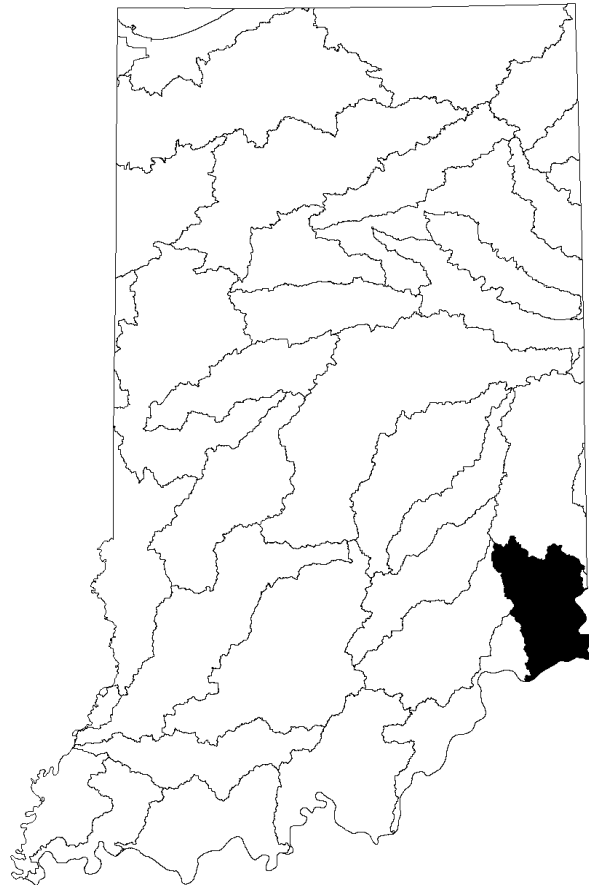


Middle Ohio-Laughery Watershed Restoration Action Strategy

Part I: Characterization and Responsibilities



Prepared by
Indiana Department of
Environmental Management
Office of Water Management
June 2000

Foreword

The First Draft (October 1999) of the Watershed Restoration Action Strategy (WRAS) was reviewed internally by IDEM and revised accordingly. The Second Draft (Spring 2000) was reviewed by stakeholders and revised accordingly. This Third Draft (June 2000) is intended to be a living document to assist restoration and protection efforts of stakeholders in their sub-watersheds. As a "living document" information contained within the WRAS will need to be revised and updated periodically.

The WRAS is divided into two parts: Part I, Characterization and Responsibilities and Part II, Concerns and Recommendations.

Andy Ertel, Regional Watershed Conservationist
IDEM Office of Water Management
100 N. Senate Avenue
P.O. Box 6015
Indianapolis, IN 46206-6015

Andy.Ertel@in.usda.gov

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EXECUTIVE SUMMARY

The overall goal and purpose of Part I of the Watershed Restoration Action Strategy (WRAS) is to provide a reference point and map to assist with improving water quality. The major water quality concerns and recommended management strategies will be addressed in Part II of the WRAS.

This strategy broadly covers the entire watershed, therefore, it is intended to be an overall strategy and does not dictate management and activities at the stream site or segment level. Water quality management decisions and activities for individual portions of the watershed are most effective and efficient when managed through sub-watershed plans. However, these sub-watershed plans must also consider the impact on the watershed as a whole.

Finally, the Strategy is intended to be a fluid, living document in order to respond to the temporally dynamic quality of our environment. Therefore, this Strategy will require revision when new or different information becomes available.

Overview of the Middle Ohio-Laughery Watershed

The Middle Ohio-Laughery watershed covers about 800 square miles in southeast Indiana. The watershed boundary includes parts of six different counties and approximately 718 miles of perennial streams. The primary waterbody is Laughery Creek, which originates in Decatur County and ultimately discharges to the Ohio River, is estimated to be 99 miles in length.

The land use in the watershed is predominately agriculture and forestry, which represent about 96 percent of the total land cover. Corn and Soybeans comprise the majority of crops produced, while various hardwood species comprise the majority of the forested land. Other land uses include urban, wetland vegetation and open water areas.

Batesville and Lawrenceburg are the two major urban areas within the watershed area. Versailles State Park is also located within the watershed and is the second largest state park in Indiana.

Laughery Creek, just east of the town of Morris in Ripley County to its confluence with the Ohio River, is identified by state natural heritage programs as having outstanding ecological importance.

Current Status of Water Quality in the Middle Ohio-Laughery Watershed

Section 303 (d) of the Clean Water Act requires states to identify waters that do or are not expected to meet applicable water quality standards with federal technology based standards alone. The Clean Water Act Section 303(d) list for Indiana provides a basis of understanding the current status of water quality in the Middle Ohio-Laughery watershed.

The following Middle Ohio-Laughery watershed waterbodies are on Indiana's 1998 Clean Water Act Section 3030(d) list submitted to and approved by EPA:

- Bischoff Reservoir for mercury fish consumption advisory
- Versailles Lake for mercury fish consumption advisory
- Ohio River for PCB fish consumption advisory and e-coli

Water Quality Goal

The overall water quality goal for the Middle Ohio-Laughery watershed is that all waterbodies meet the applicable water quality standards for their designated uses.

Middle Ohio-Laughery Watershed Restoration Action Strategy

Part I: Characterization and Responsibilities

1 Introduction

The Clean Water Action Plan states that "States and tribes should work with public agencies and private-sector organizations and citizens to develop, based on the initial schedule for the first two years, Watershed Restoration Action Strategies, for watersheds most in need of restoration." A WRAS is essentially a large-scale coordination plan for an eight-digit hydrologic unit watershed targeted by the Unified Watershed Assessment. In Indiana, 11 such units, including the Middle Ohio - Laughery watershed, were designated for restoration by the FFY 1999 Unified Watershed Assessment. Each year, the Assessment will be refined further as additional information becomes available, and targeted areas will become more specific. This will require amendments to the WRAS, which must be flexible and broad enough to accommodate change. The WRAS will also foster greater cooperation among State and Federal agencies, which should result in more effective use of personnel and resources.

The WRAS provides an opportunity to assemble, in one place, projects and monitoring that has been completed or is on going within a watershed. It also allows agencies and stakeholders to compare watershed goals and provides a guide for future work within a watershed.

The WRAS for the Middle Ohio - Laughery watershed contains two parts. Part I provides a characterization of water quality in the watershed and agency responsibilities. Part II provides a discussion of resource concerns and recommended strategies.

1.1 Purpose of This Document

The overall goal and purpose of the Watershed Restoration Action Strategy Part I is to provide a reference point and map to assist with improving water quality.

Part I of the Strategy is intended to be a fluid, living document in order to respond to the temporally dynamic quality of our environment. Therefore, Part I of the Strategy will require revision when new or different information becomes available.

1.2 Guide to the Use of This Document

Chapter 1: Introduction - This Chapter provides a non-technical description of the purpose of Part 1 of the Strategy. This Chapter also provides an overview of some stakeholder groups in the Middle Ohio-Laughery watershed.

Chapter 2: General Watershed Description- Some of the specific topics covered in this chapter include:

- An overview of the watershed
- Hydrology of the watershed
- A summary of land use within the watershed
- Natural resources in the watershed
- Population statistics
- Major water uses in the watershed
- Water quality classifications and standards.

Chapter 3: Causes and Sources of Water Pollution - This Chapter describes a number of important causes of water quality impacts including biochemical oxygen demand (BOD), toxic substances, nutrients, E. coli bacteria and others. This Chapter also describes both point and nonpoint sources of pollution.

Chapter 4: Water Quality and Use Support Ratings - This Chapter describes the various types of water quality monitoring conducted by IDEM, summarizes water quality in the watershed based on Office of Water Management data and presents a summary of use support ratings for those surface waters that have been monitored or evaluated. It also includes studies developed by Commonwealth, Inc. and Coastal Environmental, Inc. and some local water sampling information.

Chapter 5: State and Federal Water Quality Programs - Chapter 5 summarizes the existing State and Federal point and nonpoint source pollution control programs available to address water quality problems. These programs are management tools available for addressing the priority water quality concerns and issues that are discussed in Part II of the Strategy. Chapter 5 also describes the concept of Total Maximum Daily Loads (TMDLs). TMDLs represent management strategies aimed at controlling point and nonpoint source pollutants. IDEM's TMDL Strategy will also be discussed.

1.3 Stakeholder Groups in the Watershed

The Middle Ohio-Laughery watershed contains several organized stakeholder groups.

In July 1993, the *Laughery Creek Northern Steering Committee* was formed during a public meeting. The Committee has primarily focused erosion, fecal coliform, and chemical contamination of waterbodies. To address these issues, the Committee has worked to implement appropriate conservation practices and educational activities.(Ertel, 1999)

The Dearborn County Soil and Water Conservation District guided the formation of the *Tanners Creek Steering Committee*. This group has discussed some potential areas of concern; however, they are currently targeting the development of a monitoring program that will provide some baseline information.(Stephenson, 1999)

2 General Watershed Description

This Chapter provides a general description of the Middle Ohio-Laughery watershed and includes the following:

Section 2.1	Middle Ohio-Laughery Watershed Overview
Section 2.2	Land Cover, Population, and Growth Trends
Section 2.3	Planning within the Watershed
Section 2.4	Agricultural and Forestry Activities in the Middle Ohio-Laughery Watershed
Section 2.5	Significant Natural Areas in the Middle Ohio-Laughery Watershed
Section 2.6	Surface Water Use Designations and Classifications
Section 2.7	US Geological Survey Water Use Information for the Middle Ohio-Laughery Watershed

2.1 Middle Ohio-Laughery Watershed Overview

The Middle Ohio-Laughery watershed is an 8 digit (05090203) hydrologic unit code (HUC) watershed in the southeast corner of Indiana. The watershed encompasses 800 square miles in 6 different counties and approximately 718 miles of perennial streams (Figure 2-1). It is subdivided into 80 sub-basins represented on the map by 14 digit HUCs (Figure 2-2). The Middle Ohio-Laughery watershed is located in the Muscatatuck Flats and Canyon Section, and Switzerland Hills Section, Natural Region. The Middle Ohio-Laughery watershed is comprised of numerous meandering creeks that eventually discharge to the Ohio River. The primary waterbody in the watershed is Laughery Creek, which is estimated to be 99 miles in length and drains over 214,000 acres. Other major waterbodies in the watershed are Tanners Creek, Ripley Creek, and North and South Hogan Creek. There are no major metropolitan areas in the watershed.

Geology/Soils

The majority of the watershed is underlain with Ordovician-age shale and limestone, which occurs under the entire area of Dearborn, Ohio and Switzerland counties, and most of Franklin county. The eastern half of Ripley county and the southeastern corner of Decatur county is underlain with limestone of Devonian-age. Eden, Carmel, Pate and Switzerland soils are common soils within the Ordovician areas, and have dominantly formed in clayey residuum from this bedrock material. These soils are primarily used for pasture or woodland. For building sites, shrink-swell and slippage of these soils are concerns. The Devonian-age limestone areas are predominantly covered by glacial till.

The western and northern parts of the watershed were covered by continental ice with the Illinoian stage being the most recent. The till, which varies in thickness, is covered by a mantle of loess. Hickory and Bonnell soils have formed in relatively thick Illinoian glacial till on slopes where the loess cap is thin or absent. These soils are mainly used for pasture or woodland.

The Avonburg, Cincinnati, Cobbsfork, and Rossmoyne soils have formed in materials consisting of, from the surface downward, silty loess, "gritty" loess, and Illinoian till. These soils are mainly used for cropland and pasture.

The flood plains within this area are dominated by loamy alluvial soils. Common soil types are Haymond, Wirt, Holton, and Dearborn. (USDA-NRCS, 1999)

Climate

Average yearly precipitation for the watershed is approximately 40 inches. Of this, approximately 23 inches, or about 60 percent usually falls in April through September. The average yearly snowfall is approximately 17 inches. January normal average temperatures are 31 degrees Fahrenheit, respectively, while July normal average temperatures are 72 degrees Fahrenheit, respectively (USDA Soil Survey of Ripley County and Part of Jennings County, Indiana, 1985).

2.2 Land Cover, Population, and Growth Trends

This section describes and discusses land cover, population, and population growth trends in the Middle Ohio-Laughery watershed.

2.3.1 General Land Cover

The U.S. Geological Survey - Biological Resources Division and the U.S. Fish and Wildlife Service are overseeing the National Gap Analysis Program. In Indiana, Indiana State University and Indiana University are carrying out the Indiana GAP Project which involves an analysis of current vegetative land cover through remote sensing (ISU 1999). This analysis provided vegetative land cover data in 30 x 30 meter grids (Figure 2-3). The following is a summary of vegetative cover in the watershed determined from the GAP image:

1.71%	Urban (impervious, low and high density)
49.27%	Agricultural vegetation (row crop and pasture)
47.07%	Forest vegetation (shrubland, woodland, forest)
1.25%	Wetland vegetation (Palustrine: forest, shrubland, herbaceous)
0.70%	Open Water

2.3.2 Population

The 1990 total population in the six counties that have land portions in the watershed was 119,600 (IBRC 1993). Table 2-1 shows a break down of population by county and estimated population projections. It should be noted that these numbers do not reflect the actual

population living in the Middle Ohio-Laughery watershed. (Figure 2-1) To reach a better estimate of the population of the Middle Ohio-Laughery watershed, the US Geological Survey Water-Use Report may be used. The 1990 and 1995 US Geological Survey Water Use Reports show a total population in the watershed of 58,320 in 1990 and 72,660 in 1995 (Table 2-6). These reports indicate that the population in the watershed appears to have grown by about 24.5% between 1990 and 1995.

The US Census and the Indiana Business Research Center also provide information about the population in cities and towns. Table 2-2 contains population estimates for various cities and towns located wholly within the watershed. Batesville is the largest city located in the watershed and in terms of population.

TABLE 2-1
Middle Ohio Laughery Watershed County Population 1990-2020*

County	1990	2000	2010	2020	% Change (1990 to 2020)
Dearborn	38,800	41,700	43,600	44,600	+14.9 %
Decatur	23,600	24,000	24,800	25,300	+7.2%
Franklin	19,600	20,400	21,300	21,900	+11.7%
Ohio	5,300	5,600	5,700	5,900	+11.3%
Ripley	24,600	25,500	26,600	27,600	+12.1%
Switzerland	7,700	7,900	8,000	7,900	+2.5%

* IBRC 1993

TABLE 2-2
Middle Ohio-Laughery Watershed City & Town Population Estimates*

City/Town	Census 1990	Estimate 1996	Percent Change (1990 to 1996)
Aurora	3,825	3,806	- 0.5
Batesville	4,720	5,330	12.9
Lawrenceburg	4,375	4,324	- 1.2
Moores Hill	649	825	27.1
Napolean	238	256	7.6
New Point	296	304	2.7
Osgood	1,688	1,836	8.8
Patriot	190	210	10.5
Milton	634	660	4.1
Saint Leon	493	619	25.6
Versailles	1,791	1,931	7.8
Rising Sun	2,311	2,076	- 10.2
Sunman	724	793	9.5
Milan	1,529	1,659	8.5
Vevay	1,393	1,429	2.6

* IBRC 1997

2.3.4 Planning within the Watershed

Dearborn County has begun working on a county wide planning process; however, it appears that this planning process has slowed down tremendously. The planning commission and the county commissioners will consider what environmental effects new developments will have on the surrounding natural resources (Baer, 1999).

In the early 1960's, Ohio County government officials began implementing zoning regulations. The zoning regulations have held firm with minimal changes over time and have proven to be beneficial. For example, Ohio County's three acre lot size minimum has controlled growth and reduced many potential septic system problems (Kittenbrink, 1999).

Ripley County is actively developing a Long Range Plan. The planning process began with funding from various grants and their local government. Water quality protection, along with other environmental concerns, will be addressed within this planning process (Osborn, 1999).

2.4 Agricultural and Forestry Activities in the Middle Ohio-Laughery Watershed

Agriculture and Forestry are very important land uses in the Middle Ohio-Laughery watershed. Section 2.3.1 shows that 96.34 percent of land cover in the watershed is agricultural or forest vegetation. This section provides an overview of the agricultural and forestry activities in the watershed. Specifically, Section 2.4.1 describes livestock operations, Section 2.4.2 describes crop production activities, and Section 2.4.3 forest management.

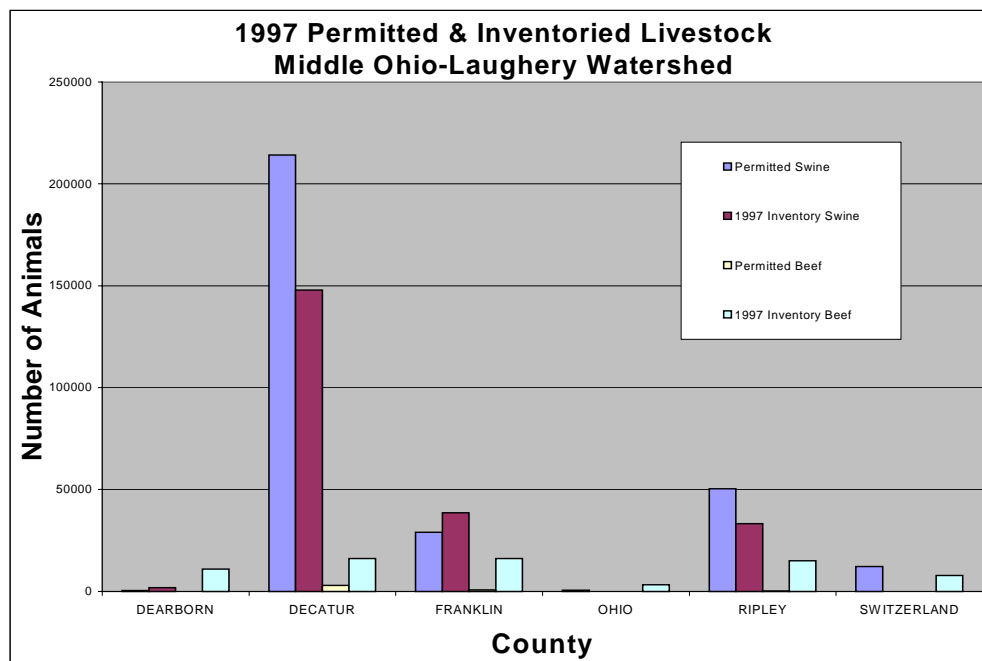
2.4.1 Livestock Operations

Confined feeding is the raising of animals for food, fur or recreation in lots, pens, ponds, sheds or buildings, where they are confined, fed and maintained for at least 45 days during any year, and where there is no ground cover or vegetation present over at least half of the animals' confinement area. Livestock markets and sale barns are generally excluded (IDEM 1999).

Indiana law defines a confined feeding operation as any livestock operation engaged in the confined feeding of at least 300 cattle, or 600 swine or sheep, or 30,000 fowl, such as chickens, ducks and other poultry. The IDEM regulates these confined feeding operations, as well as smaller livestock operations which have violated water pollution rules or laws, under IC 13-18-10.

There are 207 permitted livestock operations in the six counties of the watershed. The following are permitted farms by county:

- Dearborn 5
- Decatur 117
- Franklin 38
- Ohio 3
- Ripley 40
- Switzerland 4



Not all livestock operations require a permit from IDEM. Therefore, the actual number of livestock operations in the Middle Ohio-Laughery watershed is larger than the number of permitted operations. Table 2-3 shows the 1997 distribution of livestock throughout the six counties of the watershed. Hogs and pigs make up the largest number of domestic animal raised in the Middle Ohio-Laughery watershed.

2.4.2 Crop Production

The soils of the Middle Ohio-Laughery watershed are well suited for growing corn, soybeans, and wheat. Table 2-4 shows the acres of the major crops produced in 1997 throughout the six counties of the watershed. For 1997, total acres of corn planted for grain was the number one crop produced in the six counties. Corn and Soybeans are clearly the primary crops produced in the watershed on basis of total acres. Secondary crops are hay, wheat, and tobacco.

