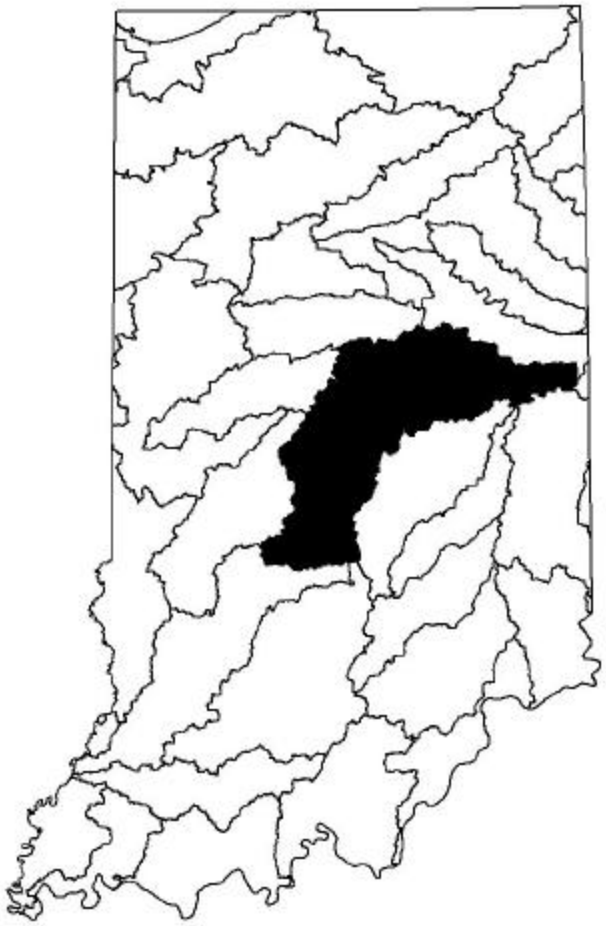
Upper White River Watershed Restoration Action Strategy

Part I: Characterization and Responsibilities



Prepared by

Indiana Department of
Environmental Management
Office of Water Quality

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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 (January 2001) 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 Upper White River Watershed

The Upper White River watershed is located in the middle of Indiana. The primary waterbody is the West Fork of the White River, which receives rainfall from parts of sixteen counties. The West Fork of the White River originates in Randolph County, flows southwest through eleven counties and is joined by the East Fork of the White River near Petersburg. In total, the West Fork flows about 356 miles and drains 5,600 square miles (IDEM, 1995).

Land use in the watershed is predominately agriculture, which represents approximately 76 percent of the total land cover. Corn and soybeans comprise the majority of crops produced.

Indianapolis is the state capitol and largest city in the watershed with a population estimated over 750,000 people. Muncie, followed by Anderson are the next largest cities. The largest population change from 1990 to 1996 was in the community of Fishers, which it experienced a 187% increase.

The West Fork of the White River from Farmland to its confluence with the Wabash River, is on the Outstanding Rivers List for Indiana, as having outstanding ecological, recreational, or scenic importance.

Current Status of Water Quality in the Upper White 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 Upper White River watershed. Thirty-five waterbodies within the Upper White watershed are on Indiana's 1998 Clean Water Act Section 303(d) list submitted to and approved by EPA.

Water Quality Goal

The overall water quality goal for the Upper White 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.

Upper White 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 Upper White River 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 Upper White 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 Upper White 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 Quality 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 Upper White 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 Upper White River watershed. The following discussions briefly describe some of the watershed groups.

Eagle Creek Watershed Task Force

In 1997, Farm Bureau (state office) organized a public awareness meeting about various pollutants entering the Eagle Creek Reservoir. As a result of that meeting, the Eagle Creek Watershed Project was initiated with a goal to improve the water quality of the waterbodies within the Eagle Creek watershed. Approximately 10 to 25 people attend the watershed steering committee meetings, which are held every other month. Any person interested in the project can become a steering committee member. A watershed plan is currently being developed (Dickey, 1999).

Friends Of The White River

The Friends' primary purposes are to promote the continued improvement of water quality in the river and to maintain and restore existing habitat and wildlife in the river and along the greenway adjacent to the river. The Friends represent those who use the White River for recreational purposes, those who live near its banks and all citizens interested in the preservation of the river as a natural resource for Indiana (Friends of the White River Home Page, 1996). The organization was established in 1985 and is an Indiana not-for-profit corporation. Their membership is currently around 400. Past accomplishments include stream bank stabilization areas, public education events, and monitoring (Cowser, 2000).

Upper White River Watershed Alliance, Inc.

The Upper White River Watershed Alliance (UWRWA) is a forward thinking, not for profit corporation led by local elected officials. The mission of the UWRWA is to improve and protect water quality on a local watershed basis by consolidating data, integrating planning and priorities, and encouraging the development of smaller watershed partnerships that can more efficiently implement projects and plans with the larger Upper White Region.

In order to accomplish this mission the organization has set the following goals:

- Obtain better and more cost-efficient data and enhance the value and quality of locally collected information.
- Increase involvement of local leadership and their abilities to advise and prioritize the development of water quality standards, regulation and control.
- Develop sound financial support for the Alliance, and increase public awareness of regional water resource issues.

The organization is lead by a board of directors, and has obtained support from local, state, and federal agencies (Upper White River Alliance Home Page, no date).

2 General Watershed Description

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

2.1 Upper White River Watershed Overview

The Upper White River watershed is an 8 digit (05120201) hydrologic unit code (HUC) watershed that covers roughly 2,271 square miles, located in central Indiana (Figure 2-1). The Upper White River watershed is subdivided into 180 subbasins represented on the map by 14 digit HUCs (figure 2-2). The Upper White River watershed includes parts of sixteen counties.

The West Fork of the White River rises as an insignificant creek near the Ohio border in central Indiana and winds gently westward. By the time it passes Muncie, however, it is a substantial river. Near the center of the state it abruptly turns south as it builds from the strength of hundreds of creeks and streams. One of those, Fall Creek, marks the chosen site for the state capital. Indianapolis now overshadows the confluence with the landmarks of urbanization (IDNR, 1996).

Further South the scenery changes to a broad, more open valley, but soon the river passes through hill country as it travels into Martinsville. The valley opens once more as the river continues its southwestern flow through Indiana's southern coal fields and sandy farmland (IDNR, 1996). In total, the West Fork flows about 356 miles and drains 5,600 square miles (IDEM, 1995).

Indianapolis is the state capitol and largest city in the watershed with a population estimated over 750,000 people. Muncie, followed by Anderson are the next largest cities. The largest population change from 1990 to 1996 was in the community of Fishers, which experienced a 187% increase.

Geology and Soils

This watershed area covers a vast landscape of various landforms. The eastern half of the watershed which include areas located in Randolph, Delaware, Henry, Madison, Tipton, the eastern half of Hamilton and the northeastern third of Hancock counties, is underlain with

Silurian limestone, and dolomite and shale. The dominant soil types are Brookston, Crosby, Miami, and Parr. Blount, Pewano and Morley soil are dominant soils types in the northern part of the watershed located in Randolph, Delaware and Madison counties. Brookston, Crosby, Miami, and Parr soils are formed in thin loess over loamy glacial till. Blount, Pewano and Morley soils are formed in clayey glacial till. These soils are mainly used for cropland.

The next one fourth of the watershed, which include areas located in Boone, western Hamilton, Marion, the northwest corner of Hancock, north central Johnson, and the extreme northeast corner of Hendricks counties, is underlain with middle Devonian limestone, dolomite, sandstone and New Albany and Antrim shale. Common soils types are Brookston, Crosby, and Miami. These soils are formed in thin loess over loamy glacial till. These soils are mainly used for cropland.

The western one fourth of the watershed, which includes areas located in Hendricks, Morgan, western Johnson, Owen, Monroe and Brown counties, can be divided into three areas based on loess thickness and parent materials. These areas are thin loess over loamy glacial till, moderately thick loess over weathered loamy glacial till and discontinuous loess over weathered sandstone and shale. Common soils associated with the thin loess over loamy glacial till are Brookston, Crosby, Miami and Parr soils. Common soils associated with the moderately thick loess over weathered loamy glacial till are Cincinnati, Avonburg, Vigo and Ava soils. Common soils associated with discontinuous loess over weathered sandstone and shale are Zanesville, Berks, Wellston and Gilpin soils. These soils are mainly used for cropland, hayland, pasture and timberland (USDA -NRCS, 2000).

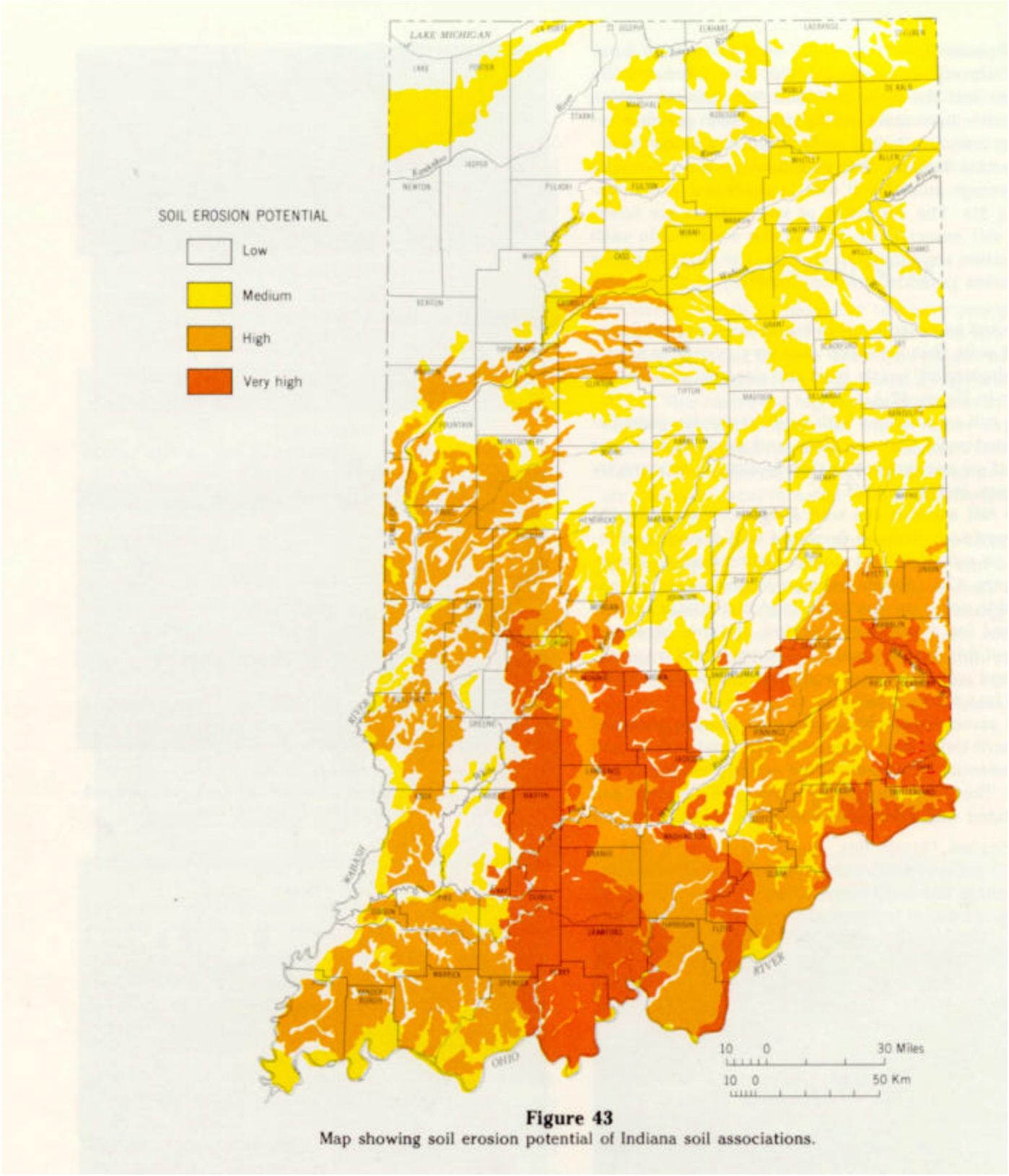

Figure 43
Map showing soil erosion potential of Indiana soil associations.

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

Climate

Average yearly precipitation for the watershed is approximately 42 inches and average yearly snowfall is approximately 29 inches. In winter the average temperature is 30° F, while in the summer the average temperature is 74° F (USDA, 1981).

Precipitation Quality

Precipitation can be contaminated by a variety of compounds. During the latter part of the 20th century , "acid rain" (precipitation with a pH of 4.0 or less) in the northern United States and Canada has been the subject of most precipitation-contamination studies. A three month study of atmospheric deposition across the north-central and northeastern United States showed that the average pH for precipitation in the White River Basin was 4.2 to 4.4. Atmospheric deposition may be a significant pathway for the dispersal of pesticides and nutrients. Herbicides were detected in more than 50 percent of the atmospheric deposition samples in the upper Midwest taken during May to June 1990 (USGS, 1999).

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:

8.14%	Urban (impervious, low and high density)
76.40%	Agricultural vegetation (row crop and pasture)
12.55%	Forest vegetation (shrubland, woodland, forest)
2.03%	Wetland vegetation (Palustrine: forest, shrubland, herbaceous)
0.87%	Open Water

2.2.2 Population

Of the 38, eight digit hydrologic unit area mapped watersheds in the state, the Upper White River Watershed is the largest of such regions that lie completely within state boundaries, and it has the fastest growing population. Nearly one quarter of the state's population resides in the Upper White River Watershed (UWRWA newsletter, Spring, 1999.).

The 1990 total population in the sixteen counties that have land portions in the watershed was 1,722,500. 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 Upper White River watershed. For example, Clinton, Brown, Owen, and Monroe Counties, have small portions of the land area in the Upper White River watershed area (Figure 2-1). A better estimate of the population within the Upper White watershed may be the 1990 and 1995 US Geological Survey Water Use Reports which show a total population in the watershed of 1,367,630 in 1990 and 1,413,030 in 1995 (Table 2-6). These reports indicate that the population in the watershed appears to have grown by about 3.3% between 1990 and 1995.

The average percentage of change in county growth for the Upper White watershed is estimated at 7.6%. If that growth were distributed evenly in the sixteen counties, each county population would increase 8,074 people by the year 2020 (based on the 1990 populations).

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

2.3 Urban Activities in the Upper White Watershed

Six of the seven fastest growing municipalities and the fastest growing county fall entirely in the Upper White River watershed (UWRWA newsletter, Spring, 1999.).

Agricultural and/or other land use acreage is now below 8% or approximately 29,000 acres in Marion County. Most of the remaining 29,000 acres has a “for sale” sign on the property (Harting, 2000).

Neighboring counties that surround Marion county are experiencing continual land use conversion from agricultural to urban uses. For example, approximately one-third of Hamilton County and most of the Upper White River watershed area in Boone County is now urban land use (McCauley, 1999; Culbertson, 2000). Keeping up with the planning and zoning ordinances is quite challenging. Hamilton County alone has nine different planning commissions (McNulty, 1999).

Instead of cattle or hogs, many of the farms and large urban properties in Hamilton and Boone County have horses (McCauley, 1999; Culbertson, 2000).

Industry within the region produces products ranging from pharmaceutical drugs to auto parts and virtually everything in between (UWRWA newsletter, Spring, 1999.).

The SWCDs review urban erosion control plans for sites of five acres or larger and offer recommendations to developers. This task is steadily increasing in all the Upper White River watershed counties. Marion County reviews an average of 165 plans and visited over 300 sites in 1999. Over 4,500 drainage and 800 flood permits are issued each year in Marion County (Matthieu, 2000).

There are four inter agency watershed teams organized in Marion County to assess and implement improvements that effect the county’s water quality. These networking teams provide more timely and better-coordinated construction activities within the city and county, thus possibly reducing erosion and other materials into the watercourses (Goode, 2000). Each

of the different departments provide cross training for each other, which creates more efficient service and a better understanding of departmental responsibilities (Goode, 2000).

In 1996-98, the Hendricks County SWCD provided various educational events and materials about water quality protection in urbanized areas of White Lick Creek watershed. Grant assistance was provided through IDEM under the Section 319 program (Wallis, 2000).

In 1964, the town of Muncie formed a sanitary sewer district and created the Bureau of Water Quality (BWQ). A percentage of the sewage treatment bill is used to fund this department, which costs approximately eight dollars per resident per year. The BWQ provides the city with information about the quality and pollutants in Water River and its tributaries. Under the district law, the Sanitary District has certain legal authority within the city limits to ten miles upstream in the White River tributaries, to enforce compliance to point source organizations. The BWQ department works closely with the Muncie Waste and Water Treatment Plants (Craddock, 2000).

In Muncie, the watercourses have seen tremendous improvements over the years. In 1972, there were 30 species of fish found in the city streams, sludge and bacteria were prevalent, and the steambeds were covered with sediment. Now, the steam bottoms are sand and gravel or bedrock, the water quality tests are excellent, and 69 species of fish inhabit the streams (Craddock, 2000). The city owns 85 percent of the flood control levee along the White River in the city of Muncie. One side has been developed into a park area and the other side is a wildlife habitat area. This situation has allowed many of the native waterfowl and other wildlife to return along the river system. Much of this success has come from the 98 percent reduction of toxic pollutants in our streams over the years (Craddock, 2000).

TABLE 2-1
UPPER WHITE RIVER COUNTY POPULATION PROJECTIONS 1990-2020*

County	1990	2000	2010	2020	Percent Change (1990 to 2020)
Boone	38,100	39,900	41,100	42,100	+10.5
Brown	14,100	14,900	14,900	14,400	+2.1
Clinton	31,000	31,300	31,900	32,900	+6.1
Delaware	119,700	121,500	125,000	128,800	+7.6
Hamilton	108,900	127,800	136,900	140,900	+29.3
Hancock	45,500	47,500	48,900	49,000	+7.7
Hendricks	75,700	80,100	82,700	83,200	+9.9
Henry	48,100	46,500	45,500	44,200	-8.1
Johnson	88,100	94,100	96,700	96,700	+9.7
Madison	130,700	128,200	126,700	124,400	-4.8
Marion	797,200	841,300	865,200	882,900	+10.7
Monroe	109,000	118,900	126,900	131,100	+20.2
Morgan	55,900	59,400	61,700	62,700	+12.1
Owen	17,300	18,500	19,300	19,600	+13.3
Randolph	27,100	26,300	26,000	25,800	-4.8
Tipton	16,100	16,000	16,000	15,900	-1.2

* IBRC 1993

TABLE 2-2
UPPER WHITE RIVER CITY AND TOWN POPULATION ESTIMATES*

City/Town	Census 1990	Estimate 1996	Percent Change (1990 to 1996)
Alexandria	5,709	5,769	1.1
Anderson	59,518	59,131	-0.7
Atlanta	703	781	11.1
Bargersville	1,681	1,938	15.3
Beech Grove	13,383	13,239	-1.1
Bethany	90	100	11.1
Blountsville	155	162	4.5
Brooklyn	1,162	1,275	9.7
Brownsburg	7,628	9,960	30.6
Carmel	25,380	36,837	45.1
Chesterfield	2,730	2,772	1.5
Cicero	3,353	4,201	25.3
Clermont	1,678	1,606	-4.3
Daleville	1,681	1,603	-4.6
Danville	4,345	4,982	14.7
Edgewood	2,057	1,999	-2.8
Elwood	9,494	9,119	-3.9
Farmland	1,412	1,428	1.1
Fishers	7,189	20,665	187.5

City/Town	Census 1990	Estimate 1996	Percent Change (1990 to 1996)
Fortville	2,690	3,075	14.3
Gaston	979	966	-1.3
Georgetown	2,092	2,248	7.5
Homecroft	758	721	-4.9
Indianapolis	731,278	746,737	2.1
Ingalls	889	1,014	14.1
Kempton	362	343	-5.2
Lake Hart	213	233	9.4
Lawrence	26,849	32,642	21.6
Martinsville	11,677	12,155	4.1
McCordsville	684	790	15.5
Middletown	2,333	2,456	5.3
Millersburg	854	957	12.1
Mooresville	5,541	7,553	36.3
Morgantown	978	987	0.9
Muncie	71,170	69,058	-3
Noblesville	17,655	23,960	35.7
Orestes	458	486	6.1
Paragon	515	513	-0.4
Parker City	1,323	1,354	2.3

City/Town	Census 1990	Estimate 1996	Percent Change (1990 to 1996)
Pendleton	2,309	2,729	18.2
Pittsboro	815	1,037	27.2
Plainfield	14,953	17,235	15.3
Selma	800	783	-2.1
Sheridan	2,199	2,340	6.4
Southport	1,969	1,891	-4
Speedway	13,092	12,582	-3.9
Springport	194	200	3.1
Sulphur Springs	257	266	3.5
Summitville	1,010	1,014	0.4
Tipton	4,784	4,725	-1.2
Whitestown	476	495	4
Winchester	5,095	5,130	0.7
Yorktown	4,106	4,536	10.5
Zionsville	5,385	6,257	16.2

* IBRC 1997

2.4 Agricultural Activities in the Upper White River Watershed

Agriculture is the dominant land use in the Upper White River watershed. Section 2.2.1 shows that 76.4 percent of land cover in the watershed is agricultural vegetation. Agriculture generates a large amount of income within the sixteen counties. This section provides an overview of the agricultural activities in the watershed. Specifically, Section 2.4.1 describes crop production activities, 2.4.2 describes conservation tillage systems, Section 2.4.3 describes conservation practices and programs, and Section 2.4.4 describes livestock operations.

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 Fall 1999, there were 461 permitted livestock operations in the sixteen counties of the watershed. The following lists the permitted farms by county:

Boone	56
Brown	0
Clinton	125
Delaware	31
Hamilton	40
Hancock	43
Hendricks	12
Henry	27
Johnson	9
Madison	24
Marion	1
Monroe	1
Morgan	11
Owen	5
Randolph	38
Tipton	38

2.4.2 Crop Production

Table 2-4 lists the 1997 acres of the major crops produced in 1997 throughout the sixteen counties in the watershed. For 1997, the sixteen county totals showed that corn was the

number one planted crop, followed by soybeans. The difference between the corn and soybean planted acres was only 1439 acres. Over 1.8 million acres of corn and soybeans were planted.

2.4.3 Conservation Tillage Systems

Over a span of forty years the tillage systems used in the Upper White River watershed continued to change. In the 1960's moldboard plowing was still the most used implementation tool. The chisel plow moved into the scene in the 1970's and increased the speed and size of farming operations. In 1980, various federal and state conservation agencies promoted using a reduced or no-tillage planting system by offering technical and financial assistance. This movement was created because of the nation wide erosion and sedimentation problems found on cropland fields and in watercourses. The most popular no-till crop grown was corn, followed by wheat. Soybeans were considered too sensitive of a crop to be no-tilled. The 1990's experienced a significant change in farming. The 1985, 1990, and 1996 farm bills required USDA participating farm operators to develop and implement conservation plans to control erosion. The most popular type of conservation plan in Indiana was to adopt high residue systems, which greatly reduced soil erosion in crop fields. Many operators adopted total no-till systems to plant their corn, wheat, and soybeans crops. From 1997 to 2000, the tillage trends indicate that the early no-till pioneers remain committed to 100% no-till operations, but the majority of operators are now using light to moderate tillage to plant corn crops, and no-till their soybean and wheat crops.
No-till drilled soybeans has significantly increased as the most widely used tillage method for soybeans. Around 60 to 80 percent of the soybeans planted within the Upper White River watershed are no-tilled. No-till corn has significantly decreased to only 10 to 20 percent planted within the Upper White River watershed.

Most of the farm operators are still leaving crop residue on the soil surface after the planted row crop. On the average, the majority of farm operators are using low residue tillage operations for corn and high residue no-tillage methods for wheat and soybeans. Residue (the plant remains from last year's crop) left on the soils surface protects soil particles from the impact of the raindrop, reducing its energy, which reduces soil particles from dislodging and washing away.

2.4.4 Conservation Practices and Programs

The installation of conservation practices, such as grassed waterways or concrete block overfall structures, is not new and continues to be implemented. However, the number of conservation practices installed on the farmland over the last ten years has significantly declined. Some of the reasons for this decline are:

- Urbanization
- Reduction of Cost Share Programs
- Land owners are leasing their land and are becoming less involved about the condition of the land
- Cash flow problems

Several natural resource agencies have identified that implementing filter strips along watercourses is needed to improve and/or protect water quality (Wallis, 2000; McClain, 2000;

Norris, 2000). The USDA Conservation Reserve Program (CRP), the DNR Lake and River Enhancement Program, EPA 319 grant program, and local county funding are used in combinations to increase more filter strips throughout the Upper White watershed. The adoption of this practice has not been widely accepted throughout the watershed (Glover, 1999; Canaday, 1999).

Several nutrient and pest management plans were developed in Delaware County with cost-share assistance from the USDA Environmental Quality Incentive Program from 1997 through 1998 (McClain, 2000).

Financial incentives under the CRP have lead to more grassed waterway installation throughout the Upper White watershed. This conservation practice controls gully erosion.

In the 1990's, Fall Creek and Lambs Creek watersheds received funding from state and federal programs and implemented some conservation practices. No watershed plan was developed in these areas.

The Randolph County SWCD is currently using an IDEM Section 319 grant to provide cost-share funding for conservation practice installation for the 2000-2001 years. Interest in the program has been well accepted (Wilson, 2000). In the past, the Randolph County SWCD completed a woodland inventory and provided field days for education purposes.

The number of farm operators is declining. Some of the full time farmers in Morgan County are hurting financially, and have taken on secondary employment outside the farm (Glover, 1999).

TABLE 2-3
LIVESTOCK IN THE UPPER WHITE 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**
Boone	69,682	19	6,292	62	608	38	D	18
Brown	203	92	2,087	87	--	--	--	--
Clinton	181,579	2	2,484	86	860	24	D	21
Delaware	24,502	54	4,857	69	506	47	--	--
Hamilton	24,010	57	4,267	75	900	18	--	--
Hancock	54,942	26	3,437	81	1,521	6	--	--
Hendricks	25,011	51	7,176	55	845	25	D	20
Henry	18,097	61	11,078	30	1,076	13	--	--
Johnson	14,037	67	8,884	45	580	41	--	--
Madison	26,111	48	6,485	60	785	28	--	--
Marion	764	90	965	92	312	56	--	--
Monroe	279	91	10,717	34	308	57	--	--
Morgan	10,515	73	9,063	43	927	17	--	--
Owen	12,934	69	10,917	32	551	44	--	--
Randolph	81,471	34	4,272	55	--	--	179,370	12
Tipton	56,821	25	2,004	88	445	50	--	--

* 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 UPPER WHITE 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**
Boone	98,481	12	98,462	8	4,109	51	5,122	55
Brown	1,840	91	1,022	91	--	--	3,2215	78
Clinton	108,819	7	102,392	6	4,732	40	1,849	87
Delaware	63,858	46	77,999	21	4,404	45	3,602	70
Hamilton	57,296	55	56,282	43	3,759	60	3,201	79
Hancock	71,651	30	73,661	26	4,535	41	3,300	75
Hendricks	66,663	41	64,551	37	5,086	37	6,489	37
Henry	70,172	34	70,678	30	3,091	69	6,674	36
Johnson	59,275	52	46,312	55	4,516	43	5,225	53
Madison	95,169	15	97,000	9	5,232	34	3,884	66
Marion	9,248	84	9,482	84	491	86	1,357	90
Monroe	6,047	87	5,228	87	439	89	11,487	14
Morgan	50,799	60	39,978	62	3,969	55	7,085	32
Owen	20,534	77	18,068	81	2,414	75	11,652	13
Randolph	78,429	25	96,447	10	9,422	11	4,631	59
Tipton	70,977	31	70,257	31	3,246	65	1,029	92

* USDA-NASS 1997

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

2.5 Forestry Information in the Upper White River Watershed

The forested areas in the Upper White River watershed are not large, contiguous tracts of land but are intermixed with agricultural and pasture land. Virgin stands of timber are rare and consequently most wooded areas are second or third growth forests. No streams in the White River watershed basin with a drainage area greater than 10 square miles drain only forest land (USGS, 1999).

2.6 Areas of Special Concern

There are four Superfund (CERCLA) sites located in the Upper White watershed. The first three, Carter Lee Lumber Co., Reilly Tar & Chemical and the Southside Sanitary Landfill are located in Indianapolis. The fourth is the Envirochem Corp. which is located in Zionsville (USEPA, April 1999).

2.7 Significant Natural Areas in the Upper White 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 Upper White River watershed which are on the "Outstanding Rivers List" and their significance.

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

River Segment	County	Significance
White, West Fork: Farmland to confluence with Wabash River	Daviess, Delaware, Gibson, Knox, Greene, Hamilton, Madison, Marion, Morgan, Owen, Randolph	One of 1,524 river segments identified by the National Park Service in its 1982 "National Rivers Inventory" as qualified for consideration for inclusion in the National Wild and Scenic Rivers System. Rivers identified by state natural heritage programs as identified as having outstanding ecological importance. State-designated canoe/boating routes.

*NRC 1997

Other Special Areas

The **Bitternut Woods Nature Preserve** is a 22 acre tract owned by The Nature Conservancy. In this preserve, Williams Creek meanders through a narrow valley. A second-growth forest on the floodplain and adjoining terrace has scattered large specimens of beech, bitternut hickory, sycamore, oaks and blue ash. It also contains large colonies of spring wildflowers, including wild ginger, appendaged waterleaf, mayapple and bloodroot (NRCS, no date).

The **Cabin Creek Raised Bog** is a rare area approximately one acre in size located in the floodplain of Cabin Creek, in Randolph County. The peat moss is a prominent feature of the landscape and rises 10 feet above the floodplain at the maximum elevation (Maggart, 2000).

Cikana State Fish Hatchery is 118 acres in size with 35 earthen ponds developed for fish production. The water surface area totals approximately 29 acres. The primary species raised are walleye, saugeye, channel catfish and smallmouth bass. The fish produced are stocked in state-managed waters throughout Indiana (IDNR, 1997).

Morgan-Monroe State Forest is a 24,000 acre forestland of steep ridges and valleys, covered with some of the states finest hardwoods. The original settlers of the area cleared and attempted to farm the ridges, but were frustrated by rocky soil unsuitable for agriculture. The state purchased the eroded, abandoned land in 1929 (IDNR, 2000).

Mounds State Park is a 288 acres tract of land, with the White River bordering the west boundary of the park. It was established in 1930, and contains and preserves 10 mounds and other earthworks ranging in size from only a few inches tall to several feet high. They were built around 150 B.C. by the Adena and Hopwell cultures primarily for religious ceremonies (IDNR Mounds St. Park Brochure, no date).

The Ritchey Woods Nature Preserve is part of an environmental education center run by the Children's Museum of Indianapolis. The 55 acres preserve is primarily mesic upland forest dominated by sugar maple and red oak. There is also a small portion of wet-mesic floodplain forest along Cheeney Creek which supports green ash, buckeye, and American Elm (NRCS, no date).

The West Fork of the White River has its banks lined with woods of varying depth that contain species such as maple, oaks, sycamore, river birch, cottonwood and others. As the season permits one may see Canada geese, cranes, ducks, deer, muskrat, fox and herons in addition to the usual numbers of squirrels, turtles, groundhogs, and other common animals. Fishing in the stream varies from section to section with possibilities for largemouth and smallmouth bass, catfish, perch and crappie (IDNR,1996).

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 Upper White River Watershed

The statewide classifications discussed in Section 2.8 apply to the Upper White River and it's tributaries, with the following exception. The following waters listed are designated as a **limited water use:**

- Vinson Drain and Mud Creek in Madison County from the Summitville STP to the confluence of Mud Creek and Star Creek.
- North Prong of Stotts Creek in Johnson County from the Bargersville STP to one and one-fourth (1.25) miles downstream.
- Leavell Ditch in Tipton County upstream from its confluence with Buck Creek.
- Buck Creek in Tipton County upstream from its confluence with Cicero Creek.
- Schlatter Ditch which becomes Bacon Prairie Creek in Tipton County upstream from a point one (1) mile upstream of the confluence of Bacon Prairie Creek and Cicero Creek.
- An unnamed tributary of the West Fork of White River in Randolph County from the Farmland STP to its confluence with the West Fork of White River.

2.9 US Geological Survey Water Use Information for the Upper White 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 Upper White River Watershed for 1990 and 1995.

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

Population and Water Use totals	1990	1995
Total population in the watershed (thousands)	1367.63	1413.03
Public Water Supply	**1990**	**1995**
Population served by public groundwater supply (thousands)	342.18	412.64
Population served by surface water supply (thousands)	716.52	716.08
Total population served by public water supply (thousands)	1058.7	1128.72
Total groundwater withdrawals (mgd)	45.28	63.87
Total surface water withdrawals (mgd)	126.51	128.43
Total water withdrawals (mgd)	171.79	192.3
Total per capita withdrawal (gal/day)	162.27	170.37
Population self-supplied with water (thousands)	308.93	284.31
Commercial Water Use	**1990**	**1995**
Groundwater withdrawal for commercial use (mgd)	9.02	10.84
Surface water withdrawal for commercial use (mgd)	1.33	4.36
Deliveries from public water supplies for commercial use (mgd)	39.93	41.37
Total commercial water use (mgd)	50.28	56.57
Industrial Water Use	**1990**	**1995**
Groundwater withdrawal for industrial use (mgd)	25.71	14.93
Surface water withdrawals for industrial use (mgd)	19.49	19.08
Deliveries from public water suppliers for industrial use (mgd)	21.01	29.96
Total industrial water use (mgd)	66.21	63.97
Agricultural Water Use	**1990**	**1995**
Groundwater withdrawals for livestock use (mgd)	1.29	1.33
Surface water withdrawals for livestock use (mgd)	0.99	0.83
Total livestock water use (mgd)	2.28	2.16
Groundwater withdrawals for irrigation (mgd)	0.28	0.55
Surface water withdrawals for irrigation (mgd)	0.16	0.28
Total irrigation water use (mgd)	0.44	0.83
Mining Use	**1990**	**1995**
Groundwater withdrawals	0	0.05
Surface water withdrawals	34.05	49.2
Total withdrawals (mgd)	34.05	49.25
Thermoelectric Power Use	**1990**	**1995**
Groundwater withdrawals (mgd)	3.03	1.64
Surface water withdrawals (mgd)	242.26	290.71
Total withdrawals (mgd)	245.29	292.35

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.

2.10 Environmental Setting of the White River Basin: Human Influences

The effects of human activities on the quality of ground water and surface water are generally unintentional but can be significant. In the White River Basin, human related activities most strongly affect water quality in areas where urban and agricultural land uses are predominant. Major nonpoint sources of contamination include (1) pesticide and nutrient applications related to farming; (2) siltation related to farming, grazing, mining, and construction; and (3) urban runoff. Major point sources of contamination include outfalls related to wastewater treatment plants, industrial discharges, power-generated-plant cooling tank releases, combined sewer overflows, and landfills (USGS, 1999).

