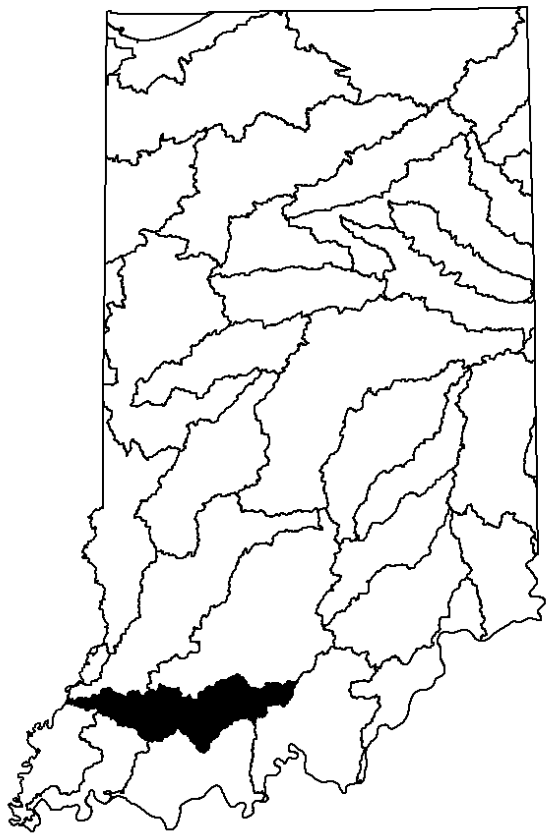
Patoka River Watershed Restoration Action Strategy

Part I: Characterization and Responsibilities



Prepared by

Indiana Department of
Environmental Management
Office of Water Management

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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.

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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 local citizens with improving water quality. The major water quality concerns and recommended management strategies will be addressed in Part II: Concerns and Recommendations 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.

This Strategy is intended to be a fluid document in order to respond to the changing and dynamic quality of our environment. Therefore, this Strategy will require revision when updated information becomes available.

Overview of the Patoka River Watershed

The Patoka River watershed is located in Southwest Indiana. The primary waterbody is the Patoka River which receives rainfall runoff from eight different counties. The Patoka River originates in Orange and Crawford Counties and flows westward 162 miles, discharging into the Wabash River. Patoka Lake is located in the headwaters of the Patoka River, while the Patoka South Fork joins the Patoka River closer towards the end.

Beginning in 1836, coal mining became a major industry in Pike County with a large concentration of mines in the 52,000 acre drainage area of the Patoka South Fork. During the following fifty years, over 20,000 acres were surfaced mined and left abandoned and unreclaimed, resulting in acid mine drainage in Pike County.

Land use in the watershed is predominately agriculture and forestry, which represents approximately 90 percent of the total land cover. Corn, soybeans, and hay 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.

Jasper and Princeton are the two major urban areas within the watershed area. Patoka Reservoir is the third largest body of water in Indiana at 8,880 surface water acres. There are approximately 35,000 acres of federal and state owned properties within the Patoka River watershed available for recreation, hunting, and fishing.

Patoka River from Patoka Reservoir to its confluence with Vernon Fork Muscatatuck is on the Outstanding Rivers List for Indiana for having outstanding ecological, recreational, or scenic importance.

Current Status of Water Quality in the Patoka River Watershed

Section 303(d) of the Clean Water Act requires states to identify waters that do not meet, or are not expected to meet, applicable water quality standards. The Clean Water Act Section 303(d) list for Indiana provides a basis for understanding the current status of water quality in the Patoka River Watershed. The following waterbodies are on Indiana's 1998 Clean Water Act Section 303(d) list submitted to and approved by EPA:

- **Patoka River** fish consumption advisory for Mercury
- **Patoka Reservoir** fish consumption advisory for Mercury and PCB
- **South Fork Patoka River** for Impaired Biotic Communities

Water Quality Goal

The overall water quality goal for the Patoka River Watershed is that all waterbodies meet the applicable water quality standards for their designated uses as determined by the State of Indiana, under the provisions of the Clean Water Act.

Patoka River 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 Patoka 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 Patoka River 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 roadmap to assist with improving water quality. Part I is a compilation of information, facts, and local concerns in this watershed. It will serve as a reference document for watershed groups and others involved in the assessment and planning of watershed restoration activities.

Part I of the Strategy is intended to be a fluid document in order to respond to the changing and dynamic quality of our environment. Therefore, it will require revision when updated 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 stakeholder groups in the Patoka River 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. It 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.

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 Patoka River watershed contains several stakeholder groups that have different missions (Appendix C). Many of these groups have a long history of conservation work in the Patoka River watershed. The following discussions briefly describe some of the watershed groups.

Southwest Indiana Brine Coalition

The Southwest Indiana Brine Coalition is a volunteer resource committee associated with the Four Rivers Resource Conservation & Development. Their mission is to identify and provide technical assistance to landowners with land areas that have soils of high saline concentration from old mining operations. Thus far, 140 people including local residents, organizations and natural resource agencies have been involved with this project. The Coalition is presently targeting brine sites that do not have an identified oil well operator. Many of these sites are 20 years or older and with impacts ranging from ½ to 5 acres. A coordinator has been hired through an EPA Section 319 grant to locate and assess the brine sites and give suggestions toward improving the soil fertility.

Patoka South Fork Watershed Steering Committee

The Patoka South Fork Watershed Steering Committee is a volunteer resource committee associated the Four Rivers Resource Conservation & Development. The goal of the Patoka South Fork Watershed Steering Committee is "the improvement of the environment and the water quality of the Patoka South Fork Watershed, and to provide grassroots access to the various and numerous people living in the area for the purpose of assisting and guiding the various organizations and agencies in their efforts to help the committee in achieving our goal." (Patoka South Fork Watershed Steering Committee Brochure, No date)

2 General Watershed Description

This Chapter provides a general description of Patoka River and its watershed and includes the following:

2.1 Patoka River Watershed Overview

The Patoka River watershed is an 8 digit (05120209) hydrologic unit code (HUC) watershed located in southwest Indiana (Figure 2-1). It lies within the Southern Bottomlands and Southwestern Lowland Natural Regions, and includes rainfall runoff from parts of eight different counties. The Patoka River watershed is subdivided into 61 subbasins represented on the map by 14 digit HUCs (figure 2-2). Flowing westward, 162 miles through four counties in southwestern Indiana, the Patoka River represents a classic meandering midwestern stream. Its floodplain contains some of the finest examples of bottomland forested wetland remaining in the State (Patoka River National Wildlife Refuge,1998). The landscape provides a variety of scenic areas that range from flat bottomland fields with numerous meandering streams to steeply rolling hills and valleys covered with hardwoods and outcropping limestone ledges.