Conservation tillage trends have increased dramatically over the last ten years. The following are the estimated levels of conservation tillage within the watershed (Stephenson, 1999; Ertel, 1999). The following estimates of conservation tillage are based on total row cropland acres farmed:

- Dearborn 30%
- Decatur 40% (approx. 8500 acres in watershed area)
- Franklin 30% (approx. 8200 acres in watershed area)
- Ohio 30%
- Southern Ripley 75%
- Northern Ripley 65%
- Switzerland 80%

Most of the soybeans planted within the watershed area are now no-till drilled (Stephenson, 1999; Ertel, 1999).

2.4.3 Forest Management

Approximately 47% of the land cover is forest in the Middle Ohio-Laughery watershed. The soils within the Middle Ohio-Laughery watershed have the capability to grow some of the best hardwoods in the state. The Hickory Silt Loam soil can produce excellent Red and White Oak, Hickory, Ash, and Tulip Poplar stands. Other upland soil types produce excellent Sugar and Hard Maple, Sassafras and Beech stands. Bottomland soils range from poorly to well drained, which can produce a wide range of species that include Swamp White Oak, Sycamore, and Black Walnut.

Many of the forest acres are managed by individual landowners. Many of these landowners use the State District Foresters or private forestry consultants for guidance with forest management. Examples of standard practices used within this watershed include timber stand improvement, tree planting, and harvest management. A properly managed forest of high quality hardwoods will bring an average yearly return similar to, and in some cases, better than a corn and soybean rotation profit (Ertel, 1999).

**TABLE 2-3
Livestock in the Middle Ohio-Laughery Watershed**

1997 Livestock Inventory*								
County	Hogs and pigs		Cattle and calves		Sheep and lamb		Horse and pony	
	Number	State Rank**	Number	State Rank**	Number	State Rank**	Number	State Rank*
Dearborn	1,868	85	11,046	31	394	52	604	23
Decatur	147,844	4	16,193	16	591	39	382	48
Franklin	38,620	35	16,193	16	667	34	423	43
Ohio	D	88	3,327	83	--	--	102	86
Ripley	33,316	42	15,012	20	875	22	426	41
Switzerland	D	79	7,809	52	--	--	350	53

USDA 1997

(D) Cannot be disclosed. See "Census of Agriculture Volume 1 Geographic Area Series" for complete footnotes.

-- No Information

** State Rank is out of a total of 92 counties in Indiana

**TABLE 2-4
Crops Produced in the Middle Ohio-Laughery Watershed**

1997 Crop Area*								
County	Corn (grain)		Soybeans (beans)		Wheat		Hay crops	
	Acres	State Rank**	Acres	State Rank**	Acres	State Rank**	Acres	State Rank**
Dearborn	7,361	86	6,785	86	1,135	83	13,380	8
Decatur	83,777	22	62,057	39	9,023	13	5,393	51
Franklin	35,220	67	22,139	78	4,382	46	11,670	12
Ohio	2,066	90	1,704	90	--	--	5,071	56
Ripley	48,345	62	45,078	57	5,292	33	8,829	30
Switzerland	4,304	88	4,478	88	--	--	9,503	28

* USDA 1997

-- No Information

** State Rank is out of a total of 92 counties in Indiana

2.5 Significant Natural Areas in the Middle Ohio-Laughery Watershed

Laughery Creek was one of the 1,524 river segments identified by the National Park Service in its 1982 "Nationwide Rivers Inventory" as qualified for consideration in the National Wild and Scenic Rivers System. Specifically, the portion of Laughery Creek just east of Morris in Ripley County to confluence with the Ohio River qualified for consideration for inclusion in the National Wild and Scenic Rivers System (NRC 1997). It was also identified by the Indiana State Natural Heritage Programs or similar state programs as having outstanding ecological importance.

In 1993, the Indiana Natural Resources Commission adopted its "Outstanding Rivers List for Indiana." This listing is referenced in the standards for utility line crossings within floodways, formerly governed by IC 14-28-2 and now controlled by 310 IAC 6-1-16 through 310 IAC 6-1-18. Except where incorporated into a statute or rule, the listing is intended to provide guidance rather than to have regulatory application (NRC 1997). To help identify the rivers and streams that have particular environmental or aesthetic interest, a special listing has been prepared by IDNR's Division of Outdoor Recreation. The listing is a corrected and condensed version of a listing compiled by American Rivers which was dated 10/90. The natural resources commission has adopted the listing as an official recognition of the resource values of these waters. A river included in the listing qualifies under one or more of 22 categories. Table 2-5 presents the rivers in the Middle Ohio-Laughery watershed that are on the list and their significance.

Another significant natural area is Versailles State Park located two miles east of the town of Versailles. The 5,905 acre park has outstanding topographical features that include Laughery Creek which is joined by Fallen Timber Creek, scenic hillsides with limestone outcroppings, upland wooded areas and fields and brush. Fine specimens of oak, hickory, tulip poplar, beech, maple and walnut trees combine with dramatic changes in topography to give this park a diverse natural character. The park provides miles of trails, horseback riding, swimming, boating, fishing and camping (IDNR, 19--).

**TABLE 2-5
Waters of the Middle Ohio-Laughery on the Outstanding Rivers list for Indiana ***

River Segment	County	Significance
Laughery Creek Source just east of Morris in Ripley Co. to confluence with Ohio River	Dearborn, Ohio, Ripley	Nationwide Rivers Inventory Rivers. The 1,524 river segments identified by the National Park Service in its 1982 "Nationwide Rivers Inventory" as qualified for consideration for inclusion in the National Wild and Scenic Rivers System. Federal Public Lands Rivers. Rivers identified in U.S. Forest Service and Bureau of Land Management resource planning as potential additions to the National Wild and Scenic Rivers System. State Heritage Program Sites. Rivers identified by state natural heritage programs or similar state programs as having outstanding ecological importance.

*NRC 1997

2.6 Surface Water Use Designations and Classifications

The following uses are designated by the Indiana Water Pollution Control Board (327 IAC 2-1-3):

- Surface waters of the state are designated for full-body contact recreation during the recreational season (April through October).
- All waters, except limited use waters, will be capable of supporting a well-balanced, warm water aquatic community.
- All waters which are used for public or industrial water supply must meet the standards for those uses at the point where water is withdrawn.
- All waters which are used for agricultural purposes must, as a minimum, meet the minimum surface water quality standards.
- All waters in which naturally poor physical characteristics (including lack of sufficient flow), naturally poor or reversible man-induced conditions, which came into existence prior to January 1, 1983, and having been established by use attainability analysis, public comment period, and hearing may qualify to be classified for limited use and must be evaluated for restoration and upgrading at each triennial review of this rule.
- All waters which provide unusual aquatic habitat, which are an integral feature of an area of exceptional natural beauty or character, or which support unique assemblages of aquatic organisms may be classified for exceptional use.

All waters of the state, at all times and at all places, including the mixing zone, shall meet the minimum conditions of being free from substances, materials, floating debris, oil, or scum attributable to municipal, industrial, agricultural, and other land use practices, or other discharges (327 IAC 2-1-3):

- That will settle to form putrescent or otherwise objectionable deposits;
- That are in amounts sufficient to be unsightly or deleterious;
- That produce color, visible oil sheen, odor, or other conditions in such degree as to create a nuisance;
- Which are in amounts sufficient to be acutely toxic to, or to otherwise severely injure or kill aquatic life, other animals, plants, or humans.
- Which are in concentrations or combinations that will cause or contribute to the growth of aquatic plants or algae to such degree as to create a nuisance, be unsightly, or otherwise impair designated uses.

2.6.1 Surface Water Classifications in the Middle Ohio-Laughery Watershed

All waterbodies are classified for full body contact recreation during the recreational season, however, Laughery Creek in Ripley County from the Napoleon Sewage Treatment Plant to a point (3.0) miles downstream (County Road 300 West Extended) is designated for limited use.

2.7 US Geological Survey Water Use Information for the Middle Ohio-Laughery Watershed

The U.S. Geological Survey's National Water-Use Information Program is responsible for compiling and disseminating the nation's water-use data. The USGS works in cooperation with local, State, and Federal environmental agencies to collect water-use information at a site-specific level. USGS also compiles the data from hundreds of thousands of these sites to produce water-use information aggregated up to the county, state, and national levels. Every five years, data at the state and hydrologic region level are compiled into a national water-use data system. Table 2-6 shows the USGS Water-Use information for the Middle Ohio-Laughery Watershed for 1990 and 1995.

TABLE 2-6
1990 & 1995 Water Use Information for the Middle Ohio-Laughery Watershed

Population and Water Use totals	1990	1995
Total population in the watershed (thousands)	58.32	72.66
Public Water Supply		
Population served by public groundwater supply (thousands)	35.51	45
Population served by surface water supply (thousands)	7.38	12.72
Total population served by public water supply (thousands)	42.89	57.72
Total groundwater withdrawals (mgd)	4.4	5.04
Total surface water withdrawals (mgd)	2.03	2.32
Total water withdrawals (mgd)	6.43	7.36
Total per capita withdrawal (gal/day)	149.92	127.51
Population self-supplied with water (thousands)	15.43	14.94
Commercial Water Use		
Groundwater withdrawal for commercial use (mgd)	0	0
Surface water withdrawal for commercial use (mgd)	0.07	0.24
Deliveries from public water supplies for commercial use (mgd)	0.47	0.44
Total commercial water use (mgd)	0.54	0.68
Industrial Water Use		
Groundwater withdrawal for industrial use (mgd)	7.99	5.6
Surface water withdrawals for industrial use (mgd)	0	0
Deliveries from public water suppliers for industrial use (mgd)	0.68	0.71
Total industrial water use (mgd)	8.67	6.31
Agricultural Water Use		
Groundwater withdrawals for livestock use (mgd)	0.2	0.26
Surface water withdrawals for livestock use (mgd)	0.52	0.5
Total livestock water use (mgd)	0.72	0.76
Groundwater withdrawals for irrigation (mgd)	0	0
Surface water withdrawals for irrigation (mgd)	0	0
Total irrigation water use (mgd)	0	0
Thermoelectric Power Use		
Surface water for electric	769.4	610.49
Total electric use	769.4	610.49
Mining Use		
Groundwater withdrawals	3.3	3.24
Surface water withdrawals	0.18	0.14
Total withdrawals (mgd)	3.48	3.38

Notes:

mgd million gallon per day

gal/day gallon per day

* The water-use information presented in this table was compiled from information provided in the U.S. Geological Survey's National Water-Use Information Program data system for 1990 and 1995. The National Water-Use Information Program is responsible for compiling and disseminating the nation's water-use data. The U.S. Geological Survey works in cooperation with local, State, and Federal environmental agencies to collect water-use information at a site-specific level. Every five years, the U.S. Geological Survey compiles data at the state and hydrologic region level into a national water-use data system and are published in a national circular.

3 Causes and Sources of Water Pollution

A number of substances including nutrients, bacteria, oxygen-demanding wastes, metals, and toxic substances, cause water pollution. Sources of these pollution-causing substances are divided into two broad categories: point sources and nonpoint sources. Point sources are typically piped discharges from wastewater treatment plants, large urban and industrial stormwater systems, and other facilities. Nonpoint sources can include atmospheric deposition, groundwater inputs, and runoff from urban areas, agricultural lands and others. Chapter 3 includes the following:

- Section 3.1 Causes of Pollution
- Section 3.2 Point Sources of Pollution
- Section 3.3 Nonpoint Sources of Pollution

3.1 Causes of Pollution

“Causes of pollution” refer to the substances which enter surface waters from point and nonpoint sources and result in water quality degradation and impairment. Major causes of water quality impairment include biochemical oxygen demand (BOD), nutrients, toxicants (such as heavy metals, polychlorinated biphenyls [PCBs], chlorine, pH and ammonia) and E. coli bacteria. Table 3-1 provides a general overview of causes of impairment and the activities that may lead to their introduction into surface waters. Each of these causes is discussed in the following sections.

**TABLE 3-1
CAUSES OF WATER POLLUTION AND CONTRIBUTING ACTIVITIES**

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

3.1.1 *E. coli* Bacteria

E. coli bacteria are associated with the intestinal tract of warm-blooded animals. They are widely used as an indicator of the potential presence of waterborne disease-causing (pathogenic) bacteria, protozoa, and viruses because they are easier and less costly to detect than the actual pathogenic organisms. The presence of waterborne disease-causing organisms can lead to outbreaks of such diseases as typhoid fever, dysentery, cholera, and cryptosporidiosis. The detection and identification of specific bacteria, viruses, and protozoa, (such as *Giardia*, *Cryptosporidium*, and *Shigella*) require special sampling protocols and very sophisticated laboratory techniques which are not commonly available.

E. coli water quality standards have been established in order to ensure safe use of waters for 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, but they also come from improperly treated discharges of domestic wastewater. Common potential 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 (often followed by dechlorination), ozonation or ultraviolet light radiation.

3.1.2 *Toxic Substances*

327 IAC 2-1-9(45) defines toxic substances as substances which are or may become harmful to plant or animal life, or to food chains when present in sufficient concentrations or combinations. Toxic substances include, but are not limited to, those pollutants identified as toxic under Section 307 (a)(1) of the Clean Water Act. Standards for individual toxic substances are listed 327 IAC 2-1-6. Toxic substances frequently encountered include chlorine, ammonia, organics (hydrocarbons and pesticides) heavy metals and pH. These materials are toxic to different organisms in varying amounts, and the effects may be evident immediately or may only be manifested after long-term exposure or accumulation in living tissue.

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 whether 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. This follow-up testing is called a toxicity reduction evaluation. Other testing, or monitoring, done to detect aquatic toxicity problems include fish tissue analyses, chemical water quality sampling and assessment of fish community and bottom-dwelling organisms such as aquatic insect larvae. These monitoring programs are discussed in Chapter 4.

Each of the substances below can be toxic in sufficient quantity or concentration.

Metals

Municipal and industrial dischargers and urban runoff are the main sources of metal contamination in surface water. Indiana has stream standards for many heavy metals, but the most common ones in municipal permits are cadmium, chromium, copper, nickel, lead, mercury, and zinc. Standards are listed in 327 IAC 2-1-6. Point source discharges of metals are controlled through the National Pollution Discharge Elimination System (NPDES) permit process. Mass balance models are employed to determine allowable concentrations for a permit limit. Municipalities with significant industrial users discharging wastes to their treatment facilities limit the heavy metals from these industries through a pretreatment program. Source reduction and wastewater recycling at waste water treatment plants (WWTP) also reduces the amount of metals being discharged to a stream. Nonpoint sources of pollution are controlled through best management practices.

In Indiana, as well as many other areas of the country, mercury contamination in fish has caused the need to post widespread fish consumption advisories. The source of the mercury is unclear; however, atmospheric sources are suspected and are currently being studied.

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, the PCB contamination present in our surface waters and environment today is the result of historical waste disposal practices

Ammonia (NH₃)

Point source dischargers are one of the major sources of ammonia. In addition, discharge of untreated septic effluent, decaying organisms which may come from nonpoint source runoff and bacterial decomposition of animal waste also contribute to the level of ammonia in a waterbody. Standards for ammonia are listed in 327 IAC 2-1-6.

3.1.3 Oxygen-Consuming Wastes

Oxygen-consuming wastes include decomposing organic matter or chemicals which reduce dissolved oxygen in water through chemical reactions. Raw domestic wastewater contains high concentrations of oxygen-consuming wastes that need to be removed from the wastewater before it can be discharged into a waterway. Maintaining a sufficient level of dissolved oxygen in the water is critical to most forms of aquatic life.

The concentration of dissolved oxygen in a water body is one 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. Higher dissolved oxygen is produced by turbulent actions, such as waves, which mix air and water. Lower water temperatures also generally allows for retention of higher dissolved oxygen concentrations. 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.

Sources of dissolved oxygen depletion include wastewater treatment plant effluent, the decomposition of organic matter (such as leaves, dead plants and animals) and organic waste matter that is washed or discharged into the water. Sewage from human and household wastes is high in organic waste matter. Bacterial decomposition can rapidly deplete dissolved oxygen levels unless these wastes are adequately treated at a wastewater treatment plant. In addition, excess nutrients in a water body may lead to an over-abundance of algae and reduce dissolved oxygen in the water through algal respiration and decomposition of dead algae. Also, some chemicals may react with and bind up dissolved oxygen. Industrial discharges with oxygen consuming wasteflow may be resilient instream and continue to use oxygen for a long distance downstream.

3.1.4 Nutrients

The term nutrients in this Strategy refers to two major plant nutrients, phosphorus and nitrogen. These 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 favorable conditions, they can stimulate the occurrence of algal blooms and excessive plant growth in quiet waters or low flow conditions. The 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 is accentuated in hot weather and low flow conditions because of the reduced capacity of the water to retain dissolved oxygen.

3.2 Point Sources of Pollution

As discussed previously, sources of these pollution-causing substances are divided into two broad categories: point sources and nonpoint sources. This section focuses on point sources. Section 3.3.1 defines point sources and Section 3.3.2 discusses point sources in the Middle Ohio-Laughery watershed.

3.2.1 Defining Point Sources

Point sources refer 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 collection systems for medium and large municipalities which serve populations greater than 100,000 and stormwater discharges associated with industrial activity as defined in the Code of Federal Regulations [40 CFR 122.26(a)(14)]. The primary pollutants associated with point source discharges are oxygen-demanding wastes, nutrients, sediment, color and toxic substances including chlorine, 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). See Chapter 5 for a description of the NPDES program and permitting strategies.

3.2.2 Point Source Discharges in the Middle Ohio-Laughery Watershed

As of August 1999, there were 88 NPDES permits within the Middle Ohio-Laughery watershed (Table 3-2, Figure 3-1). Of the 88 NPDES permits, three (IN0002160, IN0024538, IN0039268) were considered major which either discharges over 1 million gallons per day or a population greater than 10,000. The other remaining 85 were considered minor dischargers.

Another point source covered by NPDES permits are combined sewer overflows (CSO). A combined sewer system is a wastewater collection system that conveys sanitary waste waters (domestic, commercial and industrial waste waters) and storm water through a single-pipe system to a Publicly Owned Treatment Works. CSOs are point sources subject to NPDES permit requirements including both technology-based and water quality-based requirements of the Clean Water Act. There are two (2) CSOs that discharge into the watershed and they are located in the city of Aurora.

In addition to the NPDES permitted dischargers in the watershed, there are an undetermined amount of unpermitted, illegal discharges to the Middle Ohio-Laughery watershed system. Illegal discharge of residential wastewater (septic tank effluent) to streams and ditches in the watershed is a problem throughout the watershed.

