitated one group and Sheila McKinley facilitated the second group. Using a large flipchart, markers, and a large map of the Little Wildcat Creek watershed, the facilitator initiated discussion of water quality issues in the watershed:

   Use of Little Wildcat Creek & Perception of Water Quality
   - Recreation – fishing, canoeing, kayaking
   - Drainage - runoff, flooding, carries debris
   - Aesthetic - enjoy beauty of creek
   - Don't allow kids to be in Little Wildcat Creek

   Little Wildcat Creek Water Quality Issues
   - Pollutant intolerant macro invertebrates found in creek
   - Okay, needs improvement
   - Noticed changes in flow due to increased development
   - Clean water important since limited resource
   - CSO's smell
   - Wastewater Treatment Plant at SR 31 & Miller Furniture
   - Kelly West Ditch – massive algae blooms
   - Unregulated dumping (ie. builders dumping paint and other materials into stream behind Wildcat G.C.)
   - Failing septic systems
   - Sedimentation – creek shallower now than before

- Loss of natural meander
- Loss of wooded corridor
- Streambank erosion
- Technique for tiling farm fields (trenching vs. filling)
- 16th Green (Woodhaven Subdivision) erosion problems
- Golf Course mowing to edge of creek

Identify Critical Areas for Water Quality

- Along stream
- Wetlands
- Wooded areas
- Linkages for isolated wooded/wet areas for wildlife

Recommendations for Improvement & Enhancement

- Eco-friendly landscaping/mowing techniques
- Better data collection for water quality monitoring (volunteers & professional)
- More sensitive clearing/dredging of creek (smaller equipment; leave some fallen logs for habitat, etc.)
- Better enforcement to prevent illegal dumping
- More education/outreach
- Limit use of septic systems in new construction – develop only where sewers available
- Form a County septic district to maintain septic systems
- Protect floodplain from development – maintain flood storage capacity
- Maintain natural areas along creek

Priorities for Watershed Management Plan

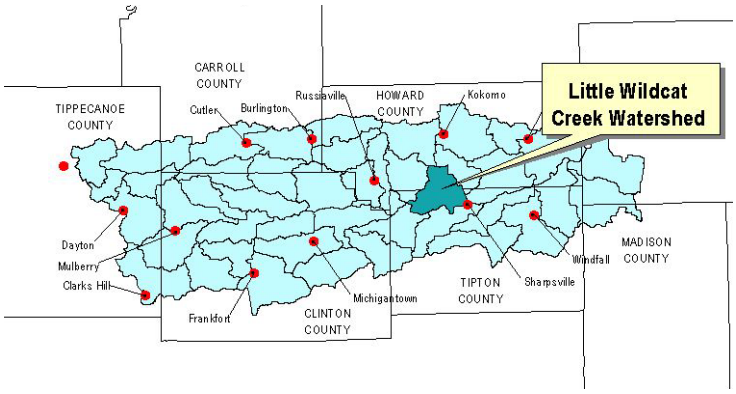
- Control illegal dumping (especially chemicals)
- Specific water quality education/notification of (potential) contamination through newspapers, signage, etc.
- General water quality education through schools, field days, workshops, etc.
- Stabilize eroded/failing stream banks
- Limit construction using septic systems/repair failing septic systems
- Protect natural areas along creeks/maintain floodplain

4. Group Discussion

The two small groups reconvened into one large group and the facilitators reported highlights from the small group discussion (see lists above).

5. Conclusion and Adjourn

At 9:00 pm, Jack Rhoda thanked everyone for coming and asked that they continue to stay involved with the Wildcat Creek Watershed Alliance by adding their name to the mailing list or joining one of the committees.



Little Wildcat Creek Watershed Meeting

Wildcat Creek Watershed Alliance, Inc.

Quarterly Stakeholder Meeting Summary

January 14, 2003 @ 7:00PM
Jackson Morrow Park
Kokomo, Indiana

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1. **Welcome and Introductions**

   Jack Rhoda welcomed everyone to the Little Wildcat Creek Watershed Stakeholder meeting. Jack reviewed the Mission Statement of the Wildcat Creek Watershed Alliance and acknowledged members of the Advisory Board that were in attendance.

2. **Draft Little Wildcat Creek Watershed Management Plan**

   Sheila McKinley gave a brief overview for the meeting including 1) welcome & introductions, 2) background on the Wildcat Creek Watershed Alliance, 3) highlights from the draft Little Wildcat Creek Watershed Management Plan, and 4) to collect comments and suggestions from the stakeholders in the watershed.