Part of the Hoosier National Forest is located in the eastern part of the Patoka River Watershed. Small oil pumping stations, some are active and others abandoned are located in Gibson and Pike counties.

The Patoka South Fork flows northwest 17 miles before its confluence with the Patoka River near the east side of the Gibson County boundary line. Beginning in 1836, coal mining became a major industry in Pike County with a large concentration of mines in the 52,000 acre drainage area of the Patoka South Fork. During the next fifty years, over 20,000 acres were surface mined and left abandoned and unreclaimed, resulting in acid mine drainage in Pike County. Furniture manufacturing is a significant industry in the area and is concentrated around the town of Jasper, a community of predominantly German influence (Patoka Lake, Indiana, Brochure, No date). Jasper and Princeton are the largest communities within the Patoka River watershed.

Geology and Soils

The Patoka River watershed area covers a vast landscape of various landforms. The majority of the watershed is underlain with interbedded sandstone, shale and siltstone of Mississippi and

Pennsylvanian-age. The dominant soil types are Zanesville, Gilpin, Wellston, Tilsit and Berks. Gilpin and Berks soils are formed in loamy residuum. Zanesville, Wellston and Tilsit soils are formed in thin loess over loamy residuum. These soils are mainly used for pasture and woodland, and to a lesser extent cropland.

A small portion of the watershed area, mostly in eastern Pike county and western Dubois county, is a loess covered lakebed of the Illinoian stage. Common soils associated with the lakebed are Otwell, Haubstadt and Dubois. These soils are formed in loess over lacustrine deposits. These soils are mainly used for cropland and pasture.

The western part of the watershed in Gibson county and western Pike county is a loess hill landform. Common soils associated with the loess hills are Hosmer, Alford, and Sylvan. These soils are formed in five feet or more of loess. These soils are mainly used for cropland and pasture.

The flood plains within this area are dominated by silty, acid alluvial soils. Common soil types are Stendal, Steff, Cuba, and Bonnie. In the western part of the Patoka flood plain, some non-acid, silty alluvial soils are present. Common soils are Wakeland and Bonnie. Cropland and woodland are the dominant uses. (USDA -NRCS, 1999)

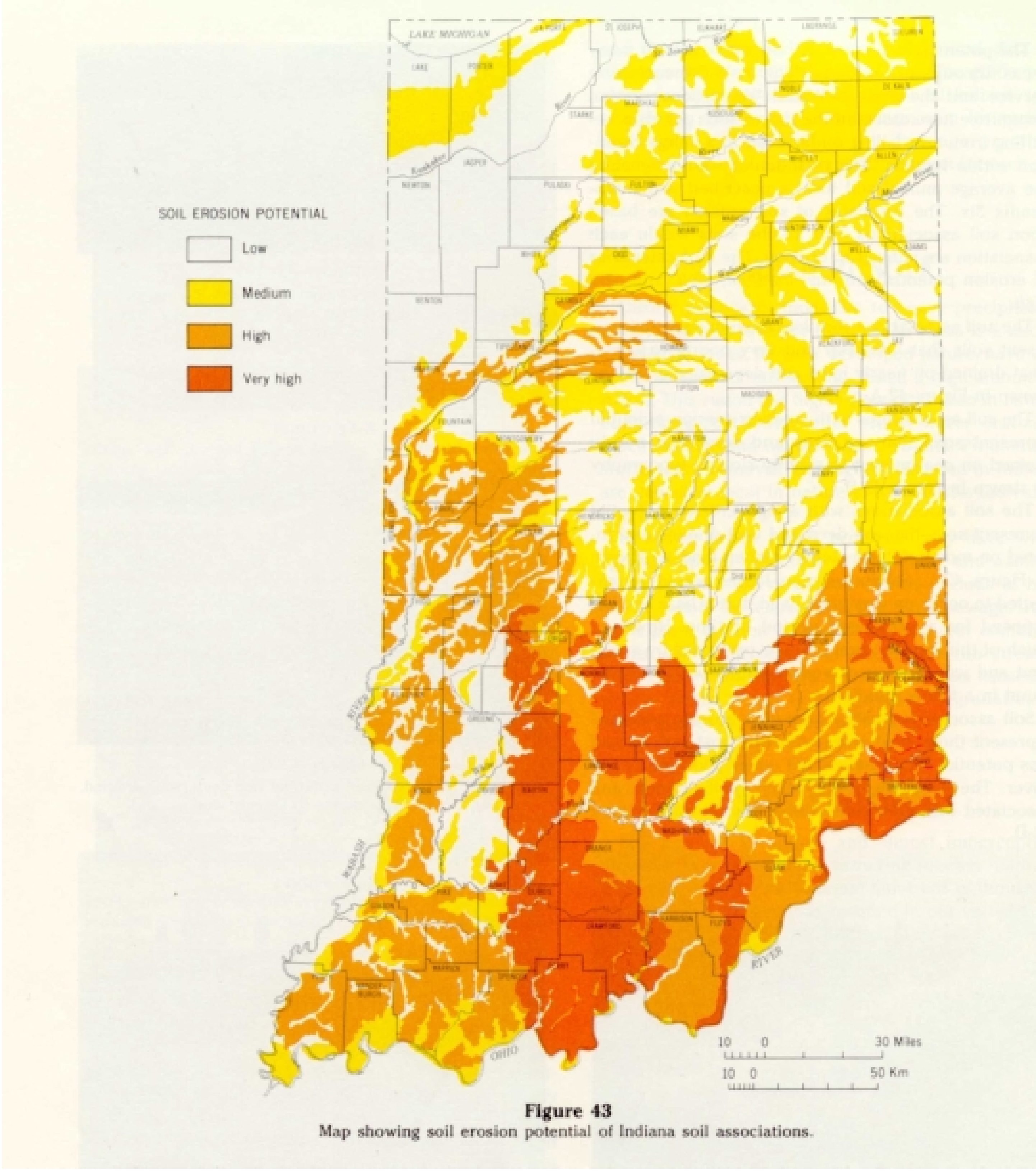


Figure 2-3 Erosion Potential *
**** from The Indiana Water Resource, IDNR, 1980***

Climate

Average yearly precipitation for the watershed is approximately 45 inches and average yearly snowfall is approximately 17 inches. In winter the average temperature is 32° F, while in the summer the average temperature is 73° F (USDA, 1984).