**Table 3-2
NPDES PERMITTED FACILITIES
MIDDLE OHIO-LAUGHERY CREEK WATERSHED**

NPDES	Facility Name	Maj/Mi	City	County	Status
ING080007	CSX Trans., Weslh Oil Property	Minor	Aurora	Dearborn	Inactive
ING250022	PSI Markland Hydroelectric Sta	Minor	Florence,	Switzerland	Active
ING490005	New Point Stone, Napoleon Quar	Minor	Batesville	Ripley	Active
INP000013	Batesville Casket Co.-Doll Plt	Minor	Batesville	Ripley	Active
INP000014	Randall/Textron	Minor	Vevay	Switzerland	Inactive
INP000029	Batesville Products, Inc	Minor		Dearborn	Inactive
INP000031	Hill-Rom Co., Inc./plating Pl.	Minor	Batesville	Ripley	Active
INP000033	Batesville Casket Co.-Hagman	Minor	Batesville	Ripley	Active
INP000039	Hill-Rom Company-Ritter Plant	Minor	Batesville	Ripley	Active
INP000064	Wood-Mizer Products, Inc.	Minor	Batesville	Ripley	Active
INP000184	Aurora Casket Company, Inc. #1	Minor	Aurora	Dearborn	Active
INP000185	Aurora Casket Co., Inc. #2	Minor	Aurora	Dearborn	Active
INP000186	Pri-Pak, Inc.	Minor	Lawrenceburg	Dearborn	Active
INP000187	Anchor Glass Container Corp.	Minor	Lawrenceburg	Dearborn	Active
INP000195	Joseph E. Seagram & Sons, Inc 1	Minor	Lawrenceburg	Dearborn	Active
INP000196	Joseph E. Seagram & Sons, Inc 2	Minor	Lawrenceburg	Dearborn	Active
INU043168	Valley Rural Utility Company	Minor	Lawrenceburg	Dearborn	Active
IN0001571	Laughery Gravel Co Inc	Minor		Dearborn	Inactive
IN0001694	Schenly Distillers, Inc.	Minor	Lawrenceburg	Dearborn	Inactive
IN0002160	American Electric Power, Tanne	Major	Lawrenceburg	Dearborn	Active
IN0003131	Joseph E. Seagram & Sons, Inc.	Minor	Lawrenceburg	Dearborn	Active
IN0003476	Hilltop Concrete	Minor		Switzerland	Inactive
IN0003557	Stedman Foundry & Mach Co Inc	Minor		Dearborn	Inactive
IN0004081	Hillenbrand Industries	Minor	Batesville	Ripley	Active
IN0004090	New Point Stone, Napoleon Quar	Minor	Batesville	Ripley	Inactive
IN0004642	Batesville Water Works	Minor	Batesville	Ripley	Active
IN0004910	Rising Sun Canning Corp	Minor		Ohio	Inactive
IN0020231	Vevay Municipal STP	Minor	Vevay	Switzerland	Active
IN0020885	Versailles #1 Municipal STP	Minor		Ripley	Inactive
IN0021237	Lawrenceburg Municipal STP	Minor		Dearborn	Inactive
IN0021393	Aurora Swq Trmt Plt	Minor		Dearborn	Inactive
IN0021679	Sunman Municipal STP	Minor	Sunman	Ripley	Active
IN0021695	Osgood Municipal STP	Minor	Osgood	Ripley	Active
IN0022322	Batesville City of Plt #1	Minor		Ripley	Inactive
IN0022331	Batesville City of Plt #2	Minor		Ripley	Inactive
IN0022781	Dillsboro Municipal STP	Minor	Dillsboro	Dearborn	Active
IN0023779	Milan Municipal STP	Minor	Milan	Ripley	Active
IN0023817	Moores Hill Municipal STP	Minor	Moores Hill	Dearborn	Active
IN0023868	Napoleon Municipal STP	Minor	Napoleon	Ripley	Active
IN0024201	Us Army COE-Louisville NPR	Minor		Ohio	Inactive
IN0024431	Rising Sun Municipal STP	Minor	Rising Sun	Ohio	Active
IN0024538	South Dearborn R.S.D.	Major	Lawrenceburg	Dearborn	Active
IN0029947	Walston's Mobile Home Park	Minor	Aurora	Dearborn	Active
IN0030376	IDNR Versailles State Park	Minor		Ripley	Inactive
IN0030384	Versailles State Park	Minor	Versailles	Ripley	Active
IN0030961	North Bend Farm	Minor		Switzerland	Inactive
IN0031160	Aurora Casket Co Inc	Minor		Dearborn	Inactive

Table 3-2 (Continued)

NPDES	Facility Name	Maj/Mi	City	County	Status
IN0031585	East Central High School	Minor	Brookville	Dearborn	Inactive
IN0035866	Hidden Valley Lake Utilities	Minor		Dearborn	Inactive
IN0035971	Hogan Hill Mobile Home Park	Minor		Dearborn	Inactive
IN0036005	Norbert Construction & Develop	Minor	Aurora	Dearborn	Inactive
IN0037109	Dendridge Mobile Park	Minor		Dearborn	Inactive
IN0038423	Plastic Moldings Corp.	Minor	EastEnterprise	Switzerland	Inactive
IN0038954	Camp Livingston	Minor	Bennington	Switzerland	Active
IN0039250	Batesville Municipal STP	Minor		Ripley	Inactive
IN0039268	Batesville Municipal STP	Major	Batesville	Ripley	Active
IN0039365	Greendale Municipal STP	Minor		Dearborn	Inactive
IN0042056	Hogan Hill Mobile Home Park	Minor	Aurora	Dearborn	Active
IN0042633	High Ridge Estates Subdivision	Minor	Aurora	Dearborn	Active
IN0042927	Osgood, Town of	Minor		Ripley	Inactive
IN0043061	Versailles Public Water Supply	Minor	Versailles	Ripley	Active
IN0043133	Milan Municipal Water Works	Minor	Milan	Ripley	Inactive
IN0043168	Hidden Valley Lake Subdivision	Minor	Lawrenceburg	Dearborn	Inactive
IN0044016	Anchor Glass Container Corp.	Minor	Lawrenceburg	Dearborn	Active
IN0044032	New Point Municipal STP	Minor	New Point	Decatur	Inactive
IN0044741	Tri-township Water Corp	Minor	Lawrenceburg	Dearborn	Inactive
IN0044806	Dillsboro Townhouses	Minor	Dillsboro	Dearborn	Inactive
IN0044814	Heritage Mobile Home Park	Minor		Dearborn	Inactive
IN0045306	Aurora Industrial Devel Corp	Minor		Dearborn	Inactive
IN0048143	Texas Gas Transmission Corp.	Minor	Statewide		Active
IN0050580	Switzerland County School Corp	Minor	Vevay	Switzerland	Inactive
IN0050903	Aurora, City of	Minor	Aurora	Dearborn	Active
IN0051501	Batesville Campground	Minor		Ripley	Inactive
IN0051551	Greendale Utilities PWS	Minor	Lawrenceburg	Dearborn	Inactive
IN0052523	Brownings Recreational Camp	Minor	Dillsboro	Dearborn	Active
IN0052701	North Dearborn Elem. School	Minor	Guilford	Dearborn	Inactive
IN0053759	Picnic Woods Development	Minor	Lawrenceburg	Dearborn	Active
IN0054089	Greendale Municipal STP	Minor	Lawrenceburg	Dearborn	Active
IN0054119	Whitewater Christian Service	Minor		Switzerland	Inactive
IN0054135	Perfect North Slopes	Minor	Lawrenceburg	Dearborn	Active
IN0055832	Silver Bell Nursing Home, Inc.	Minor	Versailles	Ripley	Active
IN0056391	Patriot Municipal STP	Minor	Patriot	Switzerland	Active
IN0056430	Texas Gas Trans. Corp.	Minor	Aurora	Dearborn	Inactive
IN0057118	Hillenbrand Remediation Proj.	Minor	Ripley County	Ripley	Active
IN0058041	East Enterprise RSD	Minor	Bennington	Switzerland	Active
IN0059200	Florence Regional Sewer Dist.	Minor		Switzerland	Active
IN0059897	All-Rite Ready Mix of IN	Minor	Aurora	Dearborn	Active
IN0060411	Friendship Regional Sewer Dist	Minor		Ripley	Active

3.3 Nonpoint Sources of Pollution

Nonpoint source pollution refers to runoff that enters surface waters through 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 including land development, construction, mining operations, crop production, animal feeding lots, timber harvesting, failing septic systems, landfills, roads and paved areas. Stormwater from large urban areas (>100,000 people) and from certain industrial sites is technically considered a point source since NPDES permits are required for piped discharges of stormwater from these areas.

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 source pollution, nonpoint pollution sources are diffuse in nature and occur at random time intervals depending on rainfall events. Below is a brief description of major areas of nonpoint sources of pollution in the Middle Ohio-Laughery watershed.

3.3.1 Agriculture

There are a number of activities associated with agriculture that can serve as potential sources of water pollution. Land clearing and plowing and/or disking make soils susceptible to erosion, which can then cause stream sedimentation. Pesticides and fertilizers (including chemical fertilizers and animal wastes) can be washed from fields, or improperly designed storage or disposal sites. Construction of drainage ditches on poorly drained soils enhances the movement of oxygen-consuming wastes, sediment and soluble nutrients into ground waters and surface waters.

Concentrated animal operations can be a significant source of nutrients, biochemical oxygen demand and E. coli bacteria if wastes are not properly managed. Impacts can result from over-application of wastes to fields, from leaking lagoons and from flows of lagoon liquids to surface waters due to improper waste lagoon management. Also there are potential concerns associated with nitrate-nitrogen movement through the soil from poorly constructed lagoons and from wastes applied to the soil surface.

Grassed waterways, conservation tillage, and no-till practices are several common practices used by many farmers to minimize soil loss. Maintaining a vegetated buffer between fields and streams is another excellent way to minimize soil loss to streams.

3.3.2 Urban/Residential

Runoff from urbanized areas, as a rule, is more localized and can often be more severe in magnitude than agricultural runoff. Any type of land-disturbing activity such as land clearing or excavation can result in soil loss and sedimentation. The rate and volume of runoff in urban areas is much greater due both to the high concentration of impervious surface areas and to storm drainage systems that rapidly transport stormwater to nearby surface waters. This

increase in volume and rate of runoff can result in streambank erosion and sedimentation in surface waters.

Urban drainage systems, including curb and guttered roadways, also allow urban pollutants to reach surface waters quickly and with little or no filtering. Pollutants include lawn care pesticides and fertilizers; automobile-related pollutants; lawn and household wastes; road salts, and E. coli bacteria (from animals and failing septic systems). The diversity of these pollutants makes it very challenging to attribute water quality degradation to any one pollutant.

Replacement of natural vegetation with pavement and removal of buffers reduces the ability of the watershed to filter pollutants before they enter surface waters. The chronic introduction of these pollutants and increased flow and velocity into a stream results in degraded waters. Many waters adjacent to urban areas are rated as biologically poor.

The population figures discussed in Section 2.3.2 are good indicators of where urban development and potential urban water quality impacts are likely to occur. The high growth of these areas may lead to further water quality problems associated with the addition of impervious surfaces next to surface waters.

3.3.3 Onsite Wastewater Disposal

Septic systems contain all of the wastewater from a household or business. A complete septic system consists of a septic tank and an absorption field to receive effluent from the septic tank. The septic tank removes some wastes, but the soil absorption field provides further absorption and treatment. 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 malfunction or are improperly placed, constructed or maintained, nearby wells and surface waters may become contaminated.

Some of the potential problems from malfunctioning septic systems include:

- **Polluted groundwater:** Pollutants in septic effluent include bacteria, nutrients, toxic substances, and oxygen-consuming wastes. Nearby wells can become contaminated by failing septic systems.
- **Polluted surface water:** Groundwater often carries the pollutants mentioned above into surface waters, where they can cause serious harm to aquatic ecosystems. Leaking septic tanks can also leak into surface waters both through or over the soil. In addition, some septic tanks may directly discharge to surface waters.
- **Risks to human health:** Septic system malfunctions can endanger human health when they contaminate nearby wells, drinking water supplies, and fishing and swimming areas.

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). However, 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."

3.3.4 Construction

Construction activities that involve excavation, grading or filling can produce significant sedimentation if not properly controlled. Sedimentation from developing urban areas can be a major source of pollution due to the cumulative number of acres disturbed in a watershed. Construction of single family homes in rural areas can also be a source of sedimentation when homes are placed in or near stream corridors.

As a pollution source, construction activities are typically temporary, but the impacts on water quality can be severe and long lasting. Construction activities tend to be concentrated in the more rapidly developing areas of the watershed. However, road construction is widespread and often involves stream crossings in remote or undeveloped areas of the basin.

4 Water Quality and Use Support Ratings in the Middle Ohio-Laughery Watershed

This section provides a detailed overview of water quality monitoring, water quality, and use support ratings in the Middle Ohio-Laughery watershed and includes the following:

- Section 4.1 Water Quality Monitoring Programs
- Section 4.2 Summary of Ambient Monitoring Data for the Middle Ohio-Laughery Watershed
- Section 4.3 Fish Consumption Advisories
- Section 4.4 Clean Water Act Section 305(b) Report
- Section 4.5 Clean Water Act Section 305(b) Assessment and Use-Support Methodology
- Section 4.6 Other Water Quality Monitoring of the Middle Ohio-Laughery Watershed

4.1 Water Quality Monitoring Programs

This section discusses water quality monitoring programs. Specifically, Section 4.1.1 describes Office of Water Management monitoring programs and Section 4.1.2 discusses local monitoring programs, such as volunteer monitoring.

4.1.1 Office of Water Management Programs

The Water Quality Assessment Branch of the Office of Water Management is responsible for assessing the quality of water in Indiana's lakes, rivers and streams. This assessment is performed by field staff from the Survey Section and the Biological Studies Section. Virtually every element of the surface water quality management program of IDEM is directly or indirectly related to one or more activities currently carried out by this Branch. The biological and surface water monitoring activities identify stream reaches, watersheds or segments where physical, chemical and/or biological quality has been or would be impaired by either point or nonpoint sources. This information is used to help allocate waste loads equitably among various sources in a way that would ensure that water quality standards are met along stream reaches in each of the nearly 100 stream segments in Indiana.

The purpose of the Surveys Section is to provide the water quality and hydrological data required for the assessment of Indiana's waters by conducting Watershed/Basin Surveys and Stream Reach Surveys. In 1996, the Section began a five (5) year synoptic study of the State's ten (10) major watersheds. Information from these studies will be integrated with data from biological and nonpoint source studies as well as the Fixed Station Monitoring Program to make a major assessment of the State's waters. Such surveys determine the extent to which water quality standards are being met and whether the fishable, swimmable and water supply uses are being maintained.

Information derived from this strategy will contribute significantly to improved planning processes throughout the Office of Water Management. This plan should initiate the development of interrelated action plans which encompass the wide range of responsibilities, such as rule making, permitting, compliance, non-point source issues, and waste water treatment facility oversight.

The Biological Studies Section conducts studies of fish and macroinvertebrate communities as well as stream habitats to establish biological conditions to which other streams may be compared in order to identify impaired streams or watersheds. The Biological Studies Section also conducts fish tissue and sediment sampling to pinpoint sources of toxic and bioconcentrating substances. Fish tissue data serve as the basis for fish consumption advisories which are issued, through the Indiana State Department of Health, to protect the health of Indiana citizens. This Section participates in the development of site-specific water quality standards.

The Biological Studies Section is responsible for determining the biological integrity of aquatic communities of Indiana lakes, rivers and streams. They do this through a variety of field and laboratory studies that involve several different forms of aquatic life. These data are used to determine compliance with the existing narrative biological criteria in the Indiana water quality standards, to form the basis for new specific numerical biological criteria, determine the extent of ecological harm, and make correlations to physical and/or chemical impairments which may occur.

The Biological Studies Section relies on Volunteer Water Quality Monitoring Programs to provide additional data on lakes and wetlands that may not be sampling sites in the Monitoring Strategy. Volunteer collected data provides IDEM scientists with overall water quality trends and early warning of problems that may be occurring in a lake or wetland. If volunteers detect that a lake or wetland is severely degraded, professional IDEM scientists will conduct follow up investigation.

The BSS also conducts fish tissue and sediment sampling to locate sources of contaminants whose concentrations in other environmental media are often too low to be easily found with routine sampling procedures. The fish tissue monitoring program provides the majority of data used for Indiana fish consumption advisories, wildlife health risk assessments for fish eating birds and mammals, and finally provides the information needed to develop models to assess changes in Indiana ecosystems that affect aquatic life and human health.

4.1.2 Local Volunteer Monitoring Programs

There are very few active volunteer monitoring programs throughout the Middle Ohio-Laughery watershed. Almost all of these volunteer monitoring programs are conducted through local schools and/or through Soil and Water Conservation Districts. The main focus of the various stream volunteer monitoring programs is education.

The Project CLEAR monitoring program was used for educational purposes and completed through the assistance of schools, organizations and residential volunteers. This activity has been completed.

There is no database available to hold the volunteering monitoring data for the Middle Ohio-Laughery watershed. In addition, the data collected by the various volunteer monitoring groups are for educational purposes and may not have a consistent level of quality. Therefore, the data and information collected by the volunteer monitoring groups are not readily accessible or usable by the Office of Water Management. However, IDNR's Hoosier

RiverWatch is initiating a new, higher level of volunteer monitoring training. Volunteer monitors receiving Hoosier RiverWatch's Level II training will be certified and be able to collect and produce data at consistent, higher level of quality. In addition, Hoosier RiverWatch and IDEM's Office of Water Management are working toward creating a volunteer monitoring database that would make volunteer monitoring data readily accessible.

4.2 Summary of Ambient Monitoring Data for the Middle Ohio-Laughery Watershed

IDEM's Office of Water Management designed a new surface water monitoring strategy in 1995 to assess the quality of Indiana waters within five years using a rotating basin approach. Approximately, one-fifth of the state is scheduled for monitoring each year for five years. The monitoring results are analyzed and each waterbody is assessed in the second year. Waterbody impairments are generally reported in the third year. In the year 2000, the Great Lakes and Ohio River Basin will be sampled. Presently, the IDEM's Office of Water Management does not have any fixed station monitoring sites in the Middle Ohio-Laughery watershed.

4.3 Fish Consumption Advisories

Each year since 1972, the Indiana Department of Natural Resources, the IDEM, and the Indiana State Department of Health have come together to create the Indiana Fish Consumption Advisory. Each year members from these three agencies meet to discuss the findings of recent fish monitoring data and to develop the new statewide fish consumption advisory.

The 1998 advisory is based on levels of PCBs and Mercury found in fish tissue. Fish are tested regularly only in areas where there is suspected contamination. In each area, samples were taken of bottom-feeding fish, top-feeding fish, and fish feeding in between. Over 1,600 fish tissue samples were analyzed for PCBs, pesticides, and heavy metals. Of those samples, 99% contained Mercury. Criteria for placing fish on the 1996 Indiana Fish Consumption Advisory have changed from using the Food and Drug Administration guidelines to using the Great Lakes Task Force risk-based approach.

Carp generally are contaminated with both PCBs and Mercury. Except as otherwise noted, Carp in all Indiana rivers and streams fall under the following risk groups:

- Carp, 15-20 inches - Group 3
- Carp, 20-25 inches - Group 4
- Carp over 25 inches - Group 5

In the Middle Ohio-Laughery watershed, there are no listed *streams and rivers* under the 1999 fish consumption advisory. Table 4-2 (a) shows the 1999 fish consumption advisories for Bischoff Reservoir and Versailles Lake, while Table 4-2 (b) shows the 1999 Ohio River fish consumption advisories.

TABLE 4-1 (a)
1999 Lakes and Reservoirs Advisory Report: Middle Ohio-Laughery Watershed

Location	Species	Fish Size (inches)	Contaminant	Group
Bischoff Reservoir (Ripley County)	Largemouth Bass	12- 15	Mercury	2
		15+	Mercury	3
Versailles Lake (Ripley County)	Largemouth Bass	14+	Mercury	3

TABLE 4-1 (b)
1999 Lakes and Reservoirs Advisory Report: Ohio River

Location	Species	Fish Size (inches)	Contaminant	Group
ALL	Carp	15-20	PCB's	3
		21-25		4
		25+		5
	Channel Catfish	13-18	PCB's	3
		19-21		4
		21+		5
	Flathead Catfish	Up to 22	PCB's	3
		22+		4
	Freshwater Drum	15	PCB's	3
		15+		4
	Largemouth Bass	11-13	PCB's	2
		13+		3
	Paddlefish**	ALL	PCB's	3
	Sauger	13-16	PCB's	3
		16+		4
	Smallmouth Buffalo	15-17	PCB's	3
17+		4		
Smallmouth Bass	13-15	PCB's	4	
	15+		5	
Spotted Bass	12-13	PCB's	2	
	13+		3	
Walleye	Up to 19	PCB's	3	
	19+		4	
White Bass	11-13	PCB's	3	
	13+		4	

** Special Note- this fish has been added as a precaution due to elevated levels of PCB's that have been noted in preliminary tissue and egg samplers.