   Sheila presented background information on the Wildcat Creek Watershed Alliance; it's mission, organizational structure, committees, and funding. Sheila showed an illustration of the 44 subwatershed in the Wildcat Creek Watershed and explained that the Little Wildcat Creek watershed was selected as a targeted watershed since it contained headwater streams and was unable to support aquatic life and recreational use (according to IDEM 305(b) report). Sheila presented some background information on the Little Wildcat Creek Watershed including location, drainage area, waterways, and land use.

   Steve Hall presented water quality impairment issues in the Little Wildcat Creek watershed. Steve highlighted the findings of the 1998 Upper Wabash River Basin Report, the 1998 303(d) Impaired Stream List, the 2000 Water

Quality Report, the 2001 Fish Consumption Advisory, and the 2002 303(d) Impaired Stream List. Each report specifies stretches of waterways and their associated water quality impairment. Steve provided some information on the cause and possible source of pollution in the Little Wildcat Creek watershed. These included: 1) E.coli from failing septic systems, animal waste, and plant effluent, 2) Oxygen Consuming Substances from wastewater effluent, leaking sewers, and animal waste, 3) Toxic Chemicals from pesticides, automobile fluids, and illegal dumping, and 4) Nutrients from fertilizers, leaking septic systems, and wastewater treatment plants.

Steve presented the results of water quality samples that were collected during the summer and fall of 2002. Chemical, physical, and biological monitoring was conducted at 5 monitoring locations. Monitoring parameters included: ammonia, phosphorus, BOD, PH, Temperature, DO, TSS, and E.coli. Steve reported that the chemical monitoring confirmed water quality impairments in the Little Wildcat Creek Watershed, low DO, high BOD, and exceeded E.coli standards. The biological monitoring showed healthy aquatic communities in the West Fork and impaired aquatic communities in the East Fork. Steve identified highly erodible soils, lack of sufficient riparian cover or filter strips, suspected discharge from WWTP, and suspected failing septic systems as priorities for improving water quality in the Little Wildcat Creek.

Sheila McKinley gave an overview of the goals that are included in the Watershed Management Plan. These goals were developed from 18 months of discussion among the WCWA Committees, Advisory Board, and the July 2002 Stakeholder meeting. These include:

Education:
•Survey stakeholders to determine awareness
•Submit quarterly updates in newspaper
•Maintain quarterly mailings, meetings, and newsletters
•Conduct workshops
•Participate in community events

Septic Systems:
•Conduct septic system maintenance workshop
•Improve detection and enforcement of illicit discharge
•Improve planning process to minimize impact
•Research alternatives to septic systems
•Compile list of funding sources

Agriculture:
•Increase participation in nutrient & pest management practices
•Increase number of acres in conservation tillage
•Establish buffers on streams & drainage ditches
•Research funding for implementing BMPs
•Explore Tax Incremental Funding (TIF) District

Land Use Planning:
•Include water quality issues in planning documents
•Minimize soil erosion from construction
•Require better storage and filtration of stormwater runoff
•Establish zoning districts based on soils map
Natural & Constructed Waterways:
•Buffer streams and drainage ditches
•Prepare a Greenways Plan
•Stabilize streambanks using combination of vegetation and structural systems
•Establish a Watercourse Protection Ordinance
•Modify maintenance procedures for ditches

Sheila McKinley opened the meeting to comments and suggestions from those in attendance. Sheila reminded the group that the plan is available on the WCWA webpage and comments will be accepted through the end of February.

3. **Comments and Suggestions on the Draft Plan:**
   - Refer to septic systems as "failing" septic systems since not all systems are bad
   - Define septic system as a complete system with an absorption field and tank
   - Add section or appendix regarding funding opportunities to implement ideas in Plan
   - Build credibility to ease implementation
   - Focus on benefits not problems therefore get better buy in from public and support for implementation
   - Refrain from using scare tactics
   - Support for decision-makers, health department, planning staff, etc. to implement the Plan
   - Percentages used in goals is confusing, try setting end point conditions to be met
   - Identify critical areas
   - Focus on solving problems

4. **Conclusion and Adjourn**
   At 9:00 pm, Jack Rhoda thanked everyone for coming and asked that they continue to stay involved with the Wildcat Creek Watershed Alliance by adding their name to the mailing list or joining one of the committees.