2.2 Land Cover, Population, and Growth Trends

2.2.1 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 (GAP). 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 provides vegetative land cover data in 30 by 30-meter grids (Figure 2-4). The following is a summary of vegetative cover in the watershed determined from the GAP image:

1.80%	Urban (impervious, low and high density)
50.90%	Agricultural vegetation (row crop and pasture)
39.22%	Forest vegetation (shrubland, woodland, forest)
5.70%	Wetland vegetation (Palustrine: forest, shrubland, herbaceous)
2.22%	Open Water

The forest vegetation in the Patoka River watershed is comprised of both upland and bottomland mixed hardwood species in varied stages of succession. The upland hardwoods include a variety of red, white and black oaks, sugar maples, beech, and hickories, etc., while the bottomland species include swamp white oak, swamp chestnut oak, pin oak, cottonwood and sycamore.

Active mining operations are located in the western part of the watershed. There are also many abandoned mines that are slowing reverting back to a dense cover of brush and trees. Located throughout these mining areas are lakes and pits that provide water for a variety of wildlife.

2.2.2 Population

The 1990 total population in the eight counties that have land portions in the watershed was 184,000 (IRBC 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 Patoka River watershed. For example, only a portion of Warrick County is within the land area of the Patoka River watershed (Figure 2-1). A better estimate of the population within the Patoka River watershed may be the 1990 and 1995 U.S. Geological Survey Water Use Reports, which show a total population in the watershed of 47,030 in 1990 and 52,410 in 1995 (Table 2-6). These reports indicate that the population in the watershed appears to have grown by about 11.4 percent between 1990 and 1995.

The U.S. 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. Jasper is the largest city located in the watershed in terms of population.

TABLE 2-1
PATOKA RIVER COUNTY POPULATION PROJECTIONS 1990-2020*

County	1990	2000	2010	2020	Percent Change (1990 to 2020)
Crawford	9,900	10,200	10,600	10,800	+9.0
Dubois	36,600	38,200	39,800	41,000	+12.0
Gibson	31,900	31,300	31,400	31,400	-1.5
Martin	10,400	10,300	10,400	10,600	+1.9
Orange	18,400	18,300	18,500	18,400	0
Pike	12,500	12,100	12,000	11,800	-5.6
Spencer	19,500	19,600	20,000	20,100	+3.0
Warrick	44,900	47,200	48,700	49,100	+9.3

IBRC 1993

TABLE 2-2
PATOKA RIVER CITY AND TOWN POPULATION ESTIMATES*

City/Town	Census 1990	Estimate 1996	Percent Change (1990 to 1996)
Ferdinand	2,318	2,385	2.9
Huntingburg	5,236	5,247	0.2
Jasper	10,030	10,995	9.6
Oakland City	2,810	2,902	3.3
Spurgeon	149	148	-0.7
Winslow	875	880	0.6
Princeton	8,127	7,273	-10.5

* IBRC 1997

2.3 Planning within the Patoka River Watershed

Only Warrick and Spencer Counties use planning and zoning ordinances. Crawford, Gibson, Martin, Orange, Pike and Dubois Counties have not adopted planning and zoning ordinances.

2.4 Agricultural Activities in the Patoka River Watershed

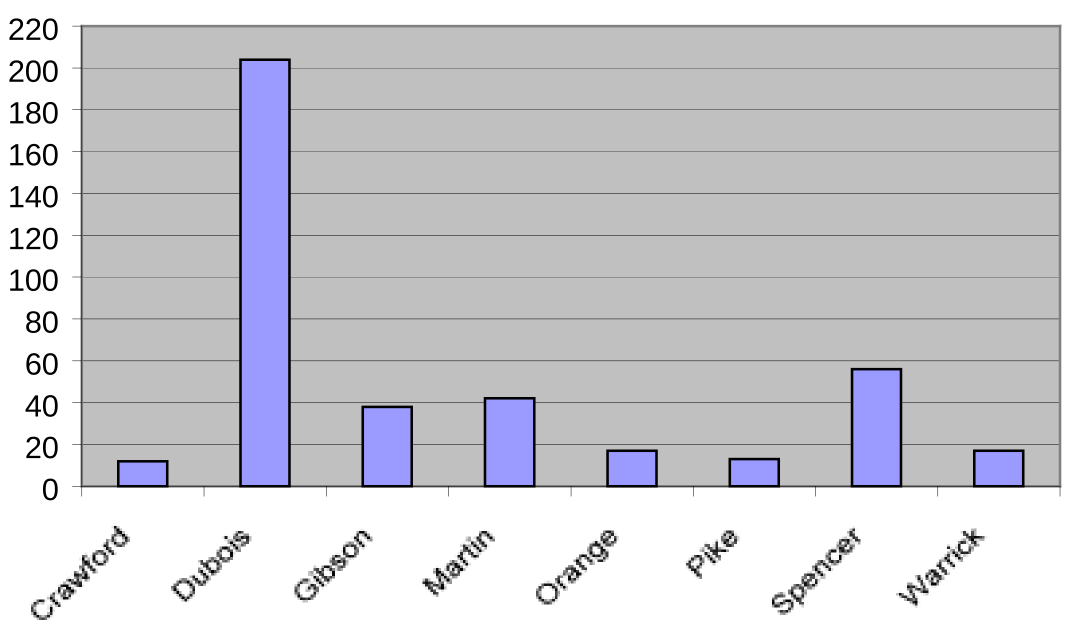
Agriculture is the dominant land use in the Patoka River Watershed. Section 2.2.1 shows that 50.90 percent of land cover in the watershed is agricultural vegetation. This section provides an overview of the agricultural activities in the watershed.

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.

As of October 1999, there were 399 livestock producers operating under the Confined Feeding Rules in the eight counties of the watershed (IDEM 1999). The following chart shows the permitted farms by county:



In the Patoka River watershed, Dubois County has the majority of animal operations. Listed are the number of different livestock operations located in Dubois County (Pitstick, 1999):

Poultry	160 Facilities
Swine	160 Facilities
Cattle	80 Facilities

Dubois County is the number one poultry producer and the seventh ranked hog and pig producer in Indiana. Most of the poultry industry is owned by Purdue Farms, who sub-contracts much of the operation to the public. Most of the swine operations in the county are following a manure management plan and use a lagoon system to manage manure. (Jim Peters, 1999) Smaller livestock operations do not require a permit from IDEM. Table 2-3 lists the 1997 distribution of livestock throughout the eight counties in the watershed. Turkeys and Poultry make up the largest number of domestic animal raised in the Patoka River watershed.