The ISDH defines the Advisory Groups as follows:

- Group 1 Unrestricted consumption
- Group 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.
- Group 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.
- Group 4 One meal every 2 months (6 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.
- Group 5 No consumption (DO NOT EAT)

4.4 Clean Water Act Section 305(b) Report

Section 305(b) of the Clean Water Act requires states to prepare and submit to the EPA a water quality assessment report of state water resources. A new surface water monitoring strategy for the Office of Water Management was implemented in 1996 with the goal of monitoring all waters of the state by 2001 and reporting the assessments by 2003. Each year approximately 20 percent of the waterbodies in the state will be assessed and reported the following year. "Indiana 305(b) Report 1994-95" provides the most recent comprehensive report on the Middle Ohio-Laughery watershed and is the baseline report for areas of the state for which water quality assessments have not yet been updated (IDEM 1994-95). The methodology of the Clean Water Act Section 305(b) assessment and use support ratings are discussed in Section 4.5.

Table 4-2 contains the listing of the Middle Ohio Laughery watershed waterbodies assessed, status of designated use support, probable causes of impairment, and stream miles affected. This assessment was largely based on data collected during the summer of 1994.

From examination of Table 4-2, a two-mile section, within part of Laughery Creek below the community of Osgood, had a classification of *partial support* of aquatic life. The probable cause of the water quality impairment was organic matter and E. coli, possibly from the Municipal Sewage Treatment Plant. In 1998, the town of Osgood built a new sewage treatment plant (Ertel, 1999).

A two-mile section, within a tributary of Ripley Creek, located near Sunman was evaluated and given a classification of *non support* of aquatic life. The probable cause of the water quality impairment was organics and low dissolved oxygen, possibly from the Municipal Sewage Treatment Plant in Sunman.

The rest of the streams evaluated were classified as *full support* of aquatic life.

The Ohio River and its Indiana tributaries (excluding the Wabash River) drain approximately 5,800 square miles in Indiana. The Middle Ohio-Laughery watershed is one of seven major Indiana tributaries in the Ohio River Basin. Water quality monitoring of the Ohio River itself,

which forms the southern boundary of 13 Indiana counties is done by the Ohio River Valley Water Sanitation Commission (ORSANCO). A detailed discussion of the water quality conditions in the Ohio River main stem can be found in the 1994-1995 ORSANCO 305 (b) report.

TABLE 4-2
Middle Ohio-Laughery Watershed: Waters Assessed in the Clean Act
Section 305(b) Report 1994-95

Waterbody	Town/ County	Status	Causes	Comments
Tributary of Laughery Creek	Osgood	Partially Supporting; (Aquatic Life) Evaluated	Municipal STP Organics <i>E. coli</i>	Town built new treatment plant in 1998
Tributary of Ripley Creek	Sunman	Non-supporting; (Aquatic Life) Evaluated	Municipal STP Organics Low dissolved oxygen	State working with Sunman on new treatment plant
Laughery Creek	Ripley/ Ohio	Fully Supporting (Aquatic Life) Evaluated		3 miles of this stream in Ripley Co. downstream of Napoleon are designated for limited use.
Laughery Creek	Ripley/ Ohio	Fully Supporting (Aquatic Life) Evaluated		
North Fork Tanner Creek	Lawrence burg	Fully Supporting (Aquatic Life) Evaluated		
South Fork Tanner Creek	Lawrence burg	Fully Supporting (Aquatic Life) Evaluated		
North Hogan Creek	Aurora	Fully Supporting (Aquatic Life) Evaluated		
South Hogan Creek	Aurora	Fully Supporting (Aquatic Life) Evaluated		
Indian Creek	Vevay	Fully Supporting (Aquatic Life) Evaluated		
Plum Creek	Vevay	Fully Supporting (Aquatic Life) Evaluated		

4.5 Clean Water Act Section 305(b) Assessment and Use Support: Methodology

The Office of Water Management determines use support status for each stream and waterbody in accordance with the assessment guidelines provided by EPA (1997). Results from four monitoring programs are integrated to provide an assessment for each stream and waterbody:

- Physical/chemical water column results.
- Benthic aquatic macroinvertebrate community assessments.
- Fish tissue and surface aquatic sediment contaminant results.
- *E. coli* monitoring results.

The assessment process was applied to each data sampling program. Then the individual assessments were integrated into an overall assessment for each waterbody by use designation: aquatic life support, fish consumption, recreational use. River miles in a watershed appear as one waterbody while each lake in a watershed is reported as a separate waterbody.

Physical/chemical data for toxicants (total recoverable metals), conventional water chemistry parameters (dissolved oxygen, pH, and temperature), and bacteria (*E. coli*) were evaluated for exceedance of the Indiana Water Quality Standards (327 IAC 2-1-6). U.S. EPA 305(b) Guidelines were applied to sample results as indicated in Table 4-3 (U.S. EPA 1997b).

**TABLE 4-3
Criteria for Use Support Assessment***

Parameter	Fully Supporting	Partially Supporting	Not Supporting
Aquatic Life Use Support			
Toxicants	Metals were evaluated on a site by site basis and judged according to magnitude of exceedance and the number of times exceedances occurred.		
Conventional inorganics	There were very few water quality violations, almost all of which were due to natural conditions.		
Benthic aquatic macroinvertebrate Index of Biotic Integrity (mIBI)	mIBI \geq 4.	mIBI < 4 and \geq 2.	mIBI < 2.
Qualitative habitat use evaluation (QHEI)	QHEI \geq 64.	QHEI < 64 and \geq 51.	QHEI < 51.
Fish community (fIBI) (Lower White River only)	IBI \geq 44.	IBI < 44 and \geq 22	IBI < 22.
Sediment (PAHs = polynuclear aromatic hydrocarbons. AVS/SEM = acid volatile sulfide/ simultaneously extracted metals.)	All PAHs \leq 75 th percentile. All AVS/SEMs \leq 75 th percentile. All other parameters \leq 95 th percentile.	PAHs or AVS/SEMs > 75 th percentile. (Includes Grand Calumet River and Indiana Harbor Canal sediment results, and so is a conservative number.)	Parameters > 95 th percentile as derived from IDEM Sediment Contaminants Database.
Indiana Trophic State Index (lakes only)	Nutrients, dissolved oxygen, turbidity, algal growth, and sometimes pH were evaluated on a lake-by-lake basis. Each parameter judged according to magnitude.		
Fish Consumption			
Fish tissue	No specific Advisory*	Limited Group 2 - 4 Advisory*	Group 5 Advisory*
* Indiana Fish Consumption Advisory, 1997, includes a state wide advisory for carp consumption. This was not included in individual waterbody reports because it obscures the magnitude of impairment caused by other parameters.			
Recreational Use Support (Swimmable)			
Bacteria (cfu = colony forming units.)	No more than one grab sample slightly > 235 cfu/100ml, and geometric mean not exceeded.	No samples in this classification.	One or more grab sample exceeded 235 cfu/100ml, and geometric mean exceeded.

*From Indiana Water Quality Report for 1998

4.6 Other Water Quality Monitoring of the Middle Ohio Laughery Watershed

In 1996, Coastal Environmental Services, Inc conducted a Diagnostic-Feasibility Study on Versailles Lake and its watershed. This study (Coastal Environmental Services, Inc.) involved collecting water samples from Versailles Lake and several stations within the watershed with the goal of characterizing water quality in order to develop a watershed management plan.

The CES study found that the nutrient and sediment budgets calculated from land use information, wastewater treatment plant data and animal populations in the Versailles Lake watershed indicate that over 85% of the phosphorus load, 97% percent of the nitrogen load and virtually all of the suspended solids load to Versailles Lake are the result of runoff from nonpoint sources in the watershed. Animal wastes were estimated to contribute over 11% of the total phosphorus load and 1.6% of the total nitrogen load. Internal nutrient loading contributes about 2% of the total phosphorus load and less than 1% of the nitrogen load. Wastewater treatment plant effluent and rainfall on the lake surface contribute less than 1% of the nutrient and suspended solids loads to Versailles Lake. Groundwater contributions to the lake pollutant budgets were considered to be inconsequential (CES 1996).

During 1994 and 1999, Commonwealth Biomonitoring, Inc. conducted biological assessments in the Upper Laughery Creek watershed, starting at Versailles Lake and above (Coastal Environmental Services, Inc). The assessments involved the collection and study of benthic macroinvertebrates. The Commonwealth bioassessments found that stone flies, which are very sensitive to water quality and habitat degradation, made up less than 1% of the aquatic communities of Upper Laughery Creek in 1994 and were present at only half the study sites. In 1999, Commonwealth found that stone flies made up more than 10% of the aquatic community in Laughery Creek and were present at all study sites. The Commonwealth bioassessment concluded that habitat was degraded by silt covering the stream bottom at most sites in 1994. In 1999, aquatic habitat improved at each site because the percentage of silt "embeddedness" had significantly declined.(Commonwealth 1999)

During 1997, the Ohio County Soil and Water Conservation District collected water samples just below Versailles Lake and at the Heartland Crossing of Laughery Creek. The purpose of this water sample collection was to characterize the lower portion of the Laughery Creek watershed. Currently, the Ohio County Soil and Water Conservation District has not published a report that summarizes the results of this water sampling.

5 State and Federal Water Programs

This Chapter summarizes the existing point and nonpoint source pollution control programs available for addressing water quality problems in the Middle Ohio-Laughery watershed. Chapter 5 includes:

- Section 5.1 Indiana Department of Environmental Management Water Quality Programs
- Section 5.2 Indiana Department of Natural Resources Water Programs
- Section 5.3 USDA/Natural Resources Conservation Service Water Programs

5.1 Indiana Department of Environmental Management Water Quality Programs

This Section describes the water quality programs managed by the Office of Water Management within IDEM and includes:

- Section 5.1.1 State and Federal Legislative Authorities for Indiana's Water Quality Program
- Section 5.1.2 Indiana's Point Source Control Program
- Section 5.1.3 Nonpoint Source Control Programs
- Section 5.1.4 Integrating Point and Nonpoint Source Pollution Control Strategies
- Section 5.1.5 Potential Sources of Funding for Water Quality Projects

5.1.2 State and Federal Legislative Authorities for Indiana's Water Quality Program

Authorities for some of the programs and responsibilities carried out by the Office of Water Management are derived from a number of federal and state legislative mandates outlined below. The major federal authorities for the state's water quality program are found in sections of the Clean Water Act. State authorities are from state statutes.

Federal Authorities for Indiana's Water Quality Program

- The Clean Water Act Section 301 - Prohibits the discharge of pollutants into surface waters unless permitted by EPA.
- The Clean Water Act Section 303(c) - States are responsible for reviewing, establishing and revising water quality standards for all surface waters.
- The Clean Water Act Section 303(d) - Each state shall identify waters within its boundaries for which the effluent limits required by 301(b)(1) A and B are not stringent enough to protect any water quality standards applicable to such waters.
- The Clean Water Act Section 305(b) - Each state is required to submit a biennial report to the EPA describing the status of surface waters in that state.
- The Clean Water Act Section 319 - Each state is required to develop and implement a nonpoint source pollution management program.

- The Clean Water Act Section 402 - Establishes the National Pollutant Discharge Elimination System (NPDES) permitting program. Allows for delegation of permitting authority to qualifying states (which Indiana has received).
- The Clean Water Act Section 404/401 - Section 404 regulates the discharge of dredge and fill materials into navigable waters and adjoining wetlands. Section 401 requires the Corps to receive a state Water Quality Certification prior to issuance a 404 permit.

State Authorities for Indiana's Water Quality Program

IC 13-13-5 Designation of Department for Purposes of Federal Law: Designates the Indiana Department of Environmental Management as the water pollution agency for Indiana for all purposes of the Federal Water Pollution Control Act (33 U.S.C. 1251 et seq.) effective January 1, 1988, and the federal Safe Drinking Water Act (42 U.S.C. 300f through 300j) effective January 1, 1988.

5.1.2 Indiana's Point Source Control Program

The State of Indiana's efforts to control the direct discharge of pollutants to waters of the State were inaugurated by the passage of the Stream Pollution Control Law of 1943. The vehicle currently used to control direct discharges to waters of the State is the NPDES (National Pollutant Discharge Elimination System) permit program. This was made possible by the passage of the Federal Water Pollution Control Act Amendments of 1972 (also referred to as the Clean Water Act). These permits place limits on the amount of pollutants that may be discharged to waters of the State by each discharger. These limits are set at levels protective of both the aquatic life in the waters which receive the discharge and human health.

The State of Indiana was granted primacy from U.S. EPA to issue NPDES permits on January 1, 1975 through a Memorandum of Agreement.

U.S. EPA, Region V, has oversight authority for the NPDES permits program. Under terms of the Memorandum of Agreement, Region V has the right to comment on all draft Major discharger permits. In addition to NPDES, the Office of Water Management Permits Section has a pretreatment group which regulates municipalities in their development of municipal pretreatment programs and indirect discharges or those discharges of process wastewater to municipal sewage treatment plants through Industrial Waste Pretreatment permits and regulation of Stormwater, CSO's, and variance requests through a special projects group currently known as the Urban Wet Weather Group. Land Application of waste treatment plant sludge is no longer a part of the Office of Water Management but is now a part of the Office of Solid and Hazardous Waste.

The purpose of the NPDES permit is to control the point source discharge of pollutants into the waters of the State such that the quality of the water of the State is maintained in accordance with the standards contained in 327 IAC 2. The NPDES permit requirements must ensure that the minimum amount of control is imposed upon any new or existing point source through the application of technology-based treatment requirement contained in 327 IAC 5-5-2. According to 327 IAC 5-2-2, "Any discharge of pollutants into waters of the State as a point source discharge, except for exclusions made in 327 IAC 5-2-4 is prohibited unless in

conformity with a valid NPDES permit obtained prior to discharge." This is the most basic principal of the NPDES permit program.

The majority of NPDES permits have existed since 1974. This means that most of the permit writing is for permit renewals. Approximately 10% of each year's workload is attributed to new permits, modifications and requests for estimated limits. NPDES permits are designed to be re-issued every five years but are administratively extended in full force and effect indefinitely if the permittee applied for a renewal before the current permit expires.

There are several different types of permits that are issued in the NPDES permitting program. Table 5-1 lists and describes the various permits.

**TABLE 5-1
TYPES OF PERMITS ISSUED UNDER THE NPDES PROGRAM**

Type of Permit	Subtype	Comment
Municipal, Semi-Public or State (sanitary discharger)	Major	A facility owned by a municipality with a design flow Municipal of 1 MGD or greater (Cities, Towns, Regional Sewer Districts)
	Minor	Any municipally owned facility with a design flow of less than 1 MGD (Cities, Towns, Regional Sewer Districts)
	Semipublic	Any facility not municipally, State or Federally owned (i.e.- mobile home parks, schools, restaurants, etc.)
	State Owned	A facility owned or managed by a State agency (State parks, prisons, etc.)
	Federally	A facility owned by a federal agency (military Owned installation, national park, federal penitentiary, etc.)
Industrial (Wastewater generated in the process of producing a product)	Majors	Any point source discharger designated annually by agreement between the commissioner and EPA. Classification of discharger as a major involves consideration of factors relating to significance of impact on the environment, such as: Nature and quantity of pollutants discharged; Character and assimilative capacity of receiving waters; Presence of toxic pollutants in discharge; Compliance history of discharger.
	Minors	All dischargers which are not designated as major dischargers.
	Generals	General permit rule provides streamlined NPDES permitting process for certain categories of industrial point source discharges under requirements of the applicable general permit rule, rather than requirements of an individual permit specific to a single discharge. General permit rules: 327 IAC 15-7 Coal mining, coal processing, and reclamation activities; 327 IAC 15-8 Non-contact cooling water; 327 IAC 15-9 Petroleum product terminals; 327 IAC 15-10 Groundwater petroleum remediation systems; 327 IAC 15-11 Hydrostatic testing of commercial pipelines; 327 IAC 15-12 Sand, gravel, dimension stone or crushed stone operations.
	Cooling Water	Water which is used to remove heat from a product or process; the water may or may not come in contact with the product.
	Public Water Supply	Wastewater generated from the process of removing pollutants from ground or surface water for the purpose of producing drinking water.
Pretreatment Urban Wet Weather Group (Associated with NPDES but do not fall under same rule.)	Stormwater-related	Wastewater resulting from precipitation coming in contact with a substance which is dissolved or suspended in the water.
	Industrial Wastewater Pre-treatment	Processed wastewater generated by Industries that contribute to the overall wastewater received by the plant.
	Combined Sewer Overflows (CSOs)	Wastewater discharged from combined storm and sanitary sewers due to precipitation events. Municipal and Industrial Urban Wet Weather Programs

5.1.3 Nonpoint Source Control Programs

Nonpoint source (NPS) pollution is so named because the pollutants do not originate at single point sources, such as industrial and municipal waste discharge pipes. Instead, NPS pollutants are carried over fields, lawns, and streets by rainwater, wind, or snowmelt. This runoff may carry with it such things as fertilizer, road salt, sediment, motor oil, or pesticides. These pollutants either enter lakes and streams or seep into groundwater. While some NPS pollution is naturally occurring, most of it is a result of human activities.

Reducing NPS pollution requires careful attention to land use management and local geographic and economic conditions. The NPS Program was established to fully integrate methods for coping with the state's varied NPS water pollution problems. While a number of agencies and organizations currently have their own programs for addressing specific NPS issues, overall NPS coordination is being aided through the consolidated NPS Management Plan that was developed in the early stages of the Program's formation. Approximately 120 NPS-related projects have been funded and managed by the NPS Program since 1990. The NPS Management Plan was prepared in 1989, partially based on findings from the NPS Assessment Report, which was also completed that year. Some of the objectives of the Management Plan included the education of land users, the reduction and remediation of NPS pollution caused by erosion and sedimentation of forested and agricultural lands, and urban runoff. Other objectives addressed pesticide and fertilizer use, land application of sludge, animal waste practices, past and present mining practices, on-site sewage disposal, and atmospheric deposition. All of these objectives are being re-examined in an update and revision of the Management Plan.

The state's NPS Program, administered by the IDEM Office of Water Management's Watershed Management Section, focuses on the assessment and prevention of NPS water pollution. The program also provides for the exchange of education and information in order to improve the way land is managed. Through the use of federal funding for the installation of best management practices (BMPs), the NPS Program effectively reaches out to citizens and assist in the development of BMPs to manage land in such a way that less pollution is generated. The NPS program promotes a non-regulatory, voluntary approach to solving water quality problems.

The many nonpoint source projects funded through the Office of Water Management are a combination of local, regional, and statewide efforts sponsored by various public and not-for-profit organizations. The emphasis of these projects has been on the local, voluntary implementation of NPS water pollution controls. Since the inception of the program in the late 1980s, it has utilized over \$8 million of federal funds for the development of over 120 projects.

The federal Clean Water Act contains nonpoint source provisions in several sections of the Act including the Section 319 Nonpoint Source Program, the Section 314 Clean Lakes Program (no longer funded), the Section 104(b)(3) Watershed Management Program, and the Section 205(j) Water Quality Planning Program. The Section 319 program provides for various voluntary projects throughout the state to prevent water pollution and also provides for assessment and management plans related to water bodies in Indiana impacted by NPS pollution. Section 314 has assessment provisions that assist in determining the nonpoint and point source water quality impacts on lakes and provides recommendations for improvements,

but no longer receives funding. Section 104(b)(3) provides assistance in the development of watershed management planning efforts and education/information and implementation projects. Section 604(b) provides for planning activities relating to the improvement of water quality from nonpoint and point sources. The Watershed Management Section within the Planning Branch of the Office of Water Management provides for the administration of the Section 319 funding source for the NPS-related projects. The Financial Management Services Branch of the Office of Water Management administers the Section 104(b)(3) and Section 604(b) grants.