Little Wildcat Creek Watershed Water Quality Data

Sample Date	Site No.	Stream Name	Location	Sample ID	Sample Collector	DO (mg/L)	Temp. (C)	pH	Cond.	Weather	TSS	NH3	T.Phos.	TOC	BOD	*E.coli*	QC Check	Comments
6/26/02	1	East	CR 50 E	626021	SDH	4.83	24	8.4	504	4-00-1-5	12	0.254	0.101		2.56	1000		
7/31/02	1	East	CR 50 E	731021	SDH	5.08	23.6	7.3	236.9	1-27-1-5	16	0.173	0.276		3.16	700		Bank Erosion
8/28/02	1	East	CR 50 E	828021	ZDB	4.65	20.2	7.9		2-18-1-4	7.2	0.206	0.182		2.44	1225		
9/30/02	1	East	CR 50 E	930021	ZDB	2.55	17.4	7.9	183.4	1-27-1-4	12.8	0.07	0.241		7.32	720		Stagnant w/ film
10/30/02	1	East	CR 50 E	1030021	WMA	3.43	5.6	7.2	199.1	4-00-1-2	3.81	0.089	0.231		8.96	589		
11/26/02	1	East	CR 50 E	1126021	ZDB	7.9	1.7	8.4	279.4	4-00-2-1	6	0.07	0.127		2.51			Algae/scum
6/26/02	2	East	SR 26	626022	SDH	4.5	24.4	7.5	240.3	4-00-1-5	28.7	0.184	0.143		2.42	1367		
7/31/02	2	East	SR 26	731022	SDH	3.53	23.3	7.6	318.2	1-27-1-5	18	0.157	0.33		2.51	967		Digging along bank
8/28/02	2	East	SR 26	828022	ZDB	5.77	21.3	7.4	316	2-18-1-4	17.5	0.174	0.255		3.62	480		Resurfacing SR 26
9/30/02	2	East	SR 26	930022	ZDB	3.55	17.8	7.3	218.6	1-27-1-4	15.6	0.226	0.253		4.09	311		Surface film
10/30/02	2	East	SR 26	1030022	WMA	4.6	7.8	7.4	267	4-00-0-2	9.6	0.21	0.21		5.75	2693		Fill dumped upstream
11/26/02	2	East	SR 26	1126022	ZDB	6.9	2.7	8.3	610	4-00-1-2	4	0.106	0.172		2.11			Edge frozen
6/26/02	3	East	US 31	626023	SDH	4.84	25.7	8.5	290.2	4-00-1-5	96	0.176	0.214		3.8	2550		Algae/turbid
7/31/02	3	East	US 31	731023	SDH	3.89	23.8	7.4	317.9	1-27-2-4	69	0.197	0.364		4.07	1840		Turbid/low flow
8/28/02	3	East	US 31	828023	ZDB	10.31	23.1	7.6		2-18-0-5	14	0.158	0.234		4.67	480		
9/30/02	3	East	US 31	930023	ZDB	3.75	18.3	7.7	257.5	1-27-1-4	7.33	0.344	0.254		4.18	2750		
10/30/02	3	East	US 31	1030023	WMA	2.84	7.4	7.7	232.4	4-00-0-2	11.6	0.16	0.253		8.19	2175		
11/26/02	3	East	US 31	1126023	ZDB	6.2	2.7	8.2	548.5	4-00-1-1	6.8	0.142	0.131		2.0			
6/26/02	4	West	SR 26	626024	SDH	5.7	22.6	8.7	225	4-00-2-5	10	0.2	0.052		2.0	650		
7/31/02	4	West	SR 26	731024	SDH	3.7	25	7.4	361.5	1-27-1-5	27	0.186	0.145		2.0	133		
8/28/02	4	West	SR 26	828024	ZDB	6.37	20.9	8.1		2-18-1-4	22	0.186	0.15		2.98	133		
9/30/02	4	West	SR 26	930024	ZDB	5.4	17.1	8.1	193.4	1-27-0-4	2.89	0.117	0.166		2.24	244		
10/30/02	4	West	SR 26	1030024	WMA	6.6	7.9	8.1	279.4	4-00-3-2	2.5	0.097	0.0126		4.06	139		
11/26/02	4	West	SR 26	1126024	ZDB	15.3	8.5		474	4-00-2-1	4	0.04	0.05		2.0			
6/26/02	5	West	CR 300	626025	SDH	7.1	24.7	8.7	234	7-00-2-5	10	0.091	0.069		2.05	222		

Sample Date	Site No.	Stream Name	Location	Sample ID	Sample Collector	DO (mg/L)	Temp. (C)	pH	Cond.	Weather	TSS	NH3	T.Phos.	TOC	BOD	*E.coli*	QC Check	Comments
7/31/02	5	West	CR 300	731025	SDH	5.2	22.9	7.4	304.4	1-27-2-5	9.2	0.154	0.258		2.0	367		
8/28/02	5	West	CR 300	828025	ZDB	5.41	22.1	7.9		2-18-1-5	8	0.128	0.112		2.79	444		
9/30/02	5	West	CR 300	930025	ZDB	4.95	18.9	8.2	212.2	1-27-0-4	9.56	0.158	0.073		2.0	56		
10/30/02	5	West	CR 300	1030025	WMA	8.08	7.2	7.6	300	4-00-3-2	8	0.09	0.054		3.26	50		
11/26/02	5	West	CR 300	1126025	ZDB	14.8	4.1	8.5	463	4-00-2-1	4	0.035	0.052		2.0			