In the Indianapolis area, the White River has experienced water quality problems from extensive organic loading in wastewater treatment plant effluent. In the early 1980's, two tertiary treatment plants were installed near Indianapolis to reduce point source contamination from sewage effluent. The tertiary treatment plants significantly reduced biochemical-oxygen demand, fecal coliform bacteria, and ammonia, all indicators of sewage contamination. As a result, water quality in the White River improved (USGS, 1999).

Combined sewer overflows and urban runoff contribute pollutants to streams in the White River Basin. Dissolved oxygen concentrations in the White River downstream from Indianapolis were studied during the summers of 1986 and 1987. Twelve periods of low dissolved oxygen concentrations (less than the Indiana water quality standard of 4.0 mg/L) were measured (USGS,1999).

A study of Fall Creek in Indianapolis during the summer of 1987 concluded that increased concentrations of ammonia, biochemical oxygen demand, copper, lead, zinc, and fecal coliform bacteria during storm runoff were caused by combined sewer overflows and urban runoff (USGS, 1999).

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(d) states that *E. coli* bacteria, using membrane filter count (MF), shall not exceed 125 per 100 milliliters as a geometric mean based on not less than five samples equally spaced over a 30 day period nor exceed 235 per 100 milliliters in any one sample in a 30 day period.

E. coli bacteria may enter surface waters from nonpoint source runoff, but they also come from improperly treated discharges of domestic wastewater. Common potential sources of *E. coli* bacteria include leaking or failing septic systems, direct septic discharge, leaking sewer lines or pump station overflows, runoff from livestock operations, urban stormwater and wildlife. *E. coli* bacteria in treatment plant effluent are controlled through disinfection methods including chlorination (often followed by dechlorination), ozonation or ultraviolet light radiation.

3.1.2 Toxic Substances

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

Whole effluent toxicity testing is required for major NPDES dischargers (discharge over 1 million gallons per day or population greater than 10,000). This test shows whether the effluent from a treatment plant is toxic, but it does not identify the specific cause of toxicity. If the effluent is found to be toxic, further testing is done to determine the specific cause. This follow-up testing is called a toxicity reduction evaluation. Other testing, or monitoring, done to detect aquatic toxicity problems include fish tissue analyses, chemical water quality sampling and assessment of fish community and bottom-dwelling organisms such as aquatic insect larvae. These monitoring programs are discussed in Chapter 4.

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

Metals

Municipal and industrial dischargers and urban runoff are the main sources of metal contamination in surface water. Indiana has stream standards for many heavy metals, but the

most common ones in municipal permits are cadmium, chromium, copper, nickel, lead, mercury, and zinc. Standards are listed in 327 IAC 2-1-6. Point source discharges of metals are controlled through the National Pollutant 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 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 Upper White 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 Upper White River Watershed

As of June 1999, there were 505 NPDES permits within the Upper White watershed (Table 3-2, Figure 3-1). Of the 505 NPDES permits, thirty-two (32) were considered a major discharge (discharge over 1 million gallons per day or population greater than 10,000), while the remaining 473 were considered minor dischargers.

Another point source covered by NPDES permits are combined sewer overflows (CSO). A combined sewer system is a wastewater collection system that conveys sanitary wastewaters (domestic, commerical and industrial wastewaters) and storm water through a single-pipe system to a Publicly Owned Treatment Works. A CSO is the discharge from a combined sewer system at a point prior to the Publicly Owned Treatment Works. CSO's are point sources subject to NPDES permit requirements including both technology-based and water quality-based requirements of the Clean Water Act. There are numerous CSOs that discharge into the watershed. Table 3-2 is a list of known CSO's; however, more may exist within the watershed:

Table 3-2
Number of Known CSOs in Upper White Watershed

Name of the City	Number of CSOs
Anderson	19
Brownsburg	2
Chesterfield	3
Fortville	12
Indianapolis	131
Middletown	3
Munice	20
Noblesville	7
Plainfield	5
Summitville	3
Tipton	7

In addition to the NPDES permitted dischargers in the watershed, there may be many unpermitted, illegal discharges to the Upper White 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
UPPER WHITE RIVER WATERSHED

NPDES	Facility Name	Maj/Mi	City	County	Status
ING080003	Speedway Station #6014	Minor	Martinsville	Morgan	Active
ING080005	Marathon Service Station #2152	Minor	Indianapolis	Marion	Active
ING080008	Speedway Service Station #5390	Minor	Brownsburg	Hendricks	Active
ING080010	Amoco Oil Company St. #558	Minor	Anderson	Madison	Active
ING080012	Marathon Service Station #1502	Minor	Indianapolis	Marion	Inactive
ING080013	Marathon Station #2617	Minor	Indianapolis	Marion	Active
ING080014	Speedway Station #6065	Minor	Noblesville	Hamilton	Active
ING080028	Amoco Oil Company St. #10102	Minor	Indianapolis	Marion	Inactive
ING080029	Amoco Oil Company St. #556	Minor	Indianapolis	Marion	Inactive
ING080030	Amoco Oil Company St. #572	Minor	Indianapolis	Marion	Inactive
ING080031	Amoco Oil Company St. #541	Minor	Indianapolis	Marion	Inactive
ING080032	Amoco Oil Company St. #10028	Minor	Indianapolis	Marion	Inactive
ING080033	Amoco Oil Company St. #85	Minor	Indianapolis	Marion	Inactive
ING080034	Amoco Oil Company St. #20270	Minor	Carmel	Hamilton	Active
ING080035	Amoco Oil Company St. #20304	Minor	Indianapolis	Marion	Inactive
ING080036	Amoco Oil Company St. #487	Minor	Indianapolis	Marion	Inactive
ING080038	Amoco Oil Company St. #30943	Minor	Zionsville	Boone	Inactive
ING080040	Marathon Station #2079	Minor	Indianapolis	Marion	Active
ING080046	Amoco Oil Company St. #10044	Minor	Carmel	Hamilton	Inactive
ING080047	Shell Oil Products Station	Minor	Westfield	Hamilton	Inactive
ING080048	Phillips 66 Station #19885	Minor	Indianapolis	Marion	Inactive
ING080049	Phillips 66 Station #27303	Minor	Indianapolis	Marion	Active
ING080052	Famous Barr Distribution Centr	Minor	Indianapolis	Marion	Active
ING080053	Coca-Cola Bottling of Indpls	Minor	Indianapolis	Marion	Active
ING080054	Johnson Oil Co. Bigfoot #23	Minor	Indianapolis	Marion	Active
ING080055	United Station #6036 Former	Minor	Anderson	Madison	Active
ING080060	Marathon Station #2200	Minor	Indianapolis	Marion	Active
ING080062	Larry's Marathon	Minor	Danville	Hendricks	Active
ING080066	Amoco Station #521	Minor	Indianapolis	Marion	Active
ING080068	Speedway Station #6107	Minor	Indianapolis	Marion	Active
ING080070	Marathon Pipeline Sheridan II	Minor	Sheridan	Hamilton	Inactive
ING080073	Amoco Station 20304	Minor	Indianapolis	Marion	Active
ING080074	Mobil Service Station #05-E64	Minor	Carmel	Hamilton	Active
ING080078	Marathon Station #2493	Minor	Westfield	Hamilton	Inactive
ING080079	Marathon Station #1974	Minor	Anderson	Madison	Active
ING080080	Marathon Oil Station #1636	Minor	Pendleton	Madison	Active
ING080082	Traders Point IDOT #1 Garage	Minor	Indianapolis	Marion	Active
ING080087	Marathon Station #2140	Minor	Indianapolis	Marion	Active
ING080088	Wake-up Store #6400	Minor	Greenwood	Johnson	Active
ING080090	Marathon Ashland Sheridan II	Minor	Sheridan	Hamilton	Active
ING080091	Speedway Store #7155	Minor	Pendleton	Madison	Active
ING080092	Marathon Station #1502	Minor	Speedway	Marion	Active
ING080093	Marathon Station #2152	Minor	Indianapolis	Marion	Active
ING080094	Amoco Oil Company St. #460	Minor		Hendricks	Active
ING080102	Village Pantry #532 G&g Oil	Minor	Muncie	Delaware	Active
ING250004	Navistar International Trans.	Minor	Indianapolis	Marion	Active
ING250014	Rexnord Link-Belt Bearing Div	Minor	Indianapolis	Marion	Active

Table 3-2 (Continued)

NPDES	Facility Name	Maj/Mi	City	County	Status
ING250024	Downey Designs International	Minor	Indianapolis	Marion	Active
ING250029	Wishard Memorial Hospital	Minor	Indianapolis	Marion	Inactive
ING250046	Burco Molding Inc.	Minor	Noblesville	Hamilton	Active
ING250051	Royal Food Products Inc.	Minor	Indianapolis	Marion	Active
ING250052	Illinois Cereal Mills	Minor	Indianapolis	Marion	Active
ING250054	United Airlines Inc.	Minor	Indianapolis	Marion	Active
ING250058	Omco Cast Metals Inc.	Minor	Winchester	Randolph	Active
ING340001	Phillips Pipe Line Indpls Ter	Minor	Clermont	Marion	Active
ING340002	Kerr-mcgee Refining Clermont	Minor	Indianapolis	Marion	Inactive
ING340004	Clark Refining & Marketinginc	Minor	Clermont	Marion	Active
ING340005	Support Terminal Services Inc	Minor	Indianapolis	Marion	Active
ING340010	Marathon Oil Muncie Terminal	Minor	Muncie	Delaware	Inactive
ING340016	Clermont Indiana Bulk Terminal	Minor	Indianapolis	Marion	Active
ING340021	Marathon Pipeline Sheridan Ii	Minor	Sheridan	Hamilton	Inactive
ING340025	Amoco Oil Co. Indpls Terminal	Minor	Indianapolis	Marion	Active
ING340028	Transmontaigne Indpls Termina	Minor	Indianapolis	Marion	Active
ING340033	La Gloria Oil & Gas Clermont	Minor	Clermont	Marion	Active
ING490012	American Agg. 96th St Plt 521	Minor	Indianapolis	Marion	Active
ING490013	American Agg. Harding Plt 522	Minor	Indianapolis	Marion	Inactive
ING490020	IMI/ Hoyt Avenue Muncie	Minor	Muncie	Delaware	Active
ING490024	Martin Marietta Kentucky Ave	Minor	Indianapolis	Marion	Active
ING490026	Martin Marietta River Ave Qua	Minor	Noblesville	Hamilton	Active
ING490028	IMI/irving Bros Stone & Gravel	Minor	Muncie	Delaware	Active
ING490030	IMI/stony Creek Stone Co.	Minor	Noblesville	Hamilton	Active
ING490033	IMI/pendleton	Minor	Anderson	Madison	Active
ING490034	IMI/mccordsville	Minor	Fortville	Hancock	Active
ING490056	U.S. Aggregates Noblesville	Minor	Noblesville	Hamilton	Active
ING490061	Martin Marietta Belmont Sand	Minor	Indianapolis	Marion	Active
ING490068	Kentucky Stone Harding St Plt	Minor	Indianapolis	Marion	Active
ING670011	Amoco Pipeline Company	Minor	Indianapolis	Marion	Active
INP000003	Steel Parts Corporation	Minor	Tipton	Tipton	Inactive
INP000019	Summit Finishing Co. Inc.	Minor	Indianapolis	Morgan	Inactive
INP000025	Biddle Screw Products Co. Inc	Minor	Sheridan	Hamilton	Active
INP000026	Federal-mogul Corporation	Minor	Mooresville	Morgan	Active
INP000030	Economy Plating Co. Inc.	Minor		Boone	Inactive
INP000041	Elsa Llc	Minor	Elwood	Madison	Active
INP000052	Owens-Brockway Glass Container	Minor	Lapel	Madison	Inactive
INP000076	Engineered Cooling Systems Inc	Minor	Carmel	Hamilton	Active
INP000080	Airfoil Textron Inc.	Minor	Elwood	Madison	Inactive
INP000081	Centra-Met Inc.	Minor	Elwood	Madison	Active
INP000089	State Plating Llc.	Minor	Elwood	Madison	Active
INP000099	Anchor Glass Container Corp.	Minor	Winchester	Randolph	Active
INP000106	D.c. Coaters Inc.	Minor	Tipton	Tipton	Active
INP000110	Abrasive Products Inc.	Minor	Fortville	Hancock	Active
INP000116	Environmental Coatings Inc.	Minor	Mooresville	Morgan	Inactive
INP000123	Saber Coating Llc	Minor	Elwood	Madison	Active

Table 3-2 (Continued)

NPDES	Facility Name	Maj/Mi	City	County	Status
INP000126	Red Giant Foods Inc.	Minor	Elwood	Madison	Active
INP000158	Linel Signature	Minor	Mooresville	Morgan	Active
INP000167	Paint and Assembly Corp.	Minor	Elwood	Madison	Active
INP000170	Reeder & Kline Machine Co Inc	Minor	Carmel	Hamilton	Active
INP000189	Vinings Industries Inc.	Minor	Fortville	Hancock	Active
INS000001	Indpls Mun. Storm Sewer System	Minor	Indianapolis	Marion	Active
INS200002	Citizens Gas & Coke Utility	Minor	Indianapolis	Marion	Active
IN0000019	Summit Finishing Co. Inc.	Minor		Morgan	Inactive
IN0001040	Carmel Water Trtmt Plant	Minor		Hamilton	Inactive
IN0001104	Dow Consumer Products Inc.	Minor		Marion	Inactive
IN0001112	Dow Chemical Co-Biological Lab	Major		Boone	Inactive
IN0001228	Pneu-Tech Rubber Specialities	Minor		Marion	Inactive
IN0001236	Borg-warner Automotive	Minor	Muncie	Delaware	Active
IN0001295	Indiana Steel & Wire Division	Minor	Muncie	Delaware	Inactive
IN0001341	Bridgestone/firestone Inc.	Minor	Noblesville	Hamilton	Active
IN0001465	Johns-manville Sales Corp	Minor		Madison	Inactive
IN0001520	Muncie Water Works Co	Minor	Muncie	Delaware	Active
IN0001619	Brooks Foods	Minor	Mount Summit	Henry	Inactive
IN0001635	Daimlerchrysler Inpls Foundry	Minor	Indianapolis	Marion	Active
IN0001643	Twenty-nine Hundred (2900) N.	Minor	Indianapolis	Marion	Inactive
IN0001651	Hoosier Water Co Inc	Minor	Winchester	Randolph	Inactive
IN0001660	Hoosier Water Company Inc	Minor		Marion	Inactive
IN0001724	Armour Swift-Eckrich Foods	Minor	Indianapolis	Marion	Inactive
IN0001732	Stark Wetzel & Co Inc	Minor		Marion	Inactive
IN0001741	Stark Wetzel & Co Inc	Minor		Marion	Inactive
IN0001767	Bridgeport Brass Corporation	Major	Indianpolis	Marion	Inactive
IN0001783	Indianapolis Water Co-wh River	Minor	Indianapolis	Marion	Active
IN0001791	Indianapolis Water Co-fall Crk	Minor	Indianapolis	Marion	Active
IN0001805	Indianapolis Water Co-gray Sta	Minor		Marion	Inactive
IN0001813	Allison Engine Company Inc.	Major	Indianapolis	Marion	Active
IN0001821	GMC-Detroit Diesel Allison Div	Minor		Marion	Inactive
IN0001856	Ray Bros. And Noble Canning	Minor	Hobbs	Tipton	Active
IN0001881	Omco Cast Metals Inc.	Minor	Winchester	Randolph	Inactive
IN0001902	General Motors Corporation	Minor	Indianapolis	Marion	Inactive
IN0001988	Norfolk & Western RR Tipton	Minor		Tipton	Inactive
IN0001996	Norfolk & Western RR Muncie	Minor		Delaware	Inactive
IN0002143	Rieth-Riley Construction Co	Minor		Madison	Inactive
IN0002186	Indiana Michigan Power Madison	Minor	Anderson	Madison	Active
IN0002216	Amoco Oil Company Indpls Term	Minor	Indianapolis	Marion	Inactive
IN0002330	Marhoefer Packing Co Inc	Minor		Delaware	Inactive
IN0002364	Marathon Ashland Indpls Term.	Minor	Indianapolis	Marion	Active
IN0002518	Pittsboro Water Trmt Plant	Minor	Pittsboro	Hendricks	Inactive
IN0002526	American Aggregates Plt #510	Minor	Indianapolis	Marion	Inactive
IN0002534	American Aggregates Plt #513	Minor	Indianapolis	Marion	Inactive
IN0002577	Muncie Stone Co. Irving Bros.	Minor		Delaware	Inactive

Table 3-2 (Continued)

NPDES	Facility Name	Maj/Mi	City	County	Status
IN0002615	Stony Creek Stone Co. Inc.	Minor	Noblesville	Hamilton	Inactive
IN0002631	Irving Brothers Stone & Gravel	Minor	Muncie	Delaware	Inactive
IN0002691	Indianpolis Paving Corp	Minor		Marion	Inactive
IN0002712	Navistar Internat'l Transport.	Minor	Indianapolis	Marion	Inactive
IN0002739	FMC Corp - Peerless Pump Div	Minor		Marion	Inactive
IN0002801	PSI Noblesville Gen. Station	Major	Noblesville	Hamilton	Active
IN0002836	Eli Lilly & Co. Indianapolis	Major	Indianapolis	Marion	Inactive
IN0002844	Eli Lilly Co. Materials Center	Minor		Marion	Inactive
IN0002879	Irving Materials Pendleton Qu	Minor	Anderson	Madison	Inactive
IN0002941	Western Electric Co.	Minor		Marion	Inactive
IN0003123	Bargersville Mun Water Facts	Minor		Johnson	Inactive
IN0003191	Ind Water Corp - Noblesville	Minor		Hamilton	Inactive
IN0003221	Ind Cities Water - Summitville	Minor		Madison	Inactive
IN0003310	Eli Lilly Kentucky Ave. Plant	Minor	Indianapolis	Marion	Active
IN0003395	Diamond Bathurst	Minor		Marion	Inactive
IN0003441	Anchor Hocking Corp Plt #3	Minor		Randolph	Inactive
IN0003468	Ford Motor Plant-indpls Plant	Minor		Marion	Inactive
IN0003549	Stokely-van Camp Inc-can Mfg	Major		Marion	Inactive
IN0003751	Owen-brockway Glass Container	Minor	Lapel	Madison	Active
IN0003867	Sun Refining & Marketing Co.	Minor	Clermont	Marion	Inactive
IN0003999	Carmel Water Trtmt Plant	Minor		Hamilton	Inactive
IN0004031	Danville Muncpl Wtr Sanitation	Minor		Jay	Inactive
IN0004138	Proportion-Air Corporation	Minor	Mccordsville	Hancock	Active
IN0004146	Bargersville Water Utilities	Minor	Greenwood	Johnson	Active
IN0004308	IDNR - Morgan	Minor		Morgan	Inactive
IN0004430	Martin Mariette Agg Lapel Qua	Minor		Madison	Inactive
IN0004502	Colonial Baking Co of Muncie	Minor		Delaware	Inactive
IN0004588	Engineering Research Inc	Major		Marion	Inactive
IN0004677	IPL C. C. Perry "K" Station	Minor	Indianapolis	Marion	Active
IN0004685	IPL E. W. Stout Station	Major	Indianapolis	Marion	Active
IN0004693	IPL H. T. Pritchard Station	Major	Martinsville	Morgan	Active
IN0004715	Cikana Fish Hatchery	Minor		Morgan	Inactive
IN0004855	Speedway Water Works Plant	Minor	Speedway	Marion	Active
IN0004979	Barrick Polishing & Plating Co	Minor		Marion	Inactive
IN0004987	Jones Chemicals Inc.	Minor	Beech Grove	Marion	Inactive
IN0005037	Riggins Dairy-NPR	Minor		Delaware	Inactive
IN0005045	Hydraulic Press Brick Company	Minor	Brooklyn	Morgan	Active
IN0020028	Frankton Municipal STP	Minor	Frankton	Madison	Active
IN0020044	Alexandria Municipal STP	Major	Alexandria	Madison	Active
IN0020079	Danville Municipal STP	Minor	Danville	Hendricks	Active
IN0020087	Lapel Municipal STP	Minor	Lapel	Madison	Active
IN0020150	Yorktown Municipal STP	Major	Yorktown	Delaware	Active
IN0020168	Noblesville Municipal STP	Major	Noblesville	Hamilton	Active
IN0020303	Martinsville Municipal STP	Major	Martinsville	Morgan	Active
IN0020311	Howard W. Sams	Minor		Marion	Inactive

Table 3-2 (Continued)

NPDES	Facility Name	Maj/Mi	City	County	Status
IN0020338	Gaston Municipal STP	Minor	Gaston	Delaware	Active
IN0020401	Pittsboro Municipal STP	Minor	Pittsboro	Hendricks	Active
IN0020729	Parker City Municipal STP	Minor	Parker City	Randolph	Active
IN0020761	Marathon Oil Co&l&k Ent Inc	Minor		Marion	Inactive
IN0020770	Middletown Municipal STP	Minor	Middletown	Henry	Active
IN0020796	Whitestown Municipal STP	Minor	Whitestown	Boone	Active
IN0020826	Johnson Suburban Ulty Incorp	Minor		Johnson	Inactive
IN0020958	Fortville Municipal STP	Minor	Fortville	Hancock	Active
IN0021024	Winchester Municipal STP	Major	Winchester	Randolph	Active
IN0021202	Plainfield Municipal STP	Major	Plainfield	Hendricks	Active
IN0021245	Brownsburg Municipal STP	Major	Brownsburg	Hendricks	Active
IN0021261	Pendleton Municipal STP	Minor		Madison	Inactive
IN0021326	Weyerhauser Co	Minor		Henry	Inactive
IN0021334	Arcadia Municipal STP	Minor	Arcadia	Hamilton	Active
IN0021351	Westfield Municipal STP	Minor	Westfield	Hamilton	Active
IN0021474	Tipton Municipal STP	Major	Tipton	Tipton	Active
IN0021512	Farmland Municipal STP	Minor	Farmland	Randolph	Active
IN0021806	Eastern Hendricks Co. Utility	Minor	Avon	Hendricks	Active
IN0021954	Texaco Sales Terminal	Minor		Marion	Inactive
IN0022004	Lake of the Lanterns Mhp	Minor	Indianapolis	Hendricks	Active
IN0022012	Oakhurst Mobile Home Park	Minor	Clermont	Hendricks	Active
IN0022021	Cardinal Healthcare of Danvill	Minor	Danville	Hendricks	Inactive
IN0022039	Asland Oil Co - Ashland Chemic	Minor		Marion	Inactive
IN0022080	Indy 500 Unocal 76 Truck Plaza	Minor	Whitestown	Boone	Active
IN0022098	Muncie Recclamation and Supply	Minor		Delaware	Inactive
IN0022101	Indianapolis W. 70 Truck Plaza	Minor	Clayton	Hendricks	Active
IN0022110	Atlantic Richfield Co	Minor		Marion	Inactive
IN0022306	Atlanta Municipal STP	Minor	Atlanta	Hamilton	Active
IN0022314	Bargersville Municipal STP	Minor	Bargersville	Johnson	Active
IN0022497	Carmel Municipal STP	Major	Indianapolis	Hamilton	Active
IN0022501	Carmel South Wst Plt	Minor		Hamilton	Inactive
IN0022560	Chesterfield Municipal STP	Minor	Chesterfield	Madison	Active
IN0022586	Cicero Municipal STP	Minor	Cicero	Hamilton	Active
IN0023035	Greenwood San Dept No 2 North	Minor		Johnson	Inactive
IN0023183	Indianapolis-belmont Mun. STP	Major	Indianapolis	Marion	Active
IN0023574	Lawrence City of	Minor		Marion	Inactive
IN0023825	Mooresville Municipal STP	Major	Mooresville	Morgan	Active
IN0023850	Farmington Utilities Inc.	Minor	Muncie	Delaware	Inactive
IN0024562	Summitville Municipal STP	Minor	Summitville	Madison	Active
IN0024970	Oak Meadows Mobile Home Comm.	Minor	Greenwood	Johnson	Active
IN0025020	Indiana and Michigan Electric	Minor		Madison	Inactive
IN0025089	Indiana and Michigan Electric	Minor		St Joseph	Inactive
IN0025097	Economy Plating	Major		Boone	Inactive
IN0025151	Wes-Del Jr-Sr High School	Minor	Gaston	Delaware	Active
IN0025275	Indianapolis Southside Utiliti	Minor		Marion	Inactive

Table 3-2 (Continued)

NPDES	Facility Name	Maj/Mi	City	County	Status
IN0025364	Royerton Elementary School	Minor	Muncie	Delaware	Active
IN0025372	Deer Path Utilites Inc	Minor	Plainfield	Hendricks	Active
IN0025381	Westminster Village North	Minor		Marion	Inactive
IN0025399	Delaware County Home	Minor		Delaware	Inactive
IN0025402	Country Village Subdivision	Minor	Muncie	Delaware	Active
IN0025411	Muncie Mall	Minor		Delaware	Inactive
IN0025429	Central Sewage	Minor		Delaware	Inactive
IN0025470	Marathon Oil Co and L & K Ente	Minor		Delaware	Inactive
IN0025488	Daleville Elem. And H.s. Trmt	Minor		Delaware	Inactive
IN0025518	Pennwood Mobile Home Community	Minor		Marion	Inactive
IN0025526	Tall Timber Mobile Home Park	Minor	Noblesville	Hamilton	Active
IN0025542	Echo Lake Mobile Home Village	Minor		Morgan	Inactive
IN0025569	Pine Ridge Mobile Home Park	Minor	Zionsville	Boone	Active
IN0025631	Muncie Sanitary District	Major	Muncie	Delaware	Active
IN0025780	Lantern Hills Village	Minor		Morgan	Inactive
IN0025976	Maple Grove MHP	Minor	Martinsville	Morgan	Active
IN0029700	Culligan Water Conditioning	Minor		Morgan	Inactive
IN0029742	Grassyfork Fisheries Co Inc	Minor		Morgan	Inactive
IN0030023	Ashbury Park Investments	Minor	Mooresville	Morgan	Active
IN0030040	Indianapolis Training Center	Minor	Indianapolis	Marion	Active
IN0030546	Broadacre Mobile Home Park	Minor	Indianapolis	Hendricks	Active
IN0030597	Indian Lakes Country Club	Minor		Marion	Inactive
IN0030830	Monrovia Elem & High School	Minor	Monrovia	Morgan	Active
IN0030899	Wheel Estates Mobile Home Park	Minor		Johnson	Inactive
IN0030902	Echo Lake Mobile Home Communit	Minor	Mooresville	Morgan	Active
IN0030953	Engineering Research Inc. - N	Major		Marion	Inactive
IN0031046	Link-Belt Bearing Division	Minor	Indianapolis	Marion	Inactive
IN0031054	Perry Worth Elementary School	Minor	Lebanon	Boone	Inactive
IN0031062	Indian Creek Senior Hs	Minor		Johnson	Inactive
IN0031071	Sheridan Municipal STP	Minor	Sheridan	Hamilton	Active
IN0031101	General Shale Products Corp.	Minor	Mooresville	Morgan	Inactive
IN0031135	Union Elementary & High School	Minor	Modoc	Randolph	Active
IN0031241	Mt. Vernon Middle & High Sch.	Minor	Fortville	Hancock	Active
IN0031356	Pipe Creek Rest Area I-69	Minor	Gaston	Delaware	Active
IN0031381	Spring Mill Elem School	Minor		Marion	Inactive
IN0031526	Plainfield Rest Area I-70	Minor	Plainfield	Hendricks	Active
IN0031569	Cowan Elem. & High School	Minor	Muncie	Delaware	Active
IN0031640	Perry Elementary School	Minor	Selma	Delaware	Active
IN0031666	North Grove Elem School	Minor		Johnson	Inactive
IN0031674	Center Grove Schools	Minor	Greenwood	Johnson	Inactive
IN0031712	Shenandoah Mid and High School	Minor	Middletown	Henry	Active
IN0031828	Cicero Wstwtr Trmt Plt	Minor		Hamilton	Inactive
IN0031925	St. John's Evangel. Luth. Sch.	Minor	Indianapolis	Marion	Active
IN0031933	Country Acres M.H.P.	Minor	Muncie	Delaware	Active
IN0031950	Indianapolis-southport STP	Major	Indianapolis	Marion	Active

Table 3-2 (Continued)

NPDES	Facility Name	Maj/Mi	City	County	Status
IN0031984	Indiana Youth Center	Minor		Hendricks	Inactive
IN0032085	Oaklandon Elem School	Minor		Marion	Inactive
IN0032115	Ryan Inc	Minor		Madison	Inactive
IN0032123	Craig Jr HS	Minor		Marion	Inactive
IN0032166	Brooklyn Elem School	Minor		Morgan	Inactive
IN0032182	Nixon Cattle Co	Minor		Delaware	Inactive
IN0032204	Greenwood San Dept No 1 South	Minor		Johnson	Inactive
IN0032255	Quality Inn of Muncie	Minor		Delaware	Inactive
IN0032298	Brooklyn Town of	Minor		Morgan	Inactive
IN0032301	Easterbrook Elem School	Minor		Marion	Inactive
IN0032387	Ozark Fisheries Inc	Minor		Morgan	Inactive
IN0032476	Anderson Municipal STP	Major	Anderson	Madison	Active
IN0032719	Elwood Municipal STP	Major	Elwood	Madison	Active
IN0032905	Alexandria Public Water Supply	Minor	Alexandria	Madison	Active
IN0032913	Lawrence City of Wtr Wks	Minor	Lawrence	Marion	Inactive
IN0032921	ITT-Hoffman	Minor		Marion	Inactive
IN0032972	Speedway Municipal STP	Major	Indianapolis	Marion	Active
IN0033456	USDA Ft Ben Harrsn USA Adm Ctr	Minor		Marion	Inactive
IN0033669	U S Steel Supply-indianapolis	Major		Marion	Inactive
IN0034932	Montgomery Municipal STP	Minor	Montgomery	Daviess	Active
IN0035271	Northwestern School Corp	Minor		Henry	Inactive
IN0035475	Chesterfield Town of	Minor		Madison	Inactive
IN0035874	Aero Mayflower Transit Co	Minor		Hamilton	Inactive
IN0035891	Canary Cottage Motel	Minor		Hendricks	Inactive
IN0035947	Foxcliff Estate Summit City Ut	Minor		Morgan	Inactive
IN0035963	Hi 40 Mobile Home Park	Minor		Marion	Inactive
IN0036030	Sun Oil Co	Major		Marion	Inactive
IN0036048	Sun Oil Co	Major		Marion	Inactive
IN0036099	Kerr-McGee Refining Corp.	Minor	Clermont	Hendricks	Inactive
IN0036102	Aircraft & Electronic Specialt	Minor		Hendricks	Inactive
IN0036331	Suburban Estates	Minor		Hamilton	Inactive
IN0036382	Country Club of Indianapolis	Minor		Marion	Inactive
IN0036439	Penn Central Transportation Co	Minor		Marion	Inactive
IN0036544	ABB Power T & D Company Inc.	Minor	Muncie	Delaware	Inactive
IN0036587	Red Gold	Minor	Orestes	Madison	Active
IN0036820	Morgantown Municipal STP	Minor	Morgantown	Morgan	Active
IN0036862	Glenn Hills Village WWTP	Minor		Delaware	Inactive
IN0036951	Zionsville Municipal STP	Minor	Zionsville	Boone	Active
IN0036986	Edgewood Town of	Minor		Madison	Inactive
IN0037028	Indiana & Michigan Elec Co-mun	Minor		Delaware	Inactive
IN0037079	Hickory Haven Mobile Home Pk	Minor		Delaware	Inactive
IN0037133	Interventions	Minor	Gaston	Delaware	Active
IN0037184	Delta High School	Minor	Muncie	Delaware	Active
IN0037257	Mary Evelyn Castle Elementary	Minor		Marion	Inactive
IN0037354	Hamilton Southeastern H.S.	Minor	Fishers	Hamilton	Inactive

Table 3-2 (Continued)

NPDES	Facility Name	Maj/Mi	City	County	Status
IN0037362	Sheridan Waste Treatment Plant	Minor		Hamilton	Inactive
IN0037397	Muncie Comm Schools-no View El	Minor		Delaware	Inactive
IN0037486	Hamilton S. E. Middle School	Minor		Hamilton	Inactive
IN0037907	Phillips Petroleum Company	Minor	Clermont	Hendricks	Inactive
IN0038059	Teppco - Indianapolis Terminal	Minor	Indianapolis	Hendricks	Active
IN0038407	Jackson Mobile Home Park	Minor	Muncie	Delaware	Active
IN0038458	Regency Mobile Home Park	Minor		Madison	Inactive
IN0038598	Suburban Estates M.H.P.	Minor	Noblesville	Hamilton	Active
IN0038601	Frazier Mobile Home Park	Minor		Delaware	Inactive
IN0038695	Wooded Hills Mobile Home Park	Minor	Martinsville	Morgan	Active
IN0038750	Clermont Mobile Home Park	Minor	Clermont	Hendricks	Active
IN0038857	I-69 Auto Truck Plaza Inc.	Minor	Gaston	Delaware	Active
IN0038881	Mt. Comfort Elementary School	Minor	Greenfield	Hancock	Active
IN0039152	Bunker Hill Elementary School	Minor		Marion	Inactive
IN0039284	Carmel N Municipal STP	Major		Hamilton	Inactive
IN0039420	Stokely Van-Camp Inc.	Minor		Tipton	Inactive
IN0039462	Quality Inn of Muncie	Minor		Delaware	Inactive
IN0039471	Quiet Acres Mobile Home Park	Minor	Selma	Delaware	Active
IN0039578	Westminster Village Muncie	Minor		Marion	Inactive
IN0039586	Mayflower Transit Inc.	Minor	Carmel	Hamilton	Inactive
IN0039675	Drake Terrace Apartments	Minor		Marion	Inactive
IN0039730	Bethany Town of	Minor		Morgan	Inactive
IN0039772	Brooklyn Municipal STP	Minor	Brooklyn	Morgan	Active
IN0040011	Fishers Municipal STP	Major	Fishers	Hamilton	Active
IN0040142	Ingalls Municipal STP	Minor		Madison	Inactive
IN0040304	Markleville Municipal STP	Minor		Madison	Inactive
IN0040410	Mount Sumitt Municipal STP	Minor		Henry	Inactive
IN0040452	Orestes Town of	Minor		Madison	Inactive
IN0040479	Paragon Municipal STP	Minor	Paragon	Morgan	Active
IN0040606	Selma Municipal STP	Minor		Delaware	Inactive
IN0040657	Sulphur Springs Municipal STP	Minor		Henry	Inactive
IN0040681	Trafalgar Municipal STP	Minor	Trafalgar	Johnson	Active
IN0040860	Ray Bros. & Noble Canning Co	Minor		Tipton	Inactive
IN0041025	Brooklyn Elementary School	Minor		Morgan	Inactive
IN0041033	Eastbrook Elementary School	Minor		Marion	Inactive
IN0041041	Creston Jr High School	Minor		Marion	Inactive
IN0041050	Grassy Creek Elementary School	Minor		Marion	Inactive
IN0041068	Lowell Elementary School	Minor		Marion	Inactive
IN0041475	Plainfield Town Of-Swinford Pk	Minor		Hendricks	Inactive
IN0041548	Plainfield Public Water Supply	Minor	Plainfield	Hendricks	Active
IN0041572	Anderson Water Works	Minor	Anderson	Madison	Inactive
IN0041645	Williams Creek Municipal STP	Minor		Marion	Inactive
IN0041815	CSX Transportation Inc.- Avon	Minor	Plainfield	Hendricks	Active
IN0041963	Ryan Lake Development	Minor		Madison	Inactive
IN0041971	Hi-40 Mobile Home Park	Minor	Indianapolis	Hendricks	Active
IN0041980	Canary Cottage Motel	Minor	Clayton	Hendricks	Inactive