2.4.2 Crop Production

As discussed previously, the soils of the Patoka River watershed are good for crop production. Table 2-4 lists the 1997 acres of the major crops produced in 1997 throughout the eight counties in the watershed. For 1997, total acres of corn edged out total acres of soybeans as the number one crop produced in the eight counties are clearly the primary crops produced in the watershed on basis of total acres.

Land used for forage within the Patoka River watershed has been steadily declining. In Dubois county alone, there were approximately 50,000 acres of forage in 1978. In 1992 that number fell to 30,000 acres, and in 1997 it was down to 16,215 acres. (Pitstick, 1999)

TABLE 2-3
LIVESTOCK IN THE PATOKA RIVER WATERSHED

	1997 Livestock Inventory*							
	Hogs and pigs		Cattle and calves		Sheep and lamb		Turkeys	
County	**Number**	**State Rank****	**Number**	**State Rank****	**Number**	**State Rank****	**Number**	**State Rank****
Crawford	1,230	90	4,180	56	--	--	--	--
Dubois	206,896	7	14,967	12	--	--	4,548,262	1
Gibson	71,493	37	3,137	66	110	78	88,800	16
Martin	46,433	50	4,481	52	34	90	767,700	4
Orange	36,696	59	6,561	33	--	--	(D)	11
Pike	13,539	77	1,903	76	59	86	354,789	9
Spencer	103,343	28	6,805	29	--	--	415,000	7
Warrick	22,717	70	1,787	79	(D)	85	--	--

* USDA-NASS 1997

@ indicates specie is not in the top 4 for this county

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

(D) Numbers not disclosed by USDA-NASS

TABLE 2-4
CROPS PRODUCED IN THE PATOKA RIVER WATERSHED

	1997 Crops*							
	Corn for grain		Soybeans for beans		Wheat		Hay crops	
County	Acres	State Rank**	Acres	State Rank**	Acres	State Rank**	Acres	State Rank**
Crawford	713	92	968	92	(D)	90	10,362	24
Dubois	59,549	63	38,911	63	9,845	10	16,215	7
Gibson	95,804	13	85,338	16	30,044	3	4,562	60
Martin	16,105	81	12,623	83	2,165	77	6,838	34
Orange	22,017	76	17,977	82	3,719	61	12,170	10
Pike	29,996	74	27,609	72	4,942	39	2,857	81
Spencer	55,715	56	53,838	48	12,781	5	11,415	16
Warrick	33,671	70	34,408	66	5,867	30	5,504	50

* USDA-NASS 1997

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

2.5 Forest Lands and Management in the Patoka River Watershed

The Patoka watershed in Orange County is located within the Hoosier National Forest. There is very little cropland in this area of the watershed and much of that cropland has been abandoned and is slowly reverting back to brush and trees. There are a small number of cattle pastured however, those numbers are falling (Cheatham, 1999). The Conservation Reserve Program has made an impact within this area since 1985, with many landowners enrolling their cropland fields into 10-15 year set asides. These areas are typically grassed or forested.

IDNR State District and Private Consultant Foresters are very active and administer state funded cost share programs and provide harvest management plans to the landowners in the Patoka River watershed.

2.6 Surface and Subsurface Mining in the Patoka River Watershed

Beginning in 1836, underground coal mining became a major industry in Pike County. During the following fifty years, over 20,000 acres were surfaced mined and left abandoned and unreclaimed in Pike County. Problems such as acid mine drainage have become more prevalent. Acid mine drainage eradicated all fish in long stretches of the Patoka River, and the entire length of the 17 mile long South Fork Tributary (Patoka South Fork Watershed Steering Committee Brochure, No date). In the 1920s, surface mining began to replace deep mining. Fifty years ago there were approximately 140 different mining operations, presently there are three. (Salkeld, 1999)

2.7 Significant Natural Areas in the Patoka River Watershed

In 1993, the Indiana Natural Resources Commission (NRC) 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 "Outstanding Rivers List" is intended to provide guidance rather than to have regulatory application (NRC 1997). To help identify the rivers and streams which have particular environmental or aesthetic interest, a special listing has been prepared by IDNR's Division of Outdoor Recreation. This listing is a corrected and condensed version of a list compiled by American Rivers and dated October 1990. The NRC has adopted the IDNR listing as an official recognition of the resource values of these waters. A river included in the "Outstanding Rivers List" qualifies under one or more of 22 categories. Table 2-5 presents the rivers in the Patoka River watershed which are on the "Outstanding Rivers List" and their significance.

Other Special Areas

Patoka Reservoir was designed and built by U.S. Army Corps of Engineers in July 1972. The U.S. Army Corps of Engineers built the reservoir for flood control. It is the third largest body of water in Indiana, providing an 8,880 acre (surface area) water supply, also used for fish, wildlife and recreational activities.

The Patoka Reservoir dam is built from earth and rock fill, with a maximum height of 84 feet and is 1550 feet in length. The drainage area above the dam is 168 square miles. The area around Patoka Lake is at least 50% forested (Patoka Lake, Indiana – US Army Corps of Engineers Brochure, No date).

Patoka Reservoir is the drinking water supply for the town of Jasper, IN. The wastewater from the homes around Patoka Reservoir including the community of Dubois, is treated by the Patoka Regional Sewer and Water District.

Sugar Ridge Fish and Wildlife Area consists of six separate areas totaling approximately 7,300 acres in Pike County. Much of the area has been strip mined and contains 100 pits and lakes and rows of overburden mounds. The un-mined portion is mostly rough and rolling (Sugar Ridge Fish and Wildlife Area, Property Map, No date).

Patoka River National Wildlife Refuge and Management Area includes a 30 mile stretch of the Patoka River and covers 22,000 acres of land in Pike County. Although somewhat degraded by past drainage efforts and nearby abandoned mine lands, the array of wetlands and other habitat types continues to support a rich diversity of fish and wildlife species. There is nearly 7,000 acres of bottomland forested wetland, which is the most endangered of all our Nation's wetlands (Patoka River National Wildlife, Brochure). As a testimony to the intrinsic biological value of the area's habitat diversity, at least 20 plant species classified by Indiana as threatened or endangered have been found within project boundaries. More than 380 species of mammals, birds, reptiles, amphibians, fish and molluskes are known or expected to occur here. (Patoka River National Wildlife, Brochure, No date).