East = East Fork Little Wildcat Creek
West = West Fork Little Wildcat Creek

Weather Codes:

Sky Conditions	Wind Direction	Wind Strength	Air Temp
1 Clear	00 North	0 Calm	1 32-
2 Scattered	09 East	1 Light	2 33-45
3 Partly	18 South	2 Mod/Light	3 46-60
4 Cloudy	27 West	3 Moderate	4 61-75
5 Mist		4 Mod/Strong	5 76-85
6 Fog		5 Strong	6 86+
7 Shower		6 Gail	
8 Rain			
9 Snow			
0 Sleet			

Load Reduction Calculations

Load reductions were calculated using the Revised Universal Soil Loss Equation (RUSLE). RUSLE is a conservation-planning tool that predicts annual average soil loss. It is a mathematical equation that considers climate, soil, topography, and land use. RUSLE is commonly used by federal, state, and local governments to prevent excessive soil erosion. Values input into the equation directly represent the conditions of the site under a particular condition. The Howard and Tipton County SWCD and NRCS staff provided input data used in the following tables.

1. Load Reduction Worksheet for Agricultural Field Practices
(Adapted from NRCS worksheet available at
http://www.in.gov/idem/water/planbr/wsm/loadredest.xls)
Project ARN: 00-199
Watershed: Little Wildcat Creek

RUSLE	Before Treatment	After Treatment
Rainfall-Runoff Erosivity Factor (R)	180	180
Soil Erodibility Factor (K)	0.28	0.28
Length-Slope Factor (LS)	0.14	0.14
Cover Management Factor (C)	0.24	0.02
Support Practice Factor (P)	2	1
Predicted Ave. Annual Soil Loss (ton/ac/yr)	2.00	0.2
Contributing Area (Ac)	540.54	540.54

Gross soil texture: Silt (silt, silty, clay loan, and silt loam)

Estimated Load Reductions from Agricultural Field Practices

Sediment Load Reduction (ton/yr)	417
Phosphorus Load Reduction (lb/yr)	644
Nitrogen Load Reduction (lb/yr)	1286

2. Load Reduction Worksheet for Filter Strips & Riparian Buffers Combined
(Adapted from NRCS worksheet available at
http://www.in.gov/idem/water/planbr/wsm/loadredest.xls)
Project ARN: 00-199
Watershed: Little Wildcat Creek

RUSLE	Before Treatment	After Treatment
Rainfall-Runoff Erosivity Factor (R)	180	180
Soil Erodibility Factor (K)	0.28	0.28
Length-Slope Factor (LS)	0.14	0.14
Cover Management Factor (C)	0.24	0.24
Support Practice Factor (P)	2	1
Predicted Ave. Annual Soil Loss (ton/ac/yr)	2.00	0.2
Contributing Area (Ac)	558.2	558.2

Gross soil texture: Silt (silt, silty, clay loan, and silt loam)

Estimated Load Reductions from Filter Strips

Sediment Load Reduction (ton/yr)	31
Phosphorus Load Reduction (lb/yr)	94
Nitrogen Load Reduction (lb/yr)	174

3. Load Reduction Worksheet for Riparian Buffers Only
(Adapted from NRCS worksheet available at
http://www.in.gov/idem/water/planbr/wsm/loadredest.xls)
Project ARN: 00-199
Watershed: Little Wildcat Creek

RUSLE	Before Treatment	After Treatment
Rainfall-Runoff Erosivity Factor (R)	180	180
Soil Erodibility Factor (K)	0.28	0.28
Length-Slope Factor (LS)	0.14	0.14
Cover Management Factor (C)	0.24	0.02
Support Practice Factor (P)	1	1
Predicted Ave. Annual Soil Loss (ton/ac/yr)	2.00	0.2
Contributing Area (Ac)	479.37	479.37

Gross soil texture: Silt (silt, silty, clay loan, and silt loam)

Estimated Load Reductions from Agricultural Field Practices

Sediment Load Reduction (ton/yr)	27
Phosphorus Load Reduction (lb/yr)	122
Nitrogen Load Reduction (lb/yr)	229

4. Load Reduction Worksheet for Filter Strips Only
(Adapted from NRCS worksheet available at
http://www.in.gov/idem/water/planbr/wsm/loadredest.xls)
Project ARN: 00-199
Watershed: Little Wildcat Creek

RUSLE	Before Treatment	After Treatment
Rainfall-Runoff Erosivity Factor (R)	180	180
Soil Erodibility Factor (K)	0.28	0.28
Length-Slope Factor (LS)	0.14	0.14
Cover Management Factor (C)	0.24	0.02
Support Practice Factor (P)	1	1
Predicted Ave. Annual Soil Loss (ton/ac/yr)	2.00	0.2
Contributing Area (Ac)	78.8	78.8