Table 3-2 (Continued)

NPDES	Facility Name	Maj/Mi	City	County	Status
IN0042099	Hoosier Village	Minor	Indianapolis	Boone	Inactive
IN0042242	Journal-Box Servicing Corp	Minor		Marion	Inactive
IN0042269	Ind Dept Administration-ind re	Minor		Madison	Inactive
IN0042609	Westwood Terrace Apartments	Minor	Bridgeport	Hendricks	Active
IN0043036	Circle Inn Mobile Home Park	Minor		Hendricks	Inactive
IN0043222	Homecroft Municipal STP	Minor		Marion	Inactive
IN0043281	Carefree Homes M.H.P.	Minor	Pendleton	Madison	Active
IN0043389	Eagletown Estes Mobile Home Pa	Minor		Boone	Inactive
IN0043401	Highland Golf & Country Club	Minor		Marion	Inactive
IN0043532	Avon Village Mobile Home Park	Minor	Indianapolis	Hendricks	Inactive
IN0043559	Shady Hills Subdivision	Minor	Indianapolis	Marion	Active
IN0043591	White Lick Sewer Inc.-prestwi	Minor	Avon	Hendricks	Active
IN0043656	Roost (Sherwood Inn)-merri	Minor		Marion	Inactive
IN0043672	Fibrex Corporation	Minor	Alexandria	Madison	Inactive
IN0043796	Frankton Town of	Minor		Madison	Inactive
IN0043885	American Precaste Concrete Co.	Minor		Marion	Inactive
IN0043974	Delaware Acres M.H.P.	Minor	Muncie	Delaware	Active
IN0044121	American Can Co	Minor		Marion	Inactive
IN0044296	B&B Anodize	Minor		Marion	Inactive
IN0044555	Clark Oil & Refining Corp.	Minor	Clermont	Hendricks	Inactive
IN0044636	Dept Pub Wks Liquid Wste-cande	Minor		Marion	Inactive
IN0044946	William H. Roberts & Sons Inc	Minor	Indianapolis	Marion	Inactive
IN0045021	Country Club of Indianapolis	Minor		Marion	Inactive
IN0045047	Martin Marietta Agg Dawson Pl	Minor		Marion	Inactive
IN0045152	Dept. Of Transportation Gar.#2	Minor		Marion	Inactive
IN0045209	Equilon Enterprises Zionsvill	Minor	Indianapolis	Boone	Active
IN0045233	T. W. Moses Plant	Minor	Indianapolis	Marion	Active
IN0045446	Bradford Woods Camping Area	Minor	Martinsville	Morgan	Active
IN0045497	Martin Marietta Aggregates	Minor		Hamilton	Inactive
IN0045632	Irving Materials Fortville Qu	Minor	Fortville	Hancock	Inactive
IN0045659	Wm. J. Rahe & Sons	Minor	Muncie	Delaware	Inactive
IN0045772	Jeps Inc	Minor		Marion	Inactive
IN0045781	Maul Bros.	Minor		Randolph	Inactive
IN0046205	Downey Designs Int'l Inc.	Minor	Indianapolis	Marion	Inactive
IN0046213	Davis Brothers Oil Company	Minor	Cloverdale	Putnam	Inactive
IN0046353	Consolidated Freightways	Minor	Indianapolis	Marion	Inactive
IN0046370	Greenwood City Of Sani. Dist	Minor	Greenwood	Johnson	Inactive
IN0046639	STC Corporation	Minor	Clermont	Marion	Inactive
IN0046779	Alac Garment Services	Minor	Anderson	Madison	Inactive
IN0046787	Terradyn Inc.	Minor	Tipton	Tipton	Inactive
IN0047198	IUPUI Indianapolis	Minor		Marion	Inactive
IN0047597	Durbin Elementary School	Minor	Noblesville	Hamilton	Inactive
IN0048135	Wishard Memorial Hospital	Minor	Indianapolis	Marion	Inactive
IN0048224	Printed Wiring Inc.	Minor		Hamilton	Inactive
IN0048798	United Pentecostal Church Camp	Minor		Madison	Inactive

Table 3-2 (Continued)

NPDES	Facility Name	Maj/Mi	City	County	Status
IN0049026	Fall Creek RSD STP	Major	Pendleton	Madison	Active
IN0049069	Forest Glen Subd.	Minor		Johnson	Inactive
IN0049107	Dart Controls Inc.	Minor	Zionsville	Boone	Inactive
IN0049361	Mapleturn Utilities WWTP	Minor		Morgan	Active
IN0049476	Diamond Chain Co.	Minor	Indianapolis	Marion	Active
IN0049581	Belleville Conservancy Distric	Minor	Clayton	Hendricks	Active
IN0049603	BDP Company	Minor		Marion	Inactive
IN0049794	Summit Springs_reg Wst Dist	Minor	Mount Summit	Henry	Active
IN0049956	Marathon Ashland Speedway Ter	Minor	Indianapolis	Marion	Active
IN0049964	Marathon Ashland Muncie Term.	Minor	Muncie	Delaware	Active
IN0050024	Brownsburg Public Water Supply	Minor	Brownsburg	Hendricks	Active
IN0050164	Gaston Public Water Supply	Minor	Gaston	Delaware	Active
IN0050199	Panhandle Eastern Pipeline Co.	Minor	Statewide		Active
IN0050385	WAP Company	Minor		Morgan	Inactive
IN0050393	American United Life Ins. Co.	Minor	Indianapolis	Marion	Active
IN0050491	Mike's Car Wash	Minor		Delaware	Inactive
IN0050661	Asphalt Materials Inc.	Minor	Indianapolis	Marion	Active
IN0050962	AMR Combs-Indianapolis Inc.	Minor	Indianapolis	Marion	Inactive
IN0050989	Zionsville Municipal STP	Minor	Zionsville	Boone	Inactive
IN0051365	Peerless Pump	Minor	Indianapolis	Marion	Active
IN0051632	West Central Conservancy Dist	Minor	Plainfield	Hendricks	Active
IN0051951	Hamilton Western Utilities	Minor	Carmel	Hamilton	Active
IN0051993	Morgan County Rural Water Co.	Minor	Martinsville	Morgan	Active
IN0052051	Woodland Country Club	Minor		Hamilton	Inactive
IN0052256	Wildwood Shores Development	Minor	Camby	Morgan	Active
IN0052311	Coca-Cola Bottling Company	Minor	Speedway	Marion	Inactive
IN0052680	Stokely-Van Camp Inc.	Minor		Tipton	Inactive
IN0052736	Quaker Oats Company the	Minor	Indianapolis	Marion	Inactive
IN0052868	Firstmark Standard Life Insur.	Minor	Indianapolis	Marion	Inactive
IN0053031	Indiana Reformatory	Major		Madison	Inactive
IN0053171	Quemetco (RSR Corporation)	Major	Indianapolis	Marion	Active
IN0053627	Resting Wheels M.H.P.	Minor	Anderson	Madison	Active
IN0053732	Feeny Manufacturing Company	Minor	Muncie	Delaware	Inactive
IN0053805	Martin Marietta Agg Ky Avenue	Minor	Indianapolis	Marion	Inactive
IN0054071	Coz Terminaling Inc.	Minor	Clermont	Hendricks	Inactive
IN0054143	Hamilton S.E. Utilities Inc.	Minor	Indianapolis	Hamilton	Inactive
IN0054348	Greentree County Club Estates	Minor		Hamilton	Inactive
IN0054551	Harding Paving Company Inc.	Minor	Indianapolis	Marion	Inactive
IN0054593	Carolina Freight Carriers Corp	Minor	Indianapolis	Marion	Inactive
IN0054666	Equilon Enterprises Muncie	Minor	Muncie	Delaware	Active
IN0054691	Amoco Service Station	Minor		Marion	Inactive
IN0054771	Flatfork Creek/marina Limited	Minor	Noblesville	Hamilton	Active
IN0054887	Indianapolis Water Co-wh Rvr N	Minor	Carmel	Hamilton	Active
IN0054909	Martin Marietta Agg River Ave	Minor	Noblesville	Hamilton	Inactive
IN0054917	Geist Station - Indianapolis W	Minor	Indianapolis	Marion	Active

Table 3-2 (Continued)

NPDES	Facility Name	Maj/Mi	City	County	Status
IN0055107	R & D Transport Inc.	Minor	Brownsburg	Hendricks	Inactive
IN0055280	Eagletown Treatment Plant/	Minor	Eagletown	Hamilton	Active
IN0055654	IH Sewer Corporation (Exit 10)	Minor	Fishers	Hamilton	Active
IN0055760	Clay Township Rwd	Minor	Lebanon	Boone	Active
IN0055948	P.L. Porter Co. A.s.g.	Minor	Westfield	Hamilton	Inactive
IN0056022	Kutche Chevyoldspontiacbuic	Minor	Elwood	Madison	Inactive
IN0056120	Shell Oil Co. Service Station	Minor	Indianapolis	Marion	Inactive
IN0056375	Pilot Travel Center No. 362	Minor	Fortville	Madison	Active
IN0056421	Johnson Oil Company	Minor	Daleville	Delaware	Inactive
IN0056472	Hanging Tree Stables Estate	Minor	Westfield	Hamilton	Inactive
IN0056499	Amoco Oil Company St. #439	Minor	Indianapolis	Marion	Inactive
IN0056511	Pepsi-Cola Bottling Plant	Minor	Indianapolis	Marion	Inactive
IN0056561	United Oil Station #6107	Minor	Indianapolis	Marion	Inactive
IN0056600	United Oil Station #6112	Minor	Indianapolis	Marion	Inactive
IN0056651	Mobil Service Station #05-e64	Minor	Carmel	Hamilton	Inactive
IN0056693	Mobil Facility #13-010	Minor		Hendricks	Inactive
IN0056871	Wabash Alloys L.l.c.	Minor	Tipton	Tipton	Inactive
IN0056880	Anr Pipeline Co. 25 Co. Wide	Minor	Winchester	Randolph	Active
IN0056936	Traders Point IDOT Facility	Minor	Indianapolis	Marion	Inactive
IN0056979	Buckeye Pipeline Co 4 Countys	Minor	Central & Northern	Hendricks	Active
IN0056987	Amoco Oil Company Sta. #1044	Minor	Carmel	Hamilton	Inactive
IN0057011	Indpls Motor Speedway Golf Cou	Minor	Speedway	Marion	Inactive
IN0057096	Kentucky Fried Chicken Facilit	Minor	Indianapolis	Marion	Inactive
IN0057100	Western Hancock Utilities	Minor	Mccordsville	Hancock	Inactive
IN0057126	Village Pantry No. 390 WWTP	Minor	Muncie	Delaware	Active
IN0057282	Speedway Gas Station #7155	Minor	Pendelton	Madison	Inactive
IN0057401	Marathon Ashland Speedway Gw	Minor	Indianapolis	Marion	Active
IN0057479	Marathon Service Station #3079	Minor	Mooresville	Morgan	Active
IN0057487	Rolling Vista Estates WWTP	Minor	Five Points	Morgan	Active
IN0057495	Irishman's Run Farm Utility Co	Minor	Zionsville	Boone	Active
IN0057614	Hendricks County Rsd	Minor	Avon	Hendricks	Active
IN0057665	United Service Station #6136	Minor	Indianapolis	Marion	Active
IN0057720	AT&T-Lucent Meridian Rd Lndfl	Minor	Fortville	Hancock	Active
IN0057746	Marathon Service Station #2460	Minor	Noblesville	Hamilton	Inactive
IN0057827	United Store #6067	Minor	Carmel	Hamilton	Inactive
IN0057878	Fawn Valley Subdivision	Minor	Martinsville	Morgan	Active
IN0058238	Indpls International Airport	Minor	Indianapolis	Marion	Active
IN0058301	Four Star Transportation Inc.	Minor	Indianapolis	Marion	Active
IN0058394	Windy Hills Farm Utility Corp	Minor	Sheridanle	Boone	Active
IN0058629	Leach Elementary School	Minor	Anderson	Madison	Active
IN0058645	Thiesing Veneer Company	Minor	Mooresville	Morgan	Active
IN0059072	Country View Estates	Minor	Mooresville	Morgan	Active
IN0059170	Ball State University - Coal	Minor	Muncie	Delaware	Active
IN0059196	Indpls Air Traffic Control Cnt	Minor	Indianapolis	Marion	Inactive

Table 3-2 (Continued)

NPDES	Facility Name	Maj/Mi	City	County	Status
IN0059234	Sanitrol Incorporated	Minor		Morgan	Active
IN0059315	Noblesville Plant - IAWC	Minor	Noblesville	Hamilton	Active
IN0059340	Woods Industries Inc.	Minor	Carmel	Hamilton	Active
IN0059358	Liberty Water Company	Minor	Clayton	Hendricks	Active
IN0059366	Indpls West 70 Truck Plaza	Minor	Clayton	Hendricks	Active
IN0059374	Liberty Township STP	Minor	Plainfield	Hendricks	Active
IN0059544	Westfield Municipal STP	Minor	Westfield	Hamilton	Active
IN0059676	Navistar Internat'l Transporta	Minor	Indianapolis	Marion	Active
IN0059943	Gas America Hinkle Creek WWTP	Minor	Nr Bakers Corner	Hamilton	Active
IN0060011	Kennedy Machine & Tool WWTP	Minor	Alexandria	Madison	Active
IN0060020	Shadeland Commerce Center	Minor	Indianapolis	Marion	Active
IN0060054	Dow Chemical Co. Zionsville	Minor	Zionsville	Boone	Active
IN0060119	Sand Creek Middle School WWTP	Minor	Fishers	Hamilton	Active
IN0060259	Bowar Utilities Llc	Minor	Morgan County	Morgan	Active
IN0060291	Eastern Estates WWTP	Minor	Greene County	Hendricks	Active
IN0109398	Royal Oaks MHP	Minor		Madison	Inactive
IN0109762	Eagletown Estates Mobile Home	Minor	Westfield	Hamilton	Active
IN0109860	Hamilton Western Utilities in	Minor		Hamilton	Inactive
IN0109967	Highland Lakes Baptist Center	Minor	Monrovia	Morgan	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 than 100,000 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 UPPER WHITE 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 Upper White River Watershed

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

4.1 Water Quality Monitoring Programs

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

4.1.1 Office of Water Quality Programs

The Water Quality Assessment Branch of the Office of Water Quality 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 Quality. 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 a few groups and organizations spread throughout Upper White watershed performing monitoring activities. Most of the local monitoring is done on a volunteer basis and performed by school groups with education as the primary focus. There are some local organizations funding personnel or contracting with consultants to obtained data to make future planning and implementation strategies.

The Tipton County High School has a science class that monitors Cicero Creek, a tributary of White River. The Tipton County SWCD received funding for three years to monitor ten locations around the outer edge of Tipton County to determine if and where water quality impairments are occurring (Baird, 2000).

The Friends of the White River provides monitoring kits and personal assistance to various organizations and twenty-nine school groups around the Marion county area (Cowser, 2000).

The White River Watchers are performing *E. coli* testing in the White River. They also sponsor Clean-ups that provide educational and habitat improvement activities.

Ball State University will utilize the White River as a teaching tool, with both teacher and students learning more about the river ecology. Two workshops and a web page will be developed to help inform the public about the river's ecology (McClain, 2000).

The Marion County Health Department-Water Quality & Hazardous Materials Management (MCHD/WQHMM) has water quality monitoring data available on their website http://www.mchd.com. Many of the MCHD/WQHMM sampling points are selected with input form stakeholders such as the Eagle Creek Watershed Task Force, Friends of the White River, USGS, and IDEM.

4.2 Summary of Ambient Monitoring Data for the Upper White River Watershed

The fixed station monitoring program managed by IDEM's Office of Water Quality 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 Upper White 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 Upper White 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 Quality - IDEM.

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

Parameter	EC-1 Eagle Creek at Indianapolis	EC-7 Eagle Creek at Indianapolis	EC-21 Eagle Creek South of Zionsville	FC-6 Fall Creek Indianapolis	FC-7 Fall Creek Indianapolis
Biological Oxygen Demand	ß	ß	ß	↘	¬
Chemical Oxygen Demand	ß	¬	¬	¬	¬
Dissolved Oxygen	¬	ß	¬	¬	↗
E. coli	¬	↗	¬	¬	¬
Ammonia	ß	¬	¬	¬	¬
Nitrite + Nitrate	¬	ß	¬	ß	ß
Total phosphorus	↘	ß	¬	↘	¬
Total Residue	¬	Ý	¬	↘	¬
Total Residue, Filterable	?	?	?	?	¬
Total Residue, Nonfilterable	¬	¬	¬	¬	¬
Copper	ß	?	?	ß	?
Cyanide (total)	¬	¬	¬	↘	¬

Notes
- ¬ No Statistical Change; significance < 80% or reported slope = 0.00000
- ß Statistically Decreasing; significance >95% with a negative slope
- ↘ Potentially Decreasing; significance >80% with a negative slope

↗ Potentially Increasing; significance >80% with a positive slope
Ý Statistically Increasing; significance >95 % with a positive slope
? Insufficient Data for analysis

TABLE 4-1
RESULTS OF SEASONAL KENDALL ANALYSIS FOR STATIONS LOCATED IN THE UPPER WHITE WATERSHED
1986 TO 1995
(continued)

Parameter	IWC-9 Indianapolis Waterway Canal at Indianapolis	WR-192 White River at Martinsville	WR-210 White River at Waverly	WR-248 White River at Nora	WR-279 White River at Perkinsville
Biological Oxygen Demand	ß	¬	↘	ß	ß
Chemical Oxygen Demand	ß	↘	¬	ß	¬
Dissolved Oxygen	¬	↗	↗	↗	Ý
E. coli	¬	¬	¬	¬	¬
Ammonia	¬	¬	¬	¬	ß
Nitrite + Nitrate	¬	ß	ß	¬	¬
Total phosphorus	¬	ß	ß	↘	ß
Total Residue	¬	¬	¬	¬	↗
Total Residue, Filterable	↗	**?**	**?**	**?**	**?**
Total Residue, Nonfilterable	ß	¬	¬	ß	¬
Copper	ß	ß	ß	**?**	ß
Cyanide (total)	¬	¬	¬	**?**	¬

Notes

¬ No Statistical Change; significance < 80% or reported slope = 0.00000
ß Statistically Decreasing; significance >95% with a negative slope
↘ Potentially Decreasing; significance >80% with a negative slope
↗ Potentially Increasing; significance >80% with a positive slope
Ý Statistically Increasing; significance >95 % with a positive slope
? Insufficient Data for analysis

TABLE 4-1
RESULTS OF SEASONAL KENDALL ANALYSIS FOR STATIONS LOCATED IN THE UPPER WHITE WATERSHED
1986 TO 1995
(continued)

Parameter	WR-293 White River at Anderson	WR-309 White River at Yorktown	WR-319 White River at Muncie	WR-348 White River at Near Winchester
Biological Oxygen Demand	ß	¬	¬	¬
Chemical Oxygen Demand	ß	¬	¬	¬
Dissolved Oxygen	¬	¬	¬	¬
E. coli	¬	¬	¬	¬
Ammonia	¬	¬	¬	¬
Nitrite + Nitrate	ß	ß	¬	¬
Total phosphorus	¬	¬	¬	ß
Total Residue	Ý	¬	¬	¬
Total Residue, Filterable	Ý	**?**	¬	¬
Total Residue, Nonfilterable	ß	¬	¬	¬
Copper	ß	ß	¬	**?**
Cyanide (total)	¬	¬	¬	¬

Notes

¬ No Statistical Change; significance < 80% or reported slope = 0.00000
ß Statistically Decreasing; significance >95% with a negative slope
↘ Potentially Decreasing; significance >80% with a negative slope
↗ Potentially Increasing; significance >80% with a positive slope
Ý 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 UPPER WHITE RIVER Watershed, the following waterbodies are under the 1998 fish consumption advisory:

Waterbody/County	Species	Size (inches)	Contaminant	Group
Buck Creek, Delaware County	Longear Sunfish	5-6	PCBs	3
		6 +	PCBs	4
	Rock Bass	6-9	PCBs	3
		9+	PCBs	4
	Smallmouth Bass	8-11	PCBs	3
		11+	PCBs	4
East Fork of White Lick Creek, Hendricks County	Creek Chub	6-9	PCBs	2
		9+	PCBs	3
	Northern Hogsucker	8-11	PCBs	2
		11+	PCBs	3
	Yellow Bullhead	8-10	PCBs	2
		10+	PCBs	3
Fall Creek, Madison County	Black Redhorse	13-17	Mercury	2
		17+	Mercury	3
	Carp	19-22	PCBs/ Mercury	3
		22+	PCBs/ Mercury	4
	Channel Catfish	Up to 22	PCBs	3
		22+	PCBs	4
	Rock Bass	5-7	PCBs	2
		7+	PCBs	3
	Smallmouth Bass	6-14	Mercury	2
		15-17	Mercury	3
		17+	Mercury	4
	White Sucker	12-16	Mercury	2
		16+	Mercury	3
Hamilton County	Carp	16-23	PCBs	2
		23+	PCBs	3
	Largemouth Bass	12-16	Mercury	2
		16+	Mercury	3
Killbuck Creek, Madison County	Largemouth Bass	16+	Mercury	3
	Longear Sunfish	5-6	PCBs	3
		6+	PCBs	4
Little Sugar Creek (East Fork of White River Basin), Hancock County	Creek Chub	ALL	PCBs/Mercury	3
Eagle Creek Reservoir, Marion County	Largemouth Bass	Up to 20	PCBs/Mercury	2
		20+	PCBs/Mercury	3
Geist Reservoir, Hamilton County	Channel Catfish	22-28	PCBs/Mercury	2
		28+	PCBs/Mercury	3
	Largemouth Bass	10-13	Mercury	2
		13+	Mercury	3
Griffy Lake, Monroe County	Bluegill	7+	Mercury	2
	Largemouth Bass	10-11	Mercury	2
		11+	Mercury	3
Morse Reservoir, Hamilton County	Largemouth Bass	13-17	Mercury	2
		17+	Mercury	3

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 Quality 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. The methodology of the Clean Water Act Section 305(b) assessment and use support ratings are discussed in Section 4.5.

The Upper White 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 Upper White River watershed.

Appendix C contains the listing of the Upper White 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 Quality 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 Upper White 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 Quality 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 Quality 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 issuing 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 Quality 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 Quality 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 Quality'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 Quality 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 Quality 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 Quality 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 Quality 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 Upper White 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.

Total Maximum Daily Loads

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

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

The Office of Water Quality 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 'draft-final' and open public review. Public meetings will be held in areas affected to solicit comments.

5.1.5 Potential Sources of Funding for Water Quality Projects

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

Office of Water Quality 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 Quality 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 Quality 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 Quality
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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Upper White River Watershed Restoration Action Strategy

Part II: Concerns and Recommendations

Prepared by

Indiana Department of
Environmental Management
Office of Water Quality

January 2001

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 (January 2001) 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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Upper White River Watershed Restoration Action Strategy
Part II: Concerns and Recommendations

Part II of the Watershed Restoration Action Strategy discusses the water quality concerns identified for the Upper White River Watershed and lists recommended management strategies to address these concerns.

Part II includes:

1 Water Quality Concerns and Priority Issues Identified by Stakeholder Groups

The Upper White River watershed contains potential stakeholder groups that have different missions. Many of these groups have a long history of working in the Upper White River watershed. The following discussion briefly describes some of the watershed groups and lists their priorities and concerns.

Upper White River Watershed Alliance, Inc.

The Alliance's water quality concerns are fish kills, contaminated drinking water, contaminated groundwater, sedimentation, and fish consumption advisories. The Alliance is also concerned with the impairments of the 34 identified stream segments listed on the "303 (d) list" in the 1998 Indiana Water Quality Report.

A priority issue of the Alliance is to develop a regional water quality monitoring program that is synchronized in terms of methodology, timing and purpose and linked with an integrated regional Geographical Information System (Goode, 2000).

Friends of the White River

The main concerns of the Friends of the White River are combined sewer overflows, habitat removal along the riverbanks, and chemical runoff from agriculture, urban lawns and businesses. The organization is working towards developing a better education system about watersheds and the river ecosystem. They plan on targeting the agricultural and urban populations with different educational materials and more activities.

The organization would like to see:

- more filter strips along the tributaries
- Urban erosion control plans enforced
- Reduction of livestock accessibility into tributaries
- The public view the river as a vital natural resource
- Less dumping and polluting of trash, leaves, etc.
- Access sites to the river

The Friends of the White River is planning to continue and build educational events. They need a staff person to help the organization develop to a higher level (Cowser, 2000).

Eagle Creek Watershed Task Force

The Committee has identified these pollutants as the primary causes that are threatening the water quality in the Eagle Creek watershed:

- Erosion – Major sources are the agricultural cropland and urban construction sites
- Nutrients and pesticides – Sources from agriculture and urban land uses
- Chemicals (oil, hydro-carbons, etc.) – Major source from urban communities and business areas
- Lawn herbicides
- Pathogens - This is the committees biggest concern in the watershed.

In 1997, the Indianapolis Star newspaper wrote articles which reported that Atrazine, an agricultural herbicide used for weed control in corn production, was found in the water of the Eagle Creek Reservoir. The reservoir is a drinking water source for the city of Indianapolis. Since then the water treatment plant now uses a carbon based filtering system to treat the raw water (Dickey, 1999).

The Committee continues to gather more water quality data. A section 319 grant will be used to begin identifying DNA strands in *E. coli* from certain warm blooded animals. The process is called ribo-typing. Human, cattle, sheep, hogs, turkey, poultry, and horse bacteria will be monitored. The results should determine the sources and amounts of bacteria at each monitoring site. Another grant source will fund a macro-invertebrate study in the year 2000.

The Committee through Farm Bureau has also received for a section 319 grant to perform a fish study and further the Eagle Creek watershed Coordinator position in the year 2000.

The Eagle Creek Watershed's Technical Committee is presently working on developing alternatives and implementation strategies for both agricultural and urban land uses (Dickey, 1999).

Local Health Departments

In the Upper White watershed, the county average of new and repaired septic system permits issued ranges from 120 to 480. As urban growth continues, the county health department

workload has become larger than their staffs can properly service (McNulty, 1999; Huffman, 1999; Carr, 1999).

Home or business sites for future septic systems are required to have a soils report. Depending upon the soil type, some of the standard septic systems function properly, while others fail to percolate because of high clay content and/or high water tables. Perimeter drains are installed to lower the water table; however, finding an adequate outlet is often difficult because of all the flat areas in Madison County. The newer installed septic systems in Hamilton County are working better than the older installed systems; however, everything could stand more improvement (McNulty, 1999).

Municipal sewage treatment facilities continue to be constructed throughout many of the growing urban and rural communities of the Upper White watershed. All the county health departments feel this will make a positive improvement in water quality (McNulty, 1999; Carr, 1999; Huffman, 1999).

In Marion County, 17,000 to 20,000 homes still use septic systems. Failure rates for these systems are high and expected to increase as these 20 to 40 year old systems age. The traditional method to extend sewers in Marion County's densely populated neighborhoods is to use the Barrett Law process. Assessment costs to homeowners using this process have ranged from $8,000 to $15,000 per "buildable lot." The majority of homeowners strongly object to these costs and 25% of homeowners default on their mortgages in Barrett Law neighborhoods. This process places local officials in an increasingly unpopular position. While understanding the public health importance of extending public sewers, the decision-makers must face the wrath of homeowners who are literally "fighting for their home." An improved way to finance public sewer connection is needed.

Boone County requires that new subdivisions planned within 500 feet of an existing sewage treatment system be connected (Culbertson, 2000).

Bacterial concerns in lakes with surrounding homes that have inadequate septic systems or small lot sizes are a growing problem. One example is Patton Park Lake, an area that was once used seasonally and inhabited with small fishing cabins, has larger homes and permanent residence.

There is an undetermined amount of straight pipe outlets that discharge septic effluent on the soil surface, in road ditches, in drainage field tile, etc. This does not appear to be a significant problem; however, it still is a concern. These systems create a health hazard due to the possibility of spreading disease and are illegal.

There are two ways these illicit discharges get upgraded to county standards.

1. the owner sells the property and must disclose it, and
2. a complaint is filed

Education seems to be an ongoing need. Developing outreach programs would benefit septic system users and help them manage their system (Huffman, 1999).

Soil and Water Conservation Districts

Urban Areas

In many urban areas, one or two ponds are constructed as storm water detention structures to help manage the rainfall runoff from homes, apartments, recreational facilities and parking lots. Over time these ponds develop weed and algae problems. They also accumulate undetermined amounts of fertilizers and lawn and other chemicals that flush out after storm events (Matthieu, 2000).

Urban erosion and off site sedimentation is a major problem in many of the counties of the Upper White watershed. SWCDs feel that the timeliness of enforcement from IDEM for Rule 5 violators is to slow and the penalties (if any) are cheaper to pay than the time spent to install the conservation practices (Venable, 1999; Matthieu, 2000).

Rural Areas

Some counties, like Hamilton and Madison, still have several hundred oil and gas wells that need capping. Uncapped wells provide a direct route to possible ground water contamination. Presently, funding for capping wells are available in some counties.

Sedimentation in the White River and its tributaries is a major concern that has been identified by all the local Soil and Water Conservation Districts, Natural Resource Conservation Service and IDNR Division of Soil Conservation Agencies within the Upper White watershed.

Sedimentation continues to occur in many county drains. Filter strips planted along these county drains would greatly reduce the sediment loads (Heaton, 2000; McClain, 2000).

The Indianapolis Water Company stated that their biggest problem in cleaning up the water is sediment (Matthieu, 2000).

In the western part of the Upper White watershed, wildlife habitat continues to decline because fence rows are being removed and urban growth (McClain, 2000; Douglas, 1999).

More filter strips need to be established along the rivers, streams, and county ditches. Cropland tillage is performed to close to the edge of watercourses creating erosion and sedimentation problems. Buffer strips along the edges of crop fields would also provide some erosion control (Douglas, 1999; Canaday, 1999; Glover, 1999; Hillis 1999; McClain, 2000).

Upper White River Fish Kill

In the middle of December 1999, a contaminant entered the White River causing a fish kill which stretched for more than 50 miles. The approximate area started at the community of Anderson and reached the city of Indianapolis. As of January 6, 2000, the Indiana Department of Environmental Management found no contamination or dead fish south of Marion County.

The investigation and subsequent actions resulting from the contamination and fish kill are still underway. The incident has sparked wide-spread concern about the health of the Upper White River. Local stakeholder groups have been and continue to be integral in restoring the Upper

White River system. The Upper White River Alliance and the Friends of the White River organizations feel that some positive public involvement resulting from the incident may develop and help restore and protect the river in the future (Goode, 2000; Cowser, 2000).

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

This section presents the combined efforts of state and federal agencies, and universities (such as IDEM, IDNR, USDA-Natural Resources Conservation Service, Ohio River Valley Water Sanitation Commission, Purdue University, Indiana University, Indiana Geologic Survey, and US Geological Survey) to assess water quality concerns and priority issues in The Upper White River Watershed. This multi-organization effort formed the basis of the Unified Watershed Assessment for Indiana. At this time, the Unified Watershed Assessment has been completed for 1998 and 2000-2001, as described below.

Indiana's 1998 Unified Watershed Assessment (UWA)

The UWA workgroup gathered a wide range of water quality data that could be used to characterize Indiana's water resources. These data were used in 'layers' in order to sort the 8-digit HUC watersheds according to the present condition of the water in lakes, rivers, and streams. The workgroup used only those data which concerned the water column, organisms living in the water, or the suitability of the water for supporting aquatic ecosystems. Each 'layer' of information/data was partitioned by percentiles into scores. The scores ranged between one and five, with a score of one indicative of good water quality or minimum impairment, and a score of five indicating heavily impacted or degraded water quality. The scoring derived through the UWA process is presented in Table 2-1.

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

- Lake Fishery: Large mouth bass community information for lakes
- Stream Fishery: Small mouth bass community information for streams
- Aquatic Life Use Support: The 'livability' of the water column for aquatic life, determined from evaluation of chemical and physical water data, and assessment of aquatic life
- Fish Consumption Advisories: Site specific advisories based on current data
- Fish Index of Biotic Integrity: Based on fish community diversity and fish health
- Qualitative Habitat Evaluation Index: Measure of whether the aquatic habitat is suitable for diverse communities, based on visual observations
- Lake Trophic Scores: Indicator for the rate at which a lake is 'aging' due to inputs of nutrients and other factors
- Sediment Potential: Indicator of potential sediment input to waterbodies in the watershed

The sources and additional information for these data layers include:

- Lake Fishery: From IDNR fisheries surveys of lakes and reservoirs from 1972 to 1994. Raw scores were averaged for all lakes in the watershed

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

TABLE 2-1
RESULTS OF THE UNIFIED WATERSHED ASSESSMENT FOR UPPER WHITE RIVER

Data/Information Layer	UPPER WHITE RIVER Score
Recreational/Swimming	3
Stream Fishery	2
Aquatic Life Use Support	3
Fish Consumption Advisories	4
Fish Index of Biotic Integrity	3
Qualitative Habitat Evaluation Index	1
Lake Trophic Scores	1
Sediment Potential	5

Note:
The UWA scores range from one to five, with a score of one indicating good water quality and a score of five indicating severe impairment.

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

During summer 1999 the UWA workgroup used additional layers of information to identify the **resource concerns and stressors** for each of the 361 11-digit watersheds in Indiana. Examination of the human activities that have the potential to impact the ecosystem will help

planners to focus on those areas where restoration may be most critical. Organizations can identify opportunities to use their programs and resources to address those areas.

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

This amended assessment has the following benefits:

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

Table 2-2 and Figure 2-1 show the results of the 2000-2001 UWA for the Upper White River watershed.