Clean Water Act Section 319(h) grant monies are made available to the states on an annual basis by EPA. Agencies and organizations in the state that deal with NPS problems submit proposals to the Office of Water Management each year for use of these funds in various projects.

One of the most important aspects of all NPS pollution prevention programs is the emphasis on the watershed approach to these programs. This calls for users in the watershed to become involved in the planning and implementation of practices which are designed to prevent pollution. By looking at the watershed as a whole, all situations causing the degradation of water quality will be addressed, not just a few.

5.1.4 Integrating Point and Nonpoint Source Pollution Control Strategies

Integrating point and nonpoint source pollution controls and determining the amount and location of the remaining assimilative capacity in a watershed are key long-term objectives of watershed management. The information is used for a number of purposes including: determining if and where new or expanded municipal or industrial wastewater treatment facilities can be allowed; setting the recommended treatment level at these facilities; and identifying where point and nonpoint source pollution controls must be implemented to restore capacity and maintain water quality standards.

Total Maximum Daily Loads

The Clean Water Act mandates an integrated point and nonpoint source pollution control approach. This approach, called a total maximum daily load (TMDL), uses the concept of determining the total pollutant loading from point and nonpoint sources that a waterbody can assimilate while still maintaining its designated use (maintaining water quality standards). EPA is responsible for ensuring that TMDLs are completed by States and for approving the completed TMDLs.

Under the TMDL approach, waterbodies that do not meet water quality standards are identified. States establish priorities for action, and then determine reductions in pollutant loads or other actions needed to meet water quality goals. The approach is flexible and promotes a watershed approach driven by local needs and directed by the State's list of priority waterbodies. The overall goal in establishing the TMDL is to establish the management actions on point and nonpoint sources of pollution necessary for a waterbody to meet water quality standards.

The Office of Water Management at IDEM is in the process of reorganizing its work activities around a five year rotating basin schedule. The waters of the state have been grouped

geographically into six major river basins, and water quality data and other information will be collected and analyzed from each basin (or group of basins) once every five years). The schedule for implementing the TMDL Strategy is proposed to follow this rotating basin plan to the extent possible. The TMDL Strategy discusses activities to be accomplished in three phases. Phase One involves planning, sampling and data collection and would take place the first year. Phase Two involves TMDL development and would occur in the second year, and Phase Three is the TMDL implementation and would occur the third year. It is expected that some phases, especially implementation of TMDLs (Phase Three) in the basin(s), may take more than one year to fully accomplish.

Initially, as part of the TMDL Strategy in a watershed, the IDEM TMDL Program Manager, in coordination with the IDEM Basin Coordinator of the target basin, will develop an activity reference guide for each TMDL. This activity reference guide will provide: (1) a list of the necessary activities and tasks, (2) a schedule for completing activities and tasks associated with an individual TMDL, and (3) a roster that indicates which Section, staff, and /or contractor are responsible for completion of each activity/task.

In Phase Three, the TMDL scenario chosen in conjunction with watershed stakeholders during Phase Two will be used to develop a plan to implement the TMDL. During this process, stakeholder participation will be essential. The Basin Coordinator, in conjunction with the stakeholder groups, will develop a plan to implement the TMDL. Once the draft plan has been finalized through comments from stakeholder groups and IDEM, the plan becomes "draft-final" and open public review. Public meetings will be held in areas affected to solicit comments.

5.1.5 Potential Sources of Funding for Water Quality Projects

There are numerous sources of funding for all types of water quality projects. The sources of funding include federal and state agencies, nonprofits, and private funding. Funds may be loans, cost-share projects, or grants. Section 319(h) grants are discussed in some detail in Section 5.7.1. Other funding sources are listed in Section 5.7.2.

If a local government, environmental group, university researcher, or other individual or agency wants to find funding to address a local water quality problem, it is well worth the time to prepare a thorough but concise proposal and submit it to applicable funding agencies. Even if a project is not funded, persistence may be beneficial when funding agencies observe several consecutive proposals from the same group.

Section 319(h) Grants

EPA offers to the state Clean Water Act Section 319(h) grant moneys on an annual basis. These grants must be used to fund projects that address nonpoint source pollution issues. Some projects which the Office of Water Management has funded with this money in the past include best management practice (BMP) demonstrations, watershed water quality improvements, data management, educational programs, modeling, stream restoration, and riparian buffer establishment. Agencies, environmental groups, university researchers, and others in the state that have expertise in nonpoint source pollution problems are invited to submit Section 319(h) proposals to the Office of Water Management.

Office of Water Management staff review proposals for minimum 319 eligibility criteria such as:

- Does it support the state NPS Management Program milestones?
- Does the project address targeted, high priority watersheds?
- Is there sufficient nonfederal cost-share match available (25% of project costs)?
- Are measurable outputs identified?
- Is monitoring required? Is there a Quality Assurance/Quality Control plan for monitoring?
- If a Geographical Information System is used, is it compatible with that of the state?
- Is there a commitment for educational activities and a final report?

Office of Water Management staff separately review and rank each proposal which meets the minimum 319 eligibility criteria. In their review, members consider such factors as: technical soundness; likelihood of achieving water quality results; degree of balance lent to the statewide NPS Program in terms of project type; and competence/reliability of contracting agency. They then convene to discuss individual projects' merits, to pool all rankings and to arrive at final rankings for the projects. The Office of Water Management seeks a balance between geographic regions of the state and types of projects. All proposals that rank above the funding target are included in the annual grant application to EPA, with the Office of Water Management reserving the right to make final changes to the list. Actual funding depends on approval from EPA and yearly Congressional appropriations.

To obtain more information about applying for a Section 319(h) grant, contact:

Susan McCloud, Watershed Management Section Chief
IDEM Office of Water Management
100 N. Senate Avenue
P.O. Box 6015
Indianapolis, IN 46206-6015
(317) 232-0019

Other Sources of Funding

Besides Section 319(h) funding, there are numerous sources of funding for all types of water quality projects. The sources of funding include federal and state agencies, nonprofit, and private funding. Funds may be loans, cost-shares, or grants. Appendix E provides a summary list of agencies and funding opportunities.

5.2 Indiana Department of Natural Resources Water Programs

Division of Soil Conservation

The Division of Soil Conservation's mission is to ensure the protection, wise use, and enhancement of Indiana's soil and water resources. The Division's employees are part of Indiana's Conservation Partnership, which includes the 92 soil and water conservation districts (SWCDs), the USDA Natural Resources Conservation Service, and the Purdue University

Cooperative Extension Service. Working together, the partnership provides technical, educational, and financial assistance to citizens to solve erosion and sediment-related problems occurring on the land or impacting public waters.

The Division administers the T-by-2000 soil conservation and water quality program under guidelines established by the State Soil Conservation Board, primarily through the SWCDs in direct service to land users. The Division staff includes field-based resource specialists who work closely with land users, assisting in the selection, design, and installation of practices to reduce soil erosion and sediment on their land. Regional urban conservation specialists work primarily with developers, contractors, and others to address erosion and sediment concerns in urban settings, developments under construction, and in landfills. The Lake and River Enhancement staff (LARE) oversee all administrative, operational, and technical aspects of the LARE program, which provides financial assistance to local entities concerned with improving and maintaining water quality in public-access lakes, rivers, and streams (Figure 5-1).

Division of Water

The IDNR, Division of Water (DOW) is charged by the State of Indiana to maintain, regulate, collect data, and evaluate Indiana's surface and ground water resources.

The Engineering Branch of the DOW includes Dam and Levee Safety, Project Development, Surveying, Drafting, and Computer Services. The Dam and Levee Safety Section performs geotechnical and hydraulic evaluation on existing and proposed dams and levees throughout the State. The Project Development Section provides technical support to locally funded water resource projects along with engineering leadership and construction management to State funded water resource projects. The remaining sections provide support services to all Sections within the DOW such as reservoir depth mapping, topographic mapping, high waters marks, design of publications and brochures, and computer procurement and maintenance.

The Planning Branch of the DOW consists of Basin Studies, Coastal Coordination, Floodplain Management, Ground Water, Hydrology and Hydraulics, and Water Rights. Basin Studies are comprehensive reports on surface-and ground-water availability and use. Coastal Coordination is a communication vehicle to address Lake Michigan's diverse shoreline issues. Floodplain Management involves various floodplain management aspects including coordination with the National Flood Insurance Program and with State and Federal Emergency Management agencies during major flooding events. The Ground Water Section maintains the water-well record computer database and publishes reports and maps on the ground-water resource for the State. Hydrology and Hydraulics Section develops and reviews floodplain mapping and performs hydrologic studies and modeling. The Water Rights Section investigates and mediates groundwater/surface water rights issues, licenses water-well drillers, and develops well construction and abandonment procedures.

The Regulations Branch of DOW is made up of Stream Permits, Lake Permits, Permit Administration, Public Assistance, and Legal Counsel. The Stream Permits Section is responsible for reviewing permit applications for construction activity in the 100-year regulatory floodway along Indiana's waterways. The Lake Permits Section reviews construction projects at or below the legal lake level for all of Indiana's public freshwater lakes. Permit Administration Section provides administrative support to Branch staff, maintains the application database, and coordinates the application review process with other Divisions. The

Public Assistance Section provides technical assistance on possible permit applications on proposed construction projects, investigates and mediates unpermitted construction activities and in some cases with the support of Legal Counsel pursues legal action for violation of State laws.

5.3 USDA/Natural Resources Conservation Service Water Quality Programs

While there are a variety of USDA programs available to assist people with their conservation needs, the following primarily assistance programs are the principal programs available.

Conservation Technical Assistance (CTA)

The purpose of the program is to assist land-users, communities, units of state and local government, and other Federal agencies in planning and implementing conservation systems. The purpose of the conservation systems are to reduce erosion, improve soil and water quality, improve and conserve wetlands, enhance fish and wildlife habitat, improve air quality, improve pasture and range condition, reduce upstream flooding, and improve woodlands.

Objectives of the program are to: Assist individual land users, communities, conservation districts, and other units of State and local government and Federal agencies to meet their goals for resource stewardship and assist individuals to comply with State and local requirements. NRCS assistance to individuals is provided through conservation districts in accordance with the Memorandum of Understanding signed by the Secretary of Agriculture, the Governor of the State, and the conservation district. Assistance is provided to land users voluntarily applying conservation and to those who must comply with local or State laws and regulations. Assists agricultural producers to comply with the highly erodible land (HEL) and wetland (Swampbuster) provisions of the 1985 Food Security Act as amended by the Food, Agriculture, Conservation and Trade Act of 1990 (16 U.S.C. 3801 et. seq.) and the Federal Agriculture Improvement and Reform Act of 1996 and wetlands requirements of Section 404 of the Clean Water Act. NRCS makes HEL and wetland determinations and helps land users develop and implement conservation plans to comply with the law. They also provide technical assistance to participants in USDA cost-share and conservation incentive programs. The Agency collects, analyzes, interprets, displays, and disseminates information about the condition and trends of the Nation's soil and other natural resources so that people can make good decisions about resource use and about public policies for resource conservation. They also develop effective science-based technologies for natural resource assessment, management, and conservation.

Conservation Farm Option (CFO)

The Conservation Farm Option is a pilot program for producers of wheat, feed grains, cotton, and rice. The program's purposes include conservation of soil, water, and related resources, water quality protection and improvement, wetland restoration, protection and creation, wildlife habitat development and protection, or other similar conservation purposes. Eligibility is limited to owners and producers who have contract acreage enrolled in the Agricultural

Market Transition Act program, i.e. production flexibility contracts. The CFO is a voluntary program. Participants are required to develop and implement a conservation farm plan, which becomes part of the CFO contract covering a ten year period. CFO is not restricted as to what measures may be included in the conservation plan, so long as they provide environmental benefits.

Conservation of Private Grazing Land Initiative (CPGL)

The Conservation of Private Grazing Land initiative will ensure that technical, educational, and related assistance is provided to those who own private grazing lands. It is not a cost share program. This technical assistance will offer opportunities for: better grazing land management; protecting soil from erosive wind and water; using more energy-efficient ways to produce food and fiber; conserving water; providing habitat for wildlife; sustaining forage and grazing plants; using plants to sequester greenhouse gases and increase soil organic matter; and using grazing lands as a source of biomass energy and raw materials for industrial products.

Conservation Reserve Program (CRP)

The Conservation Reserve Program reduces soil erosion, protects the Nation's ability to produce food and fiber, reduces sedimentation in streams and lakes, improves water quality, establishes wildlife habitat, and enhances forest and wetland resources. It encourages farmers to convert highly erodible cropland or other environmentally sensitive acreage to vegetative cover, such as tame or native grasses, wildlife plantings, trees, filter strips, or riparian buffers. Farmers receive an annual rental payment for the term of the multi-year contract. Cost-share funding is provided to establish the vegetative cover practices.

Environmental Quality Incentives Program (EQIP)

The Environmental Quality Incentives Program provides technical, educational, and financial assistance to eligible farmers and ranchers to address soil, water, and related natural resource concerns on their lands in an environmentally beneficial and cost-effective manner. The program provides assistance to farmers and ranchers in complying with Federal, State, and tribal environmental laws, and encourages environmental enhancement. The program is funded through the Commodity Credit Corporation. The purposes of the program are achieved through the implementation of a conservation plan which includes structural, vegetative, and land management practices on eligible land. Five to ten year contracts are made with eligible producers. Cost-share payments may be made to implement one or more eligible structural or vegetative practices, such as animal waste management facilities, terraces, filter strips, tree planting, and permanent wildlife habitat. Incentive payments can be made to implement one or more land management practices, such as nutrient management, pest management, and grazing land management.

Fifty percent of the funding available for the program is targeted at natural resource concerns relating to livestock production. The program is carried-out primarily in priority areas that may be watersheds, regions, or multi-state areas, and for significant statewide natural resource concerns that are outside of geographic priority areas.

Watershed Surveys and Planning

The Watershed and Flood Prevention Act, P. L. 83-566, August 4, 1954, (16 U.S.C. 1001-1008) authorized this program. Prior to fiscal year 1996, small watershed planning activities and the cooperative river basin surveys and investigations authorized by Section 6 of the Act were operated as separate programs. The 1996 appropriations act combined the activities into a single program entitled the Watershed Surveys and Planning program. Activities under both programs are continuing under this authority.

The purpose of the program is to assist Federal, State, and local agencies and tribal governments to protect watersheds from damage caused by erosion, floodwater, and sediment and to conserve and develop water and land resources. Resource concerns addressed by the program include water quality, opportunities for water conservation, wetland and water storage capacity, agricultural drought problems, rural development, municipal and industrial water needs, upstream flood damages, and water needs for fish, wildlife, and forest-based industries.

Types of surveys and plans include watershed plans, river basin surveys and studies, flood hazard analyses, and flood plain management assistance. The focus of these plans is to identify solutions that use land treatment and nonstructural measures to solve resource problems.

Watershed Program and Flood Prevention Program (WF 08 or FP 03)

The Small Watershed Program works through local government sponsors and helps participants solve natural resource and related economic problems on a watershed basis. Projects include watershed protection, flood prevention, erosion and sediment control, water supply, water quality, fish and wildlife habitat enhancement, wetlands creation and restoration, and public recreation in watersheds of 250,000 or fewer acres. Both technical and financial assistance are available.

Wetlands Reserve Program (WRP)

The Wetlands Reserve Program is a voluntary program to restore wetlands. Participating landowners can establish conservation easements of either permanent or 30 year duration, or can enter into restoration cost-share agreements where no easement is involved. In exchange for establishing a permanent easement, the landowner receives payment up to the agricultural value of the land and 100 percent of the restoration costs for restoring the wetlands. The 30 year easement payment is 75 percent of what would be provided for a permanent easement on the same site and 75 percent of the restoration cost. The voluntary agreements are for a minimum 10 year duration and provide for 75 percent of the cost of restoring the involved wetlands. Easements and restoration cost-share agreements establish wetland protection and restoration as the primary land use for the duration of the easement or agreement. In all instances, landowners continue to control access to their land.

Wildlife Habitat Incentives Program (WHIP)

The Wildlife Habitat Incentives Program provides financial incentives to develop habitat for fish and wildlife on private lands. Participants agree to implement a wildlife habitat development plan and USDA agrees to provide cost-share assistance for the initial implementation of wildlife habitat development practices. USDA and program participants enter into a cost-share agreement for wildlife habitat development. This agreement generally lasts a minimum of 10 years from the date that the contract is signed.

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- Speiller, Joseph. 1999. Personal communication between Joseph Speiller, Switzerland County Health Department, and Andy Ertel, Regional Watershed Conservationist USDA-NRCS-IDEM about water quality concerns and septic system information. July 19.
- Stephenson, Terry. 1999. Personal communication between Terry Stephenson, District Conservationist USDA-NRCS, and Andy Ertel, Regional Watershed Conservationist USDA-NRCS-IDEM about tillage trends and local water quality issues in Dearborn and Switzerland Counties. July 12.
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APPENDIX A:

Watershed Stakeholders

LOCAL MIDDLE OHIO-LAUGHERY WATERSHED STAKEHOLDERS

Ripley County

Planning Commission
406 W US Highway 50
Versailles, IN
(812) 689-5505

Ripley County Building Inspector
P.O. Box 151
Versailles, IN
(812) 689-6068

Ripley County Health Dept
102 W 1st North St
Versailles, IN
(812) 689-5751

Ripley County Planning Comm
102 W 1st N St
Versailles, IN
(812) 689-6062

Solid Waste District
102 N Main St
Versailles, IN
(812) 689-3525

Transportation Dept
1805 S US Highway 421
Versailles, IN
(812) 689-5788

Historic Hoosier Hills, RC&D
P.O. Box 407
Versailles, IN
(812) 689-6410

Versailles Town Hall
118 W Water St
Versailles, IN
(812) 689-6181

Versailles Water & Sewage Works
E Perry St
Versailles, IN
(812) 689-5130

Highway Garage
2710 N Hasmer Hill Rd
Osgood, IN
(812) 689-4720

Ripley Co. Soil and Water Conservation District
1981 S. Industrial Park Rd
Suite 2
Versailles, IN

(812) 689-6410

Osgood Town Hall
147 West Ripley St
Osgood, IN

Ripley County Extension Service
525 W Beech St
Osgood, IN
(812) 689-6511

Switzerland County

Purdue Cooperative Extension
801 E Main St
Vevay, IN
(812) 427-3152

Switzerland Circuit Ct Clerk
212 W Main St
Vevay, IN
(812) 427-3175

Switzerland County 911 Adm
305 Liberty St
Vevay, IN
(812) 427-2943

Switzerland County Garage
708 W Seminary St
Vevay, IN
(812) 427-3578

Switzerland Housing Inc
803 E Main St
Vevay, IN
(812) 427-3827

Switzerland Co. Soil and Water Cons. District
105 East Pike Street
Vevay, IN
(812) 427-3126

USDA Natural Resources Cons. Service
105 East Pike Street
Vevay, IN
(812) 427-3126

USDA Farm Service Agency
105 East Pike Street
Vevay, IN
(812)427-3126

Switzerland CO. High school
1020 West Main
Vevay, IN

(812) 427-2626

Dearborn County

County Administrator
215 W High St # B
Lawrenceburg, IN
(812) 537-8824

County Of Dearborn
215 W High St
Lawrenceburg, IN
(812) 537-1040

Dearborn County Bldg
Inspector
215b W High St # 103
Lawrenceburg, IN
(812) 537-8822