Gross soil texture: Silt (silt, silty, clay loan, and silt loam)

Estimated Load Reductions from Agricultural Field Practices

Sediment Load Reduction (ton/yr)	6
Phosphorus Load Reduction (lb/yr)	24
Nitrogen Load Reduction (lb/yr)	45

WCWA Funding Opportunities

Prepared by Goode & Associates, Inc. August 2002

Non Point Source Implementation Grants (319)
Administered: EPA/IDEM
Summary: Projects to control nonpoint source pollution are eligible. Funds can be used for TMDL development and implementation, watershed management plans, education programs and more.
Eligibility: Non-profit groups, universities, municipalities, etc.
How Much: Twenty Five percent match with a maximum award of $112,500.
Application Deadline: October 1
Web Pages/Links: http://www.in.gov/idem/water/planbr/wsm/index.html

State Revolving Fund Program
Administered: EPA/IDEM
Summary: Low interest loans designed to assist communities with wastewater and drinking water needs. Projects include traditional wastewater treatment methods as well as nonpoint source management programs.
Eligibility: Cities, towns, regional sewer districts.
How Much: Fixed low interest loans (20yr) are provided to recipients (80% Federal : 20% State)
Deadlines: February 22
Web Pages/Links: http://www.in.gov/idem/water/fasb/srflp.html

Water Quality Cooperative Agreements (104 (b)(3))
Administered: EPA
Summary: Funding for programs developing, implementing, and demonstrating new concepts or requirements that will improve the effectiveness of NPDES programs (CSO and Stormwater).
Eligibility: Non-profit organizations
How Much: There is a 5% in-kind or cash match required for 104(b)(3).
Application Deadline: End of January
Web Pages/Links: http://www.in.gov/idem/water/planbr/wsm/Section104b3_main.html
http://aspe.os.dhhs.gov/cfda/p66463.htm

Wetlands Protection Development Grants Program
Administered: EPA
Summary: Provides financial assistance to support wetlands programs/projects or augmentation and enhancement of existing programs.
Eligibility: States, Local Governments
How Much: 1999 grants ranged from $20,000 - +$594,000. Federal non-federal cost share is 75% - 25%.
Application Deadline: December 14
Web Pages/Links:
http://www.epa.gov/r5water/wshednps/pdf/r5wetlandgrants2002_info.pdf
http://www.epa.gov/owow/wetlands/2002grant/

Environmental Education Program
Administered: EPA
Summary: To support environmental education programs and projects.
Eligibility: Non-profit organizations
Application Deadlines: Mid to late November
How Much: $25,000, or less. Federal non-federal cost share of 75%-25%.
Web Pages/Links: http://www.epa.gov/Region5/enved/grants.html

Section 205(j) Water Quality Management Planning Program
Administered: IDEM
Summary: Grants are for water quality projects such as, studies of non-point source pollution impacts, nonagricultural NPS mapping, and the development and implementation of watershed management projects.
Eligibility: Available to municipalities, counties, conservation districts, drainage districts, and other public organizations. For-profit entities, non-profit organizations, private associations, and individuals are NOT eligible for this funding.
Application Deadline: January 31
How Much: Funds can be requested for up to $100,000 and no match is required.
Web Pages/Links: http://www.in.gov/idem/water/planbr/wsm/205jgeninfo.pdf
http://www.in.gov/idem/water/planbr/wsm/Section205j_main.html

Environmental Quality Incentives Program
Administered: USDA/NRCS
Summary: Funding for projects to treat identified soil, water and related natural resource concerns on eligible land. Technical, financial and educational support are available. Half of which is targeted towards livestock related concerns and half of it toward general conservation.
Eligibility: Non-federal landowners engaged in livestock operations or agricultural productions.
How Much: Up to $10,000 per person per year and up to $50,000 over the length of a contract. Federal cost share support of up to 75%.
Application Deadline:
Web Pages/Links: http://www.nrcs.usda.gov/programs/eqip/

Conservation Reserve Program
Administered: USDA/ Indiana Farm Service Agency
Summary: Funding for projects to control soil erosion. The goal of the program is to give farmers incentives to convert highly erodible land or other sensitive areas into vegetative cover such as native grasses, trees, and riparian buffers.
Eligibility: Agricultural land owners
How Much: Annual rental payments for the term of a multi year contract of up to $50,000 per fiscal year. Funds are also available for up to 50% of cost of establishing vegetative cover.
Application Deadline: Continual sing up period
Web Pages/Links: http://www.fsa.usda.gov/dafp/cepd/crp.htm