3 Identification of Impaired Waters

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

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

The following Upper White River Watershed waterbodies are on Indiana's 1998 Clean Water Act Section 303(d) list submitted and approved by EPA (Figure 3-1):

Table 3-1
List of Impaired Waterbodies for the Upper White Watershed

Water Body	Location Reach	Parameter(s) of Concern	Severity Ranking
Bean Creek	Indianapolis	E. coli	High
Buck Ceek	All	Fish Consumption Advisory for PCB & Mercury; Impaired Biotic Communities	Medium
Cicero Creek	Downstream of Morse Reservoir	E. coli	Low
Dollar Hide Creek	All	Impaired Biotic Communities	Medium
Duck Creek	Elwood to State Rd 213	E. coli	Low
East Fork of White Lick Creek	Headwaters to U.S. 40	Impaired Biotic Communities	Medium
East Fork of White Lick Creek	All	Fish Consumption Advisory for PCB	Medium
Eagle Creek	Indianapolis	E. coli	High
Fall Creek	All	Fish Consumption Advisory for PCB & Mercury	Medium
Fall Creek	Emerson Ave. in Indianapolis to West Fork of White River	E. coli	High
Geist Reservoir	All	Fish Consumption Advisory for Mercury	Low
Indian Creek	All	E. coli	Low
Indianapolis Waterway Canal	Indianapolis	E. coli	High
Killbuck Creek	All	Fish Consumption Advisory for PCB & Mercury; E. coli	Medium
Little Cicero Creek	All	Impaired Biotic Communities	Medium
Mars Ditch	All	Cyanide; pH	High
Morse Reservoir	All	Fish Consumption Advisory for Mercury	Low
Pipe Creek	All	Fish Consumption Advisory for PCB & Mercury; E coli	Medium
Pleasant Creek	All	E coli	High
Pogues Creek	Indianapolis	E coli	High

Table 3-1
List of Impaired Waterbodies for the Upper White Watershed (continued)

Water Body	Location Reach	Parameter(s) of Concern	Severity Ranking
South Fork Griffy Creek	All	Impaired Biotic Communities	Medium
State Ditch	All	Cyanide; pH; E. coli	High
Stout Creek	All	Fish Consumption Advisory for PCB & Mercury	Medium
West Fork White River	Fall Creek to Pleasant Run	Fish Consumption Advisory for PCB & Mercury; E. coli; Dissolved Oxygen; Ammonia	High
West Fork White River	Indianapolis from Pleasant Run to Little Buck Creek	Fish Consumption Advisory for PCB & Mercury; Cyanide; Dissolve Oxygen; E. coli; Impaired Biotic Communities	High
West Fork White River	Crooked Creek to Fall Creek	Fish Consumption Advisory for PCB & Mercury	High
West Fork White River	Cicero Creek to Crooked Creek	Fish Consumption Advisory for PCB & Mercury; Impaired Biotic Communities	Medium
West Fork White River	White Lick Creek to Beanblossom	Fish Consumption Advisory for PCB & Mercury; Cyanide; E. coli; Impaired Biotic Communities	Medium
West Fork White River	Hamilton	Fish Consumption Advisory for PCB & Mercury; E. coli; Impaired Biotic Communities	High
West Fork White River	Little Buck Creek to White Lick Creek	Fish Consumption Advisory for PCB & Mercury; Cyanide; Impaired Biotic Communities	High
West Fork White River	Madison County	Fish Consumption Advisory for PCB; E coli; Impaired Biotic Communities	Medium
West Fork White River	Muncie to Madison County	Fish Consumption Advisory for PCB & Mercury; E. coli	Medium
West Fork White River	All	Fish Consumption Advisory for PCB & Mercury	Medium
West Fork White River	Headwaters to Muncie	Fish Consumption Advisory for PCB & Mercury; Impaired Biotic Communities	Medium
White Lick Creek	All	Fish Consumption Advisory for PCB & Mercury	Medium

Notes:
Severity Ranking - High: Waters with acute criteria violations of state water quality standards for toxic substances or ammonia; a group 5 (do not eat any fish) fish consumption advisory for PCBs or mercury; scores of very poor or less based on biological assessments; and waters used or potentially used extensively for whole body contact recreation where potential sources of E. coli are identifiable.

Severity Ranking - Medium: Waters with chronic criteria violations of state water quality standards for toxic substances, ammonia or dissolved oxygen; waters threatened or scoring poor on biological assessments; and waters which had group 3 or 4 fish consumption advisories for mercury or group 2,3, or 4 for PCBs.

Severity Ranking - Low: Waters with violations of state water quality standards for pH, chlorides, etc.; waters with group 2 or 3 fish consumption advisories for mercury; and waters with E. coli violations that have limited potential for whole body contact recreation.

4 Priority Issues and Recommended Management Strategies

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

4.1 Planning Process and Plan Development

Many organized watershed groups or committees have difficulty developing watershed plans. Sometimes groups or committees try too hard to produce a document that is "perfect" or "complete." However, new information will always be available so the watershed plan will be a living document, updated periodically. The "process of involving and informing" the watershed community will determine the success of a watershed project. The talent and resources in a watershed community are invaluable. The planning process involves visioning, team building activities, goal setting, etc., as well as data inventory, implementation and monitoring. It is a constant evaluation that should be reviewed from the beginning, middle and end.

Recommended Management Strategy 1: Read and reference the documents, "Watershed Action Guide for Indiana" and "What Needs to be in a Watershed Management Plan" supplement (Obtain copies from IDEM, Office of Watershed Management). Leadership committees or groups should reference them at all stages of the watershed project.

Recommended Management Strategy 2: Use existing data, develop a plan of work, target areas, find funding sources, etc., and begin developing a watershed plan. Contact local, state and federal agencies that provide assistance in plan development.

4.2 Data\Information and Targeting

As in many of the watersheds in Indiana, there is a need for more water quality data and information in order to prioritize and target specific areas of the Upper White watershed. In addition to targeting areas, there is also an identified need for more data and information about

the actual impact on water quality from nonpoint sources. Success in restoring water quality in the Upper White watershed is fundamentally based on identifying the specific geographic problem areas; identifying all sources contributing to the impairment of the waterbody; and quantifying the contribution of a pollutant by each source.

Recommended Management Strategy 1: Local SWCDs, natural resource agencies, cooperative county extension services, and other interested personnel need to gather and analyze existing water quality data, natural resource information and other information pertinent to the area. Communication and the sharing of this data and information should be provided at a meeting sponsored by the Soil and Water Conservation Districts or a interested group.

Recommended Management Strategy 2: Once all the information and data is shared, a "plan of work" should be developed. The "plan of work" basically outlines what direction the local stakeholders will take involving more stakeholders, obtaining additional information, formulating committee(s), setting time frames of events, etc.

Recommended Management Strategy 3: Inform the public about the past, present, and future desired condition of the watershed or watershed areas that will be improved upon. If possible run a series of articles or radio updates about each assessed tributary of the watershed. Present the findings whether an impairments exists or not. This will help build community support if a project is further developed. Document your findings and decisions.

Recommended Management Strategy 4: Target and prioritize watershed areas that are creating possible impairments to a waterbody. Targeting and prioritization should be managed at the 11 or 14 digit HUC watershed area (Figure 2-2 of Part I). The targeting and prioritization will require input from stakeholders living in those geographic areas. The purpose of this prioritization and targeting is to enhance allocation of resources in the effort of improving water quality.

Recommended Management Strategy 5: Encourage the public to participate in water quality monitoring. Stream and macroinvertebrate assessments are good measures of progress.

4.3 Failing Septic Systems and Straight Pipe Discharges

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

Recommended Management Strategy: All of the County Health Departments have stressed that more education is needed pertaining to septic system management. Providing demonstrations, field days, or workshops for the public in order to provide more information on the impacts of failed septic systems, regulations, alternative treatment systems, and financial assistance may be a good start. Local stakeholders could partner to help share in the cost of this program. To further these educational efforts, the direct impact of communities discharging their septic tank effluent to waterbodies needs to be adequately characterized. This

will involve coordination between the County Health Departments, the Indiana State Department of Health, and other stakeholders. The option of choice to eliminate the illegal discharges will be a cooperative effort between homeowners and local, state, and federal stakeholders. If a cooperative solution can not be reached, illicit dischargers will be required to cease discharge.

4.4 Water Quality - General

The Clean Water Act Section 303(d) list presented in Section 3 lists water quality limited waterbodies for the Upper White watershed.

Recommended Management Strategy: The Clean Water Act requires states to complete TMDLs for waterbodies listed on the Section 303(d) list. The Office of Water Quality is currently evaluating and exploring the modeling process and data needs required to complete TMDLs for the Section 303(d) listed waterbodies in the Upper White watershed. Completion of a TMDL will involve loading allocations of a pollutant to both point and nonpoint sources. The Office of Water Quality is currently drafting a TMDL strategy that involves stakeholder input throughout the process.

4.5 Fish Consumption Advisories

As noted in Part I and Part II, fish consumption advisories are a major concern in the White River and many of its tributaries.

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

4.6 Nonpoint Source Pollution - General

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

Recommended Management Strategy : Numerous funding mechanisms, such as Conservation Reserve Program, Environmental Quality Incentive Program, Lake and River Enhancement program, and 319(h) grants, exist to promote practices to reduce nonpoint source pollution in the watershed. The prioritization and targeting discussed previously in Part II should be used to allocate further application of resources.

4.7 Point Sources - General

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

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

5 Future Expectations and Actions

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

5.1 Expectations and Measuring Progress

The Upper White River Strategy provides a starting point to address water quality concerns held by local, state, and federal stakeholders. Part II provides recommended management strategies to address these concerns. Through cooperative efforts with stakeholders, all of the recommended management strategies listed will begin implementation by the summer of 2000.

Measurement of progress is critical to the success of any plan. Water quality improvements will not take place overnight. Measuring of progress in terms of water quality will be provided through the Office of Water Quality Assessment Branch's rotating basin monitoring strategy. Specifically, they will be conducting sampling again in 2001. This will allow an assessment of progress in improving water quality.

5.2 Expected Revisions and Amendments

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

5.2.1 Short Term Revisions and Amendments

The most significant revisions and amendments will likely occur during 2001 and after, as a result of the rotating basin assessments to be completed during 2001. The Section 305(b) assessments will be completed by late 1999 or early 2000. Local, state, and federal stakeholder comments regarding the Watershed Restoration Action Strategy will be addressed in future revisions of the document.

5.2.2 Long Term Revisions and Amendments

The Office of Water Quality is moving toward adopting a watershed management approach to solve water quality problems. Part of the watershed approach is the use of a rotating basin management cycle. The Assessment Branch of the Office of Water Quality has already adopted this rotating basin cycle in its intensive monitoring and assessment of Indiana waterbodies (this is in addition to the already established fixed monitoring station monitoring which occurs on a monthly basis). Based on the cycle the Assessment Branch is using, the next intensive monitoring of the Upper White River watershed will occur during the sampling season of 2001. The information from the 2001 monitoring effort will be incorporated into the Watershed Restoration Action Strategy.

In addition, the Watershed Restoration Action Strategy may be revised or amended prior to 2001, if sufficient information becomes available.

5.3 Review of the Watershed Restoration Action Strategy

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

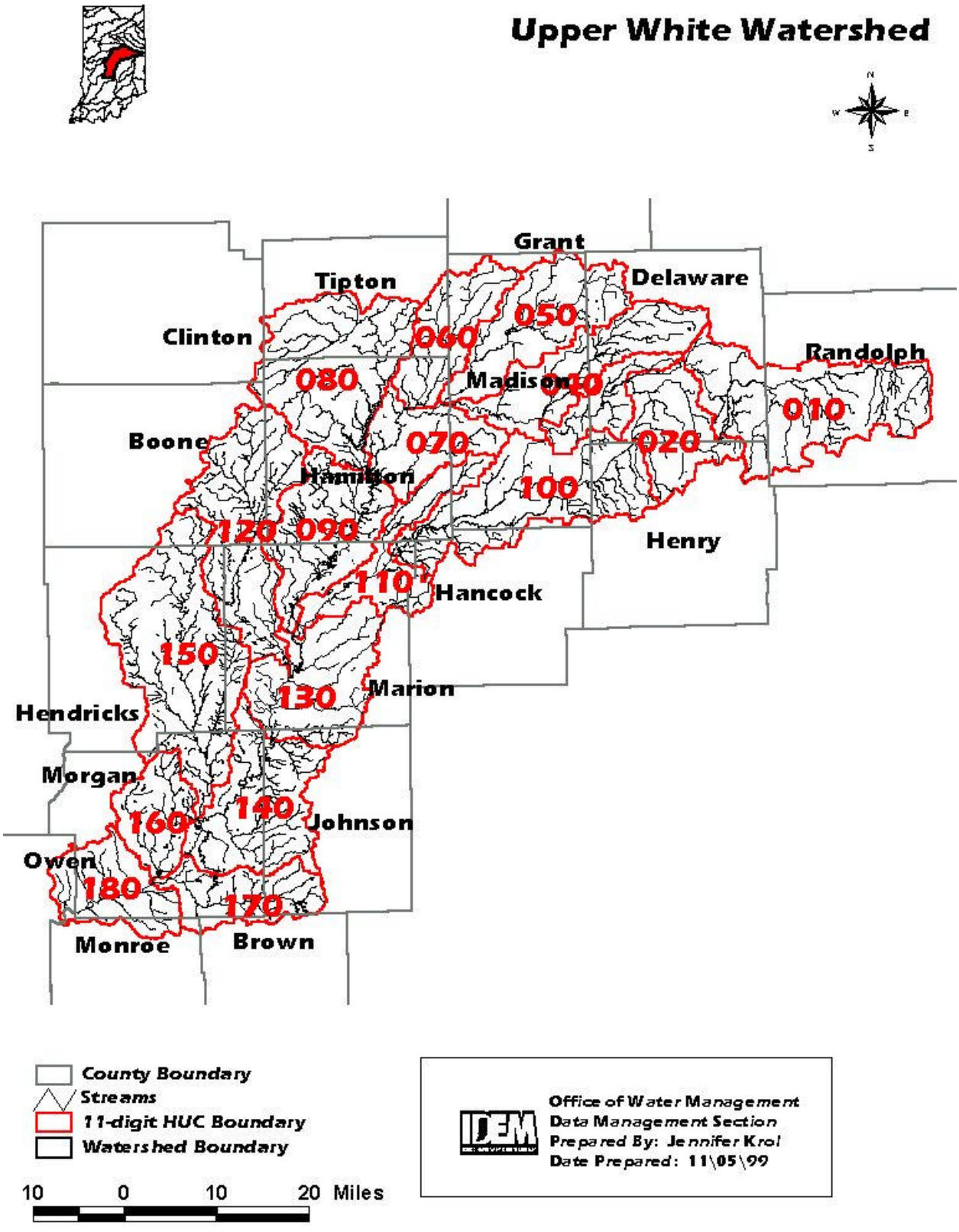
Table 2-2

HYDROLOGIC UNIT SCORES for Each Parameter Used in the Unified Watershed Assessment [2000-2001]																
	11 Digit Hydrologic Unit	Mussel Diversity and Occurrence	Aquatic Life Use Support	Recreational Use Attainment	Stream Fishery	Lake Fishery	Eurasian Milfoil Infestation Status	Lake Trophic Status	Critical Biodiversity Resource	Aquifer Vulnerability	Population Using Surface Water for Drinking Water	Residential Septic System Density	Degree of Urbanization	Density of Livestock	% Cropland	Mineral Extraction Activities
Upper White	05120201010	1	3	nd	nd	nd	nd	2	3	4	4	3	2	3	4	2
	05120201020	nd	3	nd	nd	nd	nd	nd	3	3	4	4	2	3	4	2
	05120201030	nd	4	nd	nd	nd	nd	nd	3	2	4	5	2	2	4	2
	05120201040	1	3	1	nd	nd	nd	nd	2	3	4	5	2	2	4	2
	05120201050	nd	4	4	nd	nd	nd	1	2	4	4	4	2	3	5	3
	05120201060	nd	4	3	nd	nd	nd	nd	1	5	4	3	2	3	5	2
	05120201070	nd	3	3	nd	nd	nd	nd	2	2	4	4	2	2	3	2
	05120201080	nd	3	1	1	nd	nd	2	2	5	4	3	2	2	4	2
	05120201090	nd	3	1	nd	nd	nd	nd	3	3	4	5	3	2	1	2
	05120201100	nd	4	1	3	nd	nd	nd	3	2	4	4	2	3	4	2
	05120201110	nd	1	2	3	nd	nd	2	4	2	4	5	3	2	1	2
	05120201120	nd	3	1	3	nd	nd	3	3	4	4	4	3	3	2	2
	05120201130	nd	4	3	nd	nd	nd	nd	2	2	4	5	4	1	1	1
	05120201140	nd	1	1	nd	nd	nd	nd	2	3	4	5	2	2	2	1
	05120201150	nd	3	1	1	nd	nd	nd	2	4	4	5	2	3	3	1
	05120201160	nd	3	4	nd	nd	nd	nd	3	4	4	4	2	2	2	1
	05120201170	nd	3	3	nd	2	nd	2	2	4	4	4	2	2	2	1
	05120201180	nd	nd	nd	nd	nd	nd	nd	3	3	3	3	1	3	2	1

Nd = No data

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

Figure 2-1


Upper White Watershed
N
W
E
S
Grant
Tipton
Delaware
Clinton
Randolph
Madison
Boone
Hamilton
Henry
Hancock
Marion
Hendricks
Morgan
Johnson
Owen
Monroe
Brown
050
060
080
040
010
070
020
100
120
090
110
150
130
140
160
180
170
County Boundary
Streams
11-digit HUC Boundary
Watershed Boundary
10 0 10 20 Miles
IDEM
Office of Water Management
Data Management Section
Prepared By: Jennifer Krol
Date Prepared: 11\05\99

APPENDIX A

BENCHMARK CHARACTERISTIC ANALYSIS OF DATA FROM FIXED STATIONS IN THE UPPER WHITE RIVER WATERSHED 1991 TO 1997

Station: EC-1

	Valid N	Mean	Confid. -95.000%	Confid. +95.000%	Median	Sum	Minimum	Maximum	Lower Quartile	Upper Quartile	Range	Quartile Range	Variance	Std.Dev.	Standard Error	Skewness	Std.Err. Skewness	Kurtosis	Std.Err. Kurtosis
Alkalinity (mg/l)	74	196.0676	187.9133	204.2218	202.5	14509	101	261	174	220	160	46	1238.749	35.19586	4.091436	-0.49817	0.279197	0.01462	0.551684
Ammonia (mg/l as N)	75	0.326667	0.247115	0.406219	0.2	24.5	0.05	1.5	0.05	0.5	1.45	0.45	0.11955	0.345759	0.039925	1.549029	0.2774	2.067485	0.548211
BOD (mg/l)	35	2.805714	2.235094	3.376335	2.4	98.2	0.5	6.7	1.7	3.8	6.2	2.1	2.759378	1.661138	0.280784	0.864851	0.397694	0.001138	0.777794
COD (mg/l)	75	19.516	17.92232	21.10968	18	1463.7	9.4	48	14.7	22.4	38.6	7.7	47.97839	6.926643	0.79982	1.786555	0.2774	4.291279	0.548211
Cyanide (mg/l)	73	0.006411	0.005747	0.007075	0.005	0.468	0.005	0.021	0.005	0.007	0.016	0.002	8.11E-06	0.002847	0.000333	3.037395	0.281029	11.11063	0.555223
Nitrate (mg/l as N)	75	2.767333	2.493878	3.040789	2.6	207.55	0.05	5.9	2.2	3.6	5.85	1.4	1.412601	1.188529	0.137239	0.285304	0.2774	0.313463	0.548211
Total Phosphorus (mg/l as P)	75	0.1794	0.138718	0.220082	0.12	13.455	0.015	1.28	0.08	0.22	1.265	0.14	0.031265	0.176819	0.020417	3.687465	0.2774	19.86874	0.548211
Total Solids (mg/l)	75	492.8933	468.3422	517.4445	493	36967	295	835	408	559	540	151	11386.45	106.7073	12.3215	0.486378	0.2774	0.382044	0.548211
Suspended Solids (mg/l)	75	17.86667	10.70545	25.02788	9	1340	1	204	5	16	203	11	968.7658	31.125	3.594006	4.206077	0.2774	20.24163	0.548211
Dissolved Solids (mg/l)	22	474.8182	423.1574	526.479	476	10446	285	822	395	532	537	137	13576.25	116.5172	24.84154	0.974023	0.490962	2.721614	0.95278
Sulfate (mg/l)	22	59.68182	49.00622	70.35741	60.5	1313	34	145	46	63	111	17	579.7511	24.07802	5.133451	2.299515	0.490962	7.2724	0.95278
TKN (mg/l as N)	75	1.253333	1.112093	1.394574	1.1	94	0.4	3	0.8	1.5	2.6	0.7	0.376847	0.613879	0.070885	1.227951	0.2774	1.000149	0.548211
E. coli (CFU/100ml)	72	4445.278	-871.415	9761.971	260	320060	5	170000	70	860	169995	790	5.12E+08	22625.34	2666.421	6.538817	0.282898	44.40443	0.558831
TOC (mg/l)	22	4.125	3.441756	4.808244	4.1	90.75	0.25	7.8	3.2	4.6	7.55	1.4	2.374702	1.541007	0.328544	0.089131	0.490962	1.836295	0.95278
Hardness (mg/l)	74	274.2568	263.8793	284.6342	280.5	20295	160	368	242	310	208	68	2006.303	44.79177	5.206938	-0.19171	0.279197	-0.484	0.551684
Chloride (mg/l)	22	88.45455	65.83611	111.073	77.5	1946	36	280	58	105	244	47	2602.45	51.01422	10.87627	2.649157	0.490962	9.420759	0.95278
Dissolved Oxygen (mg/l)	58	10.34483	9.871701	10.81795	10.265	600	6.3	14.78	9.1	11.59	8.48	2.49	3.237825	1.799396	0.236272	0.250476	0.31372	-0.31331	0.618136
pH	58	7.992069	7.90346	8.080678	7.995	463.54	7.07	8.71	7.8	8.24	1.64	0.44	0.113568	0.336998	0.04425	-0.42591	0.31372	0.905351	0.618136
Copper (ug/l)	75	8.069333	6.429692	9.708975	5.9	605.2	2	35	4	10	33	6	50.78594	7.126425	0.822889	1.950599	0.2774	3.941053	0.548211
Iron (ug/l)	24	335.4583	196.1615	474.7552	200	8051	91	1400	160	380	1309	220	108822	329.8818	67.33684	2.381237	0.472261	5.477365	0.917777
Zinc (ug/l)	75	15.97	13.4322	18.5078	10	1197.75	2.25	60	10	20	57.75	10	121.6633	11.03011	1.273647	2.179222	0.2774	5.64519	0.548211

Station: EC-7

	Valid N	Mean	Confid. -95.000%	Confid. +95.000%	Median	Sum	Minimum	Maximum	Lower Quartile	Upper Quartile	Range	Quartile Range	Variance	Std.Dev.	Standard Error	Skewness	Std.Err. Skewness	Kurtosis	Std.Err. Kurtosis
Alkalinity (mg/l)	76	186.6579	179.5794	193.7364	190	14186	102	256	169.5	209.5	154	40	959.5614	30.97679	3.553281	-0.52322	0.275637	0.224025	0.544804
Ammonia (mg/l as N)	78	0.109615	0.055169	0.164062	0.05	8.55	0.05	1.7	0.05	0.05	1.65	0	0.058315	0.241486	0.027343	5.839856	0.272211	34.74773	0.538176
BOD (mg/l)	36	1.5	1.221106	1.778894	1.45	54	0.5	3.8	0.8	1.9	3.3	1.1	0.679429	0.824275	0.137379	0.824533	0.392544	0.831019	0.768076
COD (mg/l)	78	14.35769	13.28255	15.43283	13.1	1119.9	2.5	35.2	11	17	32.7	6	22.7391	4.768553	0.539932	1.520734	0.272211	4.816245	0.538176
Cyanide (mg/l)	77	0.005299	0.005009	0.005589	0.005	0.408	0.005	0.013	0.005	0.005	0.008	0	1.6E-06	0.001278	0.000146	4.618983	0.273908	21.87523	0.54146
Nitrate (mg/l as N)	78	1.545513	1.309601	1.781425	1.45	120.55	0.05	4.9	0.6	2.4	4.85	1.8	1.094817	1.046335	0.118474	0.619344	0.272211	-0.00849	0.538176
Total Phosphorus (mg/l as P)	78	0.058974	0.045538	0.072411	0.04	4.6	0.015	0.26	0.015	0.07	0.245	0.055	0.003552	0.059595	0.006748	2.026609	0.272211	3.895107	0.538176
Total Solids (mg/l)	77	382.1558	365.7299	398.5818	373	29426	183	710	344	408	527	64	5237.396	72.36986	8.247311	1.475735	0.273908	5.798064	0.54146
Suspended Solids (mg/l)	77	18.15584	8.646432	27.66526	11	1398	2	368	6	18	366	12	1755.344	41.89682	4.774586	7.882048	0.273908	66.14699	0.54146
Dissolved Solids (mg/l)	22	359.2727	331.4352	387.1103	343	7904	272	530	332	375	258	43	3942.017	62.78549	13.38591	1.751765	0.490962	3.669277	0.95278
Sulfate (mg/l)	22	42.86364	32.99177	52.73551	38.5	943	29	140	34	44	111	10	495.7424	22.26527	4.746972	4.307107	0.490962	19.51315	0.95278
TKN (mg/l as N)	78	0.715385	0.63907	0.791699	0.6	55.8	0.4	2.6	0.5	0.8	2.2	0.3	0.114565	0.338475	0.038325	3.002968	0.272211	12.90549	0.538176
E. coli (CFU/100ml)	76	539.7105	258.0155	821.4055	130	41018	5	8000	10	395	7995	385	1519668	1232.748	141.4059	4.093369	0.275637	19.57209	0.544804
TOC (mg/l)	22	3.272727	2.951783	3.593672	3.15	72	2.3	4.9	2.6	3.6	2.6	1	0.523983	0.723866	0.154329	0.83534	0.490962	0.128352	0.95278
Hardness (mg/l)	76	249.5	240.4078	258.5922	246	18962	142	332	223	282	190	59	1583.187	39.78928	4.564143	-0.20761	0.275637	0.07571	0.544804
Chloride (mg/l)	22	51.63636	42.49488	60.77785	47	1136	29	130	44	52	101	8	425.0996	20.61794	4.39576	2.835128	0.490962	10.13399	0.95278
Dissolved Oxygen (mg/l)	61	10.40754	9.950118	10.86496	10.34	634.86	6	16.4	9.32	11.22	10.4	1.9	3.189902	1.78603	0.228678	0.353612	0.30627	1.311178	0.603837
pH	62	7.924355	7.84289	8.005819	7.96	491.31	6.98	8.6	7.8	8.13	1.62	0.33	0.102904	0.320786	0.04074	-0.83108	0.303902	1.280672	0.599288
Copper (ug/l)	24	2.620833	1.991801	3.249865	2	62.9	2	7.4	2	2	5.4	0	2.219112	1.489669	0.304077	2.328608	0.472261	4.548722	0.917777
Iron (ug/l)	24	487.5	288.464	686.536	340	11700	120	2200	225	575	2080	350	222176.1	471.3556	96.21506	2.657032	0.472261	7.717169	0.917777
Zinc (ug/l)	77	9.935714	8.11111	11.76032	10	765.05	2.25	50	5	10	47.75	5	64.62374	8.038889	0.916116	2.782432	0.273908	10.24815	0.54146

Station: EC-21

	Valid N	Mean	Confid. -95.000%	Confid. +95.000%	Median	Sum	Minimum	Maximum	Lower Quartile	Upper Quartile	Range	Quartile Range	Variance	Std.Dev.	Standard Error	Skewness	Std.Err. Skewness	Kurtosis	Std.Err. Kurtosis
Alkalinity (mg/l)	75	219.9467	210.0814	229.812	225	16496	76	294	202	249	218	47	1838.511	42.87786	4.951108	-0.85107	0.2774	0.953905	0.548211
Ammonia (mg/l as N)	76	0.076974	0.062349	0.091598	0.05	5.85	0.05	0.4	0.05	0.05	0.35	0	0.004096	0.064	0.007341	2.965673	0.275637	9.789185	0.544804
BOD (mg/l)	37	1.305405	0.999022	1.611789	1.1	48.3	0.5	4.7	0.5	1.4	4.2	0.9	0.844414	0.91892	0.15107	1.979586	0.387589	4.828871	0.758719
COD (mg/l)	76	13.31053	11.91331	14.70774	12	1011.6	2.5	40	9.3	15.8	37.5	6.5	37.38682	6.114476	0.701379	2.000658	0.275637	6.353105	0.544804
Cyanide (mg/l)	74	0.00523	0.00504	0.00542	0.005	0.387	0.005	0.009	0.005	0.005	0.004	0	6.7E-07	0.00082	9.5E-05	3.835966	0.279197	14.07532	0.551684
Nitrate (mg/l as N)	76	3.735526	3.316035	4.155018	3.4	283.9	0.6	8	2.3	4.75	7.4	2.45	3.370054	1.835771	0.210577	0.695294	0.275637	-0.16363	0.544804
Total Phosphorus (mg/l as P)	76	0.097566	0.080922	0.114209	0.07	7.415	0.015	0.31	0.04	0.125	0.295	0.085	0.005305	0.072835	0.008355	1.302773	0.275637	1.028681	0.544804
Total Solids (mg/l)	76	467.4838	444.2818	490.6859	465	35528.77	4.77	713	411.5	524.5	708.23	113	10309.62	101.5363	11.64701	-1.00969	0.275637	4.929472	0.544804
Suspended Solids (mg/l)	76	19.15789	13.76002	24.55577	11.5	1456	2	124	5	24	122	19	558.0014	23.62205	2.709635	2.659942	0.275637	8.363536	0.544804
Dissolved Solids (mg/l)	22	461.5909	425.1884	497.9934	445.5	10155	368	677	391	498	309	107	6740.92	82.10311	17.50444	1.141682	0.490962	0.826716	0.95278
Sulfate (mg/l)	22	50	45.71877	54.28123	48	1100	38	79	43	53	41	10	93.2381	9.655988	2.058663	1.408918	0.490962	2.717886	0.95278
TKN (mg/l as N)	22	0.481818	0.427712	0.535924	0.5	10.6	0.3	0.8	0.4	0.5	0.5	0.1	0.014892	0.122032	0.026017	0.726078	0.490962	1.210283	0.95278
E. coli (CFU/100ml)	73	2126.781	-1416.06	5669.622	190	155255	5	130000	80	370	129995	290	2.3E+08	15184.65	1777.229	8.526258	0.281029	72.7926	0.555223
TOC (mg/l)	22	2.95	2.622825	3.277175	2.65	64.9	1.8	4.3	2.5	3.7	2.5	1.2	0.544524	0.737919	0.157325	0.309347	0.490962	-1.02898	0.95278
Hardness (mg/l)	75	299.28	287.4492	311.1108	308	22446	166	394	274	332	228	58	2644.069	51.42051	5.937529	-0.73318	0.2774	0.207734	0.548211
Chloride (mg/l)	22	72.09091	53.90151	90.28031	61	1586	30	185	41	92	155	51	1683.039	41.02486	8.746529	1.378681	0.490962	1.382385	0.95278
Dissolved Oxygen (mg/l)	61	10.21656	9.740775	10.69234	9.9	623.21	6.67	17.5	9	11.3	10.83	2.3	3.451096	1.857713	0.237856	0.904596	0.30627	2.580118	0.603837
pH	62	7.868065	7.787892	7.948237	7.87	487.82	6.94	8.5	7.74	8.08	1.56	0.34	0.099665	0.315698	0.040094	-0.68266	0.303902	0.804074	0.599288
Copper (ug/l)	32	3.18125	2.521869	3.840631	2	101.8	2	9	2	4.95	7	2.95	3.344798	1.828879	0.323303	1.437821	0.414457	1.630743	0.809371
Iron (ug/l)	23	395.1304	208.5876	581.6733	270	9088	98	2100	160	380	2002	220	186089	431.3804	89.94903	3.178975	0.481337	11.45855	0.934764
Zinc (ug/l)	32	7.475	5.522527	9.427473	6.7	239.2	2.25	20	2.25	10	17.75	7.75	29.32694	5.415435	0.957323	1.164853	0.414457	0.782056	0.809371

Station: FC-6

	Valid N	Mean	Confid. -95.000%	Confid +95.000%	Median	Sum	Minimum	Maximum	Lower Quartile	Upper Quartile	Range	Quartile Range	Variance	Std.Dev.	Standard Error	Skewness	Std.Err. Skewness	Kurtosis	Std.Err. Kurtosis
Alkalinity (mg/l)	73	209.4384	203.0327	215.844	208	15289	120	286	192	231	166	39	753.7496	27.4545	3.213306	-0.11826	0.281029	0.776426	0.555223
Ammonia (mg/l as N)	74	0.100676	0.072594	0.128757	0.05	7.45	0.05	0.9	0.05	0.1	0.85	0.05	0.014691	0.121208	0.01409	4.543884	0.279197	26.29901	0.551684
BOD (mg/l)	34	2.3	1.883863	2.716137	2.1	78.2	0.5	5.1	1.5	2.9	4.6	1.4	1.422424	1.192654	0.204539	0.51858	0.403053	-0.35524	0.787898
COD (mg/l)	74	18.16622	16.32564	20.00679	16.15	1344.3	2.5	69	14	21	66.5	7	63.11377	7.944418	0.92352	3.770307	0.279197	22.66515	0.551684
Cyanide (mg/l)	74	0.005405	0.005056	0.005755	0.005	0.4	0.005	0.014	0.005	0.005	0.009	0	2.3E-06	0.001507	0.000175	4.257285	0.279197	18.76676	0.551684
Nitrate (mg/l as N)	74	1.977027	1.720107	2.233947	2	146.3	0.2	5	1	2.7	4.8	1.7	1.229739	1.108936	0.128911	0.423053	0.279197	-0.21463	0.551684
Total Phosphorus (mg/l as P)	74	0.155	0.131857	0.178143	0.12	11.47	0.015	0.46	0.08	0.21	0.445	0.13	0.009978	0.09989	0.011612	1.087216	0.279197	0.622286	0.551684
Total Solids (mg/l)	73	446.3973	405.8542	486.9403	418	32587	298	1790	379	464	1492	85	30195.24	173.7678	20.33798	6.61995	0.281029	50.9588	0.555223
Suspended Solids (mg/l)	73	33.84932	22.47919	45.21944	22	2471	2	354	14	35	352	21	2374.852	48.73245	5.703702	4.87049	0.281029	27.85032	0.555223
Dissolved Solids (mg/l)	22	400.8182	372.4103	429.2261	392.5	8818	308	531	347	430	223	83	4105.203	64.07186	13.66017	0.689459	0.490962	-0.38432	0.95278
Sulfate (mg/l)	22	52.81818	45.99781	59.63855	50	1162	27	79	44	66	52	22	236.632	15.38285	3.279634	0.182447	0.490962	-0.93987	0.95278
TKN (mg/l as N)	74	0.966216	0.874238	1.058194	0.8	71.5	0.5	2.9	0.7	1.1	2.4	0.4	0.15761	0.397001	0.04615	2.405337	0.279197	8.450838	0.551684
E. coli (CFU/100ml)	70	3155.286	-267.001	6577.573	205	220870	5	90000	50	720	89995	670	2.1E+08	14352.73	1715.479	5.681294	0.28675	31.7405	0.566265
TOC (mg/l)	22	3.695455	3.337738	4.053171	3.55	81.3	2.7	6.6	3.4	3.9	3.9	0.5	0.650931	0.806803	0.172011	2.353017	0.490962	7.747405	0.95278
Hardness (mg/l)	74	273.9595	264.2209	283.698	279.5	20273	122	340	250	304	218	54	1766.889	42.03438	4.886397	-0.99896	0.279197	1.720096	0.551684
Chloride (mg/l)	22	48.63636	41.36827	55.90445	46.5	1070	22	83	38	60	61	22	268.7186	16.39264	3.494922	0.386479	0.490962	-0.60174	0.95278
Dissolved Oxygen (mg/l)	59	10.04153	9.593674	10.48938	9.96	592.45	7.07	14.28	8.79	11.23	7.21	2.44	2.953341	1.718529	0.223733	0.355181	0.311176	-0.48018	0.613257
pH	60	7.885833	7.793768	7.977899	7.945	473.15	6.91	8.65	7.795	8.1	1.74	0.305	0.127015	0.356391	0.04601	-0.90723	0.308694	0.928682	0.608492
Copper (ug/l)	35	7.811429	-1.89817	17.52102	2	273.4	2	170	2	4.4	168	2.4	798.9475	28.26566	4.777768	5.886782	0.397694	34.76014	0.777794
Iron (ug/l)	24	765.4167	513.1752	1017.658	495	18370	220	2100	330	1150	1880	820	356834.6	597.3563	121.9349	1.148521	0.472261	-0.0265	0.917777
Zinc (ug/l)	75	13.07267	10.37592	15.76941	10	980.45	2.25	80	8.3	11	77.75	2.7	137.3806	11.72095	1.353418	3.60427	0.2774	15.89606	0.548211