Dearborn County Engineer
215 W High St # B
Lawrenceburg, IN
(812) 537-8820

Dearborn County Highway
Mntnc
215 W High St # B
Lawrenceburg, IN
(812) 537-8835

Dearborn County Planning
215b W High St
Lawrenceburg, IN
(812) 537-8821

Dearborn Co. Soil and Water Conservation District
10729 Randall Avenue
Suite #2
Aurora, IN
(812) 926-2406

Dearborn County Surveyor Office
215 W High St # B
Lawrenceburg, IN
(812) 537-8896

Ohio County

Co-Operative Extension Agent
412 Main St
Rising Sun, IN
(812) 438-3656

Ohio County Building Inspector
500 2nd St
Rising Sun, IN
(812) 438-3368

Ohio County Highway Garage
502 2nd St
Rising Sun, IN
(812) 438-2961

Ohio Co. Soil and Water Conservation District
P.O. Box 14
Rising Sun, IN

Franklin County

Franklin County Surveyor Office
459 Main St
Brookville, IN
(765) 647-5651

Franklin Planning
Commission
459 Main St
Brookville, IN
(765) 647-5731

Franklin County Co-Op Ext
483 Main St
Brookville, IN
(765) 647-3511

River Valley Resources
1025 E Freeland Rd
Greensburg, IN
(812) 663-8597

County Fairboard
7178 Blue Creek Rd
Brookville, IN
(765) 647-4422

Decatur County

Decatur County Area Plan
Comm
150 Courthouse Sq # 117
Greensburg, IN
(812) 663-8451

Decatur County Bldg
Inspector
150 Courthouse Sq # 117
Greensburg, IN
(812) 663-8451

Decatur County
Commissioner
150 Courthouse Sq # 109
Greensburg, IN

Decatur County Highway
Office
422 E County Road 300 N

Greensburg, IN
(812) 663-5721

Decatur County Highway
Office
781 E Base Rd
Greensburg, IN
(812) 663-2682

USDA Natural Resources
Conservation Service
108 Smith Road
Greensburg, IN 47240

USDA Natural Resources
Conservation Service
Box B, 10165
Oxford Pike
Brookville, IN 47012

State and Federal

IDNR District Wildlife Biologist
Crosley Fish and Wildlife Area
2010 South St. Hwy 3
North Vernon, IN
(812) 346-6888

USDA Farm Service Agency
10729 Randall Avenue, Suite #1
Aurora, IN
(812) 926-2406

USDA Farm Service Agency
1981 S Industrial Park Rd # 1
Versailles, IN
(812) 689-6410

USDA Natural Resources Cons. Service
10729 Randall Avenue, Suite # 2
Aurora, IN
(812) 926-2406

USDA Natural Resources Conservation Service
1981 S Industrial Park Rd # 2
Versailles, IN
(812) 689-6410

USDA Natural Resources
Conservation Service
105 East Pike Street
Vevay, In 47043

USDA Rural Development
1981 S Industrial Park Rd # 3
Versailles, IN
(812) 689-4224

Indiana Dept. of Natural Resources
Division of Soil Conservation
10729 Randall Avenue,
Suite #2
Aurora, IN
(812) 926-2406

Indian Dept. of Natural Resources
Division of Soil Conservation
1981 S Industrial Park Rd # 2
Versailles, IN
(812) 689-6410

Indiana DNR
Division of Soil Cons
10729 Randall Avenue
Suite#2
Aurora, IN
(812) 926-2406

INDR District Forester
Darrel Breedlove
Route 3
North Vernon, IN 47265
(812) 346-2286

State Middle Ohio-Laughery Stakeholders

Water Management (317) 232-8670

Indiana Farm Bureau

225 S East St
Indianapolis, IN 46202

Indiana Department of Natural Resources

402 West Washington Street
Indianapolis, IN 46204-2748

IDNR Field Representatives are located in the individual

Indiana Department of Environmental Management

100 N. Senate Ave
P.O. Box 6015
Indianapolis, IN 46206-6015

IDEM Switchboard
(317) 232-8603 or (800) 451-6027

Agricultural Liaison	(317) 232-8587
Air Management	(317) 233-0178
Community Relations	(317) 232-8128
Compliance and Technical Assistance	(317) 232-8172
Criminal Investigations	(317) 232-8128
Enforcement	(317) 233-5529
Legal Counsel	(317) 232-8493
Media and Communication Services	(317) 232-8560
Pollution Prevention And Technical Assistance	(317) 232-8172
Solid and Hazardous Waste Management	(317)233-3656

Division of Engineering	(317) 232-4150
Division of Entomology And Plant Pathology	(317) 232-4120
Division of Fish & Wildlife	(317) 232-4080
Division of Forestry	(317) 232-4105
Division of Historic Preservation & Archaeology	(317) 232-1646
Division of Law Enforcement	(317) 232-4010
Division of Nature Preservation	(317) 232-4052
Division of Oil and Gas	(317) 232-4055
Division of Outdoor Recreation	(317) 232-4070
Division of Public Information and Education	(317) 232-4200
Division of Reclamation	(317) 232-1547
Division of Safety and Training	(317) 232-4145
Division of Soil Conservation	(317) 232-3870
Division of State Parks and Reservoirs	(317) 232-4124
Division of Water	(317) 232-4160

Indiana State Department of Health

2 North Meridian St
Indianapolis, IN 46204
(317) 233-1325

Federal Middle Ohio-Laughery Watershed Stakeholders

USDA Natural Resources Conservation Service

6013 Lakeside Blvd
Indianapolis, IN 46278
(317) 290-3200

*NRCS Field Representatives are located
in the counties.*

U.S. EPA Region 5

77 West Jackson Blvd
Chicago, IL 60604
(312) 353-2000
(800) 632-8431

U.S. Army Corps of Engineers

Louisville District
Dr. Martin Luther King Jr. Place
Louisville, KY 4020

APPENDIX B

FUNDING SOURCES

FUNDING SOURCES

This listing of funding sources was derived from the November 1998 *Watershed Action Guide for Indiana*, which is available from the Watershed Management Section of IDEM.

FEDERAL CONSERVATION AND WATERSHED PROGRAMS

Environmental Protection Agency

Section 319, 604(b), and 104(b)3 Grants

Grants for conservation practices, water body assessment, watershed planning, and watershed projects. Available to non-profit or governmental entities. These monies, enabled by the Clean Water Act, are funneled through the Indiana Department of Environmental Management. *For details see IDEM below.*

U.S. Department of Agriculture (See county listings for local federal agency contacts.)

EQIP: Environmental Quality Incentive Program. Administered by the Natural Resources Conservation Service. Conservation cost-share program for implementing Best Management Practices, available to agricultural producers who agree to implement a whole-farm plan that addresses major resource concerns. Up to \$50,000 over a 5- to 10- year period. Some parts of the state are designated Conservation Priority Areas and receive a larger funding allotments.

WRP: Wetland Reserve Program. Administered by the Natural Resources Conservation Service. Easement and restoration program to restore agricultural production land to wetland. Easements may be for 10 years, 30 years, or permanent. Longer easements are preferred. Partnerships with other acquisition programs are encouraged. Restoration and legal costs are paid by NRCS. Landowner retains ownership of the property and may use the land in ways that do not interfere with wetland function and habitat, such as hunting, recreational development, and timber harvesting.

CRP: Conservation Reserve Program. Administered by the Farm Service Agency with technical assistance from NRCS. Conservation easements in certain critical areas on private property. Agricultural producers are eligible. Easements are for 10 or 15 years, depending on vegetative cover, and compensation payments are made yearly to replace income lost through not farming the land. Cost share is available for planting vegetative cover on restored areas.

WHIP: Wildlife Habitat Incentive Program. Administered by the Natural Resources Conservation Service. Cost share to restore habitat on previously farmed land. Private landowners who are agricultural producers are eligible. Cost share up to 75%, and contracts are for 10 years.

FIP: Forestry Incentive Program. Administered by the Natural Resources Conservation Service. Cost-share to assist forest management on private lands. Funds may be limited.

U.S. Fish & Wildlife Service

Partners for Wildlife: assistance for habitat restoration.

STATE CONSERVATION AND WATERSHED PROGRAMS

IDNR Division of Soil Conservation

LARE: Lake & River Enhancement Program. Funds diagnostic and feasibility studies in selected watersheds and cost-share programs through local Soil & Water Conservation Districts. Project oversight provided through county-based Resource Specialists and Lake & River Enhancement Watershed Coordinators. Funding requests for Watershed Land Treatment projects must come from Soil & Water Conservation Districts. If a proposed project area includes more than one district, the affected SWCDs should work together to develop an implementation plan. The SWCDs should then apply for the funding necessary to administer the watershed project. Before applying for funding, the SWCDs should contact the Lake & River Enhancement Coordinators to determine (1) the appropriate watershed to include in the project, (2) if the proposed project meets the eligibility criteria, and (3) if funding is available.

IDNR Division of Fish & Wildlife

Classified Wildlife Habitat Program: 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. IDNR provides management plans and assistance through District Wildlife Managers. See county listings.

Wildlife Habitat Cost-share Program: Similar to above.

IDNR Division of Forestry

Classified Forest Program: Incentive program to foster private forest management through tax reduction and technical assistance. Landowners need 10 or more acres of woods to be eligible. IDNR provides management plans and assistance through District Foresters. (See county listings.)

Classified Windbreak Act: Establishment of windbreaks at least 450 feet long adjacent to tillable land. Provides tax incentive, technical assistance through IDNR District Foresters.

Forest Stewardship Program & Stewardship Incentives Program: Cost share and technical assistance to encourage responsibly managed and productive private forests.

IDNR Division of Reclamation

Appalachian Clean Streams Initiative: Funds for acid mine drainage abatement.

IDNR Division of Nature Preserves

State Nature Preserve Dedication: Acquisition and management of threatened habitat.

IDEM Office of Water Management

State Revolving Fund: Available to municipalities and counties for facilities development. Will be available in 1999 for nonpoint source projects as well. Funding is through very low-interest loans.

Section 319 Grants: Available to nonprofit groups, municipalities, counties, and institutions for implementing water quality improvement projects that address nonpoint source pollution concerns. Twenty-five percent match is required, which may be cash or in-kind. Maximum grant amount is \$112,500. Projects are allowed two years for completion. Projects may be for land treatment through implementing Best Management Practices, for education, and for developing tools and applications for state-wide use.

Section 205(j) Grants, formerly called 604(b) Grants: Available to municipalities, counties, conservation districts, drainage districts. These are for water quality management projects such as studies of nonpoint pollution impacts, nonagricultural NPS mapping, and watershed management projects targeted to Northwest Indiana (including BMPs, wetland restoration, etc.)

Section 104(b)(3) Grants: These are watershed project grants for innovative demonstration projects to promote statewide watershed approaches for permitted discharges, development of storm water management plans by small municipalities, projects involving a watershed approach to municipal separate sewer systems, and projects that directly promote community based environmental protection. NOTE: the application time frame for IDEM grant programs is annually, by March 31st.

PRIVATE FUNDING SOURCES

National Fish and Wildlife Foundation

1120 Connecticut Avenue, NW Suite 900, Washington DC 20036. Nonprofit, established by Congress 1984, awards challenge grants for natural resource conservation. Federally appropriated funds are used to match private sector funds. Six program areas include wetland conservation, conservation education, fisheries, migratory bird conservation, conservation policy, and wildlife habitat.

Individual Utilities

Check local utilities such as IPALCO, CINergy, REMC, NIPSCO. Many have grants for educational and environmental purposes.

Indiana Hardwood Lumbermen's Association

Indiana Tree Farm Program

The Nature Conservancy

Land acquisition and restoration.

Southern Lake Michigan Conservation Initiative

Blue River Focus Area

Fish Creek Focus Area

Natural Areas Registry

Hoosier Landscapes Capitol Campaign

Conservation Technology Information Center (CTIC)

'*Know Your Watershed*' educational materials are available

Indiana Heritage Trust

Land acquisition programs

Ducks Unlimited

Land acquisition and habitat restoration assistance

Quail Unlimited

Pheasants Forever

Sycamore Land Trust

Acres Inc.

Land trust

Oxbow, Inc.

Land trust

SOURCES OF ADDITIONAL FUNDING OPPORTUNITIES

Catalog of Federal Funding Sources for Watershed Protection

EPA Office of Water (EPA841-B-97-008) September 1997

GrantsWeb: <http://web.fie.com/cws/sra/resource.htm>

Middle Ohio-Laughery Watershed Restoration Action Strategy

Part II: Concerns and Recommendations

Prepared by

Indiana Department of
Environmental Management
Office of Water Management

June 2000

Foreword

The First Draft (October 1999) of the Watershed Restoration Action Strategy (WRAS) was reviewed internally by IDEM and revised accordingly. The Second Draft (Spring 2000) was reviewed by stakeholders and revised accordingly. This Third Draft (June 2000) is intended to be a living document to assist restoration and protection efforts of stakeholders in their sub-watersheds. As a "living document" information contained within the WRAS will need to be revised and updated periodically.

The WRAS is divided into two parts: Part I, Characterization and Responsibilities and Part II, Concerns and Recommendations.

Andy Ertel, Resource Conservationist
IDEM Office of Water Management
100 N. Senate Avenue
P.O. Box 6015
Indianapolis, IN 46206-6015

Andy.Ertel@in.usda.gov

Middle Ohio-Laughery Watershed Restoration Action Strategy

Part II: Concerns and Recommendations

Part II of the Watershed Restoration Action Strategy discusses the water quality concerns identified for the Middle Ohio-Laughery watershed and lists recommended management strategies to address these concerns.

Part II includes:

- Section 1 Water Quality Concerns and Priority Issues Identified by Watershed Groups and Local Agencies
- Section 2 Water Quality Concerns and Priority Issues Identified by State and Federal Agencies
- Section 3 Identification of Impaired Waters
- Section 4 Priority Issues and Recommended Strategies
- Section 5 Future Actions and Expectations

1 Water Quality Concerns and Priority Issues Identified by Watershed Groups and Local Agencies

Tanner Creek Watershed Committee

In 1999, the Tanners Creek Watershed Committee was formed under the direction of the Dearborn County Soil and Water Conservation District (SWCD). This group is hoping to develop a monitoring program within the Tanners Creek watershed (Stephenson, 1999).

Local Health Departments

The County Health Departments within the Middle Ohio-Laughery watershed are constantly challenged in assisting homeowners with their septic systems.

The number of septic system permits issued varies from county to county. For example, Ohio County issues an average of 50 permits per year, while others like Dearborn County, average 150 permits per year. The lot size requirements are also different between counties, and range between one to three acres in size. All counties require that each site have a soils report. Newer septic system guidelines from the State Board of Health, require more linear footage in the adsorption area, usually at a shallower depth and, if necessary, the installation of a perimeter drain at the fragipan depth to help lower the water table (depending on the soil type). The County Health Departments feel that more recently installed septic systems are operating properly (Baer, 1999; Ketenbrink, 1999; Bryant, 1999; Speiller, 1999).

There are an undetermined amount of failing septic systems within the Middle Ohio-Laughery watershed. The following is a list of possible reasons why septic systems fail:

- lot sizes are too small (exception Ohio County)
- poor soils
- lack of septic system management
- increased water intake into system from readily available public water supply
- filter fields are too small
- weather
- poor building site selection
- misconception that septic systems are the same as sewer systems.
- septic tank not emptied frequently
- decomposing bacteria die from grease and other harmful items
- laundry

The Switzerland County Health Department is finding more private wells testing positive with high E. coli levels. Potential sources of E. coli may be from failed septic systems and poor livestock manure management (Speiller, 1999).

In addition, there are an undetermined amount of straight pipe outlets that discharge septic effluent to the soil surface, into road ditches, and/or into drainage field tiles. These systems are illegal and create a public health hazard through the spread of disease.

Currently, these illicit discharges are uncovered and addressed through two primary means: 1. The owner sells the property and must disclose the system, and 2. A complaint is filed by residents.

Septic system education appears to be an ongoing need in the watershed. Even though many homeowners receive individual education about septic system management; in time, homeowners forget or don't believe that their systems will experience problems.

TABLE 1-1
Wastewater Treatment Information in the Middle Ohio-Laughery Watershed

Community	Treatment Plant Facilities		Comments
	Yes	No	
Aberdeen		*	Seeking financial support from the Department of Commerce to help assist in the development of a sewer system.
Aurora	*		
Batesville	*		Previously was on a sewer ban.
Bright	*		
Florence	*		Installed sewer lines that will be connected to the new waste treatment system of the River Boat Hotel.
Friendship	*		In 1998, the town installed a new sewage treatment plant.
Gulford		*	Septic systems are located on bottom land soils which are occasionally saturated from flooding. In addition, homes in the area are typically located on only ¼ and ½ acre lots.
Hartford		*	Community was established around 1810, small clusters of homes on very small lot sizes.
Milan	*		Working with separating their storm drainage system from their sewer system for the past ten years.
Moore's Hills	*		Presently working towards a system upgrade.
Lake Dildear		*	Old development with homes on small lots and poor soils for septic systems. These were primarily summer homes; however, more people are now staying longer or living there permanently.
Lawrencburg	*		
Osgood,	*		New waste water treatment plant built in 1998.
Rising Sun	*		
Sunman	*		
Versailles	*		
Wilmington		*	Primarily ¼ acre lots, with poor soils for septic systems.

Soil and Water Conservation Districts

In 1997, the Soil and Water Conservation Districts in Dearborn, Ohio, Ripley and Switzerland counties held public meetings to identify local natural resource concerns. The following concerns and issues arose during those meetings:

- Ohio River and its tributaries are experiencing streambank erosion; need more Grassland Conservation to help control erosion

- Urban development is causing a major increase of streambank erosion and flooding downstream.
- Pesticides are a concern
- Bacterial problems that may exist from livestock and hog operations.
- Potential nutrient/pesticide contamination to surface and ground water.
- Water quality
- Soil erosion
- Nuisance wildlife
- Loss of wildlife habitat (small game and birds)
- Need more education about conservation
- Restoration of Versailles Lake

Laughery Creek Northern Steering Committee

In December 1990, the Historic Hoosier Hills Resource Conservation and Development (RC&D) initiated, through a CWA Section 314 Clean Lakes Program, a watershed restoration project in the upper Laughery Creek watershed (HUA 05090203110). Currently, the group is working with the IDNR Division of Parks and Recreation to complete the last objective of the project, dredging Versailles Lake.

The main focus of the project was to improve water quality through reducing sediment, bacteria, nutrient, and pesticide loading to the lake and increasing public awareness through education. This has been accomplished by installing numerous conservation practices and providing management workshops and education programs.

For more information about the project area contact Historic Hoosier Hills, RC&D or through the internet at www.seidata.com/~pclear.

2 Water Quality Concerns and Priority Issues Identified by State and Federal Agencies

This section presents the combined efforts of state and federal agencies, and universities, such as IDEM, IDNR, USDA-Natural Resources Conservation Service, Ohio River Valley Water Sanitation Commission, Purdue University, Indiana University, Indiana Geologic Survey, and US Geological Survey, to assess water quality concerns and priority issues in the Middle Ohio-Laughery watershed. This multi-organization effort formed the basis of the Unified Watershed Assessment for Indiana.

Indiana's Unified Watershed Assessment (UWA)

The UWA workgroup gathered a wide range of water quality data that could be used to characterize Indiana's water resources. These data were used in "layers" in order to sort the 8-digit HUC watersheds according to the present condition of the water in lakes, rivers, and streams. The workgroup used only those data which concerned the water column, organisms

living in the water, or the suitability of the water for supporting aquatic ecosystems. Each "layer" of information/data was partitioned by percentiles into scores. The scores ranged between 1 and 5, with a score of 1 indicative of good water quality or minimum impairment, and a score of 5 indicating heavily impacted or degraded water quality. The scoring derived through the UWA process is presented in Table 2-1.