Wetland Reserve Program
Administered: USDA/NRCS
Summary: Program provides technical and financial assistance to land owners restoring marginal agricultural land to wetland. Easements range from 10-30 years. Landowners retain ownership.
Eligibility: Land owners who have owned their land for at least 12 months.
How Much: NRCS easement and restoration payments range from 75% - 100%
Application Deadline: Applications are always accepted.
Web pages and Links: http://www.nhq.nrcs.usda.gov/PROGRAMS/wrp/

Wildlife Habitat Incentive Program
Administered: USDA/NRCS
Summary: Cost share and technical assistance to develop and improve wildlife habitat on private land.
Eligibility: Private landowners who are agricultural producers are eligible
How Much: 75% Federal Cost Share
Application Deadline: Continual Sign Up
Web Pages/Links: http://www.nhq.nrcs.usda.gov/PROGRAMS/whip/

Conservation Security Program
Administered: USDA/NRCS
Summary: Provides incentive payments for maintaining and increasing farm and ranch stewardship practices on working lands. The program promotes conservation and improvements to soil, water, and air quality.
Eligibility: Participation in the program stipulates that land practices must achieve resource and environmental benefits. Removal of land from production is not required.
How Much: 75% federal reimbursement on conservation practice chosen, with potential for additional assistance.
Application Deadline:
Web Pages/Links: http://www.extension.iastate.edu/Publications/FM1872B.pdf

Emergency Watershed Protection Program
Administered: USDA/NRCS
Summary: The program is set up to respond to natural disaster induced emergencies. The project must be economically and environmentally justifiable.
Eligibility: Any land on floodplains that has been impaired within the last 12 months is eligible for funding, but landowners must be represented by a project sponsor, who must be a public agency.
How Much: NRCS may bear up to 75 percent of the construction cost of emergency measures. The remaining 25percent must come from local sources and can be in the form of cash or in-kind services.
Application Deadline: All applications must be submitted within 10 days of the disaster for exigency situations and within 60 days of the disaster for nonexigency situations
Web Pages/Links: http://www.nrcs.usda.gov/programs/ewp/ewp.html

SARE Producer Grant Program
Administered: USDA
Summary: Grants for farm projects such as erosion and runoff control that are economically viable, environmentally sound, and socially responsible.
Eligibility: States and non-profit organizations.
Application Deadline: Mid July
How Much: Awards range from $2,000 - $15,000
Web Pages/Links: http://www.sare.org/ncrsare/prod.htm

Soil and Water Conservation Assistance
Administered: USDA/NRCS
Summary: Cost share program available to farmers and ranchers addressing threats to soil, water, and related natural resources, including, grazing land, wetlands, and wildlife habitat.
Eligibility: Land owners and operators not in EQIP/WRP/CRP priority areas
How Much: The federal cost share will cover up to 75 percent of the cost of an eligible practice.
Application Deadline: Continual sign up
Web Pages/Links: http://www.nrcs.usda.gov.programs/swca/swca.info.html

Resource Conservation and Development Program
Summary: Technical assistance is available for the planning and installation of approved projects specified in RC&D area plans, for land conservation, water management, community development, and environmental enhancement projects.
Eligibility: Land must be in RC&D area.
How Much: Cost share of up to 25% of the total cost of a project, not to exceed $50,000
Application Deadline: Continual sign up
Web Pages/Links: http://www.nrcs.usda.gov/programs/swca/

Forest Legacy Program
Administered: USDA Forest Service
Summary: Designed to encourage the protection of privately owned forest lands. The program encourages and supports acquisition of conservation easements. Landowners are required to prepare a multiple resource management plan for the land as part of the conservation easement acquisition.
Eligibility: Private forest landowners
How Much: Federal government may fund up to 75% of program costs, with at least 25% coming from private, state or local sources.
Application Deadline: January 31, for priority but applications are accepted anytime.
Web Pages/Links: http://www.fs.fed.us/spf/coop/flp.htm

Forest Land Enhancement Program
Administered: USDA/NRCS
Summary: The program provides cost-share support for non-industrial private forest landowners to help them develop and implement Forest Stewardship Plans.
Eligibility: Non-industrial private forest land owners
How Much: Landowners are reimbursed for up to 75% of approved expenses, with a maximum of $10,000 per year per landowner. In exchange, the landowner agrees to maintain and protect FLEP funded practices for a minimum of 10 years.
Application Deadline:
Web Pages/Links: http://www.pinchot.org/pic/farmbill/CScompare.htm
http://www.usda.gov/farmbill/forestry_fb.html