Ferdinand State Forest - In 1933, a local conservation club raised funds to buy 900 acres to build a lake and establish an area to hunt and fish. They offered management of the project to the Indiana Department of Conservation the following year, and this marked the establishment of Ferdinand State Forest. The area has four lakes which provide swimming, fishing, boating, etc. There is numerous wildlife throughout the forest which can be enjoyed on any of the 9 miles of hiking trails. (IDNR- Division of Forestry, No Date)

Pike State Forest consists of 2,939 acres located in Pike County, Indiana. Acquisition of the land that makes up Pike State Forest began in the 1930s, and continued through the 1950s. Most of the buildings on the property were constructed by the Works Progress Administration (WPA) using material cut from local timber stands. Topography at Pike State Forest varies from hilly uplands to the low bottomlands of the Patoka River. Because of the diversity of the sites, a wide variety of plant and animal life live in the Pike State Forest. Several recreational opportunities are available at Pike State Forest, including hunting, horseback riding, picnicking, bird watching and hiking.(IDNR- Division of State Parks, No Date)

Buffalo Flats is a protected wetland located in Dubois County. It provides habitat for many ducks, birds, reptiles, and amphibians. The water moccasin snake, which is on Indiana's Endangered Species List, also inhabits the area. Buffalo Flats is managed by the Indiana Department of Natural Resources-Division of Nature Preserves.

TABLE 2-5
WATERS OF THE PATOKA RIVER WATERSHED ON THE OUTSTANDING RIVERS LIST FOR INDIANA*

River Segment	County	Significance
Patoka River: Patoka Reservoir to confluence with Vernon Fork Muscatatuck	Dubois, Gibson, Pike	Rivers identified as having outstanding ecological, recreational, or scenic importance.

*NRC 1997

2.8 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 meet 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:

- 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, or
- 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.

2.8.1 Surface Water Classifications in the Patoka River Watershed

The statewide classifications discussed in Section 2.5 apply to all stream segments in the Patoka River watershed, with the following exception: An unnamed stream in Dubois County, which is the outlet of Huntingburg City Lake, from the City Lake Dam downstream to its confluence with Ell Creek is designated as a **limited water use**.

2.6 US Geological Survey Water Use Information for the Patoka River Watershed

The U.S. Geological Survey's (USGS) 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 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 Patoka River Watershed for 1990 and 1995.

TABLE 2-6
1990 & 1995 Water Use Information for the Patoka River Watershed

Population and Water Use totals	**1990**	**1995**
Total population in the watershed (thousands)	47.03	52.41
Public Water Supply	**1990**	**1995**
Population served by public groundwater supply (thousands)	12.42	13.61
Population served by surface water supply (thousands)	24.38	31.34
Total population served by public water supply (thousands)	36.8	44.95
Total groundwater withdrawals (mgd)	1.21	0.09
Total surface water withdrawals (mgd)	5.61	6.99
Total water withdrawals (mgd)	6.82	7.08
Total per capita withdrawal (gal/day)	185.33	157.51
Population self-supplied with water (thousands)	10.23	7.46
Commercial Water Use	**1990**	**1995**
Groundwater withdrawal for commercial use (mgd)	0.01	0.01
Surface water withdrawal for commercial use (mgd)	0.02	0.25
Deliveries from public water supplies for commercial use (mgd)	0.9	0.42
Total commercial water use (mgd)	0.93	0.68
Industrial Water Use	**1990**	**1995**
Groundwater withdrawal for industrial use (mgd)	0	0
Surface water withdrawals for industrial use (mgd)	0.07	0
Deliveries from public water suppliers for industrial use (mgd)	4.84	2.48
Total industrial water use (mgd)	4.91	2.48
Agricultural Water Use	**1990**	**1995**
Groundwater withdrawals for livestock use (mgd)	1.23	1.33
Surface water withdrawals for livestock use (mgd)	0.5	0.44
Total livestock water use (mgd)	1.73	1.77
Groundwater withdrawals for irrigation (mgd)	0	0
Surface water withdrawals for irrigation (mgd)	0.01	0
Total irrigation water use (mgd)	0.01	0
Mining Use	**1990**	**1995**
Groundwater withdrawals	0	0
Surface water withdrawals	6.58	1.87
Total withdrawals (mgd)	6.58	1.87

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.

<u>Metals</u>

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 (NH_3)

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 water pollution 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 Patoka River 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 Patoka River Watershed

As of June 1999, there were 137 active NPDES permits within the Patoka River watershed (Table 3-2, Figure 3-1). See Chapter 5 for definition of minor dischargers.

In addition to the NPDES permitted dischargers in the watershed, there may be many unpermitted, illegal discharges to the Patoka River system. Illegal discharges of residential wastewater (septic tank effluent) to streams and ditches from straight pipe discharges and old inadequate systems are a problem within the watershed.