Station: FC-7

	Valid N	Mean	Confid. -95.000%	Confid. +95.000%	Median	Sum	Minimum	Maximum	Lower Quartile	Upper Quartile	Range	Quartile Range	Variance	Std.Dev.	Standard Error	Skewness	Std.Err. Skewness	Kurtosis	Std.Err. Kurtosis
Alkalinity (mg/l)	100	191.76	186.5053	197.0147	191.5	19176	110	250	180	210	140	30	701.3156	26.48236	2.648236	-0.62685	0.24138	1.381656	0.478331
Ammonia (mg/l as N)	101	0.071287	0.059414	0.08316	0.05	7.2	0.05	0.4	0.05	0.05	0.35	0	0.003617	0.060144	0.005985	3.6248	0.240216	13.73216	0.476065
BOD (mg/l)	49	2.128571	1.781952	2.475191	1.8	104.3	0.5	5.1	1.3	2.6	4.6	1.3	1.45625	1.206752	0.172393	0.939616	0.339828	0.306798	0.668065
COD (mg/l)	101	16.1198	15.03961	17.19999	15	1628.1	2.5	40	12	19	37.5	7	29.94	5.471746	0.544459	0.956055	0.240216	2.582312	0.476065
Cyanide (mg/l)	100	0.00507	0.004931	0.005209	0.005	0.507	0.005	0.012	0.005	0.005	0.007	0	4.9E-07	0.0007	7E-05	10	0.24138	100	0.478331
Nitrate (mg/l as N)	101	1.416832	1.193484	1.64018	1.3	143.1	0.05	4.5	0.2	2.5	4.45	2.3	1.280014	1.131377	0.112576	0.400219	0.240216	-0.79243	0.476065
Total Phosphorus (mg/l as P)	101	0.064703	0.058664	0.070742	0.06	6.535	0.015	0.14	0.04	0.09	0.125	0.05	0.000936	0.030593	0.003044	0.402245	0.240216	-0.31756	0.476065
Total Solids (mg/l)	100	359.06	352.1996	365.9204	351.5	35906	279	467	333.5	387	188	53.5	1195.431	34.575	3.4575	0.564737	0.24138	0.580447	0.478331
Suspended Solids (mg/l)	100	17.8	15.25271	20.34729	17	1780	2	77	9	22	75	13	164.8081	12.83776	1.283776	1.907036	0.24138	5.29425	0.478331
Dissolved Solids (mg/l)	97	322.4742	316.044	328.9044	320	31280	259	400	298	343	141	45	1017.898	31.90451	3.239412	0.257105	0.244975	-0.55879	0.48533
Sulfate (mg/l)	100	41.21	39.78828	42.63172	40	4121	25	60	37	43.5	35	6.5	51.33929	7.165144	0.716514	0.729243	0.24138	0.991556	0.478331
TKN (mg/l as N)	22	0.668182	0.597896	0.738467	0.7	14.7	0.4	1	0.6	0.8	0.6	0.2	0.02513	0.158524	0.033797	0.185171	0.490962	-0.30225	0.95278
E. coli (CFU/100ml)	96	349.8958	224.66	475.1316	140	33590	5	3900	30	330	3895	300	382030	618.0857	63.08311	3.400669	0.24621	13.57593	0.487732
TOC (mg/l)	21	3.561905	3.287095	3.836714	3.6	74.8	2.3	4.6	3.1	4	2.3	0.9	0.364476	0.603719	0.131742	-0.28675	0.501195	-0.58066	0.971941
Hardness (mg/l)	100	248.89	241.7398	256.0402	250	24889	142	314	225	276	172	51	1298.543	36.03531	3.603531	-0.37659	0.24138	0.238902	0.478331
Chloride (mg/l)	25	33.8	31.4741	36.1259	35	845	20	43	29	36	23	7	31.75	5.634714	1.126943	-0.43684	0.463684	0.199117	0.901721
Dissolved Oxygen (mg/l)	59	9.931017	9.49423	10.3678	9.79	585.93	6.57	15.2	8.83	11.05	8.63	2.22	2.80922	1.676073	0.218206	0.482255	0.311176	0.497391	0.613257
pH	60	7.983	7.900859	8.065141	8.01	478.98	6.96	8.58	7.82	8.21	1.62	0.39	0.101106	0.317972	0.04105	-1.0558	0.308694	1.722748	0.608492
Copper (ug/l)	35	2.825714	2.336048	3.315381	2	98.9	2	7.4	2	4.1	5.4	2.1	2.031966	1.425471	0.240949	1.578426	0.397694	1.759884	0.777794
Iron (ug/l)	34	461.4706	335.7898	587.1514	325	15690	150	1700	240	530	1550	290	129746.3	360.2031	61.77432	2.053405	0.403053	4.307661	0.787898
Zinc (ug/l)	38	7.360526	5.258391	9.462662	5.05	279.7	2.25	26	2.25	10	23.75	7.75	40.90191	6.39546	1.037481	1.254614	0.382818	0.744101	0.7497

Station: IWC-9

	Valid N	Mean	Confid. -95.000%	Confid. +95.000%	Median	Sum	Minimum	Maximum	Lower Quartile	Upper Quartile	Range	Quartile Range	Variance	Std.Dev.	Standard Error	Skewness	Std.Err. Skewness	Kurtosis	Std.Err. Kurtosis
Alkalinity (mg/l)	77	229.2338	220.178	238.2895	230	17651	120	296	198	259	176	61	1591.866	39.89819	4.546821	-0.43499	0.273908	0.015723	0.54146
Ammonia (mg/l as N)	78	0.088462	0.071719	0.105204	0.05	6.9	0.05	0.4	0.05	0.1	0.35	0.05	0.005514	0.07426	0.008408	2.215522	0.272211	4.699745	0.538176
BOD (mg/l)	37	2.421622	1.677608	3.165635	1.7	89.6	0.5	9	1.1	2.7	8.5	1.6	4.97952	2.231484	0.366854	1.602995	0.387589	1.934219	0.758719
COD (mg/l)	78	16.29641	14.87314	17.71968	14.75	1271.12	2.5	39	12	18.8	36.5	6.8	39.8488	6.31259	0.71476	1.097534	0.272211	1.580973	0.538176
Cyanide (mg/l)	78	0.005167	0.005011	0.005323	0.005	0.403	0.005	0.009	0.005	0.005	0.004	0	4.8E-07	0.000692	7.8E-05	4.359948	0.272211	18.76218	0.538176
Nitrate (mg/l as N)	78	2.978205	2.68449	3.271921	2.7	232.3	0.3	7	2.2	3.8	6.7	1.6	1.697051	1.302709	0.147503	0.768894	0.272211	0.852646	0.538176
Total Phosphorus (mg/l as P)	78	0.242564	0.214424	0.270705	0.215	18.92	0.05	0.61	0.15	0.31	0.56	0.16	0.015578	0.124811	0.014132	0.960414	0.272211	0.555346	0.538176
Total Solids (mg/l)	77	505.8442	486.3058	525.3825	493	38950	344	729	444	551	385	107	7410.239	86.08274	9.810039	0.642698	0.273908	0.236498	0.54146
Suspended Solids (mg/l)	77	22.72727	18.73906	26.71549	20	1750	2	90	11	30	88	19	308.7536	17.57139	2.002445	1.553509	0.273908	3.391741	0.54146
Dissolved Solids (mg/l)	77	470.5844	447.5615	493.6073	461	36235	278	804	404	512	526	108	10289.06	101.435	11.55959	0.754627	0.273908	0.841506	0.54146
Sulfate (mg/l)	76	74.64474	68.27638	81.01309	73	5673	32	145	53	90	113	37	776.6854	27.86908	3.196802	0.697094	0.275637	-0.03561	0.544804
TKN (mg/l as N)	78	0.925641	0.847585	1.003697	0.8	72.2	0.4	2.1	0.7	1.1	1.7	0.4	0.119853	0.346199	0.039199	1.256256	0.272211	1.65022	0.538176
E. coli (CFU/100ml)	73	465.7534	294.8345	636.6723	240	34000	10	4200	120	460	4190	340	536644.2	732.56	85.73967	3.408902	0.281029	12.71963	0.555223
TOC (mg/l)	22	3.695455	3.384797	4.006112	3.55	81.3	2.4	5.1	3.3	4.2	2.7	0.9	0.490931	0.700664	0.149382	0.263382	0.490962	-0.22154	0.95278
Hardness (mg/l)	77	306.8182	295.4759	318.1605	316	23625	178	398	276	338	220	62	2497.23	49.97229	5.694871	-0.57776	0.273908	0.042903	0.54146
Chloride (mg/l)	25	60.892	49.05252	72.73148	56	1522.3	0.3	115	41	82	114.7	41	822.6749	28.68231	5.736462	0.199773	0.463684	-0.35741	0.901721
Dissolved Oxygen (mg/l)	61	10.16803	9.715623	10.62044	9.94	620.25	6.26	16.6	9.2	10.96	10.34	1.76	3.120363	1.766455	0.226171	0.745743	0.30627	2.324002	0.603837
pH	62	7.967742	7.876565	8.058919	8.035	494	6.99	8.53	7.8	8.21	1.54	0.41	0.128903	0.359031	0.045597	-0.87082	0.303902	0.623764	0.599288
Copper (ug/l)	78	3.970513	3.584278	4.356748	4	309.7	2	9	2	5	7	3	2.934574	1.71306	0.193966	0.464809	0.272211	-0.09328	0.538176
Iron (ug/l)	78	781.9231	634.0065	929.8397	615	60990	110	4200	420	940	4090	520	430402.7	656.0509	74.28313	2.771637	0.272211	10.05551	0.538176
Zinc (ug/l)	78	11.51026	10.404	12.61652	10	897.8	5	30	10	11	25	1	24.07444	4.906571	0.55556	1.95126	0.272211	4.116498	0.538176

Station: WR-192

	Valid N	Mean	Confid. -95.000%	Confid. +95.000%	Median	Sum	Minimum	Maximum	Lower Quartile	Upper Quartile	Range	Quartile Range	Variance	Std.Dev.	Standard Error	Skewness	Std.Err. Skewness	Kurtosis	Std.Err. Kurtosis
Alkalinity (mg/l)	81	220.4815	210.4762	230.4868	229	17859	61	339	198	249	278	51	2047.453	45.24879	5.027643	-0.98652	0.267302	1.98133	0.528675
Ammonia (mg/l as N)	80	0.1875	0.144297	0.230703	0.1	15	0.05	0.8	0.05	0.25	0.75	0.2	0.03769	0.194139	0.021705	1.455495	0.268909	1.061404	0.531786
BOD (mg/l)	39	3.323077	2.606613	4.039541	2.4	129.6	0.5	11	1.6	4.4	10.5	2.8	4.88498	2.210199	0.353915	1.556929	0.37822	2.991017	0.741
COD (mg/l)	80	20.9625	18.90404	23.02096	20	1677	7	72.5	15	24.45	65.5	9.45	85.56009	9.24987	1.034167	2.562085	0.268909	11.77305	0.531786
Cyanide (mg/l)	81	0.006198	0.005445	0.00695	0.005	0.502	0.005	0.026	0.005	0.006	0.021	0.001	1.2E-05	0.003404	0.000378	4.383773	0.267302	21.12807	0.528675
Nitrate (mg/l as N)	80	2.86125	2.621242	3.101258	2.8	228.9	0.7	5.5	2.05	3.6	4.8	1.55	1.163163	1.0785	0.12058	0.286692	0.268909	-0.37634	0.531786
Total Phosphorus (mg/l as P)	80	0.417625	0.348675	0.486575	0.315	33.41	0.03	1.25	0.205	0.515	1.22	0.31	0.095996	0.309831	0.03464	1.155288	0.268909	0.380492	0.531786
Total Solids (mg/l)	81	567.9012	532.2641	603.5384	524	46000	268	1089	474	633	821	159	25975.14	161.168	17.90756	1.000654	0.267302	1.146951	0.528675
Suspended Solids (mg/l)	81	52.1358	27.58243	76.68917	24	4223	2	936	16	42	934	26	12330.29	111.0419	12.33798	6.670425	0.267302	51.41333	0.528675
Dissolved Solids (mg/l)	21	554.7619	481.1509	628.3729	524	11650	310	933	461	684	623	223	26151.19	161.7133	35.28873	0.566159	0.501195	0.052176	0.971941
Sulfate (mg/l)	21	102.4762	77.60923	127.3432	86	2152	38	240	65	120	202	55	2984.362	54.62931	11.92109	0.987525	0.501195	0.529696	0.971941
TKN (mg/l as N)	21	1.147619	1.01365	1.281588	1.1	24.1	0.8	1.9	0.9	1.3	1.1	0.4	0.086619	0.294311	0.064224	0.806956	0.501195	0.574882	0.971941
E. coli (CFU/100ml)	78	972.1795	557.6268	1386.732	200	75830	5	8400	60	700	8395	640	3380653	1838.655	208.1867	2.552887	0.272211	5.956325	0.538178
TOC (mg/l)	21	4.942857	4.321792	5.563922	4.8	103.8	2.8	9.1	4.3	5.5	6.3	1.2	1.861571	1.364394	0.297735	1.317013	0.501195	3.394251	0.971941
Hardness (mg/l)	81	289.0864	276.1176	302.0552	300	23416	100	421	258	329	321	71	3439.955	58.65113	6.516792	-1.03439	0.267302	1.431102	0.528675
Chloride (mg/l)	21	88.28571	69.80003	106.7714	81	1854	32	180	64	115	148	51	1649.214	40.61052	8.861942	0.485099	0.501195	-0.25036	0.971941
Dissolved Oxygen (mg/l)	62	9.995484	9.595468	10.3955	9.8	619.72	6.92	13.4	8.72	11.21	6.48	2.49	2.481133	1.575161	0.200046	0.137869	0.303902	-0.82005	0.599288
pH	63	7.975714	7.888712	8.062717	7.96	502.47	6.88	8.88	7.81	8.21	2	0.4	0.119341	0.345458	0.043524	-0.40355	0.301589	1.222591	0.594841
Copper (ug/l)	79	6.670886	5.48725	7.854522	6	527	2	38	4	8	36	4	27.92465	5.284378	0.594539	3.697279	0.270545	18.29995	0.534952
Iron (ug/l)	24	852.9167	421.3104	1284.523	420	20470	200	4200	300	810	4000	510	1044743	1022.127	208.6408	2.236616	0.472261	4.560648	0.917777
Zinc (ug/l)	79	18.31392	15.12847	21.49938	17	1446.8	5	100	10	20	95	10	202.253	14.22157	1.600051	4.170995	0.270545	21.06725	0.534952

Station: WR-210

	Valid N	Mean	Confid. -95.000%	Confid +95.000%	Median	Sum	Minimum	Maximum	Lower Quartile	Upper Quartile	Range	Quartile Range	Variance	Std.Dev.	Standard Error	Skewness	Std.Err. Skewness	Kurtosis	Std.Err. Kurtosis
Alkalinity (mg/l)	84	230.9167	223.1066	238.7268	240.5	19397	137	290	213.5	257	153	43.5	1295.21	35.98902	3.926724	-0.78992	0.262651	0.058869	0.51966
Ammonia (mg/l as N)	85	0.224706	0.173532	0.275879	0.2	19.1	0.05	1.6	0.05	0.3	1.55	0.25	0.056287	0.237249	0.025733	3.035367	0.261153	13.56955	0.516756
BOD (mg/l)	39	3.105128	2.608255	3.602001	3	121.1	0.5	6.6	1.9	4.4	6.1	2.5	2.349447	1.53279	0.245443	0.491052	0.37822	-0.44297	0.741
COD (mg/l)	85	21.82235	19.44921	24.1955	20	1854.9	7	81.2	15	25.6	74.2	10.6	121.0508	11.00231	1.193368	2.561495	0.261153	10.42323	0.516756
Cyanide (mg/l)	85	0.007835	0.006765	0.008906	0.005	0.666	0.002	0.033	0.005	0.009	0.031	0.004	2.5E-05	0.004964	0.000538	2.610205	0.261153	8.685725	0.516756
Nitrate (mg/l as N)	85	3.038824	2.785394	3.292254	2.9	258.3	1.1	7.3	2.3	3.7	6.2	1.4	1.380499	1.174946	0.127441	1.081618	0.261153	2.114187	0.516756
Total Phosphorus (mg/l as P)	85	0.512	0.423698	0.600302	0.38	43.52	0.06	1.75	0.22	0.67	1.69	0.45	0.167595	0.409383	0.044404	1.250223	0.261153	0.805038	0.516756
Total Solids (mg/l)	84	611.4643	562.3944	660.5342	541	51363	2	1590	475.5	687	1588	211.5	51127.82	226.1146	24.67113	1.377811	0.262651	4.106052	0.51966
Suspended Solids (mg/l)	84	64.0119	24.48822	103.5356	21	5377	2	1420	12	37.5	1418	25.5	33169.75	182.1256	19.87154	6.187	0.262651	41.65957	0.51966
Dissolved Solids (mg/l)	21	604.3333	516.0995	692.5672	591	12691	265	1035	479	682	770	203	37573.03	193.8376	42.29884	0.524588	0.501195	0.110797	0.971941
Sulfate (mg/l)	21	115.381	87.48511	143.2768	110	2423	29	270	68	140	241	72	3755.648	61.28334	13.37312	0.872422	0.501195	0.71767	0.971941
TKN (mg/l as N)	85	1.351765	1.222065	1.481464	1.3	114.9	0.4	3.8	1	1.5	3.4	0.5	0.361574	0.60131	0.065221	1.71866	0.261153	4.330171	0.516756
E. coli (CFU/100ml)	80	1541.813	760.9022	2322.723	365	123345	5	22000	105	1100	21995	995	1.2E+07	3509.093	392.3285	4.12618	0.268909	18.91204	0.531786
TOC (mg/l)	21	4.833333	4.216829	5.449838	4.7	101.5	2.8	7.8	3.9	5.6	5	1.7	1.834333	1.354376	0.295549	0.510719	0.501195	-0.34368	0.971941
Hardness (mg/l)	84	305.6071	294.0691	317.1452	313.5	25671	164	394	273	338.5	230	65.5	2826.772	53.16739	5.801038	-0.59137	0.262651	-0.10473	0.51966
Chloride (mg/l)	21	104.5238	81.30772	127.7399	96	2195	30	210	65	125	180	60	2601.262	51.00257	11.12967	0.539116	0.501195	-0.34354	0.971941
Dissolved Oxygen (mg/l)	62	9.855161	9.450884	10.25944	9.8	611.02	6.27	13.46	8.77	11	7.19	2.23	2.534275	1.591941	0.202177	-0.06469	0.303902	-0.31071	0.599288
pH	63	7.818413	7.727972	7.908853	7.8	492.56	6.61	8.63	7.6	8.09	2.02	0.49	0.128959	0.359108	0.045243	-0.38963	0.301589	1.348301	0.594841
Copper (ug/l)	84	7.416667	6.145114	8.68822	6	623	2	43	4	8.45	41	4.45	34.33177	5.859332	0.639305	3.366373	0.262651	16.41959	0.51966
Iron (ug/l)	84	1956.548	665.29	3247.805	570	164350	90	50000	365	1150	49910	785	3.5E+07	5950.131	649.2125	6.895587	0.262651	53.12606	0.51966
Zinc (ug/l)	84	23.30357	18.20533	28.40181	20	1957.5	8.5	190	10	20	181.5	10	551.9097	23.49276	2.56327	4.888154	0.262651	31.01522	0.51966

Station: WR-248

	Valid N	Mean	Confid. -95.000%	Confid. +95.000%	Median	Sum	Minimum	Maximum	Lower Quartile	Upper Quartile	Range	Quartile Range	Variance	Std.Dev.	Standard Error	Skewness	Std.Err. Skewness	Kurtosis	Std.Err. Kurtosis
Alkalinity (mg/l)	79	233.1266	224.0943	242.1588	240	18417	123	297	201	261	174	60	1626.086	40.32476	4.53689	-0.63631	0.270545	0.04503	0.534952
Ammonia (mg/l as N)	80	0.09375	0.077878	0.109622	0.05	7.5	0.05	0.4	0.05	0.1	0.35	0.05	0.005087	0.071323	0.007974	1.835817	0.268909	3.585569	0.531786
BOD (mg/l)	37	2.118919	1.462736	2.775101	1.7	78.4	0.5	9.7	1	2.8	9.2	1.8	3.873243	1.968056	0.323546	2.384625	0.387589	6.827939	0.758719
COD (mg/l)	80	15.425	14.06479	16.78521	14	1234	2.5	34.4	11.25	17.85	31.9	6.6	37.35937	6.112231	0.683368	0.960684	0.268909	0.847583	0.531786
Cyanide (mg/l)	1	0.005				0.005	0.005	0.005											
Nitrate (mg/l as N)	80	3.17125	2.887248	3.455252	2.8	253.7	0.7	7.2	2.4	3.9	6.5	1.5	1.628657	1.276188	0.142682	0.98046	0.268909	1.112389	0.531786
Total Phosphorus (mg/l as P)	80	0.260875	0.229159	0.292591	0.22	20.87	0.03	0.62	0.17	0.335	0.59	0.165	0.020312	0.14252	0.015934	0.894775	0.268909	0.082481	0.531786
Total Solids (mg/l)	80	517.85	495.8205	539.8795	497.5	41428	362	934	447	578	572	131	9799.319	98.99151	11.06759	1.225662	0.268909	2.706557	0.531786
Suspended Solids (mg/l)	80	24.8375	19.74182	29.93318	19.5	1987	2	120	9	32	118	23	524.315	22.89793	2.560086	1.989737	0.268909	4.941906	0.531786
Dissolved Solids (mg/l)	24	492.2083	449.6392	534.7775	491.5	11813	331	693	403	568.5	362	165.5	10163.04	100.8119	20.57815	0.237857	0.472261	-0.90202	0.917777
Sulfate (mg/l)	23	81.95652	67.63958	96.27346	81	1885	38	155	54	100	117	46	1096.134	33.10792	6.903479	0.519832	0.481337	-0.5795	0.934764
TKN (mg/l as N)	23	0.830435	0.703062	0.957807	0.8	19.1	0.3	1.4	0.6	1	1.1	0.4	0.086759	0.294549	0.061418	0.689788	0.481337	0.069658	0.934764
E. coli (CFU/100ml)	77	551.6234	294.7317	808.515	220	42475	5	8000	80	550	7995	470	1281017	1131.82	128.9829	4.862961	0.273908	27.27407	0.54146
TOC (mg/l)	23	3.643478	3.23535	4.051606	3.6	83.8	1.4	5.7	3	4.3	4.3	1.3	0.890751	0.943796	0.196795	-0.0848	0.481337	0.643907	0.934764
Hardness (mg/l)	79	311.5316	300.2261	322.8372	324	24611	186	388	282	342	202	60	2547.611	50.47387	5.678754	-0.68309	0.270545	-0.02877	0.534952
Chloride (mg/l)	23	62.95652	51.14011	74.77293	56	1448	29	110	40	90	81	50	746.6798	27.32544	5.697749	0.423236	0.481337	-1.22711	0.934764
Dissolved Oxygen (mg/l)	62	10.31371	9.850206	10.77721	10.3	639.45	6.4	15.1	9.06	11.59	8.7	2.53	3.331204	1.825159	0.231795	0.171986	0.303902	-0.14039	0.599288
pH	63	7.985714	7.902703	8.068726	8.02	503.1	7	8.6	7.8	8.21	1.6	0.41	0.108644	0.329612	0.041527	-0.77543	0.301589	0.767441	0.594841
Copper (ug/l)	22	3.704545	2.707622	4.701469	2	81.5	2	9.6	2	5	7.6	3	5.055693	2.248487	0.479379	1.187478	0.490962	0.706472	0.95278
Iron (ug/l)	22	880.9091	401.9429	1359.875	505	19380	200	4900	280	730	4700	450	1166990	1080.273	230.315	2.82346	0.490962	9.041928	0.95278
Zinc (ug/l)	22	12.61136	8.937397	16.28533	9.8	277.45	2.25	40	8	16	37.75	8	68.66379	8.286362	1.766658	1.991942	0.490962	5.011243	0.95278

Station: WR-279

	Valid N	Mean	Confid. -95.000%	Confid. +95.000%	Median	Sum	Minimum	Maximum	Lower Quartile	Upper Quartile	Range	Quartile Range	Variance	Std.Dev.	Standard Error	Skewness	Std.Err. Skewness	Kurtosis	Std.Err. Kurtosis
Alkalinity (mg/l)	78	242.9872	232.0706	253.9037	257.5	18953	84	341	220	274	257	54	2344.299	48.41796	5.482254	-0.97978	0.272211	0.885321	0.538176
Ammonia (mg/l as N)	78	0.09359	0.07459	0.112589	0.05	7.3	0.05	0.4	0.05	0.1	0.35	0.05	0.007101	0.084269	0.009542	1.927461	0.272211	2.707739	0.538176
BOD (mg/l)	36	2.263889	1.451437	3.076341	1.55	81.5	0.5	12	1	2.45	11.5	1.45	5.765802	2.401208	0.400201	2.605566	0.392544	7.691624	0.768076
COD (mg/l)	78	18.74231	16.27483	21.20978	15	1461.9	8	65	12	20	57	8	119.7695	10.94392	1.239155	2.080979	0.272211	4.492736	0.538176
Cyanide (mg/l)	77	0.005377	0.005075	0.005678	0.005	0.414	0.005	0.014	0.005	0.005	0.009	0	1.8E-06	0.001328	0.000151	4.700768	0.273908	25.37531	0.54146
Nitrate (mg/l as N)	78	2.788462	2.493572	3.083351	2.55	217.5	0.2	9.3	2	3.3	9.1	1.3	1.710644	1.307916	0.148092	1.745212	0.272211	7.152365	0.538176
Total Phosphorus (mg/l as P)	78	0.312564	0.269675	0.355453	0.26	24.38	0.04	0.85	0.16	0.44	0.81	0.28	0.036186	0.190225	0.021539	0.816631	0.272211	0.04532	0.538176
Total Solids (mg/l)	77	555.3117	528.2605	582.3629	528	42759	392	1002	474	617	610	143	14204.59	119.183	13.58216	1.217433	0.273908	1.746478	0.54146
Suspended Solids (mg/l)	77	41.2987	20.97783	61.61957	17	3180	2	720	7	39	718	32	8015.66	89.53022	10.20292	6.099129	0.273908	44.38208	0.54146
Dissolved Solids (mg/l)	21	518.7619	446.6283	590.8955	507	10894	213	756	376	655	543	279	25111.99	158.4676	34.58047	-0.11505	0.501195	-0.97021	0.971941
Sulfate (mg/l)	21	110.4286	81.26784	139.5893	88	2319	21	205	54	170	184	116	4103.957	64.06214	13.9795	0.293826	0.501195	-1.56057	0.971941
TKN (mg/l as N)	22	0.781818	0.63468	0.928956	0.7	17.2	0.3	1.8	0.6	0.8	1.5	0.2	0.11013	0.331858	0.070752	1.671548	0.490962	3.483352	0.95278
E. coli (CFU/100ml)	74	1147.162	634.1488	1660.176	255	84890	5	15000	80	1000	14995	920	4903157	2214.307	257.408	3.953846	0.279197	20.73847	0.551684
TOC (mg/l)	21	4.233333	3.254683	5.211984	3.5	88.9	2.2	12.9	3.2	4.2	10.7	1	4.622333	2.149961	0.46918	3.539867	0.501195	14.42581	0.971941
Hardness (mg/l)	78	320.3333	307.3076	333.3591	340.5	24986	134	412	298	358	278	60	3337.68	57.77265	6.541465	-1.06694	0.272211	0.825212	0.538176
Chloride (mg/l)	21	53.2381	43.51577	62.96042	54	1118	21	89	36	71	68	35	456.1905	21.35862	4.660832	0.080367	0.501195	-1.11775	0.971941
Dissolved Oxygen (mg/l)	57	10.17825	9.642648	10.71384	9.9	580.16	6.12	16.6	8.73	11.6	10.48	2.87	4.074604	2.018565	0.267365	0.496756	0.316327	0.408195	0.623134
pH	59	7.996271	7.913927	8.078615	8.06	471.78	6.93	8.57	7.86	8.19	1.64	0.33	0.099841	0.315976	0.041137	-1.3186	0.311176	2.243661	0.613257
Copper (ug/l)	79	5.506329	4.741346	6.271312	5	435	2	27	4	7	25	3	11.66419	3.415288	0.38425	3.40091	0.270545	19.42203	0.534952
Iron (ug/l)	24	1113.042	440.2244	1785.859	430	26713	80	6500	175	1250	6420	1075	2538799	1593.361	325.2434	2.331911	0.472261	5.460968	0.917777
Zinc (ug/l)	36	18.64167	12.60063	24.68271	14	671.1	5	110	10	20	105	10	318.7774	17.85434	2.975723	4.115987	0.392544	20.24788	0.768076

Station: WR-293

	Valid N	Mean	Confid. -95.000%	Confid. +95.000%	Median	Sum	Minimum	Maximum	Lower Quartile	Upper Quartile	Range	Quartile Range	Variance	Std.Dev.	Standard Error	Skewness	Std.Err. Skewness	Kurtosis	Std.Err. Kurtosis
Alkalinity (mg/l)	111	242.9279	233.0488	252.807	254	26965	73	343	223	277	270	54	2758.377	52.52025	4.985001	-1.05715	0.229435	1.179249	0.455044
Ammonia (mg/l as N)	111	0.087838	0.073875	0.1018	0.05	9.75	0.05	0.5	0.05	0.1	0.45	0.05	0.00551	0.074228	0.007045	2.618706	0.229435	8.765752	0.455044
BOD (mg/l)	55	2.136364	1.495859	2.776869	1.6	117.5	0.5	15	1.1	2.2	14.5	1.1	5.613468	2.369276	0.319473	3.812993	0.321742	17.36452	0.633507
COD (mg/l)	110	16.99545	14.96244	19.02847	14	1869.5	2.5	65	11	19	62.5	8	115.7392	10.75821	1.025755	2.299408	0.230448	6.510918	0.457021
Cyanide (mg/l)	109	0.005092	0.004987	0.005197	0.005	0.555	0.005	0.009	0.005	0.005	0.004	0	3.1E-07	0.000553	5.3E-05	6.053781	0.231475	36.1788	0.459025
Nitrate (mg/l as N)	111	2.196847	2.007841	2.385853	2	243.85	0.05	6.6	1.4	2.9	6.55	1.5	1.009649	1.004813	0.095373	0.994388	0.229435	2.277726	0.455044
Total Phosphorus (mg/l as P)	111	0.213333	0.18147	0.245197	0.16	23.68	0.04	0.86	0.09	0.28	0.82	0.19	0.028695	0.169396	0.016078	1.675108	0.229435	2.874891	0.455044
Total Solids (mg/l)	110	557.2455	534.2179	580.273	529.5	61297	381	897	462	615	516	153	14848.94	121.8562	11.61854	1.051261	0.230448	0.683512	0.457021
Suspended Solids (mg/l)	108	44.40741	26.60649	62.20833	14	4796	2	610	6.5	39.5	608	33	8708.3	93.31827	8.979555	4.541919	0.232515	23.73851	0.461055
Dissolved Solids (mg/l)	107	491.3084	464.3032	518.3136	482	52570	198	842	400	573	644	173	19852.22	140.8979	13.62111	0.394321	0.23357	-0.02201	0.463113
Sulfate (mg/l)	110	108.9455	96.93045	120.9605	99	11984	16	300	58	145	284	87	4042.474	63.58045	6.062158	0.891183	0.230448	0.373131	0.457021
TKN (mg/l as N)	110	0.872727	0.772441	0.973014	0.7	96	0.3	3.6	0.6	1	3.3	0.4	0.281635	0.530693	0.0506	2.812231	0.230448	10.83277	0.457021
E. coli (CFU/100ml)	103	1846.019	1058.26	2633.779	270	190140	5	29000	70	2600	28995	2530	1.6E+07	4030.706	397.1572	4.605155	0.237938	25.32868	0.471627
TOC (mg/l)	22	4.304545	3.173868	5.435223	3.8	94.7	2	14.9	3.2	4.5	12.9	1.3	6.503312	2.550159	0.543696	3.683441	0.490962	15.50949	0.95278
Hardness (mg/l)	111	316.3153	304.6127	328.0179	331	35111	128	424	284	359	296	75	3870.654	62.21458	5.905147	-0.93794	0.229435	0.458546	0.455044
Chloride (mg/l)	28	43.23214	36.13312	50.33117	44	1210.5	2.5	75	31	52	72.5	21	335.1756	18.3078	3.459849	-0.03008	0.440524	-0.33668	0.858329
Dissolved Oxygen (mg/l)	59	10.11712	9.582089	10.65215	9.95	596.91	5.63	15.37	8.5	11.9	9.74	3.4	4.215038	2.053056	0.267285	0.103133	0.311176	-0.36303	0.613257
pH	61	7.953279	7.876054	8.030504	8.02	485.15	7.07	8.41	7.8	8.19	1.34	0.39	0.090919	0.301528	0.038607	-0.974	0.30627	0.785243	0.603837
Copper (ug/l)	132	4.888636	4.264462	5.512811	4	645.3	2	25	2	6	23	4	13.14101	3.625054	0.31552	2.75702	0.210831	10.99923	0.418668
Iron (ug/l)	36	1054	396.8756	1711.124	370	37944	87	8300	180	765	8213	585	3771893	1942.136	323.6894	3.104203	0.392544	9.428319	0.768076
Zinc (ug/l)	132	14.69091	12.57034	16.81148	10	1939.2	2.25	90	10	20	87.75	10	151.6773	12.31573	1.071947	3.667546	0.210831	16.8362	0.418668