North American Wetlands Conservation Act Grants
Administered: U.S Fish and Wildlife Service
Summary: Provides matching grants to private or public organizations or to individuals who have developed partnerships to carry out wetlands conservation projects including acquisition, enhancement, and restoration in the United States, Canada, and Mexico.
Eligibility: Public or private, profit or non-profit agencies.
How Much: Cost share must be at a 1:1 federal to non-federal ratio.
Application Deadline: March 23 and July 6
Web Page/Links: http://northamerican.fws.gov/NAWCA/grants.htm
http://www.nws.usace.army.mil/pm/cw/planning.cfm

Partners for Fish and Wildlife Program
Administered: U.S. Fish and Wildlife Service
Summary: Provides financial and technical assistance to private landowners through voluntary cooperative agreements. Priority projects include restoration of degraded wetlands, streams, and riparian areas.
Eligibility: Private landowners
How Much: Dollar for dollar federal to non-federal match.
Web Pages/Links: http://partners.fws.gov/pdfs/partnersfs.pdf

Planning Assistance to States Program
Administered: U.S. Army Corps of Engineers
Summary: Funding assistance for preparation of comprehensive plans for development, utilization, and conservation of water and related land resources. Recent projects include water quality and conservation projects.
Eligibility: Non Federal entities
How Much: One to one federal to non-federal cost share, with annual allotments per state not to exceed $500,000 per year.
Application Deadline: No deadline
Web Pages and Links: http://www.cfda.gov/public/viewprog.asp?progid=250

Project Modifications for Improvement of the Environment
Administered: U.S. Army Corps of Engineers
Summary: Used to restore habitat and improve habitat that has been impacted by existing Corps projects.
Eligibility: States and non-governmental groups
How Much: 75% - 25% federal non-federal cost share.
Application Deadlines: Continual sign up
Web Pages and Links: http://www.swg.usace.army.mil/pe-p/projmod.asp

Aquatic Ecosystems Restoration
Administered: U.S. Army Corps of Engineers
Summary: Funds can be used for restoration and protection of aquatic habitat and water quality in lakes, rivers, and streams without any connection to existing Corps projects.
Eligibility: State and non-governmental groups.
How Much: 65% 35% federal non-federal cost share.
Application Deadline: Submit request for study at any time.
Web Pages and Links:
http://www.mvp.usace.army.mil/enviro_protection/aqua_eco_rstor/

Lake and River Enhancement Program
Administered: Indiana DNR
Summary: Funding to reduce inflow of sediments and nutrients into lakes and rivers. Eligible projects include water quality monitoring and watershed projects.
Eligibility: Local entities, land planners, and development organizations.
How Much: Financial assistance of up to $100,000 is available. Program also provides up to 80% cost share of approved watershed land treatment practices.
Application Deadline:
Web Pages and Links: http://www.in.gov/dnr/soilcons/pdfs/lare.pdf
http://www.in.gov/dnr/soilcons

Urban Forest Conservation Grants
Administered: Indiana DNR
Summary: Projects that help to improve and protect trees and associated resources in urban areas.
Eligibility: Municipalities, non-profit organizations
How Much: One to one matches ranging from $2,000 to $20,000
Web Pages and Links:
http://www.state.in.us./dnr/outdoor/planning/scorp/dnrresourcemanual.pdf

Hometown Indiana Grant Program
Administered: DNR
Summary: Provides grants for acquisition and or development of recreation sites and facilities, historic preservation and forestry.
Eligibility: Municipal corporations with a five year park and recreation master plan.
How Much: One to one state match of funds ranging from $10,000 - $200,000.
Web Pages and Links: http://www.in.gov/dnr/outdoor/grants/hometown.html

Classified Wildlife Habitat Program
Administered: Indiana DNR
Summary: Incentive program to foster private wildlife habitat management through tax reduction and technical assistance. Landowners need 15 or more acres of habitat to be eligible.
Eligibility: Private landowners with at least 15 acres of land.
How Much: Tax reductions
Application Deadlines:
Web Pages and Links: http://www.ai.org/dnr/fishwild/about/habitat.htm

Classified Forest Program
Administered: DNR
S**ummary:** Program allows landowners to set aside at least 10 acres of land as forest. In return owners receive property tax breaks, forestry literature, and technical assistance.
Eligibility: Private landowners with 10 acres of land.
How Much: Lands are eligible for Assessments at $1.00 an acre. Property taxes are then paid based on that assessment.
Application Deadline:
Web Pages/Links: http://www.state.in.us/dnr/forestry/privateland/clasfor.htm

Classified Wind Break Act
Administered: U.S Fish and Wildlife
Summary: Establishment of windbreaks at least 450 feet long adjacent to tillable land.
Eligibility:
How Much:
Application Deadlines:
Web Pages and Links:

Nisource Environmental Challenge Fund
Administered: NiSource
Summary: Funding for projects designed to preserve, protect, or enhance the environment in areas served by NiSource or a subsidiary.
Eligibility: Non-profit and grassroots organizations and other community groups.
How Much: Awards are usually between $500 and $5000. Funding available for up to 80% of a projects cost.
Application Deadline:
Web Pages/Links: http://www.nisource.com/enviro/ecf.asp