Table 3-2
NPDES PERMITTED FACILITIES
PATOKA RIVER WATERSHED

NPDES	Facility Name	Maj / Mi	City	County	Status
ING040025	Solar Sources, Oatsville Mine	Minor	Oatsville	Pike	Active
ING040037	Black Beauty Coal, Francisco	Minor	Francisco	Gibson	Active
ING040039	Old Ben Coal Co, Mine #1	Minor	Spurgeon	Pike	Inactive
ING040040	Old Ben Coal Co, Mine #2	Minor	Petersburg	Pike	Inactive
ING040043	Phoenix Nr, Heitz Mine	Minor	Huntingburg	Dubois	Active
ING040044	Phoenix Nr, Hunley Mine	Minor	Huningburg	Dubois	Active
ING040047	Phoenix Nr, Kohlenlager Pit	Minor	Huntingburg	Dubois	Active
ING040050	Phoenix Nr, Satellite Mine	Minor	Huntingburg	Dubois	Active
ING040051	Phoenix Nr, Upper Ell Cr Mine	Minor	Huntingburg	Dubois	Active
ING040060	Black Beauty Coal, Columbia Mn	Minor	Oakland City	Gibson	Active
ING040065	Foertsch Constr. Tretter Mine	Minor	Mariah Hill	Spencer	Active
ING040083	Phoenix Nr, Backbone Pit	Minor	Huntingburg	Dubois	Active
ING040086	Baron Coal Company	Minor	Lamar	Gibson	Active
ING040107	Triad Mining, Patoka River Min	Minor	Francisco	Gibson	Active
ING040111	United Minerals, Mallard Marsh	Minor	Velpen	Pike	Active
ING040118	Black Beauty Coal, Halo Run	Minor	Ferdinand	Dubois	Inactive
ING040124	Foertsch Constr. Co, Aml #1087	Minor	Velpen	Pike	Inactive
ING040129	Kindill Mine #2	Minor	Petersburg	Pike	Active
ING040130	Kindill Mine #1	Minor	Oakland City	Gibson	Active
ING040141	Gibson County Coal Corp.	Minor	Princeton	Gibson	Active
ING040142	Solar Sources, Cup Creek Mine	Minor	Velpen	Pike	Inactive
ING040150	Foertsch Const, Hunley Cr Mine	Minor	Mariah Hill	Spencer	Active
ING040160	Foertsch Construction AML 1101	Minor	Augusta	Pike	Active
ING340023	Teppco Princeton Terminal	Minor	Oakland City	Gibson	Active
ING670012	Amoco Pipeline Co., Francisco	Minor	Francisco	Gibson	Active
INP000127	Wabash Valley Produce, Inc.	Minor	Dubois	Dubois	Active
IN0001317	Old Ben Coal, Log Creek Field	Minor	Oakland City	Pike	Inactive
IN0001325	Old Ben Coal Inc-blackfoot #5	Minor		Pike	Inactive
IN0002399	AMAX Coal Company, Ayrcoe Mine	Minor		Gibson	Inactive
IN0003042	Wabash Valley Produce Inc	Minor		Dubois	Inactive
IN0003093	Huntingburg Public Water Sup.	Minor	Huntingburg	Dubois	Active
IN0003808	Farbest Foods, Inc.	Minor	Huntingburg	Dubois	Active
IN0020648	Ferdinand Municipal STP	Minor	Ferdinand	Dubois	Active
IN0020834	Jasper Municipal STP	Major	Jasper	Dubois	Active
IN0021687	Oakland City Municipal STP	Minor	Oakland City	Gibson	Active
IN0021881	Southern Railway Co	Minor		Dubois	Inactive
IN0023124	Huntingburg Municipal STP	Minor	Huntingburg	Dubois	Active
IN0025917	Haysville Wtr Utilities Inc.	Minor		Dubois	Inactive
IN0029653	Mulzer Crushed Stone, Eckerty	Minor	Tell City	Crawford	Inactive
IN0029661	Mulzer Crushed Stone, Temple Q	Minor	Temple	Crawford	Active
IN0030058	Old Ben Coal Co-outfall 002	Minor		Pike	Inactive
IN0030066	Old Ben Coal Co-outfall 003	Minor		Pike	Inactive
IN0031682	Winslow Elementary and High Sc	Minor	Winslow	Pike	Inactive
IN0031691	Otwell Elem. School	Minor		Pike	Inactive
IN0031704	Pike Central mid & High School	Minor	Petersburg	Pike	Active
IN0033626	Old Ben Coal, Northwest Field	Minor	Oakland City	Gibson	Inactive
IN0033634	Old Ben Coal, Hardy Yager Field	Minor	Oakland City	Pike	Inactive

Table 3-2 (Continued)

NPDES	Facility Name	Maj / Mi	City	County	Status
IN0035840	Northeast Dubois School Corp	Minor		Dubois	Inactive
IN0036595	Jasper Municipal Utl	Minor		Dubois	Inactive
IN0036757	Northland Oil & Refining Co	Minor		Gibson	Inactive
IN0036927	Sunrise Village M.H.P.	Minor	Jasper	Dubois	Inactive
IN0037788	Sun Oil Co of Pennsylvania	Minor		Dubois	Inactive
IN0037931	Sun Oil Co of Pennsylvania	Minor		Gibson	Inactive
IN0038717	Old Ben Coal, Tipple #2 Mine	Minor	Petersburg	Pike	Inactive
IN0040045	Francisco Municipal STP	Minor		Gibson	Inactive
IN0040487	Patoka Municipal STP	Minor		Gibson	Inactive
IN0040789	Winslow Municipal STP	Minor	Winslow	Pike	Active
IN0041378	Spurgeon Public Water Supply	Minor	Oakland City	Pike	Inactive
IN0041661	Spurgeon Municipal STP	Minor		Pike	Inactive
IN0041751	Old Ben Coal, West Field	Minor	Oakland City	Gibson	Inactive
IN0041769	Old Ben Coal, Tipple #1 Mine	Minor	Oakland City	Pike	Inactive
IN0042161	AMAX Coal Co-ayrcoe Mine Disc	Minor		Gibson	Inactive
IN0042170	AMAX Coal Co., Ayrcoe Mine	Minor		Gibson	Inactive
IN0042536	Winslow Public Water Supply	Minor	Winslow	Pike	Active
IN0042935	Patoka Town of W T P	Minor	Patoka	Gibson	Inactive
IN0044091	Dubois County 4-H Park	Minor		Dubois	Inactive
IN0044695	N. East Dubois Co Sch Corp	Minor		Dubois	Inactive
IN0045586	Old Ben Coal, Peterburg Field	Minor	Petersburg	Pike	Inactive
IN0045713	Dixon Present Coal Company	Minor		Dubois	Inactive
IN0046256	Phoenix Nr, Heitz Mine	Minor	Huntingburg	Dubois	Inactive
IN0046281	Old Ben Coal, S. Cup Ck Field	Minor	Oakland City	Pike	Inactive
IN0046311	IDNR Site 130, Blackfoot/pike	Minor		Pike	Inactive
IN0046361	Jefferson Township R S D	Minor	Otwell	Pike	Active
IN0046531	Old Ben Coal, Venturi #17 Pit	Minor	Cannelburg	Pike	Inactive
IN0046566	Super Block Coal, Hunley Ck Mi	Minor		Dubois	Inactive
IN0046710	IDNR Site 309, Mill Creek Aml	Minor		Pike	Inactive
IN0046744	E & M Coal, Oak Hill Railsidin	Minor	Oakland City	Gibson	Inactive
IN0046892	Dyer Enterprises, Lockhart M.	Minor	Huntingburg	Dubois	Inactive
IN0047104	Blackgold Associates, Inc.	Minor		Pike	Inactive
IN0047155	Phoenix Nr, Kohlenlager Pit	Minor	Huntingburg	Dubois	Inactive
IN0047163	Clarkson Company, Inc.	Minor		Dubois	Inactive
IN0047252	Phoenix Nr, Satellite Pit	Minor	Huntingburg	Dubois	Inactive
IN0047465	Northeast Dubois Cnty School C	Minor	Dubois	Dubois	Active
IN0047872	Parke Coal Co., Nixon Pit	Minor		Pike	Inactive
IN0047937	Phoenix Nr, Ackerman Pit	Minor	Jasper	Dubois	Inactive
IN0048216	Black Beauty Coal, Ell Creek M	Minor	Huntingburg	Dubois	Inactive
IN0048437	Midwestern Mining Consultants,	Minor		Pike	Inactive
IN0048500	Phoenix Nr, Backbone Pit	Minor	Jasper	Dubois	Inactive
IN0048828	Gibson County Coal Corporation	Minor		Gibson	Inactive
IN0049239	Solar Sources, Inc. - Pit 14	Minor		Pike	Inactive
IN0049255	Energy Supply, Hunley Cr. #2	Minor		Spencer	Inactive
IN0049263	Energy Supply, Mariah Hill Pit	Minor	Mariah Hill	Spencer	Inactive
IN0049379	Parke Coal Co., August Pit	Minor	Winslow	Pike	Inactive