Station: WR-319

	Valid N	Mean	Confid. -95.000%	Confid. +95.000%	Median	Sum	Minimum	Maximum	Lower Quartile	Upper Quartile	Range	Quartile Range	Variance	Std.Dev.	Standard Error	Skewness	Std.Err. Skewness	Kurtosis	Std.Err. Kurtosis
Alkalinity (mg/l)	79	227.2911	216.6558	237.9265	230	17956	86	331	201	258	245	57	2254.517	47.48175	5.342114	-0.50251	0.270545	0.633429	0.534952
Ammonia (mg/l as N)	79	0.08481	0.067669	0.101951	0.05	6.7	0.05	0.5	0.05	0.1	0.45	0.05	0.005856	0.076525	0.00861	3.018589	0.270545	11.28452	0.534952
BOD (mg/l)	39	1.769231	1.300585	2.237876	1.4	69	0.5	5.8	0.5	2.2	5.3	1.7	2.090081	1.445711	0.231499	1.554113	0.37822	1.906851	0.741
COD (mg/l)	79	16.56962	14.63632	18.50292	14	1309	7	52	11	19	45	8	74.49907	8.631284	0.971095	2.007651	0.270545	4.773051	0.534952
Cyanide (mg/l)	78	0.005218	0.005017	0.005419	0.005	0.407	0.005	0.011	0.005	0.005	0.006	0	8E-07	0.000892	0.000101	4.843993	0.272211	25.64516	0.538176
Nitrate (mg/l as N)	79	2.186835	1.767373	2.606298	1.8	172.76	0.05	9	0.6	3.3	8.95	2.7	3.507012	1.872702	0.210695	0.984844	0.270545	0.956815	0.534952
Total Phosphorus (mg/l as P)	79	0.130127	0.100717	0.159536	0.08	10.28	0.015	0.67	0.06	0.13	0.655	0.07	0.017239	0.131298	0.014772	2.436683	0.270545	5.970745	0.534952
Total Solids (mg/l)	79	423.4177	405.666	441.1694	407	33450	298	731	370	449	433	79	6281.018	79.25286	8.916643	1.726417	0.270545	3.9995	0.534952
Suspended Solids (mg/l)	78	36.23077	19.73906	52.72248	13.5	2826	2	538	7	29	536	22	5350.232	73.14528	8.282072	4.96916	0.272211	30.06608	0.538176
Dissolved Solids (mg/l)	77	373.013	354.9267	391.0993	364	28722	190	698	334	408	508	74	6349.724	79.68515	9.080966	1.287236	0.273908	4.132384	0.54146
Sulfate (mg/l)	78	48.58974	44.58617	52.59332	46	3790	15	130	40	53	115	13	315.31	17.75697	2.010581	2.007416	0.272211	6.619303	0.538176
TKN (mg/l as N)	23	0.743478	0.567183	0.919774	0.6	17.1	0.3	1.6	0.4	1	1.3	0.6	0.166206	0.407683	0.085008	0.929538	0.481337	-0.35897	0.934764
E. coli (CFU/100ml)	77	1141.364	537.2214	1745.506	200	87885	5	15000	80	700	14995	620	7084893	2661.748	303.3341	3.588491	0.273908	13.6398	0.54146
TOC (mg/l)	22	4.345455	3.318627	5.372282	4.1	95.6	2.1	13.7	3	4.6	11.6	1.6	5.36355	2.315934	0.493759	3.350258	0.490962	13.53989	0.95278
Hardness (mg/l)	79	291.6962	278.4776	304.9148	302	23044	142	412	254	333	270	79	3482.727	59.01463	6.639665	-0.26306	0.270545	-0.02005	0.534952
Chloride (mg/l)	23	26	22.6682	29.3318	26	598	13	42	20	31	29	11	59.36364	7.70478	1.606558	0.324573	0.481337	-0.55184	0.934764
Dissolved Oxygen (mg/l)	61	9.729344	9.210332	10.24836	9.62	593.49	2	13.7	8.43	11.36	11.7	2.93	4.10672	2.026504	0.259467	-0.62237	0.30627	2.183281	0.603837
pH	62	7.906129	7.835212	7.977046	7.945	490.18	7.04	8.51	7.81	8.11	1.47	0.3	0.077981	0.279252	0.035465	-0.96533	0.303902	1.397439	0.599288
Copper (ug/l)	80	6.42375	1.480166	11.36733	2	513.9	2	200	2	5	198	3	493.4818	22.21445	2.483651	8.596891	0.268909	75.63991	0.531786
Iron (ug/l)	23	1100	456.1307	1733.869	330	25300	110	5200	190	1980	5090	1710	2148636	1465.823	305.6452	1.631464	0.481337	1.655257	0.934764
Zinc (ug/l)	26	7.196154	4.442575	9.949733	4.75	187.1	2.25	26	2.25	10	23.75	7.75	46.47598	6.81733	1.336988	1.41681	0.45556	1.056484	0.886509

Station: WR-348

	Valid N	Mean	Confid. -95.000%	Confid. +95.000%	Median	Sum	Minimum	Maximum	Lower Quartile	Upper Quartile	Range	Quartile Range	Variance	Std.Dev.	Standard Error	Skewness	Std.Err. Skewness	Kurtosis	Std.Err. Kurtosis
Alkalinity (mg/l)	78	239.4231	229.3921	249.4541	242	18675	84	329	219	267	245	48	1979.39	44.49034	5.037539	-0.58756	0.272211	1.147774	0.538176
Ammonia (mg/l as N)	78	0.074359	0.061937	0.086781	0.05	5.8	0.05	0.3	0.05	0.05	0.25	0	0.003035	0.055094	0.006238	2.275052	0.272211	4.284555	0.538176
BOD (mg/l)	39	1.248718	0.942825	1.554611	1.1	48.7	0.5	4.8	0.5	1.8	4.3	1.3	0.890459	0.943641	0.151104	1.787381	0.37822	4.241396	0.741
COD (mg/l)	78	14.69103	13.36633	16.01572	13.95	1145.9	2.5	36	10	19	33.5	9	34.52005	5.875376	0.665255	0.858607	0.272211	1.187369	0.538176
Cyanide (mg/l)	77	0.005195	0.004986	0.005403	0.005	0.4	0.005	0.011	0.005	0.005	0.006	0	8.4E-07	0.000918	0.000105	5.461273	0.273908	30.53721	0.54146
Nitrate (mg/l as N)	78	2.980769	2.391036	3.570502	2.8	232.5	0.05	11	0.4	4.6	10.95	4.2	6.841508	2.615628	0.296162	0.709347	0.272211	-0.12008	0.538176
Total Phosphorus (mg/l as P)	78	0.110321	0.082432	0.138209	0.08	8.605	0.015	0.92	0.04	0.13	0.905	0.09	0.0153	0.123691	0.014005	4.302695	0.272211	24.48694	0.538176
Total Solids (mg/l)	78	416.5256	404.4106	428.6407	416	32489	257	611	386	448	354	62	2887.292	53.73352	6.084123	0.355916	0.272211	1.90313	0.538176
Suspended Solids (mg/l)	78	22.21795	16.93186	27.50403	12	1733	2	117	6	29	115	23	549.6792	23.44524	2.65465	1.796057	0.272211	3.325347	0.538176
Dissolved Solids (mg/l)	77	379.2338	366.1734	392.2941	383	29201	180	575	350	404	395	54	3311.024	57.54149	6.557462	0.065066	0.273908	2.472688	0.54146
Sulfate (mg/l)	22	35.27273	31.09737	39.44809	35	776	14	53	29	38	39	9	88.68398	9.417217	2.007757	0.206211	0.490962	0.482171	0.95278
TKN (mg/l as N)	78	0.652564	0.592446	0.712682	0.6	50.9	0.2	1.4	0.4	0.8	1.2	0.4	0.071097	0.266641	0.030191	0.810232	0.272211	-0.02627	0.538176
E. coli (CFU/100ml)	76	1133.421	566.4275	1700.415	390	86140	5	17600	150	995	17595	845	6156680	2481.266	284.6207	4.969254	0.275637	28.71268	0.544804
TOC (mg/l)	22	4.922727	3.553899	6.291555	4	108.3	1.9	15.8	3	6.5	13.9	3.5	9.531364	3.087291	0.658213	2.318582	0.490962	6.711584	0.95278
Hardness (mg/l)	78	304.8974	293.5618	316.233	309.5	23782	110	400	274	335	290	61	2527.73	50.27653	5.692698	-0.80089	0.272211	1.864541	0.538176
Chloride (mg/l)	22	26.63636	23.34239	29.93034	25.5	586	12	44	23	30	32	7	55.19481	7.429321	1.583936	0.496335	0.490962	0.463502	0.95278
Dissolved Oxygen (mg/l)	60	10.03417	9.532729	10.5356	9.95	602.05	5.47	15.44	8.88	10.14	9.97	2.06	3.767845	1.941094	0.250594	0.507537	0.308694	0.901253	0.608492
pH	61	7.899508	7.794829	8.004187	7.98	481.87	6.3	8.61	7.79	8.15	2.31	0.36	0.167055	0.408723	0.052332	-1.3526	0.30627	2.817857	0.603837
Copper (ug/l)	78	3.415385	2.932047	3.898722	2	266.4	2	11	2	4	9	2	4.595604	2.143736	0.24273	1.659967	0.272211	2.40741	0.538176
Iron (ug/l)	78	865.8077	666.4161	1065.199	565	67533	93	4100	270	1100	4007	830	782086.5	884.3565	100.1337	1.809021	0.272211	2.975273	0.538176
Zinc (ug/l)	78	9.253846	8.08686	10.42083	10	721.8	2.25	30	5	10	27.75	5	26.78999	5.175904	0.586056	1.280963	0.272211	2.903026	0.538176

WR-319

	Valid N	Mean	Confid. -95.000%	Confid. +95.000%	Median	Sum	Minimum	Maximum	Lower Quartile	Upper Quartile	Range	Quartile Range	Variance	Std.Dev.	Standard Error	Skewness	Std.Err. Skewness	Kurtosis	Std.Err. Kurtosis
Alkalinity (mg/l)	79	227.2911	216.6558	237.9265	230	17956	86	331	201	258	245	57	2254.517	47.48175	5.342114	-0.50251	0.270545	0.633429	0.534952
Ammonia (mg/l as N)	79	0.08481	0.067669	0.101951	0.05	6.7	0.05	0.5	0.05	0.1	0.45	0.05	0.005856	0.076525	0.00861	3.018589	0.270545	11.28452	0.534952
BOD (mg/l)	39	1.769231	1.300585	2.237876	1.4	69	0.5	5.8	0.5	2.2	5.3	1.7	2.090081	1.445711	0.231499	1.554113	0.37822	1.906851	0.741
COD (mg/l)	79	16.56962	14.63632	18.50292	14	1309	7	52	11	19	45	8	74.49907	8.631284	0.971095	2.007651	0.270545	4.773051	0.534952
Cyanide (mg/l)	78	0.005218	0.005017	0.005419	0.005	0.407	0.005	0.011	0.005	0.005	0.006	0	8E-07	0.000892	0.000101	4.843993	0.272211	25.64516	0.538176
Nitrate (mg/l as N)	79	2.186835	1.767373	2.606298	1.8	172.76	0.05	9	0.6	3.3	8.95	2.7	3.507012	1.872702	0.210695	0.984844	0.270545	0.956815	0.534952
Total Phosphorus (mg/l as P)	79	0.130127	0.100717	0.159536	0.08	10.28	0.015	0.67	0.06	0.13	0.655	0.07	0.017239	0.131298	0.014772	2.436683	0.270545	5.970745	0.534952
Total Solids (mg/l)	79	423.4177	405.666	441.1694	407	33450	298	731	370	449	433	79	6281.016	79.25286	8.916643	1.726417	0.270545	3.9995	0.534952
Suspended Solids (mg/l)	78	36.23077	19.73906	52.72248	13.5	2826	2	538	7	29	536	22	5350.232	73.14528	8.282072	4.96916	0.272211	30.06608	0.538176
Dissolved Solids (mg/l)	77	373.013	354.9267	391.0993	364	28722	190	698	334	408	508	74	6349.724	79.68515	9.080966	1.287236	0.273908	4.132384	0.54146
Sulfate (mg/l)	78	48.58974	44.58617	52.59332	46	3790	15	130	40	53	115	13	315.31	17.75697	2.010581	2.007416	0.272211	6.619303	0.538176
TKN (mg/l as N)	23	0.743478	0.567183	0.919774	0.6	17.1	0.3	1.6	0.4	1	1.3	0.6	0.166206	0.407683	0.085008	0.929538	0.481337	-0.35897	0.934764
E. coli (CFU/100ml)	77	1141.364	537.2214	1745.506	200	87885	5	15000	80	700	14995	620	7084893	2661.746	303.3341	3.588491	0.273908	13.6398	0.54146
TOC (mg/l)	22	4.345455	3.318627	5.372282	4.1	95.6	2.1	13.7	3	4.6	11.6	1.6	5.36355	2.315934	0.493759	3.350258	0.490962	13.53989	0.95278
Hardness (mg/l)	79	291.6962	278.4776	304.9148	302	23044	142	412	254	333	270	79	3482.727	59.01463	6.639665	-0.26306	0.270545	-0.02005	0.534952
Chloride (mg/l)	23	26	22.6682	29.3318	26	598	13	42	20	31	29	11	59.36364	7.70478	1.606558	0.324573	0.481337	-0.55184	0.934764
Dissolved Oxygen (mg/l)	61	9.729344	9.210332	10.24836	9.62	593.49	2	13.7	8.43	11.36	11.7	2.93	4.10672	2.026504	0.259467	-0.62237	0.30627	2.183281	0.603837
pH	62	7.906129	7.835212	7.977046	7.945	490.18	7.04	8.51	7.81	8.11	1.47	0.3	0.077981	0.279252	0.035465	-0.96533	0.303902	1.397439	0.599288
Copper (ug/l)	80	6.42375	1.480166	11.36733	2	513.9	2	200	2	5	198	3	493.4818	22.21445	2.483651	8.596891	0.268909	75.63991	0.531786
Iron (ug/l)	23	1100	466.1307	1733.869	330	25300	110	5200	190	1900	5090	1710	2148636	1465.823	305.6452	1.631464	0.481337	1.655257	0.934764
Zinc (ug/l)	26	7.196154	4.442575	9.949733	4.75	187.1	2.25	26	2.25	10	23.75	7.75	46.47598	6.81733	1.336988	1.41681	0.45556	1.056484	0.886509

APPENDIX B

UPPER WHITE RIVER WATERS ASSESSED IN THE CLEAN WATER ACT SECTION 305(B) REPORT 1996 TO 1998

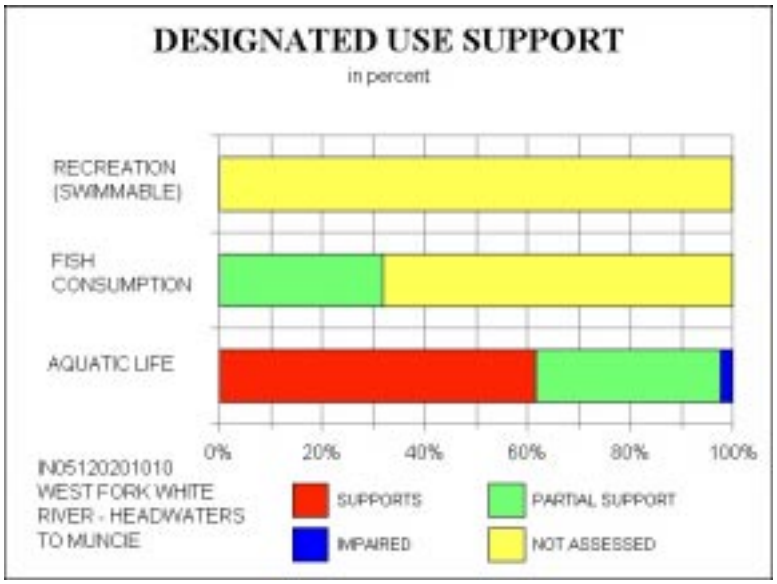
Overall Use Support Status Report
06-04-98

Waterbody ID : **IN05120201010** Segment Number: 00
Waterbody Name: W F WHITE RIVER (HEADWATERS TO MUNCIE)
Waterbody Type: River Size: 163.70 Miles
Basin: WHITE RIVER

Assessment Date: 9804

---------- Use Support ----------

Designated Use	Fully Supp	Threat	Partial Supp	Not Supported	Not Attained	Not Assessed
AQUATIC LIFE SUPPORT	100.90	0.00	58.80	4.00	0.00	0.00
FISH CONSUMPTION	0.00	0.00	52.10	0.00	0.00	111.60
SWIMMABLE	0.00	0.00	0.00	0.00	0.00	163.70



---------- Nonattainment Causes ----------

Cause	Size	Mag
0410-PCBs	52.10	M
0500-METALS	52.10	S
0560-Mercury	52.10	S
0300-PRIORITY ORGANICS	9.00	M

---------- Nonattainment Sources ----------

Source	Size	Mag
9000-SOURCE UNKNOWN	52.10	M

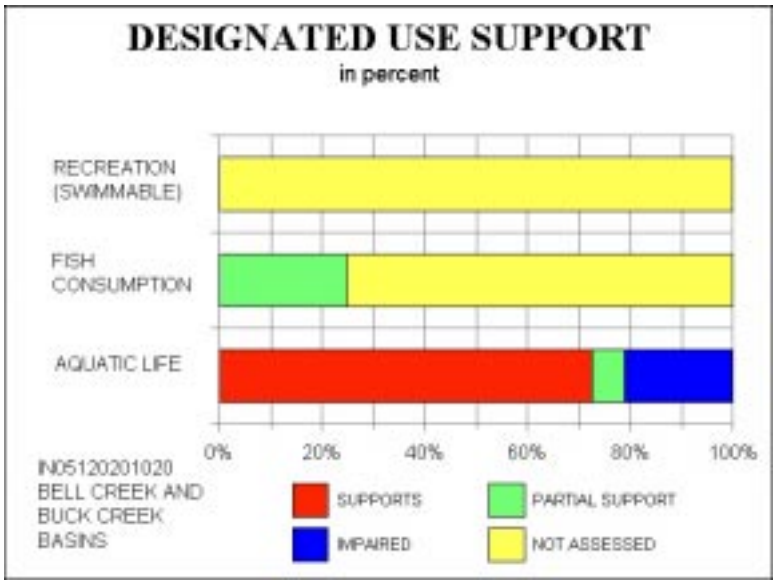
Overall Use Support Status Report
06-04-98

Waterbody ID : **IN05120201020** Segment Number: 00
Waterbody Name: Bell/Buck Creek
Waterbody Type: River Size: 54.90 Miles
Basin: WHITE RIVER

Assessment Date: 9804

---------- Use Support ----------

Designated Use	Fully Supp	Threat	Partial Supp	Not Supported	Not Attained	Not Assessed
AQUATIC LIFE SUPPORT	39.80	0.00	3.60	11.50	0.00	0.00
FISH CONSUMPTION	0.00	0.00	13.70	0.00	0.00	41.20
SWIMMABLE	0.00	0.00	0.00	0.00	0.00	54.90



---------- Nonattainment Causes ----------

Cause	Size	Mag
0300-PRIORITY ORGANICS	13.70	M
0410-PCBs	13.70	M
0000-CAUSE UNKNOWN	15.10	M
0560-Mercury	13.70	M

---------- Nonattainment Sources ----------

Source	Size	Mag
9000-SOURCE UNKNOWN	13.70	M

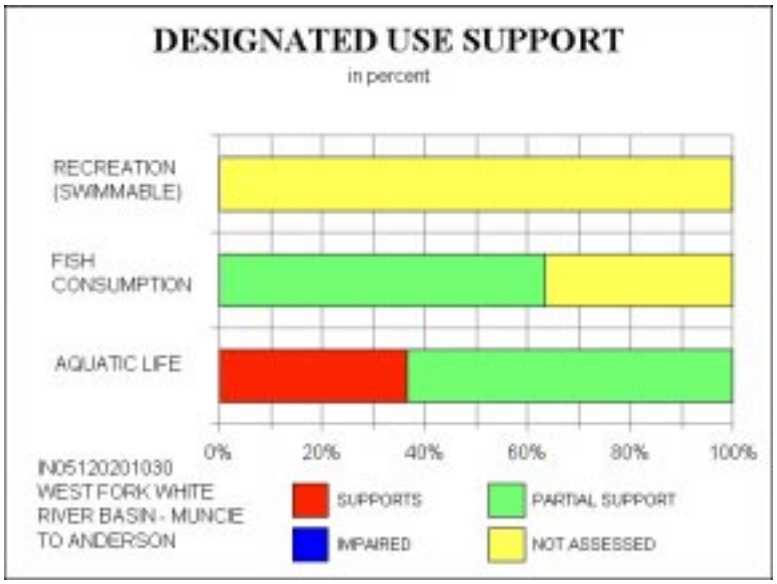
Overall Use Support Status Report
06-04-98

Waterbody ID : **IN05120201030** Segment Number: 00
Waterbody Name: W.F. White River Basin (Muncie to Anderson)
Waterbody Type: River Size: 32.90 Miles
Basin: WHITE RIVER

Assessment Date: 9804

---------- Use Support ----------

Designated Use	Fully Supp	Threat	Partial Supp	Not Supported	Not Attained	Not Assessed
AQUATIC LIFE SUPPORT	12.00	0.00	20.90	0.00	0.00	0.00
FISH CONSUMPTION	0.00	0.00	20.90	0.00	0.00	12.00
SWIMMABLE	0.00	0.00	0.00	0.00	0.00	32.90



---------- Nonattainment Causes ----------

Cause	Size	Mag
0300-PRIORITY ORGANICS	20.90	M
1600-HABITAT ALTER. (non-flow)	20.90	M
0410-PCBs	20.90	M
0560-Mercury	20.90	S

---------- Nonattainment Sources ----------

Source	Size	Mag
9000-SOURCE UNKNOWN	20.90	M

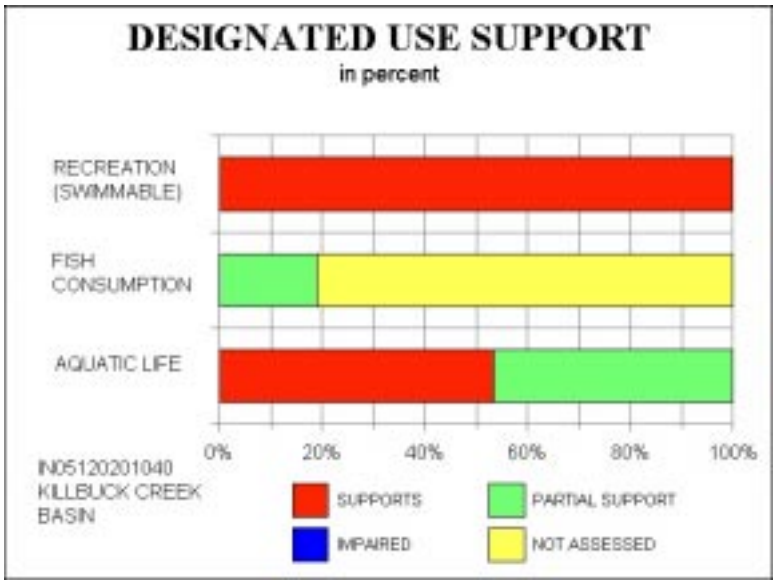
Overall Use Support Status Report
06-04-98

Waterbody ID : **IN05120201040** Segment Number: 00
Waterbody Name: Killbuck Creek Basin
Waterbody Type: River Size: 54.90 Miles
Basin: WHITE RIVER

Assessment Date: 9804

---------- Use Support ----------

Designated Use	Fully Supp	Threat	Partial Supp	Not Supported	Not Attained	Not Assessed
AQUATIC LIFE SUPPORT	29.30	0.00	25.60	0.00	0.00	0.00
SWIMMABLE	54.90	0.00	0.00	0.00	0.00	0.00
FISH CONSUMPTION	0.00	0.00	10.50	0.00	0.00	44.40



---------- Nonattainment Causes ----------

Cause	Size	Mag
0410-PCBs	10.50	M
0560-Mercury	10.50	M

---------- Nonattainment Sources ----------

Source	Size	Mag
9000-SOURCE UNKNOWN	10.50	M

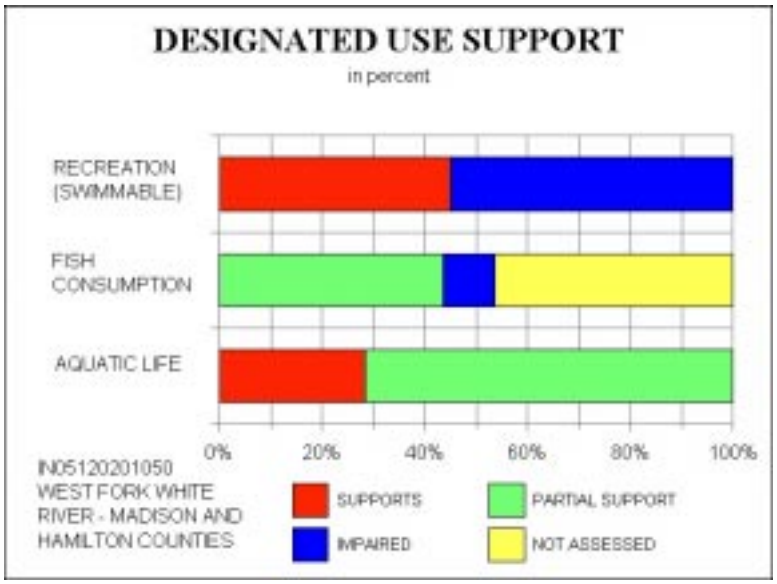
Overall Use Support Status Report
06-04-98

Waterbody ID : **IN05120201050** Segment Number: 00
Waterbody Name: W.F. White River (Madison and Hamilton Counties)
Waterbody Type: River Size: 89.30 Miles
Basin: WHITE RIVER

Assessment Date: 9804

---------- Use Support ----------

Designated Use	Fully Supp	Threat	Partial Supp	Not Supported	Not Attained	Not Assessed
AQUATIC LIFE SUPPORT	25.40	0.00	63.90	0.00	0.00	0.00
FISH CONSUMPTION	0.00	0.00	38.90	8.90	0.00	41.50
SWIMMABLE	40.30	0.00	0.00	49.20	0.00	0.00



---------- Nonattainment Causes ----------

Cause	Size	Mag
0410-PCBs	47.80	M
1600-HABITAT ALTER. (non-flow)	25.00	M
1700-PATHOGENS	49.20	S

---------- Nonattainment Sources ----------

Source	Size	Mag
0110-Major Industrial Point Source	8.90	H
9000-SOURCE UNKNOWN	55.00	S

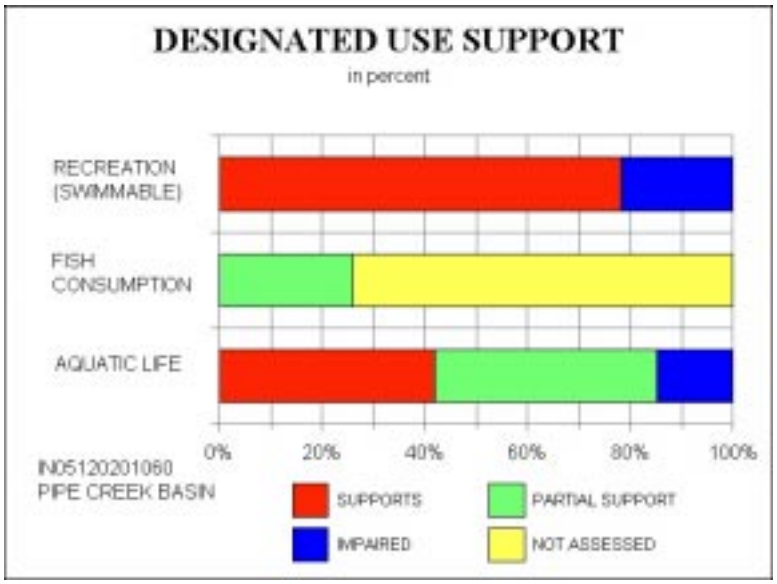
Overall Use Support Status Report
06-04-98

Waterbody ID : **IN05120201060** Segment Number: 00
Waterbody Name: Pipe Creek Basin
Waterbody Type: River Size: 77.00 Miles
Basin: WHITE RIVER

Assessment Date: 9804

---------- Use Support ----------

Designated Use	Fully Supp	Threat	Partial Supp	Not Supported	Not Attained	Not Assessed
AQUATIC LIFE SUPPORT	32.30	0.00	33.40	11.30	0.00	0.00
FISH CONSUMPTION	0.00	0.00	20.00	0.00	0.00	57.00
SWIMMABLE	60.20	0.00	0.00	16.80	0.00	0.00



---------- Nonattainment Causes ----------

Cause	Size	Mag
0410-PCBs	20.00	M
1600-HABITAT ALTER. (non-flow)	33.40	S
1700-PATHOGENS	16.80	S
0500-METALS	20.00	S
0560-Mercury	20.00	S
2400-TOTAL TOXICS	20.00	M

---------- Nonattainment Sources ----------

Source	Size	Mag
9000-SOURCE UNKNOWN	20.00	M

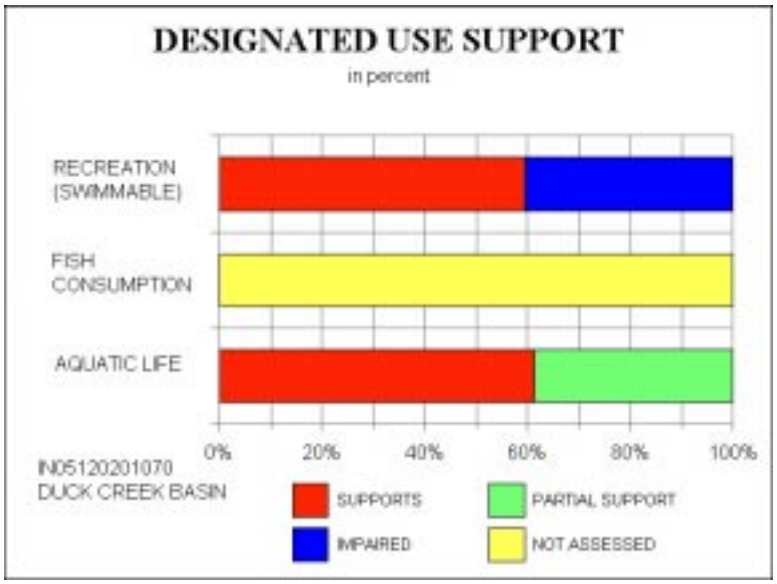
Overall Use Support Status Report
06-04-98

Waterbody ID : **IN05120201070** Segment Number: 00
Waterbody Name: Duck Creek Basin
Waterbody Type: River Size: 62.20 Miles
Basin: WHITE RIVER

Assessment Date: 9804

---------- Use Support ----------

Designated Use	Fully Supp	Threat	Partial Supp	Not Supported	Not Attained	Not Assessed
SWIMMABLE	37.00	0.00	0.00	25.20	0.00	0.00
FISH CONSUMPTION	0.00	0.00	0.00	0.00	0.00	62.20
AQUATIC LIFE SUPPORT	38.20	0.00	24.00	0.00	0.00	0.00



---------- Nonattainment Causes ----------

Cause	Size	Mag
1700-PATHOGENS	25.20	S

---------- Nonattainment Sources ----------

Source	Size	Mag
9000-SOURCE UNKNOWN	25.20	S

Overall Use Support Status Report
06-04-98

Waterbody ID : **IN05120201080** Segment Number: 00
Waterbody Name: Cicero Creek Basin
Waterbody Type: River Size: 177.50 Miles
Basin: WHITE RIVER

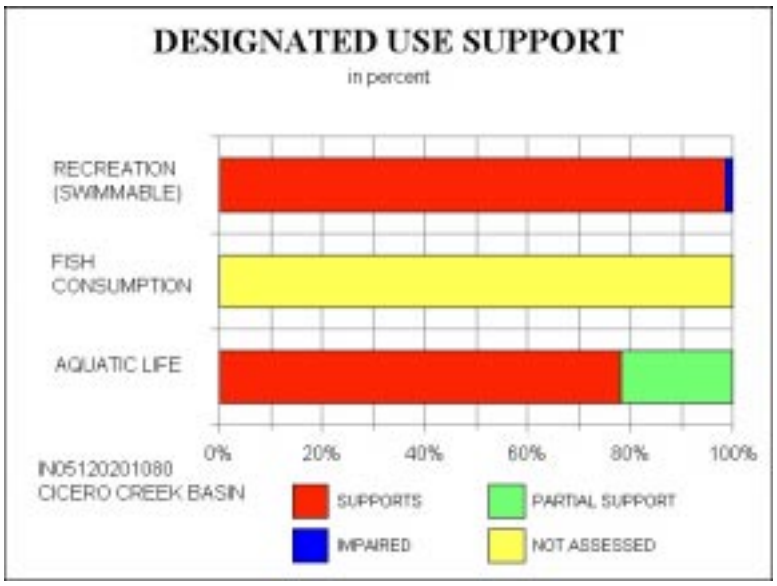
---------- Description of the Waterbody ----------

Does not include Morse Reservoir.