2002 IPL Golden Eagle Environmental Grant
Administered: Indianapolis Power & Light
Summary: Provide funds for projects that will preserve, protect, enhance or restore environmental and biological resources throughout the state.
Eligibility: Municipalities, states, non-for profits, etc.
How Much: Grants will not exceed $10,000.
Application Deadline:
Web Pages/Links:
http://www.ipalco.com/ABOUTIPALCO/Environment/Golden_Eagle/Golden_Eagle_Application.html

Great Lakes Aquatic Habitat Network & Fund
Administered: Tip of the Mitt Watershed Council
Summary: Provide financial support to advocacy activities that strengthen the role of citizens working locally to protect and restore shorelines, inland lakes, rivers, wetlands, and other aquatic habitats**.**
Who: Grassroots organizations working to protect habitat in the Great Lakes Basin.
How Much: $500 -$3,500
Application Deadline: September 30, 2002 for fall funding.
Web Pages & Links: http://www.glhabitat.org/Eligibility.html

Great Lakes Basin Program for Soil Erosion and Sediment Control
Administered: Great Lakes Commission…Funding is provided through a cooperative agreement with the U.S. Department of Agriculture-Natural Resources Conservation Service (USDA-NRCS).
Summary: Funded programs range from information/education programs to physical measures designed to reduce erosion and improve water quality.
Eligibility: Non-profit agencies in the Great Lakes Basin.
How Much: Grants have been awarded for up to $36,000.
Web Pages: http://www.glc.org/basin/RFP.html http://www.glc.org/about/about.html

Watershed Assistance Grants
Administered: EPA and the River Network
Summary: Program is designed support the growth and sustainability of local watershed partnerships in the United States. For the purpose of this program, a "watershed partnership" is defined as an inclusive, enduring, diverse, community-based group organized to identify and resolve watershed problems and issues.
Eligibility: Watershed partnerships.
How Much: Awards ranging from $1,000 - $3,100
Web Pages/Links: http://www.rivernetwork.org/howwecanhelp/howwag_2002cri.cfm

Re-Grants
Administered: CS Mott Foundation
Summary: This Program is designed to help staff members, board members, and volunteers develop skills important to their duties with river and watershed organizations. Funding is used to cover travel expenses and/or registration fees for selective river training opportunities.
Eligibility: Non Profit organizations, watershed staffs, volunteers in the Great Lakes Basin.
How Much: $300-$500
Web pages/links: http://www.rivernetwork.org/howwecanhelp/howregrant.cfm

Hoosier Riverwatch Water Quality Monitoring Equipment
Administered: Hoosier Riverwatch
Summary: Grant provides equipment for participating in the statewide volunteer stream-monitoring program.
Eligibility: Schools, government agencies, non-profit organizations
How Much: Up to $500 worth of water quality testing equipment.
Application Deadline: March 15
Web Pages/Links: http://www.state.in.us/dnr/soilcons/riverwatch/

Core Four Alliance Grants
Summary: Grants are provided to alliances throughout the country implementing programs that will advance the Core 4 Conservation Campaign to realize better soil, cleaner water, greater profits for agriculture, and a brighter future for all of us.
Eligibility: Alliances promoting Core 4 Campaign.
How much: Up to $2500 with a dollar for dollar match from non-federal funds.
Web Pages/Links: **http://www.ctic.purdue.edu/Tammy/Application.pdf**

General Challenge Grant
Administered: National Fish and Wildlife Federation
Summary: Funding for projects that address priority actions promoting fish, wildlife, plants and the habitats on which they depend.
Eligibility: Federal, tribal, state, local governments, education institutions, non-profit, and conservation organizations.
How Much: $10,000 - $150,000. The match is 1:1 federal to non-federal.
Web Pages/Links: http://www.nfwf.org/programs/guidelines.htm

Bring Back the Natives
Administered: National Fish and Wildlife Foundation
Summary: Program provides funds to restore damaged or degraded riverine habitats and their native aquatic species through watershed restoration and improved land management.
Eligibility: Local governments, states, and non-profit organizations.
How Much: Non federal to federal matching is 2:1.
We Pages/Links: http://www.nfwf.org
http://www.epa.gov/owow/watershed/wacademy/fund/natives.html

Tipmont REMC Envirowatts Trust
Administered: Tipmont REMC
Summary: Provide funds to support environmental projects and activities in surrounding communities.
Eligibility: Local groups working on environmental projects.
How Much:
Application Deadlines: 3 cycles (1st Monday of January/April/July/October).
Web Pages/Links: http://www.tipmont.org/services/envirowatts.org.