The data layers listed in Table 2-1 can be defined as:

- ◆ Lake Fishery: Large mouth bass community information for lakes
- ◆ Stream Fishery: Small mouth bass community information for streams
- ◆ Mussel Diversity: Indicates waters supporting species which are sensitive to water quality degradation, especially siltation, water clarity, and toxic chemical in sediment.
- ◆ River Biodiversity: A multi-species diversity measure using vertebrates.
- ◆ Lake Trophic Scores: Indicator for the rate at which a lake is 'aging' due to inputs of nutrients and other factors
- ◆ Sediment Potential: Indicator of potential sediment input to waterbodies in the watershed

The sources and additional information for these data layers include:

- ◆ Lake Fishery: From IDNR fisheries surveys of lakes and reservoirs from 1972 to 1994. Raw scores were averaged for all lakes in the watershed.
- ◆ Stream Fishery: From IDNR fisheries surveys of streams from 1970 to 1994. Raw scores were averaged for all streams in the watershed.
- ◆ Aquatic Life Use Support: IDEM, Office of Water Management, Assessment Branch
- ◆ Fish Consumption Advisories: ISDH and IDEM, Office of Water Management, Assessment Branch
- ◆ Fish Index of Biotic Integrity: IDEM, Office of Water Management, Assessment Branch
- ◆ Qualitative Habitat Evaluation Index: IDEM, Office of Water Management, Assessment Branch
- ◆ Lake Trophic Scores: Indiana Clean Lakes Program through IDEM, Office of Water Management, Assessment Branch. This score was based on information gathered from sampling conducted in the 1970's and 1980's.
- ◆ Sediment Potential: U.S. Geological Survey scored the population rate of change and the 1996 Conservation Tillage Transect data. The scores were then added and normalized to produce a sediment yield indicator for each watershed.

From this analysis, mussel diversity appears to be the primary water quality concern for the Middle Ohio-Laughery watershed. River biodiversity and stream fishery are also significant concerns for this watershed. Overall, the average score of the indicators was 3.

**TABLE 6-1
RESULTS OF THE UNIFIED WATERSHED ASSESSMENT
FOR MIDDLE OHIO-LAUGHERY**

Data/Information Layer	Middle Ohio-Laughery (05090203) Score
Lake Fishery	2
Mussel Diversity	5
River Biodiversity	4
Lake Trophic Scores	3
Stream Fishery	4
Sediment Potential	2

Note:

The UWA scores range from 1 to 5, with a score of 1 indicating good water quality and a score of 5 indicating severe impairment.

Indiana's 2000-2001 Unified Watershed Assessment (UWA)

During summer 1999 the UWA workgroup used additional layers of information to identify the **resource concerns and stressors** for each of the 361 11-digit watersheds in Indiana. Examination of the human activities that have the potential to impact the ecosystem will help planners to focus on those areas where restoration may be most critical. Organizations can identify opportunities to use their programs and resources to address those areas.

This focusing process will illuminate areas where the interests of two or more partner agencies may converge. It is intended that this will lead to more effective allocation of resources for restoration and protection activities. At the local level, this information can assist groups to prioritize watershed activities and provide some discussion points for planning.

This amended assessment has the following benefits:

- ◆ Provides a logical process for targeting funds, which may be expanded or updated without changing the basic framework.
- ◆ Provides information at a finer resolution (11-digit hydrologic units) to agencies and local groups interested in watershed assessment.
- ◆ Identifies data gaps.
- ◆ Can be used as a compliment to other assessments, such as the 305(b) Report and 303(d) List.

Table 2-2 and Figure 2-1 show the results of the 2000-2001 UWA for the Middle Ohio-Laughery watershed.

3 Identification of Impaired Waters

Section 303(d) of the Clean Water Act requires states to identify waters that do not or are not expected to meet applicable water quality standards with federal technology based standards alone. States are also required to develop a priority ranking for these waters taking into account the severity of the pollution and the designated uses of the waters. Indiana's 303(d) list was approved by EPA on February 16, 1999.

Once the Section 303(d) list and ranking of waters is completed, the states are required to develop Total Maximum Daily Loads (TMDLs) for these waters in order to achieve compliance with the water quality standards. The TMDL is an allocation that determines the point and nonpoint source (plus margin of safety) load reductions required in order for the waterbody to meet water quality standards. IDEM's Office of Water Management has and continues to perform point source waste load allocations for receiving waters.

The following Middle Ohio-Laughery watershed waterbodies are on Indiana's 1998 Clean Water Act Section 303(d) list submitted and approved by EPA 303(d) list (Figure 6-1):

Ohio River: PCB fish consumption advisory, e-coli	severity ranking: Medium
Versailles Lake: Mercury fish consumption advisory	severity ranking: Low
Bischoff Reservoir: Mercury fish consumption advisory	severity ranking: Low

4 Priority Issues and Recommended Management Strategies

Part I provided the existing water quality information for the Middle Ohio-Laughery watershed and Part II lists priority issues and concerns from local, state, and federal stakeholders in the watershed. This section pulls together the priority issues and concerns held by all stakeholders and recommends management strategies. Underlying all discussions of priority issues and concerns is the fact that improving water quality in the Middle Ohio-Laughery watershed will also enhance the natural and recreational values within the watershed. Each subsection below focuses on a single priority issue.

4.1 Data\Information and Targeting

As in many of the watersheds in Indiana, there is a need for more water quality data and information in order to prioritize and target specific areas of the Middle Ohio-Laughery watershed. In addition to targeting areas, there is also an identified need for more data and information about the actual impact on water quality from nonpoint sources. Success in restoring water quality in the Middle Ohio-Laughery watershed is fundamentally based on identifying the specific geographic problem areas; identifying all sources contributing to the impairment of the waterbody; and quantifying the contribution of a pollutant by each source.

Recommended Management Strategy 1: Local SWCD's, along with the natural resource agencies, county extension service, and other interested personnel, need to gather and analyze existing water quality data. Once information is gathered, targeting and prioritization should be managed at the 14 digit HUC watershed area (Figure 2-2 of Part I). The targeting and prioritization will require input from stakeholders living in those geographic areas. The purpose of this prioritization and targeting is to enhance allocation of resources in the effort of improving water quality.

Recommended Management Strategy 2: Through the development of Total Maximum Daily Loads (TMDLs) for impaired waterbodies in the Middle Ohio-Laughery watershed, all sources contributing to the impairment of a waterbody will be identified and quantified in terms of their contribution to the waterbody. This includes gathering more data and information on nonpoint sources of water pollution. Throughout the TMDL process, information and feedback from watershed stakeholders will be required in order to generate appropriate allocation scenarios. The result of developing TMDLs will be an understanding of the impact of nonpoint sources on water quality in the watershed.

Recommended Management Strategy 3: As discussed in Part I, there has only been extensive monitoring in certain parts of the watershed. Other areas have limited monitoring data and some areas none. Local soil and water conservation districts appear to be a logical vehicle to organize and manage a volunteer water quality monitoring programs with groups or organizations. It may be possible that a district staff person perform some of the monitoring (if available). Assistance in setting up a quality monitoring program is available from Hoosier Riverwatch. Presently, a database that would hold the volunteer water quality monitoring data for the Middle Ohio-Laughery watershed does not exist.

4.2 Streambank Erosion and Stabilization

The cutting and erosion of streambanks within the Middle Ohio-Laughery watershed was identified by many local, state, and federal stakeholders as a major concern. This cutting and erosion increases the sediment load in waterbodies and directly impacts the scenic and recreational values of waterbodies in the Middle Ohio-Laughery watershed. Streambank cutting and erosion is often a function of many factors that include: stream energy and velocity, flooding, and land management. Increased drainage in headwater streams and ditches increases stream energies during rain fall events and often leads to increased streambank cutting and erosion downstream. Hence, this problem is not easily solved.

Recommended Management Strategy: The Office of Water Management's (IDEM) primary mission is water quality; specifically, what is in the water. It is not the role of the Office of Water Management to spearhead an effort to address streambank erosion/cutting and flooding. However, the Office of Water Management can suggest ways to approach this difficult problem.

Structural stabilization of specific streambank areas in the Middle Ohio-Laughery watershed may solve problems on a temporary basis. However, a comprehensive understanding of drainage, stream flows and energies, and land management practices is required to adequately approach this problem. Conservation partners (local, state, and federal) are actively working within their specific geographic areas (typically at the county level); however, this may not facilitate solving the streambank cutting and erosion problems because efforts may not be coordinated between headwater and downstream areas. For example, work in Ripley County, which contains many of

the headwaters of Laughery Creek, to increase drainage should take into account the work and efforts of downstream partners to reduce flooding and streambank cutting. Conservation efforts should be in the context of watersheds and span county boundaries in order to account for downstream impacts.

4.3 Failing Septic Systems and Straight Pipe Discharges

Local county health departments and other stakeholders have identified failing septic systems and straight pipe discharge from septic tanks as significant sources of water pollution in the Middle Ohio-Laughery watershed. Straight pipe discharges from septic tanks and septic tanks connected to drainage tiles are illegal (327 IAC 5-1-1.5); however, these practices are ongoing in the Middle Ohio-Laughery watershed.

Recommended Management Strategy: All of the County Health Departments have stressed that more education is needed pertaining to septic system management. Developing a workshop which provides information on the impacts of failed septic systems, regulations, alternative treatment systems, and financial assistance is a good start. Local stakeholders could partner to help share in the cost of this program. To further these educational efforts, the direct impact of communities discharging their septic tank effluent to waterbodies needs to be adequately characterized. This will involve coordination between the Office of Water Management, County Health Departments, the Indiana State Department of Health, and other stakeholders. The option of choice to eliminate the illegal discharges will be a cooperative effort between homeowners and local, state, and federal stakeholders. If a cooperative solution can not be reached, illicit dischargers will be required to cease discharge.

4.4 Water Quality - General

The Clean Water Act Section 303(d) list presented in Section 3 lists water quality limited waterbodies for the Middle Ohio-Laughery Creek watershed.

Recommended Management Strategy: The Clean Water Act requires states to complete TMDLs for waterbodies listed on the Section 303(d) list. The Office of Water Management is currently evaluating and exploring the modeling process and data needs required to complete TMDLs for the Section 303(d) listed waterbodies in the Middle Ohio-Laughery watershed. Completion of a TMDL will involve loading allocations of a pollutant to both point and nonpoint sources. The Office of Water Management is currently drafting a TMDL strategy that involves stakeholder input throughout the process. IDEM's Office of Water Management designed a new surface water monitoring strategy in 1995 to assess the quality of Indiana waters within five years using a rotating basin approach. Approximately, one-fifth of the state is scheduled for monitoring each year for five years. The monitoring results are analyzed and each waterbody is assessed in the second year. Waterbody impairments are generally reported in the third year. In the year 2000, the Ohio River Basin will be sampled.

4.5 Fish Consumption Advisories

As noted in Part I and Part II, fish consumption advisories are more of a major concern in the Ohio River. They are more of a minor concern for the Versailles Lake and Bischoff Reservoir waterbodies that are within the Middle Ohio-Laughery watershed.

Recommended Management Strategy 1: Any person eating fish should check the fish consumption advisory every year and follow the recommendations. Soil and Water Conservation Districts could run yearly spring articles about fish consumption recommendations through local media sources or their newsletter.

4.6 Nonpoint Source Pollution - General

Nonpoint source pollution contributions are often difficult to assess or quantify. Currently, loadings of nonpoint source pollutants to water are often inferred by examination of land use practices, without actual measurements. In addition, the actual water quality impairments related to nonpoint source pollutants have not been well characterized in the Middle Ohio-Laughery watershed. Finally, very few regulatory control mechanisms exist to control nonpoint source pollution.

Recommended Management Strategy 1: Through the TMDL development process, the Office of Water Management will identify, assess, and quantify nonpoint source pollutant loadings to impaired waterbodies. In order to accomplish this task, the Office of Water Management will work closely with local, state, and federal stakeholders at the watershed and subwatershed level. Loading scenarios for nonpoint source pollutants will be developed by the Office of Water Management and reviewed by local, state, and federal stakeholders. Implementation of nonpoint source controls will involve a blend of funding assistance and regulatory action, where applicable.

Recommended Management Strategy 2: Numerous funding mechanisms, such as Conservation Reserve Program, Environmental Quality Incentive Program, Lake and River Enhancement program, and 319(h) grants, exist to promote practices to reduce nonpoint source pollution in the watershed. For example, the CLEAR watershed project received two Section 319 grants, a Section 314 grant, and project funding from USDA federal and IDNR state water quality programs, totaling approximately \$1.1 million between 1990 and 1999. These programs helped the CLEAR project plan more efficiently and effectively in addressing nonpoint source pollution in the upper Laughery Creek watershed. Other watershed areas could receive similar types of treatment. The prioritization and targeting discussed previously in Part II should be used to allocate further application of resources.

4.7 Point Sources - General

During the 1998 Intensive Sampling by the Office of Water Management, several permitted dischargers were found to be discharging in excess of their permit limits. In addition, illicit point source discharges, such as tiles discharging septic tank effluent, exist in the watershed.

Recommended Management Strategy: The Permitting and Compliance Branch of the Office of Water Management is responsible for issuing and monitoring compliance of NPDES permit holders. Clearly, more emphasis and resources are needed to identify and correct illicit point sources and noncomplying point sources. Improving compliance of NPDES dischargers and identifying illicit dischargers will involve fostering a working relationship with other local, state, and federal stakeholders to monitor compliance and report unusual discharges or stream

appearance. In regards to illicit discharges, the Office of Water Management will work with local, state, and federal stakeholders to identify and eliminate these sources of water pollution.

5 Future Expectations and Actions

As discussed in Part I, this Watershed Restoration Action Strategy is intended to be fluid, living document that will be revised or amended as new information becomes available. Section 5.1 discusses expectations derived from the Strategy and how progress will be measured. Specific revisions and amendments to the Watershed Restoration Action Strategy are discussed in Section 5.2. Finally, the Watershed Restoration Action Strategy will be reviewed by all interested stakeholders before it becomes final, as described in Section 5.3.

5.1 Expectations and Measuring Progress

The Middle Ohio-Laughery Watershed Strategy provides a starting point to address water quality concerns held by local, state, and federal stakeholders. Part II provides recommended management strategies to help address these concerns.

Measurement of progress is critical to the success of any plan. Water quality improvements will not take place overnight. Measuring of progress in terms of water quality will be provided through the Office of Water Management Assessment Branch's rotating basin monitoring strategy. Specifically, they will be conducting sampling again in the Ohio River Basin, which includes the Middle Ohio-Laughery watershed, in the year 2000. This will allow an assessment of progress in improving water quality.

Appendix A contains a listing of the strategies, suggested milestones, and suggested time-frames for completion.

5.2 Expected Revisions and Amendments

This Watershed Restoration Action Strategy is intended to provide a starting point to improve water quality and measure the improvement. Hence, this document will require revisions and amendments as new information becomes available. The future revisions and amendments have been divided into those that are expected within the next year (Section 5.2.1) and those that will occur over a long-term basis (Section 5.2.2).

5.2.1 Long-Term Revisions and Amendments

The Office of Water Management is moving toward adopting a watershed management approach to solve water quality problems. Part of the watershed approach is the use of a rotating basin management cycle. The Assessment Branch of the Office of Water Management has already adopted this rotating basin cycle in its intensive monitoring and assessment of Indiana waterbodies (this is in addition to the already established fixed monitoring station

monitoring which occurs on a monthly basis). Based on the cycle the Assessment Branch is using, the next intensive monitoring of the Middle Ohio-Laughery watershed will occur during the sampling season of 2000. The information from the 2003 monitoring effort will be incorporated into the Watershed Restoration Action Strategy.

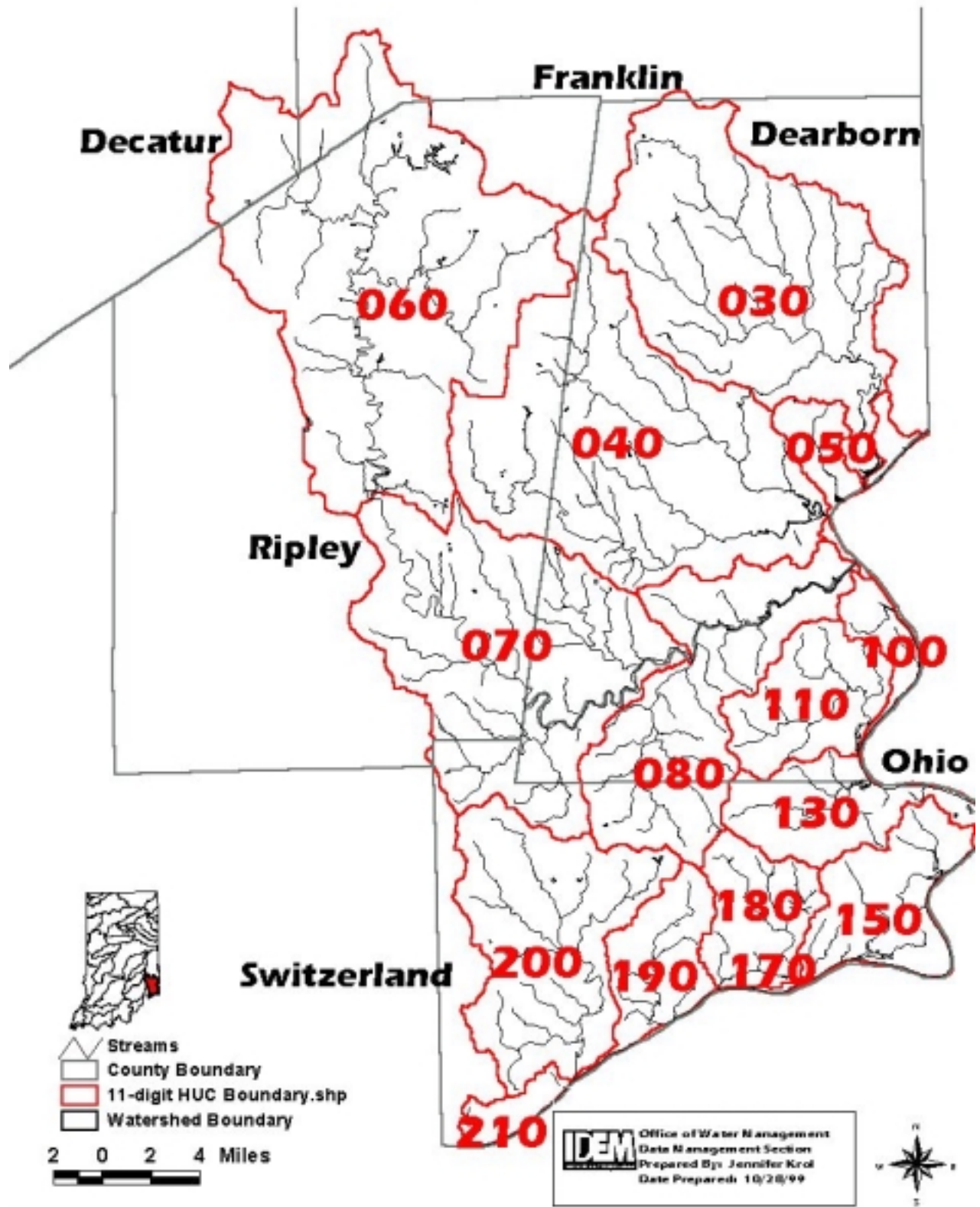
5.3 Review of the Watershed Restoration Action Strategy

Before this Watershed Restoration Action Strategy becomes final, it will undergo rigorous review. The first stage of review will be performed internally by the Office of Water Management. Once the Watershed Restoration Action Strategy has been revised to address internal Office of Water Management comments, it will be circulated to local, state, and federal stakeholders in the watershed and meetings within the watershed will be held to discuss the document. Written comments from local, state, and federal stakeholders will be addressed and the Watershed Restoration Action Strategy will again be revised to incorporate applicable comments. Once internal and external comments have been addressed, the final version of the Watershed Restoration Action Strategy will be released.