Table 3-2 (Continued)

NPDES	Facility Name	Maj / Mi	City	County	Status
IN0049816	Ohio Valley Co., Blackfoot #2	Minor		Pike	Inactive
IN0050482	Francisco Elementary School	Minor	Francisco	Gibson	Active
IN0051071	Jasper Engine & Transmission E	Minor		Dubois	Inactive
IN0051209	Hasenour & Sternberg Inc. - Np	Minor		Pike	Inactive
IN0051268	Old Erin Coal Co.	Minor		Gibson	Inactive
IN0051527	Three States Trucking	Minor		Dubois	Inactive
IN0051934	Jasper Corporation, the	Minor	Jasper	Dubois	Inactive
IN0051942	Jasper Wood Products Co., Inc.	Minor		Dubois	Inactive
IN0052361	Will Construction Company, Inc	Minor		Gibson	Inactive
IN0052558	Three States Trucking Inc	Minor		Pike	Inactive
IN0052591	Three States Trucking Inc	Minor		Dubois	Inactive
IN0052655	Spencer Coal Corp, Nr Duff	Minor		Dubois	Inactive
IN0052698	Patoka Lake Reg. Wat. & Sew. D	Minor	Dubois	Dubois	Active
IN0052744	Spencer Coal Corp	Minor		Pike	Inactive
IN0052957	B&ls Contr., Ferdinand Mine	Minor		Dubois	Inactive
IN0053007	Amax Coal Company Ayrcoe Mine	Minor		Gibson	Inactive
IN0053163	Pine Ridge Elementary School	Minor	Birdseye	Dubois	Active
IN0053473	Dubois County Concrete Product	Minor	Huntingburg	Dubois	Inactive
IN0053597	B.f.c. Coal Co., Cup Cr. Mine	Minor	Augusta	Pike	Inactive
IN0053716	Clarkson Company, Inc.	Minor		Dubois	Inactive
IN0053775	United Minerals, Mallard Marsh	Minor	Velpen	Pike	Inactive
IN0053872	Energy Supply, Cedar Hill Mine	Minor	Ferdinand	Dubois	Inactive
IN0054283	Cajun Coal Co., Johnson Pit	Minor	Winslow	Pike	Inactive
IN0054496	Peabody Coal, Oakland Cty Mine	Minor	Oakland City	Gibson	Inactive
IN0054950	Idnr Site , Fuhs Mine	Minor	Jasonville	Dubois	Inactive
IN0055204	Chesapeake Packaging Company	Minor	Saint Anthony	Dubois	Active
IN0055352	Old Ben Coal, Wh Church Field	Minor		Pike	Inactive
IN0055361	Vigo Coal Co., Columbia Mine	Minor	Oakland City	Gibson	Inactive
IN0055581	United Minerals, Halo Run Mine	Minor	Ferdinand	Spencer	Inactive
IN0055883	Solar Sources, Oatsville Mine	Minor	Petersburg	Pike	Inactive
IN0055972	Wallace Enterprises, Grandview	Minor	Grandview	Spencer	Inactive
IN0056260	Francisco Car Wash	Minor	Princeton	Gibson	Active
IN0056332	Phoenix Nr, Upper Ell Creek Mi	Minor	Huntingburg	Dubois	Inactive
IN0056553	Phoenix Nr, Hunley Pit	Minor	Huntingburg	Dubois	Inactive
IN0057061	Baron Coal Company	Minor		Gibson	Inactive
IN0057142	Idnr Site 306, Aml Nr Stendal	Minor		Pike	Inactive
IN0057231	Idnr Site 147, Wheeler Crk Aml	Minor		Gibson	Inactive
IN0057428	Black Beauty Coal, Francisco M	Minor		Gibson	Inactive
IN0057690	Idnr Site 1005, Barn Run Creek	Minor	Near Alfordsville	Martin	Inactive
IN0058866	American Disposal Services	Minor	Winslow	Pike	Active
IN0060003	Gibson County Coal Corp. WWTP	Minor	Princeton	Gibson	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 (greater than100,000 people) and from certain industrial and construction sites is technically considered a point source since NPDES permits are required for 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 Patoka River 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 tilling make soils susceptible to erosion, which can then cause stream sedimentation. Pesticides and fertilizers (including synthetic 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 groundwater 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 sediment and nutrient loads 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 fluids; 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. This degradation also exists in lakes, which have been heavily influenced by adjacent urban development.

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. Concentrated areas where urban development is high 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 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.

4. Water Quality and Use Support Ratings in the Patoka River Watershed

This section provides a detailed overview of water quality monitoring, water quality, and use support ratings in the Patoka River watershed and includes the following:

Section 4.1 Water Quality Monitoring Programs
Section 4.2 Summary of Ambient Monitoring Data for the Patoka River 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

4.1 Water Quality Monitoring Programs

This section discusses water quality monitoring programs. Specifically, Section 4.1.1 describes IDEM's Office of Water Management monitoring programs and Section 4.1.2 discusses other monitoring efforts in the watershed.

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 IDEM's surface water quality management program of IDEM is directly or indirectly related to 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-year synoptic study (Basin Monitoring Strategy) of the State's ten 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, nonpoint source issues, and wastewater 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 also participates in the development of site-specific water quality standards.

The Biological Studies Section relies on the 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 an overall view of 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.

4.1.2 Other Monitoring Efforts

There are not any known local volunteer monitoring programs actively working throughout the Patoka River watershed. The Pike County Soil and Water Conservation District hired an education coordinator to teach Boy and Girl Scouts and other organizations about water quality. They do have a water quality testing kit available.