Assessment Date: 9804

---------- Use Support ----------

Designated Use	Fully Supp	Threat	Partial Supp	Not Supported	Not Attained	Not Assessed
AQUATIC LIFE SUPPORT	175.00	0.00	48.70	0.00	0.00	0.00
SWIMMABLE	173.30	0.00	0.00	2.50	0.00	0.00
FISH CONSUMPTION	0.00	0.00	0.00	0.00	0.00	177.50



---------- Nonattainment Causes ----------

Cause	Size	Mag
1700-PATHOGENS	2.50	S

---------- Nonattainment Sources ----------

Source	Size	Mag
9000-SOURCE UNKNOWN	2.50	S

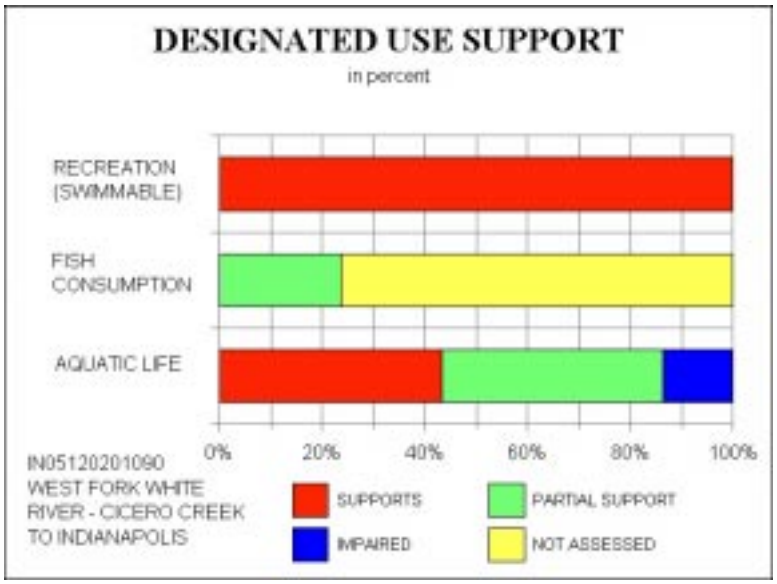
Overall Use Support Status Report
06-04-98

Waterbody ID : **IN05120201090** Segment Number: 00
Waterbody Name: W. F. White River (Cicero Cr to Indianapolis)
Waterbody Type: River Size: 82.30 Miles
Basin: WHITE RIVER

Assessment Date: 9804

---------- Use Support ----------

Designated Use	Fully Supp	Threat	Partial Supp	Not Supported	Not Attained	Not Assessed
AQUATIC LIFE SUPPORT	35.60	0.00	35.40	11.30	0.00	0.00
FISH CONSUMPTION	0.00	0.00	19.46	0.00	0.00	62.80
SWIMMABLE	82.30	0.00	0.00	0.00	0.00	0.00



---------- Nonattainment Causes ----------

Cause	Size	Mag
0410-PCBs	19.50	H
0500-METALS	19.50	S
2400-TOTAL TOXICS	19.50	H

---------- Nonattainment Sources ----------

Source	Size	Mag
9000-SOURCE UNKNOWN	19.50	M

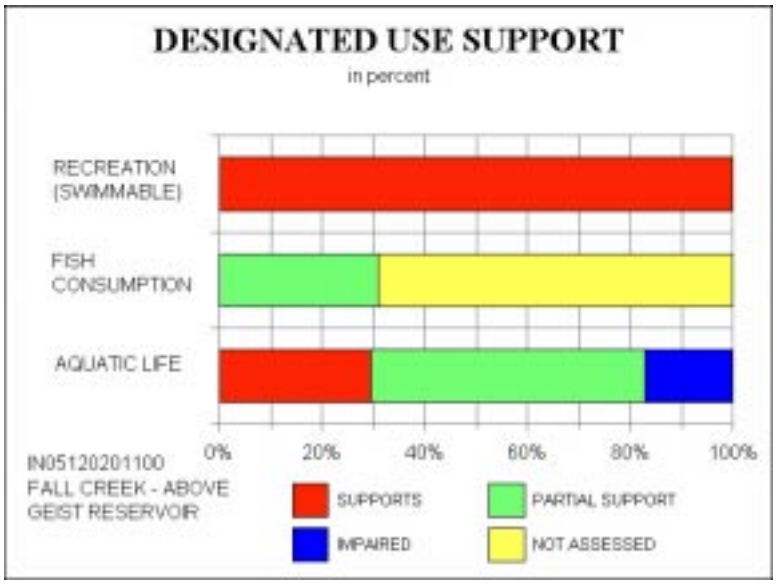
Overall Use Support Status Report
06-04-98

Waterbody ID : **IN05120201100** Segment Number: 00
Waterbody Name: Fall Creek Basin
Waterbody Type: River Size: 99.20 Miles
Basin: WHITE RIVER

Assessment Date: 9804

---------- Use Support ----------

Designated Use	Fully Supp	Threat	Partial Supp	Not Supported	Not Attained	Not Assessed
AQUATIC LIFE SUPPORT	29.30	0.00	52.90	17.00	0.00	0.00
FISH CONSUMPTION	0.00	0.00	30.60	0.00	0.00	68.60
SWIMMABLE	99.20	0.00	0.00	0.00	0.00	0.00



---------- Nonattainment Causes ----------

Cause	Size	Mag
0410-PCBs	30.60	M
0500-METALS	30.60	S
2400-TOTAL TOXICS	30.60	M

---------- Nonattainment Sources ----------

Source	Size	Mag
9000-SOURCE UNKNOWN	30.60	M

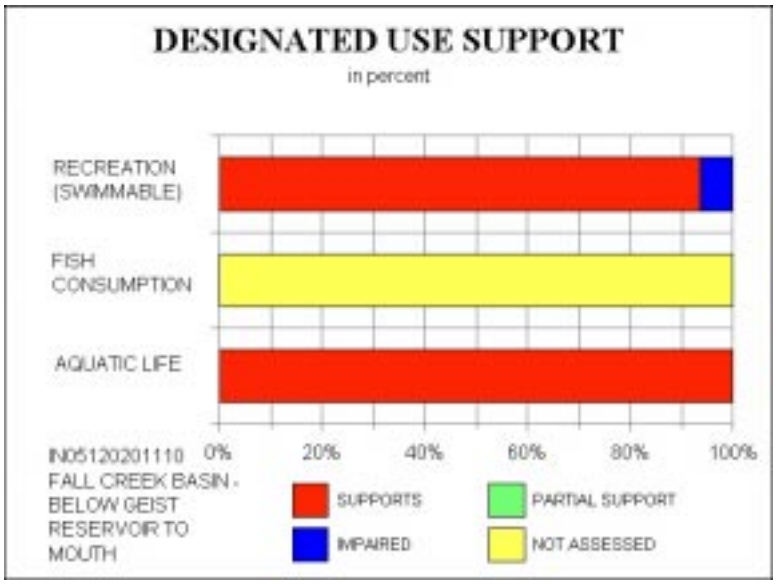
Overall Use Support Status Report
06-04-98

Waterbody ID : **IN05120201110** Segment Number: 00
Waterbody Name: Fall Creek Basin (Geist Reservoir to confl with White River)
Waterbody Type: River Size: 90.90 Miles
Basin: WHITE RIVER

Assessment Date: 9804

---------- Use Support ----------

Designated Use	Fully Supp	Threat	Partial Supp	Not Supported	Not Attained	Not Assessed
AQUATIC LIFE SUPPORT	85.10	5.80	0.00	0.00	0.00	0.00
FISH CONSUMPTION	0.00	0.00	0.00	0.00	0.00	90.90
SWIMMABLE	85.10	0.00	0.00	5.80	0.00	0.00



---------- Nonattainment Causes ----------

Cause	Size	Mag
1700-PATHOGENS	5.80	M

---------- Nonattainment Sources ----------

Source	Size	Mag
0400-COMBINED SEWER OVERFLOW	5.80	M

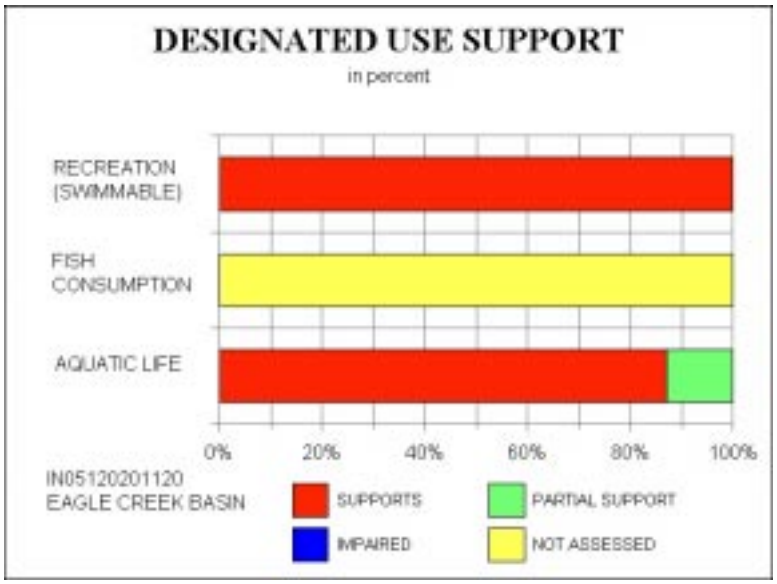
Overall Use Support Status Report
06-04-98

Waterbody ID : **IN05120201120** Segment Number: 00
Waterbody Name: Eagle Creek Basin
Waterbody Type: River Size: 164.20 Miles
Basin: WHITE RIVER

Assessment Date: 9804

---------- Use Support ----------

Designated Use	Fully Supp	Threat	Partial Supp	Not Supported	Not Attained	Not Assessed
AQUATIC LIFE SUPPORT	143.20	0.00	21.00	0.00	0.00	0.00
FISH CONSUMPTION	0.00	0.00	0.00	0.00	0.00	164.20
SWIMMABLE	164.20	0.00	0.00	0.00	0.00	0.00



---------- Nonattainment Causes ----------

Cause	Size	Mag
0000-CAUSE UNKNOWN	21.00	S

---------- Nonattainment Sources ----------

Source	Size	Mag
9000-SOURCE UNKNOWN	21.00	S

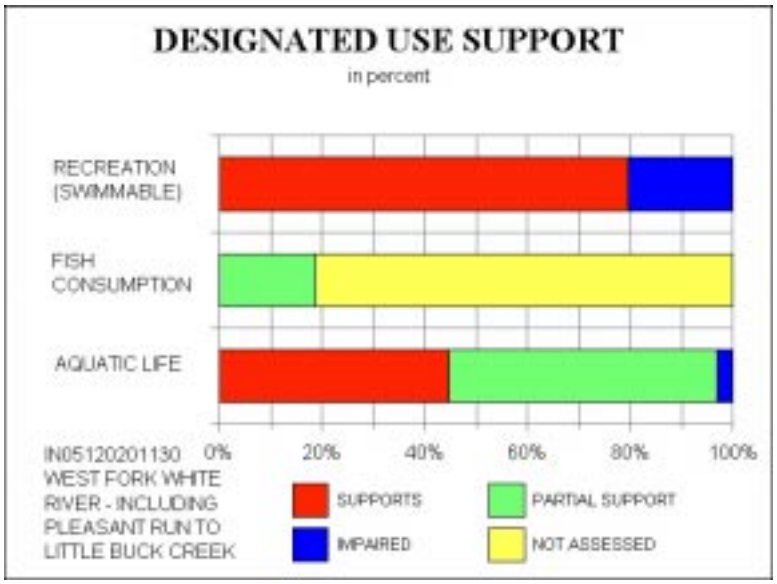
Overall Use Support Status Report
06-04-98

Waterbody ID : **IN05120201130** Segment Number: 00
Waterbody Name: W F WHITE RIVER (INCLUDING PLEASANT RUN TO LITTLE BUCK CR)
Waterbody Type: River Size: 75.20 Miles
Basin: WHITE RIVER

Assessment Date: 9804

---------- Use Support ----------

Designated Use	Fully Supp	Threat	Partial Supp	Not Supported	Not Attained	Not Assessed
AQUATIC LIFE SUPPORT	0.00	33.70	39.20	2.30	0.00	0.00
FISH CONSUMPTION	0.00	0.00	14.10	0.00	0.00	61.10
SWIMMABLE	0.00	59.80	0.00	15.40	0.00	0.00



---------- Nonattainment Causes ----------

Cause	Size	Mag
0410-PCBs	14.10	M
0500-METALS	14.10	M
0560-Mercury	14.10	M
1700-PATHOGENS	15.40	M
2400-TOTAL TOXICS	33.70	T

---------- Nonattainment Sources ----------

Source	Size	Mag
0400-COMBINED SEWER OVERFLOW	15.40	M
0100-INDUSTRIAL POINT SOURCES	33.70	T
0200-MUNICIPAL POINT SOURCES	59.80	T
9000-SOURCE UNKNOWN	14.10	S

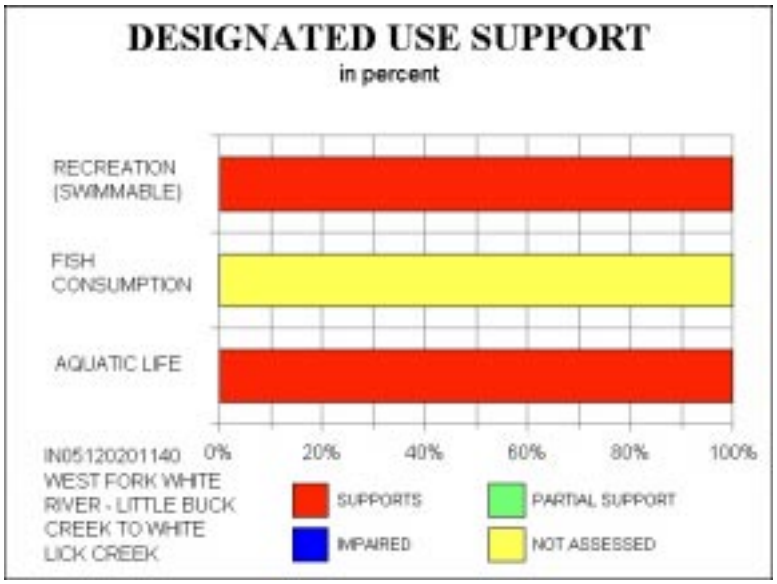
Overall Use Support Status Report
06-04-98

Waterbody ID : **IN05120201140** Segment Number: 00
Waterbody Name: W F White River Basin (Little Buck Cr to white Lick Cr)
Waterbody Type: River Size: 148.80 Miles
Basin: WHITE RIVER

Assessment Date: 9804

---------- Use Support ----------

Designated Use	Fully Supp	Threat	Partial Supp	Not Supported	Not Attained	Not Assessed
AQUATIC LIFE SUPPORT	98.40	49.40	0.00	0.00	0.00	0.00
FISH CONSUMPTION	0.00	0.00	0.00	0.00	0.00	148.80
SWIMMABLE	148.80	0.00	0.00	0.00	0.00	0.00



---------- Nonattainment Causes ----------

Cause	Size	Mag
0410-PCBs	19.60	M
0500-METALS	19.60	M
0560-Mercury	19.60	M
0300-PRIORITY ORGANICS	39.20	M

---------- Nonattainment Sources ----------

Source	Size	Mag
9000-SOURCE UNKNOWN	39.20	M

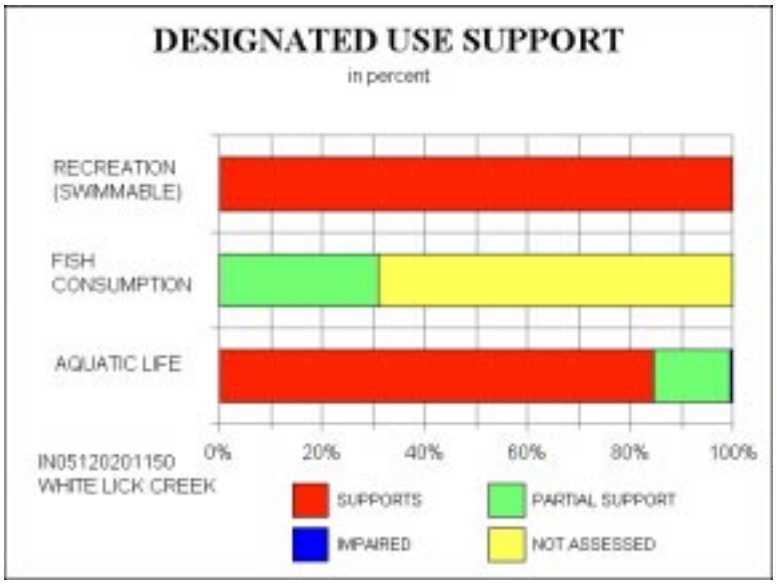
Overall Use Support Status Report
06-04-98

Waterbody ID : **IN05120201150** Segment Number: 00
Waterbody Name: White Lick Creek
Waterbody Type: River Size: 176.10 Miles
Basin: WHITE RIVER

Assessment Date: 9804

---------- Use Support ----------

Designated Use	Fully Supp	Threat	Partial Supp	Not Supported	Not Attained	Not Assessed
AQUATIC LIFE SUPPORT	35.10	114.00	26.00	1.00	0.00	0.00
FISH CONSUMPTION	0.00	0.00	54.50	0.00	0.00	121.60
SWIMMABLE	176.10	0.00	0.00	0.00	0.00	0.00



---------- Nonattainment Causes ----------

Cause	Size	Mag
0410-PCBs	54.50	S
0500-METALS	44.50	S
0560-Mercury	44.50	S
1600-HABITAT ALTER. (non-flow)	114.00	T

---------- Nonattainment Sources ----------

Source	Size	Mag
3000-CONSTRUCTION	114.00	T
3200-Land Development	114.00	T
9000-SOURCE UNKNOWN	54.50	S

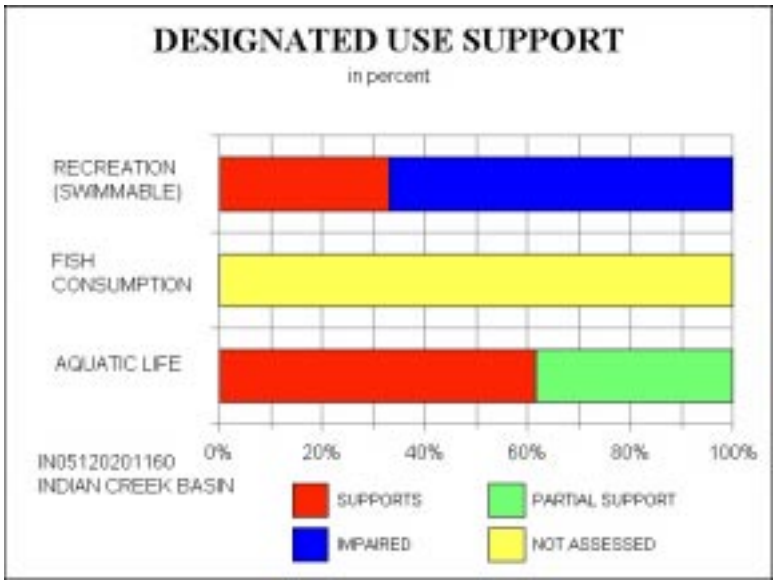
Overall Use Support Status Report
06-04-98

Waterbody ID : **IN05120201160** Segment Number: 00
Waterbody Name: Indian Creek Basin
Waterbody Type: River Size: 52.01 Miles
Basin: WHITE RIVER

Assessment Date: 9804

---------- Use Support ----------

Designated Use	Fully Supp	Threat	Partial Supp	Not Supported	Not Attained	Not Assessed
AQUATIC LIFE SUPPORT	32.00	0.00	20.00	0.00	0.00	0.00
FISH CONSUMPTION	0.00	0.00	0.00	0.00	0.00	52.00
SWIMMABLE	17.20	0.00	0.00	34.80	0.00	0.00



---------- Nonattainment Causes ----------

Cause	Size	Mag
1700-PATHOGENS	34.80	S
1600-HABITAT ALTER. (non-flow)	20.00	S

---------- Nonattainment Sources ----------

Source	Size	Mag
9000-SOURCE UNKNOWN	52.00	S

Overall Use Support Status Report
06-04-98

Waterbody ID : **IN05120201170** Segment Number: 00
Waterbody Name: W.F. White River Basin (White Lick Cr to Bean Blossom)
Waterbody Type: River Size: 109.07 Miles
Basin: WHITE RIVER

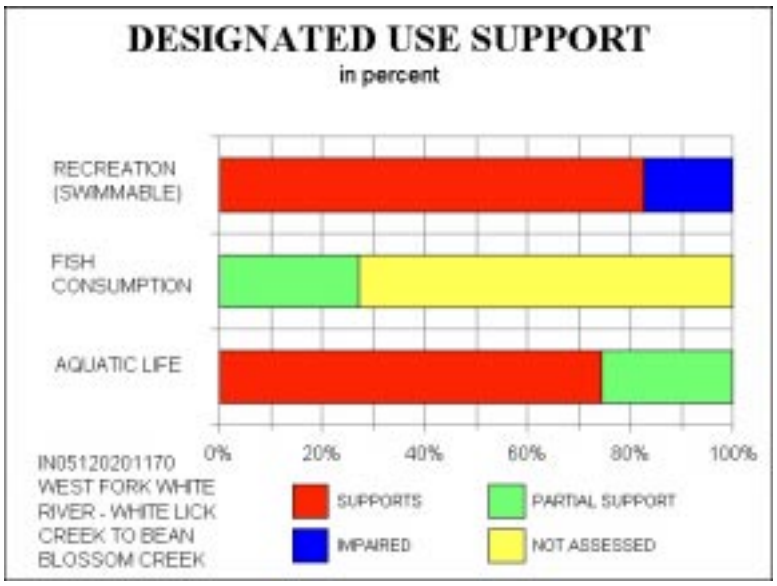
---------- Description of the Waterbody ----------

No description available

Assessment Date: 9804

---------- Use Support ----------

Designated Use	Fully Supp	Threat	Partial Supp	Not Supported	Not Attained	Not Assessed
AQUATIC LIFE SUPPORT	81.20	0.00	27.90	0.00	0.00	0.00
FISH CONSUMPTION	0.00	0.00	26.90	0.00	0.00	72.20
SWIMMABLE	90.20	0.00	0.00	18.90	0.00	0.00



---------- Nonattainment Causes ----------

Cause	Size	Mag
0410-PCBs	26.90	M
0500-METALS	26.90	S
0560-Mercury	26.90	S
1700-PATHOGENS	18.90	S

---------- Nonattainment Sources ----------

Source	Size	Mag
9000-SOURCE UNKNOWN	26.90	S

APPENDIX C

Potential Stakeholders in the Upper White River Watershed

Potential Stakeholders in the Upper White River Watershed

Boone County

Boone County Solid Waste Dist
201 Courthouse Sq
Lebanon, IN
765) 483-0687

Boone County Veterans Svc
Lebanon, IN
(765) 483-4480

Building Inspector
201 E Main St
Lebanon, IN
(765) 482-8845

Center Township Trustee
111 S Meridian St
Lebanon, IN
(765) 482-1550

County Of Boone
1300 E 100 S
Lebanon, IN
(765) 482-0750

County Surveyor
102 Courthouse Sq
Lebanon, IN
(765) 483-4444

Highway Garage
1955 Indianapolis Ave
Lebanon, IN
(765) 482-4550

Honorable J Detamore
112 Courthouse Sq
Lebanon, IN
(765) 482-6502

Honorable O Kincaid
307 Courthouse Sq
Lebanon, IN
(765) 482-0450

Honorable S David
310 Courthouse Sq
Lebanon, IN
(765) 482-0530

Boone Co. SWCD
801 West Pearl Street
Suite C
Lebanon, IN 46052
Ph: 765-482-6355

USDA
Natural Resources Conservation Service
801 West Pearl Street
Suite C
Lebanon, IN 46052
Ph: 765-482-6355

Mayors Office
201 E Main St
Lebanon, IN
(765) 482-1201

Memorial Park Barn
130 E Ulen Dr
Lebanon, IN
(765) 482-8863

Purdue Cooperative Extension
1300 E 100 S
Lebanon, IN
(765) 482-0750

US Consolidated Farm Svc
803 W Pearl St # A
Lebanon, IN
(765) 482-6355

Brown County

Brown County SWCD
121 Locsut Lane
P.O. Box 308
Nashville, IN 47448
Ph:812-988-2211

Brown County Department of Health
P.O. Box 281

Nashville, IN 47448
Ph: 812-988-2255

Delaware County

Delaware Co. SWCD
2904 Granville Avenue
Muncie, IN 47303
Ph: 765-747-5531

Building Commissioner
100 W Main St # 306
Muncie, IN
(765) 747-7799

Building Inspector
300 N High St
Muncie, IN
(765) 747-4862

Center Twp Trustee Office
1200 E Main St
Muncie, IN
(765) 288-8876

Code Enforcement
300 N High St
Muncie, IN
(765) 747-4718

Congressman David Mc Intosh
2900 W Jackson St
Muncie, IN
(765) 747-5566

County Council
100 W Main St # 309
Muncie, IN
(765) 747-7730

Delaware County Board-Health
100 W Main St # 207
Muncie, IN
(765) 747-7721

Delaware County Commissioners
100 W Main St # 309
Muncie, IN
(765) 747-7730

Delaware County Extension
100 W Main St # 202
Muncie, IN
(765) 747-7732

Delaware County Highway Engr
100 W Main St # 310
Muncie, IN
(765) 747-7765

Delaware County Surveyor
100 W Main St # 203
Muncie, IN
(765) 747-7806

Delaware County Zoning Adm
100 W Main St # 306
Muncie, IN
(765) 747-7777

Delaware Highway Garage
7700 E Jackson St
Muncie, IN
(765) 747-7818

Delaware-Muncie Board-Zoning
100 W Main St # 206
Muncie, IN
(765) 747-7740

Health Dept-Nurses Office
100 W Main St # 313
Muncie, IN
(765) 747-7814

Honorable Richard A Dailey
100 W Washington St
Muncie, IN
(765) 747-7784

Honorable Steven R Caldemeyer
100 W Washington St
Muncie, IN
(765) 747-7780

Monroe Township Trustee
2701 E County Road 700 S
Muncie, IN
(765) 282-2177

Muncie Building Commissioner
300 N High St
Muncie, IN
(765) 747-4862

Muncie City Engineer
300 N High St
Muncie, IN
(765) 747-4878

Muncie Community
Development
300 N High St
Muncie, IN
(765) 747-4825

Muncie Mayor
300 N High St
Muncie, IN
(765) 747-4845

USDA
Natural Resources Conservation Service
2904 Granville Avenue
Muncie, IN 47303
Ph: 765-747-5531

Hamilton County

Hamilton Co. SWCD
1108 South 9th Street
Noblesville, IN 46060
Ph: 317-773-432

County Commissioners Asst
1 Hamilton County Sq #
157
Noblesville, IN
(317) 776-9719

County Plan Commission
1 Hamilton County Sq #138
Noblesville, IN
(317) 776-8490

County Surveyor
1 Hamilton County Sq #146
Noblesville, IN
(317) 776-8495

Hamilton County 4-H
2003 Pleasant St
Noblesville, IN
(317) 776-0854

Hamilton County Council
1 Hamilton County Sq
Noblesville, IN
(317) 776-8557

Hamilton County Drainage
Board
1 Hamilton County Sq #
146
Noblesville, IN
(317) 776-9627

USDA
Natural Resources Conservation Service
1108 South 9th Street
Noblesville, IN 46060
Ph: 317-773-2181

Hamilton Co. Health Department
Suite 30
One Hamilton County Square
Noblesville, IN 46060
Ph: 317-776-8500

Noblesville City Hall
16 S 10th St
Noblesville, IN
(317) 776-6324

Noblesville Engineering Dept
16 S 10th St
Noblesville, IN
(317) 776-6325

Noblesville Mayor
16 S 10th St
Noblesville, IN
(317) 776-6324

Noblesville Planning Dept
16 S 10th St
Noblesville, IN
(317) 776-6325

Noblesville Township Trustee
836 Division St
Noblesville, IN
(317) 773-0249

Noblesville Wastewater Utility
197 Washington St
Noblesville, IN
(317) 776-6353

US Consolidated Farm Svc
408 S 9th St

Noblesville, IN
(317) 773-2181

Wayne Twp Trustee
13922 E 206th St
Noblesville, IN
(765) 534-4062

Hancock County

Hancock Co. SWCD
1101 West Main Street
Suite N
Greenfield, IN 46140
Ph:317-462-2283

USDA
Natural Resources Conservation Service
1101 West Main Street
Suite N
Greenfield, IN 46140
Ph:317-462-2283

Hendricks County

Center Township Trustee
115 S Washington St
Danville, IN
(317) 745-2813

Community Action-Indianapolis
247 S Wayne St
Danville, IN
(317) 745-2642

Danville Town Manager
147 W Main St
Danville, IN
(317) 745-3001

Danville Town Office
20 S Jefferson St
Danville, IN
(317) 745-5446

Danville Waste Water Treatment
1000 E Broadway St
Danville, IN
(317) 745-4928

Danville Water Co
147 W Main St
Danville, IN
(317) 745-4180

Hendricks County Bldg Permits
355 S Washington St # 212
Danville, IN
(317) 745-9255

Hendricks County Co-Op Ext
955 E Main St
Danville, IN
(317) 745-9260

Hendricks County Commissioner
355 S Washington St # 204
Danville, IN
(317) 745-9221

Hendricks County Engineer
355 S Washington St # 209
Danville, IN
(317) 745-9236

Hendricks County Highway Ofc
930 E Main St
Danville, IN
(317) 745-9227

Hendricks County Planning Comm
355 S Washington St # 212
Danville, IN
(317) 745-9254

Hendricks County Surveyor
355 S Washington St
Danville, IN
(317) 745-9237

Marion Twp Trustee
21 S State Road 75
Danville, IN
(317) 539-4024

US Consolidated Farm Svc
195 Meadow Dr
Danville, IN
(317) 745-2381

Hendricks County SWCD
195 Meadow Drive,
Suite 2
Danville, IN 46122
Ph: 317-745-2555

James Woody
IDNR Resource Specialist
195 Meadow Drive,
Suite 2
Danville, IN 46122
Ph: 317-745-2555

USDA
Natural Resource Conservation Service
195 Meadow Drive,
Suite 2
Danville, IN 46122
Ph: 317-745-2555

Henry County

Big Blue River Conservancy
1224 1/2 Broad St
New Castle, IN
(765) 529-7254

Building Comm Office
227 N Main St
New Castle, IN
(765) 521-6823

Henry County Co-Op Ext Agents
206 S 12th St
New Castle, IN
(765) 529-5002

Henry County Commissioners
101 S Main St
New Castle, IN
(765) 529-4705

Henry County Farm Svc Agen
146 E County Road 200
N # B
New Castle, IN
(765) 529-2303

Henry County Surveyor
111 S 12th St
New Castle, IN
(765) 529-4802

Henry Planning Commission
107 1/2 S 12th St
New Castle, IN
(765) 529-7408

New Castle Mayor
227 N Main St
New Castle, IN
(765) 529-7605

New Castle Sewage Treatment
10 Midway Dr
New Castle, IN
(765) 521-6836

Prairie Township Trustee
5492 N County Road 100E
New Castle, IN
(765) 836-4249

Henry County SWCD
146 East Co. Rd 200 North
Suite C
New Castle, IN 47362
Ph: 765-529-2303

Brenda Gettinger
IDNR Div. of Soil
146 East Co. Rd 200 North
Suite C
New Castle, IN 47362
Ph: 765-529-2303

USDA
Natural Resources Conservation Service
146 East Co. Rd 200 North
Suite C
New Castle, IN 47362
Ph: 765-529-2303

Johnson County

Franklin Mayor's Office
55 W Madison St
Franklin, IN
(317) 736-3602

Franklin Sewage Collection Ofc
796 State St
Franklin, IN
(317) 736-3641

Franklin Township Trustee
901 N Main St # C
Franklin, IN
(317) 736-7511

Franklin Waste Water
Treatment
796 State St
Franklin, IN
(317) 736-3640

James Farr
IDNR
Agricultural Conservation Specialist
3059 North Morton Street
Franklin, IN 46131
Ph: 317-736-6822

Johnson Cnty Plan Commission
1071 Hospital Rd
Franklin, IN
(317) 736-3723

Johnson County Extension Svc
80 S Jackson St
Franklin, IN
(317) 736-3724

Johnson County Health Dept
1071 Hospital Rd
Franklin, IN
(317) 736-3770

Johnson Co. SWCD
3059 North Morton Street
Franklin, IN 46131
Ph: 317-736-6822

US Consolidated Farm Svc
100 International Dr
Franklin, IN
(317) 736-6822

USDA
Natural Resources Conservation Service
3059 North Morton Street
Franklin, IN 46131
Ph: 317-736-6822

Madison County

Anderson Building Commissioner
120 E 8th St
Anderson, IN
(765) 648-6055

Anderson Business Office
120 E 8th St
Anderson, IN
(765) 648-6187

Anderson City Air Management
120 E 8th St
Anderson, IN
(765) 648-6158

Anderson City Engineering
120 E 8th St
Anderson, IN
(765) 648-6118

Anderson City Mayor
120 E 8th St
Anderson, IN
(765) 648-6000

Anderson Community Dev Dept
120 E 8th St
Anderson, IN
(765) 648-6097

Anderson Planning Dept
120 E 8th St
Anderson, IN
(765) 648-6163

Anderson Sewer Dept
2801 Gene Gustin
Way
Anderson, IN
(765) 648-6562

Anderson Township Trustee Ofc
1423 Central Ave
Anderson, IN
(765) 642-0267

Anderson Water Dept
550 Baxter Rd
Anderson, IN
(765) 648-6420

Anderson Water Pollution Cntrl
2801 Gene Gustin Way
Anderson, IN
(765) 648-6560

City Engineers Office
120 E 8th St

Anderson, IN
(765) 646-9670

Community Development Dept
120 E 8th St
Anderson, IN
(765) 646-9655

Congressman David Mc Intosh
1134 Meridian St
Anderson, IN
(765) 640-2919

E Central Ind Solid Waste Dist
4911 N State Road 9
Anderson, IN
(765) 640-2535

Edgewood Town Hall
3405 Nichol Ave
Anderson, IN
(765) 649-5534

Highway Garage
2830 W 8th St
Anderson, IN
(765) 646-9240

Honorable David Hopper
16 E 9th St
Anderson, IN
(765) 641-9490

Honorable Dennis Carroll
16 E 9th St # 404
Anderson, IN
(765) 641-9622

Honorable Frederick R Spencer
16 E 9th St
Anderson, IN
(765) 641-9436

Honorable Jack L Brinkman
16 E 9th St
Anderson, IN
(765) 641-9627

Honorable Thomas L Clem
16 E 9th St
Anderson, IN
(765) 641-9496

Honorable Thomas Newman Jr
16 E 9th St
Anderson, IN
(765) 641-9632

Lafayette Township Trustee
4817 N 150 W
Anderson, IN
(765) 642-3810

Madison Board Of Zoning Appls
16 E 9th St
Anderson, IN
(765) 641-9541

Madison Cnty Purdue Co-Op Extn
16 E 9th St # 303
Anderson, IN
(765) 641-9514

Madison County Board Of Health
206 E 9th St
Anderson, IN
(765) 641-9523

Madison County Commissioner
16 E 9th St
Anderson, IN
(765) 641-9474

Madison County Council-Govts
16 E 9th St # 100
Anderson, IN
(765) 641-9482

Madison County Drainage Board
206 E 9th St
Anderson, IN
(765) 641-9687

Madison Co. Cooperative Extension Service
16 East 9th Street
Anderson, IN 46016
Ph☹765) 641-9514

Madison Co. SWCD
1917 East University Blvd
Anderson, IN 46012
(765) 644-4249

USDA Natural Resource Cons. Service
1917 East University Blvd
Anderson, IN 46012
(765) 644-4249