TABLE 2-2

HYDROLOGIC UNIT SCORES for Each Parameter Used in the Unified Watershed Assessment [2000-2001]																
11 Digit Hydrologic Unit	Mussel Diversity and Occurrence	Aquatic Life Use Support	Recreational Use Attainment	Stream Fishery	Lake Fishery	Eurasian Milfoil Infestation Status	Lake Trophic Status	Critical Biodiversity Resource	Aquifer Vulnerability	Population Using Surface Water for Drinking Water	Residential Septic System Density	Degree of Urbanization	Density of Livestock	% Cropland	Mineral Extraction Activities	
Middle Ohio-Laughery	05090203030	nd	nd	nd	2	nd	nd	2	5	2	4	2	2	1	1	
	05090203040	nd	nd	nd	nd	nd	nd	2	4	2	4	2	3	1	1	
	05090203050	nd	nd	nd	4	nd	nd	2	4	2	4	3	2	1	1	
	05090203060	nd	nd	nd	nd	nd	nd	3	4	2	2	2	3	2	1	
	05090203070	nd	nd	nd	1	nd	nd	3	4	2	3	2	3	1	1	
	05090203080	nd	nd	nd	4	nd	nd	2	4	2	3	2	2	1	1	
	05090203100	nd	nd	nd	nd	nd	nd	2	3	2	3	2	2	1	1	
	05090203110	nd	nd	nd	nd	2	nd	3	2	5	2	2	2	2	1	1
	05090203130	nd	nd	nd	nd	nd	nd	nd	2	5	2	3	2	3	1	1
	05090203150	3	nd	nd	nd	5	nd	nd	2	4	2	3	1	3	1	1
	05090203170	nd	nd	nd	nd	nd	nd	nd	2	2	2	3		3	1	1
	05090203180	3	nd	nd	nd	nd	nd	4	1	5	2	3	2	3	1	1
	05090203190	3	nd	nd	nd	nd	nd	nd	2	5	2	2	2	3	1	1
	05090203200	3	nd	nd	nd	nd	nd	nd	2	5	2	2	2	3	1	1
05090203210	3	nd	nd	nd	nd	nd	nd	1	5	2	2	1	3	1	1	

Middle Ohio-Laughery Watershed



APPENDIX A:
Watershed Stakeholders

LOCAL MIDDLE OHIO-LAUGHERY WATERSHED STAKEHOLDERS

Ripley County

Planning Commission
406 W US Highway 50
Versailles, IN
(812) 689-5505

Ripley County Building Inspector
P.O. Box 151
Versailles, IN
(812) 689-6068

Ripley County Health Dept
102 W 1st North St
Versailles, IN
(812) 689-5751

Ripley County Planning Comm
102 W 1st N St
Versailles, IN
(812) 689-6062

Solid Waste District
102 N Main St
Versailles, IN
(812) 689-3525

Transportation Dept
1805 S US Highway 421
Versailles, IN
(812) 689-5788

Historic Hoosier Hills, RC&D
P.O. Box 407
Versailles, IN
(812) 689-6410

Versailles Town Hall
118 W Water St
Versailles, IN
(812) 689-6181

Versailles Water & Sewage Works
E Perry St
Versailles, IN
(812) 689-5130

Highway Garage
2710 N Hasmer Hill Rd
Osgood, IN
(812) 689-4720

Ripley Co. Soil and Water Conservation District
1981 S. Industrial Park Rd

Suite 2
Versailles, IN
(812) 689-6410

Osgood Town Hall
147 West Ripley St
Osgood, IN

Ripley County Extension Service
525 W Beech St
Osgood, IN
(812) 689-6511

Switzerland County

Purdue Cooperative Extension
801 E Main St
Vevay, IN
(812) 427-3152

Switzerland Circuit Ct Clerk
212 W Main St
Vevay, IN
(812) 427-3175

Switzerland County 911 Adm
305 Liberty St
Vevay, IN
(812) 427-2943

Switzerland County Garage
708 W Seminary St
Vevay, IN
(812) 427-3578

Switzerland Housing Inc
803 E Main St
Vevay, IN
(812) 427-3827

Switzerland Co. Soil and Water Cons. District
105 East Pike Street
Vevay, IN
(812) 427-3126

USDA Natural Resources Cons. Service
105 East Pike Street
Vevay, IN
(812) 427-3126

USDA Farm Service Agency
105 East Pike Street
Vevay, IN
(812)427-3126

Switzerland CO. High school
1020 West Main
Vevay, IN
(812) 427-2626

Dearborn County

County Administrator
215 W High St # B
Lawrenceburg, IN
(812) 537-8824

County Of Dearborn
215 W High St
Lawrenceburg, IN
(812) 537-1040

Dearborn County Bldg
Inspector
215b W High St # 103
Lawrenceburg, IN
(812) 537-8822

Dearborn County Engineer
215 W High St # B
Lawrenceburg, IN
(812) 537-8820

Dearborn County Highway
Mntnc
215 W High St # B
Lawrenceburg, IN
(812) 537-8835

Dearborn County Planning
215b W High St
Lawrenceburg, IN
(812) 537-8821

Dearborn Co. Soil and Water Conservation District
10729 Randall Avenue
Suite #2
Aurora, IN
(812) 926-2406

Dearborn County Surveyor Office
215 W High St # B
Lawrenceburg, IN
(812) 537-8896

Ohio County

Co-Operative Extension Agent
412 Main St
Rising Sun, IN
(812) 438-3656

Ohio County Building Inspector
500 2nd St
Rising Sun, IN
(812) 438-3368

Ohio County Highway Garage
502 2nd St
Rising Sun, IN
(812) 438-2961

Ohio Co. Soil and Water Conservation District
P.O. Box 14
Rising Sun, IN

Franklin County

Franklin County Surveyor Office
459 Main St
Brookville, IN
(765) 647-5651

Franklin Planning
Commission
459 Main St
Brookville, IN
(765) 647-5731

Franklin County Co-Op Ext
483 Main St
Brookville, IN
(765) 647-3511

River Valley Resources
1025 E Freeland Rd
Greensburg, IN
(812) 663-8597

County Fairboard
7178 Blue Creek Rd
Brookville, IN
(765) 647-4422

Decatur County

Decatur County Area Plan
Comm
150 Courthouse Sq # 117
Greensburg, IN
(812) 663-8451

Decatur County Bldg
Inspector
150 Courthouse Sq # 117
Greensburg, IN
(812) 663-8451

Decatur County
Commissioner
150 Courthouse Sq # 109
Greensburg, IN

Decatur County Highway
Office
422 E County Road 300 N
Greensburg, IN
(812) 663-5721

Decatur County Highway
Office
781 E Base Rd
Greensburg, IN
(812) 663-2682

State and Federal

IDNR District Wildlife Biologist
Crosley Fish and Wildlife Area
2010 South St. Hwy 3
North Vernon, IN
(812) 346-6888

USDA Farm Service Agency
10729 Randall Avenue, Suite #1
Aurora, IN
(812) 926-2406

USDA Farm Service Agency
1981 S Industrial Park Rd # 1
Versailles, IN
(812) 689-6410

USDA Natural Resources Cons. Service
10729 Randall Avenue, Suite # 2
Aurora, IN
(812) 926-2406

USDA Natural Resources Conservation Service
1981 S Industrial Park Rd # 2
Versailles, IN
(812) 689-6410

USDA Natural Resources
Conservation Service

105 East Pike Street
Vevay, In 47043

USDA Natural Resources
Conservation Service
108 Smith Road
Greensburg, IN 47240

USDA Natural Resources
Conservation Service
Box B, 10165
Oxford Pike
Brookville, IN 47012

USDA Rural Development
1981 S Industrial Park Rd # 3
Versailles, IN
(812) 689-4224

Indiana Dept. of Natural Resources
Division of Soil Conservation
10729 Randall Avenue,
Suite #2
Aurora, IN
(812) 926-2406

Indian Dept. of Natural Resources
Division of Soil Conservation
1981 S Industrial Park Rd # 2
Versailles, IN
(812) 689-6410

Indiana DNR
Division of Soil Cons
10729 Randall Avenue
Suite#2
Aurora, IN
(812) 926-2406

INDR District Forester
Darrel Breedlove
Route 3
North Vernon, IN 47265
(812) 346-2286

State Middle Ohio-Laughery Stakeholders

Water Management (317) 232-8670

Indiana Farm Bureau

225 S East St
Indianapolis, IN 46202

Indiana Department of Natural Resources

402 West Washington Street
Indianapolis, IN 46204-2748

IDNR Field Representatives are located in the individual

Indiana Department of Environmental Management

100 N. Senate Ave
P.O. Box 6015
Indianapolis, IN 46206-6015

IDEM Switchboard
(317) 232-8603 or (800) 451-6027

Agricultural Liaison	(317) 232-8587
Air Management	(317) 233-0178
Community Relations	(317) 232-8128
Compliance and Technical Assistance	(317) 232-8172
Criminal Investigations	(317) 232-8128
Enforcement	(317) 233-5529
Legal Counsel	(317) 232-8493
Media and Communication Services	(317) 232-8560
Pollution Prevention And Technical Assistance	(317) 232-8172
Solid and Hazardous Waste Management	(317)233-3656

Division of Engineering	(317) 232-4150
Division of Entomology And Plant Pathology	(317) 232-4120
Division of Fish & Wildlife	(317) 232-4080
Division of Forestry	(317) 232-4105
Division of Historic Preservation & Archaeology	(317) 232-1646
Division of Law Enforcement	(317) 232-4010
Division of Nature Preservation	(317) 232-4052
Division of Oil and Gas	(317) 232-4055
Division of Outdoor Recreation	(317) 232-4070
Division of Public Information and Education	(317) 232-4200
Division of Reclamation	(317) 232-1547
Division of Safety and Training	(317) 232-4145
Division of Soil Conservation	(317) 232-3870
Division of State Parks and Reservoirs	(317) 232-4124
Division of Water	(317) 232-4160

Indiana State Department of Health

2 North Meridian St
Indianapolis, IN 46204
(317) 233-1325

Federal Middle Ohio-Laughery Watershed Stakeholders

USDA Natural Resources Conservation Service

6013 Lakeside Blvd
Indianapolis, IN 46278
(317) 290-3200

*NRCS Field Representatives are located
in the counties.*

U.S. EPA Region 5

77 West Jackson Blvd
Chicago, IL 60604
(312) 353-2000
(800) 632-8431

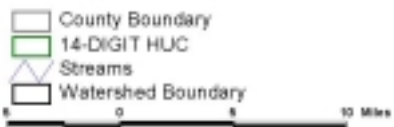
U.S. Army Corps of Engineers

Louisville District
Dr. Martin Luther King Jr. Place
Louisville, KY 4020

FIGURE 2-1
MIDDLE OHIO-LAUGHERY WATERSHED



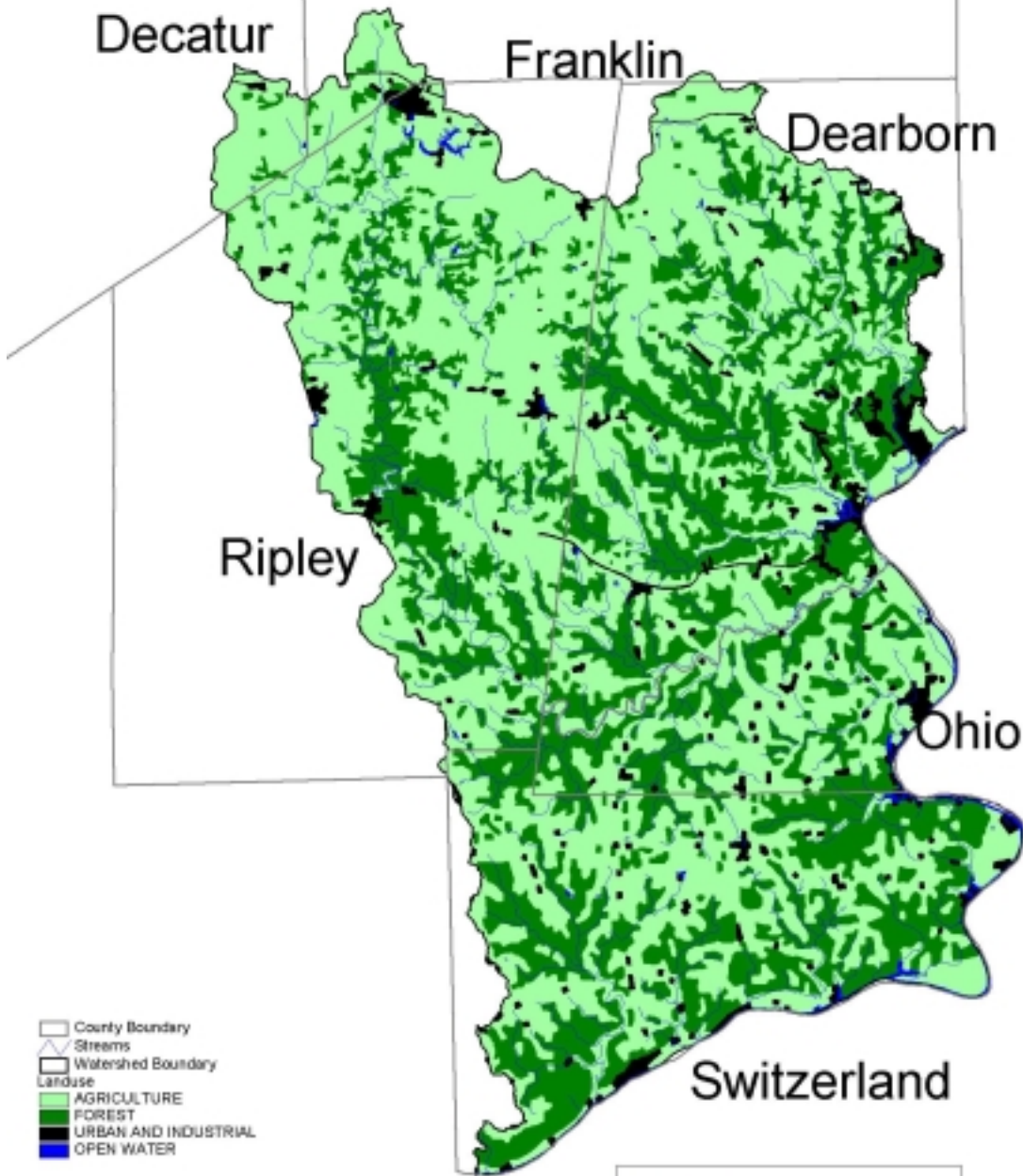
FIGURE 2-2
14-DIGIT HYDROLOGICAL CODE WATERSHEDS
MIDDLE OHIO-LAUGHERY WATERSHED



IDEM Office of Water Management
 Data Management Section
 Prepared By: Jennifer Krol
 Date Prepared: 11/10/09



**FIGURE 2-3
VEGETATIVE LAND COVER
MIDDLE OHIO-LAUGHERY WATERSHED**



4 0 4 8 Miles



Office of Water Management
Data Management Section
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Date Prepared: 11/10/09

FIGURE 3-1
NPDES DISCHARGES
MIDDLE OHIO-LAUGHERY WATERSHED

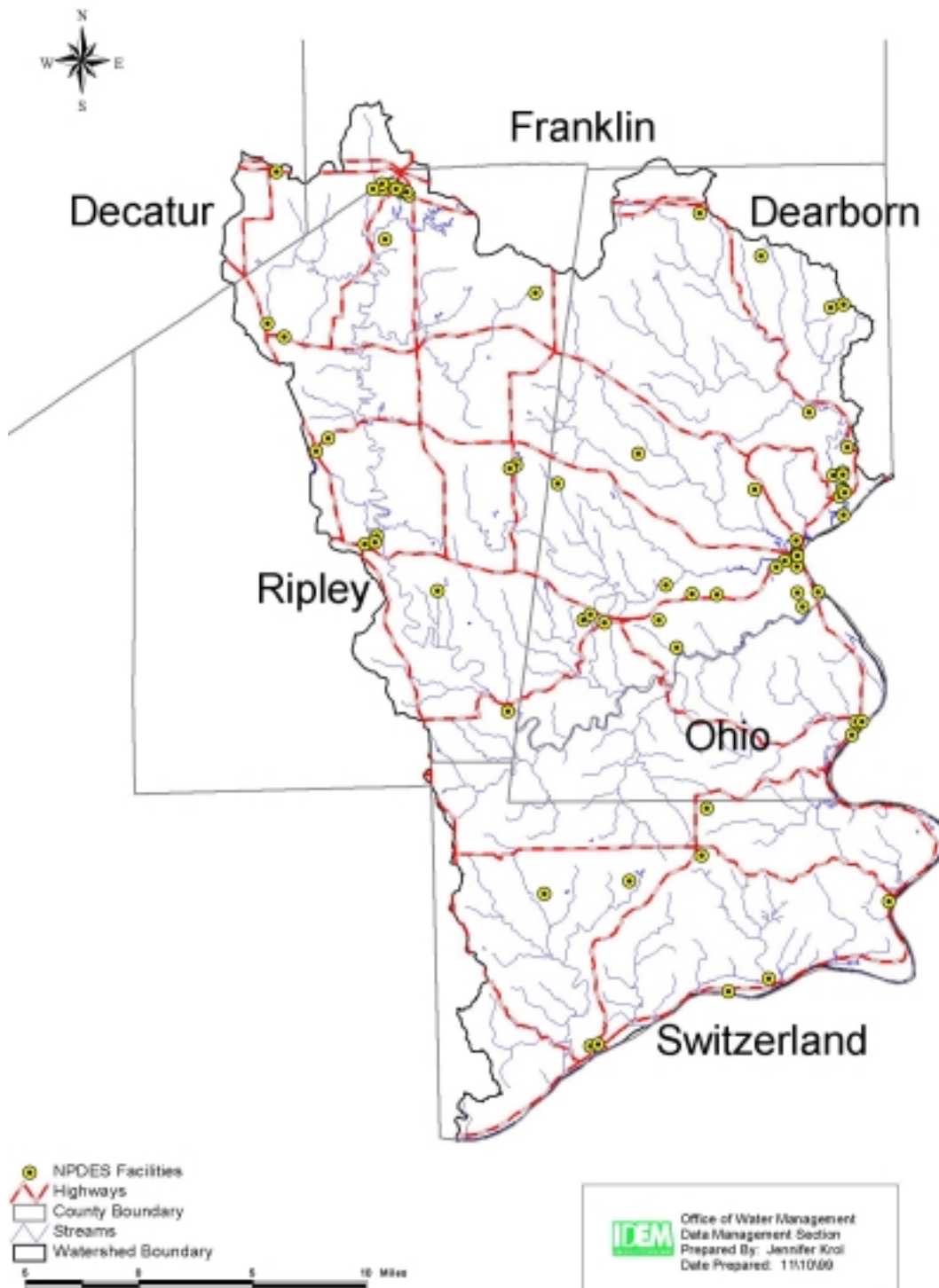


FIGURE 5-1
LARE, S.319, and EQIP AREAS
MIDDLE OHIO-LAUGHERY WATERSHED



- Watershed Boundary
- CWA Section 319 Grants
- ▲ Lake & River Enhancement Program
- Rip.shp
- County Boundary
- Environmental Quality Incentive Program 97

7 0 7 14 Miles

 Office of Water Management
Data Management Section
Prepared By: Jennifer Krol
Date Prepared: 11/10/09

FIGURE 3-1
CLEAN WATER ACT SECTION 303(d) LISTED STREAMS
MIDDLE OHIO-LAUGHERY WATERSHED