Also, the Dubois County SWCD has a water quality monitoring kit available for use by Riverwatch trained users. Staff members are monitoring the Patoka River on a quarterly basis.

IDNR's Hoosier Riverwatch will provide assistance for any interested group that may want to develop a volunteer monitoring program. There are two different levels of training available. The first level is a basic understanding of the waters chemical and physical characteristics and is used primarily as an educational method. Level II is 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.

4.2 Summary of Ambient Monitoring Data for the Patoka River Watershed

The fixed station-monitoring program managed by IDEM's Office of Water Management has been monitoring surface water chemistry throughout the state since 1957. The data set from 1986 to 1995 was analyzed using the Seasonal Kendall test. This test deduces if a statistical change in the surface water chemistry occurred over a time period. The results of the Seasonal Kendall analysis for stations located in the Patoka River watershed are provided in Table 4-1. The data collected from 1991 to 1997 from this monitoring program was also analyzed to determine benchmark characteristics. The results of the benchmark characteristic analysis for stations located in the Patoka River watershed are provided in Appendix B. For a more in depth discussion of this analysis, please refer to the Indiana Fixed Station Statistical Analysis 1997 (IDEM 32/02/005/1998), published in May 1998 by the Assessment Branch of the Office of Water Management - IDEM.

TABLE 4-1
RESULTS OF SEASONAL KENDALL ANALYSIS FOR STATIONS LOCATED IN THE PATOKA RIVER WATERSHED 1986 TO 1995

Parameter	**P-35 Patoka River Near Oakland City, S.R. 57 Bridge, North of Oakland City**	**P-76 Patoka River at Huntingburg on Huntingburg Road**
Biological Oxygen Demand		
Chemical Oxygen Demand	←	
Dissolved Oxygen	←	➚
E. coli	←	←
Ammonia		←
Nitrite + Nitrate	←	←
Total phosphorus		←
Total Residue		←
Total Residue, Filterable	?	?
Total Residue, Nonfilterable	←	←
Copper	?	
Cyanide (total)	←	←

Notes

←	No Statistical Change; significance < 80% or reported slope = 0.00000
🡇	Statistically Decreasing; significance >95% with a negative slope
	Potentially Decreasing; significance >80% with a negative slope
➚	Potentially Increasing; significance >80% with a positive slope
🡅	Statistically Increasing; significance >95 % with a positive slope
?	Insufficient Data for analysis

4.3 Fish Consumption Advisories

Since 1972, the Indiana Department of Natural Resources, the IDEM, and the Indiana State Department of Health (ISDH) have worked 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 collected throughout the state were analyzed for PCBs, pesticides, and heavy metals. Of those samples, 99 percent 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.

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 two months (six meals per year) for adult males and females. Women who are pregnant or breastfeeding, women who plan to have children, and children under the age of 15 do not eat.
Group 5	No consumption (DO NOT EAT)

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 Patoka River Watershed, the following waterbodies are under the 1999 fish consumption advisory:

Waterbody/County	Species	Size	Contaminant	Group
Patoka Reservoir, Orange County	Bluegill	5-6	Mercury	2
		6 +		3
	Largemouth Bass	13+	Mercury	2
Patoka Reservoir, Dubois County	Largemouth	13+	Mercury	2

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 Indiana water quality 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.

The Patoka River assessment was updated during the summer of 1996 as part of the five year, rotating basin, monitoring strategy. The results of the 1996 assessment are reported in the 1998 305(b) report, titled *Indiana Water Quality Report 1998* (IDEM, 1998). The 1998 305(b) report is the most current and comprehensive assessment of the Patoka River watershed.

Appendix B contains the listing of the Patoka River watershed waterbodies assessed, status of designated use support, probable causes of impairment, and stream miles affected. This assessment was based on data collected during the summer of 1996.

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 surficial aquatic sediment contaminant results, and
E. coli monitoring results.

The assessment process was applied to each data sampling program. The individual assessments were integrated into an overall assessment for each waterbody by use designation: aquatic life support, fish consumption, and 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 4-2
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 $\leq$ 75th percentile. All AVS/SEMs $\leq$ 75th percentile. All other parameters $\leq$ 95th percentile.	PAHs or AVS/SEMs > 75th percentile. (Includes Grand Calumet River and Indiana Harbor Canal sediment results, and so is a conservative number.)	Parameters > 95thpercentile 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

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 Patoka River 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 Indiana's 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

5.1.1 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 U.S. Army Corps of Engineers 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 Land Quality (formerly, 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 percent 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 Owned	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)	Major	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.
	Minor	All dischargers which are not designated as major dischargers.
	General	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 wastewater treatment plant.
	Combined Sewer Overflow (CSO)	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, over 180 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. The NPS Management Plan was updated and received EPA approval in 1999. 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.

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 assists 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 $12 million of federal funds for the development of over 180 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. Appendix C lists the conservation partners and local stakeholders located in the Patoka River watershed.

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.

<u>Total Maximum Daily Loads</u>

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 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 Adraft-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 and other funding sources are discussed below.

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, follow-up should be done to determine what changes may be needed in order to make the application more competitive.

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. Units of government, nonprofit groups, and universities 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 non-federal 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?
- Are upstream sources of NPS pollution addressed?
- Are stakeholders involved in the project?

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 project merits, to pool all rankings and to arrive at final rankings for the projects. Comments are also sought from outside experts in other governmental agencies, nonprofit groups, and universities. 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 EPA 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 McLoud, 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 D provides a summary list of agencies and funding opportunities.

5.2 Indiana Department of Natural Resources Water Programs

5.2.1 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 Clean Water Indiana soil conservation and water quality program under guidelines established by the State Soil Conservation Board, primarily through the SWCDs in direct service to landusers. The Division staff includes field-based resource specialists who work closely with landusers, assisting in the selection, design, and installation of practices to reduce soil erosion 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.

5.2.2 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, highwater 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 assistance programs are the principal programs available.

Conservation Technical Assistance (CTA)

The purpose of the program is to assist landusers, 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.

The objective of the program is to: Assist individual landusers, 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 landusers voluntarily applying conservation and to those who must comply with local or State laws and regulations. Assistance is also provided to 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.); 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. NRCS 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 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)

NRCS provides technical assistance to landowners interested in participating in the Conservation Reserve Program administered by the USDA Farm Service Agency. 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, filterstrips, 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 non-structural 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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