Marion County

Eagle Creek Watershed
Matthew Dickey, Coord.
P.O. Box 1290
Indianapolis, IN 46206
Voice: (317)692-7846

Friends Of The White River
P.O Box 90171
Indianapolis, IN 46290
Ph: 317-767-4140

Marion Co. SWCD
6960 South Gray Rd
Suite C
Indianapolis, IN 46237
Ph: 317-780-1765

Marion City-County Council
200 E Washington St
Indianapolis, IN
(317) 327-4242

Marion County
Commissioners
200 E Washington St
Indianapolis, IN
(317) 327-3001

Marion County Health Dept
Dept. of Water Quality & Hazardous
Materials Management
3838 N. Rural Street
Indianapolis, IN 46205
(317) 221-2266

Upper White River Alliance, Inc
5335 N. Tacoma Avenue
Suite 6
Indianapolis, IN 46220

USDA
Natural Resources Conservation Service
6960 South Gray Rd
Suite C
Indianapolis, IN 46237
Ph: 317-780-1765

Advanced Utilities Systems
47 S Meridian St # 410
Indianapolis, IN

Harbour Water Corporation
1220 Waterway Blvd
Indianapolis, IN
(317) 631-1431

Indianapolis Water Corporation
1220 Waterway Blvd
Indianapolis, IN

Governor's Office
200 W Washington St
Indianapolis, IN
(317) 232-4567

Housing & Community Svc
402 W Washington St
Indianapolis, IN
(317) 232-7050

Indiana Senate
200 W Washington St
Indianapolis, IN
(317) 232-9400

Indianapolis Building Auth
200 E Washington St
Indianapolis, IN
(317) 327-4343

Indianapolis Chief's Office
50 N Alabama St # E208
Indianapolis, IN
(317) 327-6041

Indianapolis City Offices
1650 N College Ave
Indianapolis, IN
(317) 931-9598

Indianapolis Code Violations
604 N Sherman Dr
Indianapolis, IN
(317) 327-4163

Indianapolis Historic Preserve
200 E Washington St # 2060
Indianapolis, IN

(317) 327-4406

Zoning Code Compliance
604 N Sherman Dr
Indianapolis, IN
(317) 327-4115

Sierra Club
6140 N. College Avenue
Indianapolis, IN 46220

Monroe County

Monroe Co. SWCD
1931 Liberty Drive
Bloomington, IN 47403
Ph: 812-334-4318

Monroe Co. Health Department
119 West Seventh Street
Bloomington, IN 47404
Ph: 812-349-2542

IDNR Div of Soil
1931 Liberty Drive
Bloomington, IN 47403
Ph: 812-334-4318

USDA
Natural Resource Cons. Service
1931 Liberty Drive
Bloomington, IN 47403
Ph: 812-334-4318

Morgan County

Building Commission
180 S Main St # 204
Martinsville, IN
(765) 342-1060

City Government Engineering
59 S Jefferson St
Martinsville, IN
(765) 342-7800

City Of Martinsville
59 S Jefferson St
Martinsville, IN
(765) 342-2342

County Commissioners
180 S Main St # 112
Martinsville, IN
(765) 342-1007

County Surveyor's Office
180 S Main St
Martinsville, IN
(765) 342-1064

Fish Hatchery
2650 State Road 44
Martinsville, IN
(765) 342-5527

Martinsville Mayor's Office
59 S Jefferson St
Martinsville, IN
(765) 342-2861

Martinsville Sewage Treatment
995 Rogers Rd S
Martinsville, IN
(765) 342-2342

Martinsville Utilities Office
60 S Sycamore St
Martinsville, IN
(765) 342-2449

Martinsville Water & Sewage
410 W Cunningham St
Martinsville, IN
(765) 342-2815

Martinsville Water & Sewage
300 S Mulberry St
Martinsville, IN
(765) 342-2707

Morgan Monroe State Forest
6220 Forest Rd
Martinsville, IN
(765) 342-4026

Purdue Extension
180 S Main St # 229
Martinsville, IN
(765) 342-1010

Township Trustee
159 W Morgan St
Martinsville, IN

(765) 342-6368

US Consolidated Farm Svc Agcy
1328 Morton Ave # 2
Martinsville, IN
(765) 342-5594

Morgan Co. SWCD
1328 Morton Avenue
Suite 2
Martinsville, IN 46151
Ph: 765-342-5594

Morgan Co. Health Department
180 South Main Street
Suite 252
Martinsville, IN 46151
Ph: 765-342-6621

IDNR Div of Soil
1328 Morton Avenue
Suite 2
Martinsville, IN 46151
Ph: 765-342-5594

USDA
Natural Resource Cons. Service
1328 Morton Avenue
Suite 2
Martinsville, IN 46151
Ph: 765-342-5594

Owen County

Owen Co. SWCD
R.R. 5, Box 102
Spencer, IN 47460
Ph: 812-829-2605

Dale Walker
IDNR Div of Soil
R.R. 5, Box 102
Spencer, IN 47460
Ph: 812-829-2605

Randolph County

Randolph Co. SWCD
975 East Washington St.
Suite 2
Winchester, IN 47394
Ph: 765-584-4505

IDNR Div of Soil
975 East Washington St.
Suite 2
Winchester, IN 47394
Ph: 765-584-4505

Health Dept
211 S Main St
Winchester, IN
(765) 584-1155

Highway Garage
1204 S Huntsville Rd
Winchester, IN
(765) 584-2601

Randolph County Area Planning
100 S Main St # 207
Winchester, IN
(765) 584-8610

Randolph County Building Comm
Courthouse # 207
Winchester, IN
(765) 584-0275

Randolph County Community Dev
111 S Main St
Winchester, IN
(765) 584-3266

Randolph County Extension Ofc
1885 S US Highway 27
Winchester, IN
(765) 584-2271

Randolph County Surveyor
100 S Main St # 206
Winchester, IN
(765) 584-0609

US Consolidated Farm Svc
State Rd 32 E
Winchester, IN
(765) 584-4505

Ward Township Trustee Office
2885 E State 28
Winchester, IN
(765) 584-1546

USDA
Natural Resource Cons. Service
975 East Washington St.
Suite 2
Winchester, IN 47394
Ph: 765-584-4505

Tipton County

Cicero Township Trustee
115 N East St
Tipton, IN
(765) 675-4506

County Landfill
229 W 300 S
Tipton, IN
(765) 675-4535

Road Superintendent Garage
405 Market Rd
Tipton, IN
(765) 675-4508

Tipton County Commissioners
101 E Jefferson St
Tipton, IN
(765) 675-7921

Tipton County Extension Office
101 E Jefferson St
Tipton, IN
(765) 675-2694

Tipton County Farm Svc
243 Ash St
Tipton, IN
(765) 675-2316

Tipton County Health Dept
1000 S Main St
Tipton, IN
(765) 675-8741

Tipton County Solid Waste
957 E Jefferson St
Tipton, IN
(765) 675-9006

Tipton County Surveyor
101 E Jefferson St
Tipton, IN
(765) 675-2793

Tipton Water Dept
300 N East St
Tipton, IN
(765) 675-7736

Township Trustee
Fire Barn
Tipton, IN
(765) 675-7088

Waste Water Plant
909 E Jefferson St
Tipton, IN
(765) 675-2234

Tipton Co. SWCD
243 Ash Street
Suite B
Tipton, IN 46072
Ph: 765-675-2316

USDA
Natural Resource Cons. Service
243 Ash Street
Suite B
Tipton, IN 46072
Ph: 765-675-2316

State Upper White Watershed Stakeholders

Indiana Farm Bureau

225 S East St
Indianapolis, IN 46202

Indiana Department of Environmental Management

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

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

Agricultural Liaison	(317) 232-8587
Air Management	(317) 233-0178
Community Relations	(317) 232-8128
Compliance and Technical Assistance	(317) 232-8172
Criminal Investigations	(317) 232-8128
Enforcement	(317) 233-5529
Legal Counsel	(317) 232-8493
Media and Communication Services	(317) 232-8560
Pollution Prevention And Technical Assistance	(317) 232-8172
Solid and Hazardous Waste Management	(317)233-3656
Water Management	(317) 232-8670

Indiana Department of Natural Resources

402 West Washington Street
Indianapolis, IN 46204-2748

IDNR Field Representatives are located in the individual

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

Indiana State Department of Health

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

Federal Upper White Watershed Stakeholders

USDA Natural Resources Conservation Service

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

NRCS Field Representatives are located in the counties.

U.S. EPA Region 5

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

U.S. Army Corps of Engineers

Louisville District
Dr. Martin Luther King Jr. Place
Louisville, KY 40202

APPENDIX D

FUNDING SOURCES

FUNDING SOURCES

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

FEDERAL CONSERVATION AND WATERSHED PROGRAMS

Environmental Protection Agency

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

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

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

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

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

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

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

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

U.S. Fish & Wildlife Service

Partners for Wildlife: assistance for habitat restoration.

STATE CONSERVATION AND WATERSHED PROGRAMS

IDNR Division of Soil Conservation

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

IDNR Division of Fish & Wildlife

Classified Wildlife Habitat Program: Incentive program to foster private wildlife habitat management through tax reduction and technical assistance. Landowners need 15 or more acres of habitat to be eligible. IDNR provides management plans and assistance through District Wildlife Managers. See county listings.

Wildlife Habitat Cost-share Program: Similar to above.

IDNR Division of Forestry

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

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

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

IDNR Division of Reclamation

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

IDNR Division of Nature Preserves

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

IDEM Office of Water Quality

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

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

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

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

PRIVATE FUNDING SOURCES

National Fish and Wildlife Foundation

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

Individual Utilities

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

Indiana Hardwood Lumbermen's Association

Indiana Tree Farm Program

The Nature Conservancy

Land acquisition and restoration.

Southern Lake Michigan Conservation Initiative
Blue River Focus Area
Fish Creek Focus Area
Natural Areas Registry
Hoosier Landscapes Capitol Campaign

Conservation Technology Information Center (CTIC)

'Know Your Watershed' educational materials are available

Indiana Heritage Trust

Land acquisition programs

Ducks Unlimited

Land acquisition and habitat restoration assistance

Quail Unlimited

Pheasants Forever

Sycamore Land Trust

Acres Inc.

Land trust

Oxbow, Inc.

Land trust

SOURCES OF ADDITIONAL FUNDING OPPORTUNITIES

Catalog of Federal Funding Sources for Watershed Protection
EPA Office of Water (EPA841-B-97-008) September 1997

GrantsWeb: http://www.sra international.org/cws/sra/resource.htm

Attachment 1
U.S. Geological Survey
National Water-Quality Assessment Program

Congress appropriated funds in 1986 for the U.S. Geological Survey (USGS) to begin a pilot program in seven project areas to develop and refine the National Water-Quality Assessment (NAWQA) Program. In 1991, the USGS began full implementation of the program. The NAWQA Program builds upon an existing base of water-quality studies of the USGS, as well as those of other Federal, State, and local agencies. The objectives of the NAWQA Program are to:

- Describe current water-quality conditions for a large part of the Nation's freshwater streams, rivers, and aquifers.
- Describe how water quality is changing over time.
- Improve understanding of the primary natural and human factors that affect water-quality conditions.

This information will help support the development and evaluation of management, regulatory, and monitoring decisions by other Federal, State, and local agencies to protect, use, and enhance water resources (Hirsch, 1997).

The NAWQA Program is assessing the water-quality conditions of more than 50 of the Nation's largest river basins and aquifers, known as Study Units. Collectively, these Study Units cover about one-half of the United States and include sources of drinking water used by about 70 percent of the U.S. population. Comprehensive assessments of about one-third of the Study Units are ongoing at a given time. Each Study Unit is scheduled to be revisited every decade to evaluate changes in water-quality conditions. NAWQA assessments rely heavily on existing information collected by the USGS and many other agencies as well as the use of nationally consistent study designs and methods of sampling and analysis. Such consistency simultaneously provides information about the status and trends in water quality conditions in a particular stream or aquifer and, more importantly, provides the basis to make comparisons among watersheds and improve our understanding of the factors that affect water-quality conditions regionally and nationally (Hirsch, 1998).

The White River Basin in Indiana was among the first 20 river basins to be studied as part of the NAWQA Program between 1992 and 1996. The USGS has published several reports and fact sheets, which address chemical, biological, and human factors within the watershed. The following is a partial listing of information available from the USGS NAWQA studies.

- Circular 1150, Water Quality in the White River Basin, Indiana, 1992-96.
- Report 94-4024, Water-Quality Assessment of the White River Basin, Indiana: Analysis of Available Information on Pesticides, 1972-92.
- Report 96-4192, Water-Quality Assessment of the White River Basin, Indiana: Analysis of Selected Information on Nutrients, 1980-92.
- Report 96-653A, Fish Communities and Habitat Data at Selected Sites in the White River Basin, Indiana, 1993-95.
- Report 97-4260, Environmental Setting and Natural Factors and Human Influences Affecting Water Quality in the White River Basin, Indiana.
- Fact Sheet 110-96, Occurrence of Nitrate in Ground Water in the White River Basin, Indiana, 1994-95.
- Fact Sheet 96-4232, Fishes of the White River Basin, Indiana.

- Fact Sheet 058-97, Trends in Acetochlor Concentrations in the Surface Waters of the White River Basin, Indiana, 1994-96.
- Fact Sheet 119-96, Influence of Natural and Human Factors on Pesticide Concentrations in Surface Waters of the White River Basin, Indiana.
- Fact Sheet 233-95, Occurrence of Pesticides in the White River, Indiana, 1991-95.
- Fact Sheet 209-96, Assessment of Water Quality at Selected Sites in the White River Basin, Indiana, 1993 and 1995 Using Biological Indices.
- Fact Sheet 124-96, Radon in the Fluvial Aquifers of the White River Basin, Indiana, 1995.
- Fact Sheet 138-96, Occurrence of Volatile Organic Compounds in Ground Water in the White River Basin, Indiana, 1994-95.
- Fact Sheet 084-96, Occurrence of Pesticides in Ground Water in the White River Basin, Indiana, 1994-95.

For additional information on the NAQWA Program, contact:
Project Chief
White River Basin Study
U.S. Geological Survey
5957 Lakeside Boulevard
Indianapolis, IN 46278-1996
317-290-3333
or visit, http://in.water.usgs.gov/

References

Hirsch, R.M. *in* Fenelon, J.M., 1998, Water quality in the White River basin, Indiana, 1992-96: U.S. Geological Survey Circular 1150, 1p.

Hirsch, R.M. *in* Baker, N.T. and Frey, J.W., 1997, Fish community and habitat data at selected sites in the White River basin, Indiana, 1993-95: U.S. Geological Survey Open File Report 96-653A, Forward.

Attachment 2
Comments

MARION COUNTY
HEALTH DEPARTMENT
making a difference

1 12 PM '01

January 23, 2001

Ms. Susan McLoud
NRCS Water Quality Liaison
IDEM
OWM-Planning Branch
100 N. Senate Avenue
PO Box 6015, Room 1255
Indianapolis, IN 46206-6015

Re: Upper White River WRAS Comments

Dear Susan,

The Marion County Health Department appreciates the opportunity to make comments on the WRAS (IDEM, July 2000).

4.1.2 - Other Monitoring Efforts

MCHD/WQHMM has monitoring data, which should be included in the WRAS. This data is available on the MCHD website www.mchd.com, click on "Marion County Watershed Sampling". Many of the sampling points are selected with input from other stakeholders (Eagle Creek Watershed Task Force, Friends of White River, USGS, IDEM) so that work is coordinated and meets the needs of multiple stakeholder groups. MCHD's stream sampling records from 1992 are attached.

Appendix B

MCHD is concerned about the lack of data regarding fish consumption advisories. More State resources need to be dedicated to collect data to properly assess this public health issue. Once this data is collected, the public must be educated so they can make informed decisions about eating the fish caught in Indiana watersheds. To date, state resources to collect data and to educate the public does not meet the publics needs. For the purposes of this document more data about fish tissue provides more information about stream water quality.

3838 NORTH RURAL STREET
INDIANAPOLIS, INDIANA 46205
TELEPHONE (317) 221-2000

Appendix C - MCHD contact information correction:

Marion County Health Department
Department of Water Quality & Hazardous Materials Management
3838 N. Rural Street
Indianapolis, Indiana 46205
(317) 221-2266

PART II - Page 4

Paragraph 1

Marion County experiences similar problems described in Hamilton County in locating an adequate perimeter drain outlet.

Paragraph 3

MCHD currently does not require 3 acre lots for septic systems. This is a zoning (versus health code) requirement, subject to granting of variances. The city may ask the developer to incorporate scattered homes with septic systems when designing sewers. However, developers generally charge homeowners for connection. The homeowner fees are a percentage of the construction costs and are monitored by the city under a program known as the "15 year sewer". Many homeowners do not connect due to these costs. MCHD will require connection to a public sewer when their septic system fails.

Note: In Marion County, 17,000 to 20,000 homes still use septic systems. Failure rates for these systems are high and expected to increase as these 20-40 year old systems continue to age. The traditional method to extend sewers into Marion County's densely populated neighborhoods is to use the Barrett Law process. Assessment costs to homeowners using this process have ranged from $8,000 to $15,000 per "buildable lot". The majority of homeowners strongly object to these costs and 25% of homeowner's default on their mortgages in Barrret Law neighborhoods. This process places local officials in an increasingly unpopular position. While understanding the public health importance of extending public sewers, the decision-makers must face the wrath of homeowners who are literally "fighting for their home".

An improved way to finance public sewer connection is needed.

Page 5, Paragraph 1

MCHD agrees the enforcement of Rule V for all practical purposes does not exist. The state does not have adequate staff to approve plans, monitor work in progress or take enforcement actions. For example, a Marion County developer had approximately 100 deficiencies of Rule V noted during inspections conducted between 11-25-97 to 3-29-00. The fees assessed by IDEM were $18,500. Enforcement at this level equates to no enforcement. In addition to more staff, local and state officials need to move closer towards a "zero tolerance" policy on soil erosion control. Developers have been educated on the requirements, they choose not to comply and our water quality suffers.

Page 12 – 4.3

Strategy – "financial assistance" there is no real assistance available, what are you referring to?
MCHD believes state legislators need to be involved in the solutions such as tax credits for septic system repairs or public sewer connection. State appropriations for low/no interest loans to reduce financial burdens to homeowners and small businesses is needed to correct this identified public health risk.

Page 13 – 4.5

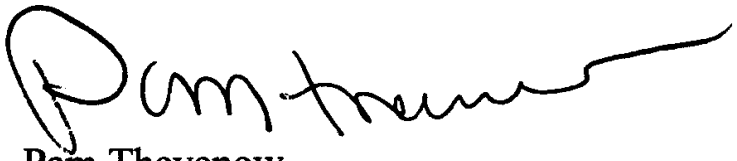
MCHD believes the public is not aware of the fish consumption advisories. An increased effort to educate the public about healthy choices is needed. An occasional newspaper article is not enough. State resources are needed to improve assessments, post advisory signs at known fishing spots, ensure information is available at W.I.C. sites, licensing facilities, public libraries, etc..

4.6 - MCHD agrees tackling NPS pollution is difficult, except in the Rule V enforcement. The state should conduct an annual assessment of compliance with Rule V by inspecting a representative sample of active sites throughout the state. Perhaps IDEM could partner with IDNR, SWCD, IDNR and local health departments to conduct these annual assessments. Such a report would easily reveal developers committed to soil erosion prevention.

Table 2-2 – include the scale. I assumed 1= good - 5= poor

Again, I appreciate the opportunity to comment on this important document. Please feel free to contact me if you have any questions at (317) 221-2266 or ptheveno@hhcorp.org.

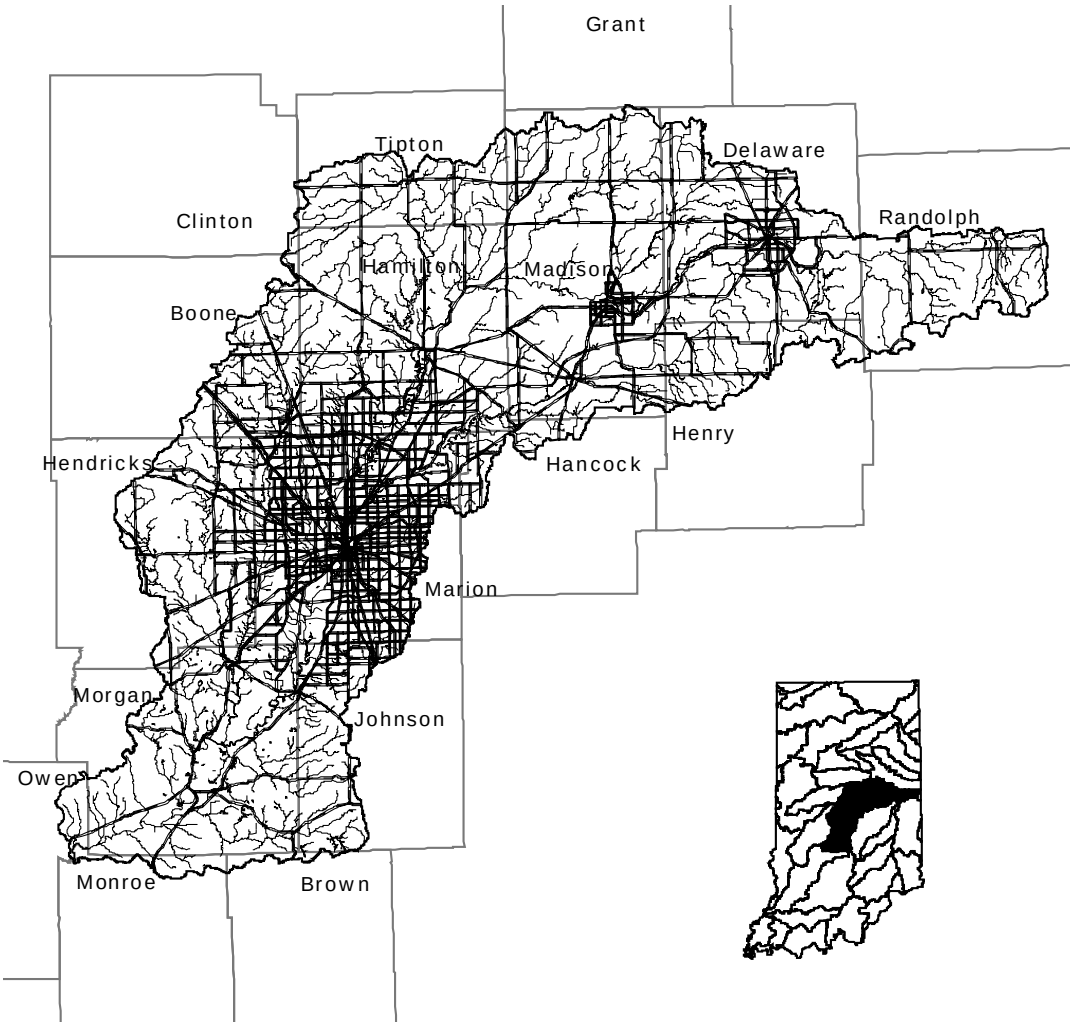
Sincerely,



Pam Thevenow
Administrator
Department of Water Quality & Hazardous Materials Management

Pt:vp

FIGURE 2-1
UPPER WHITE RIVER WATERSHED



Streams
Highways
Watershed Boundary
County Boundary

10 0 10 20 Miles

N
W E
S

Office of Water Management
Prepared By: Jennifer Krol
Data Management Section
Date Prepared: 01/13/00

FIGURE 2-2
14-DIGIT HYDROLOGIC
UNIT CODE WATERSHEDS
UPPER WHITE RIVER WATERSHED

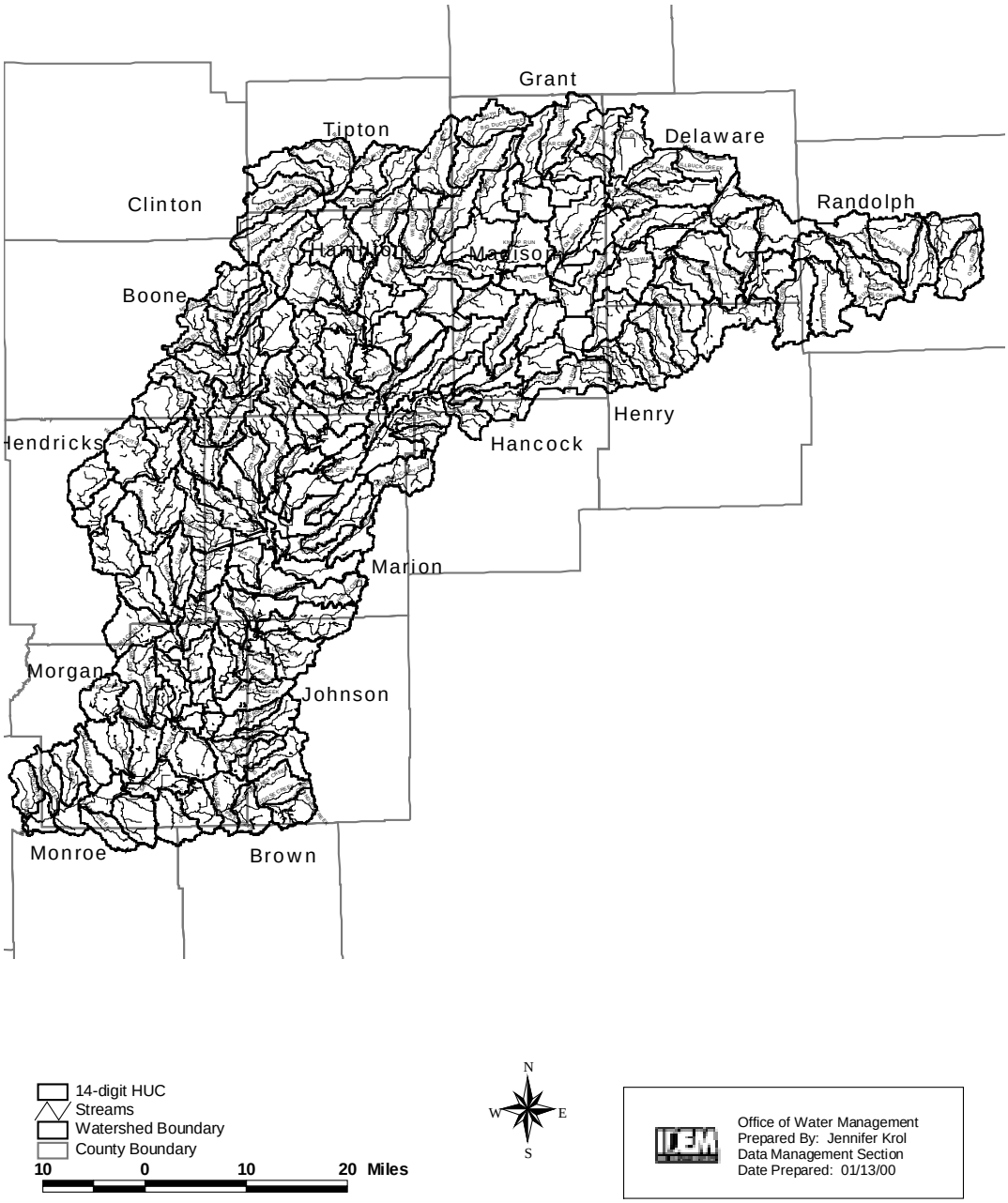


FIGURE 3-1
NPDES DISCHARGES
UPPER WHITE RIVER WATERSHED

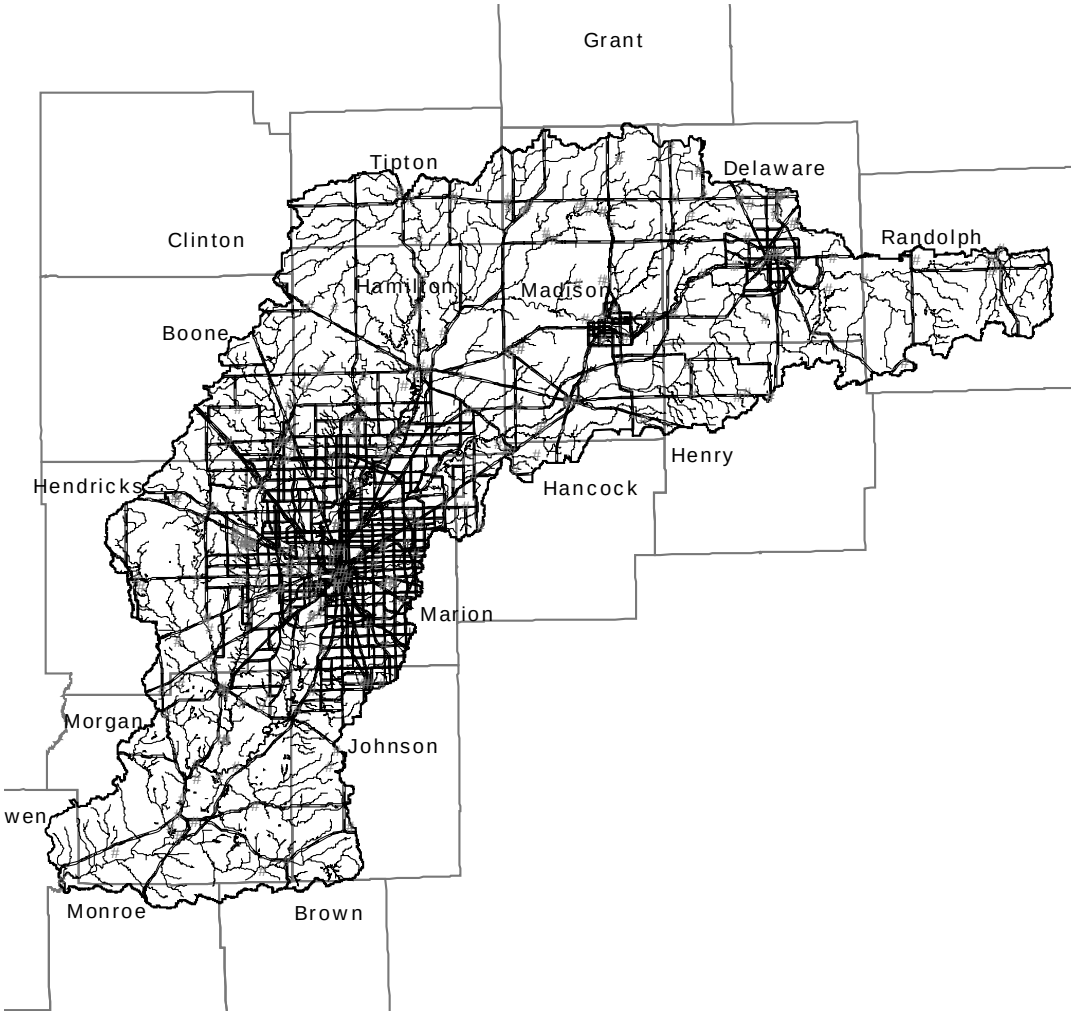


FIGURE 2-4
VEGETATIVE LAND COVER
UPPER WHITE RIVER WATERSHED

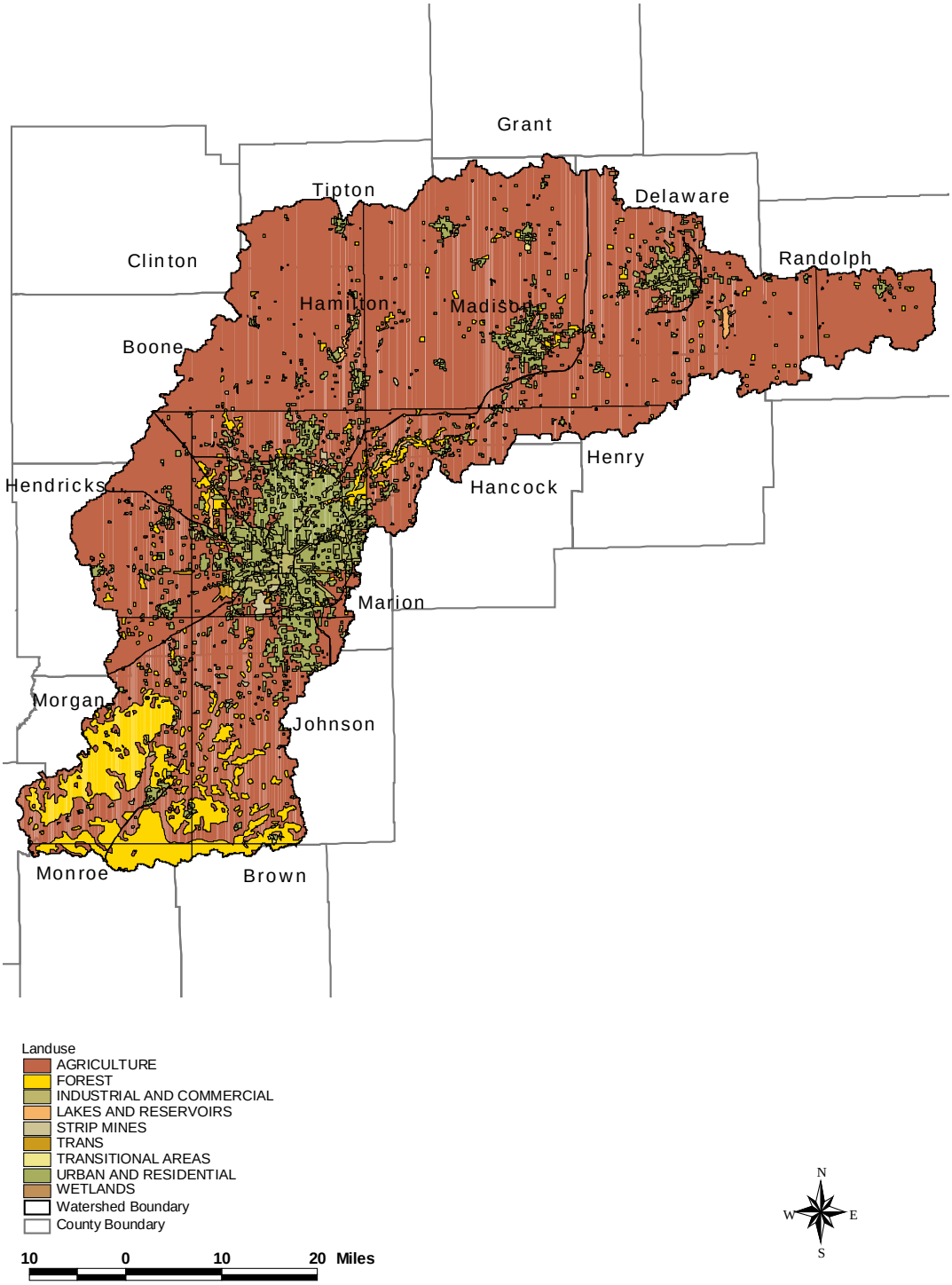


FIGURE 3-1
CLEAN WATER ACT
SECTION 303(d) LISTED STREAMS
UPPER WHITE RIVER WATERSHED

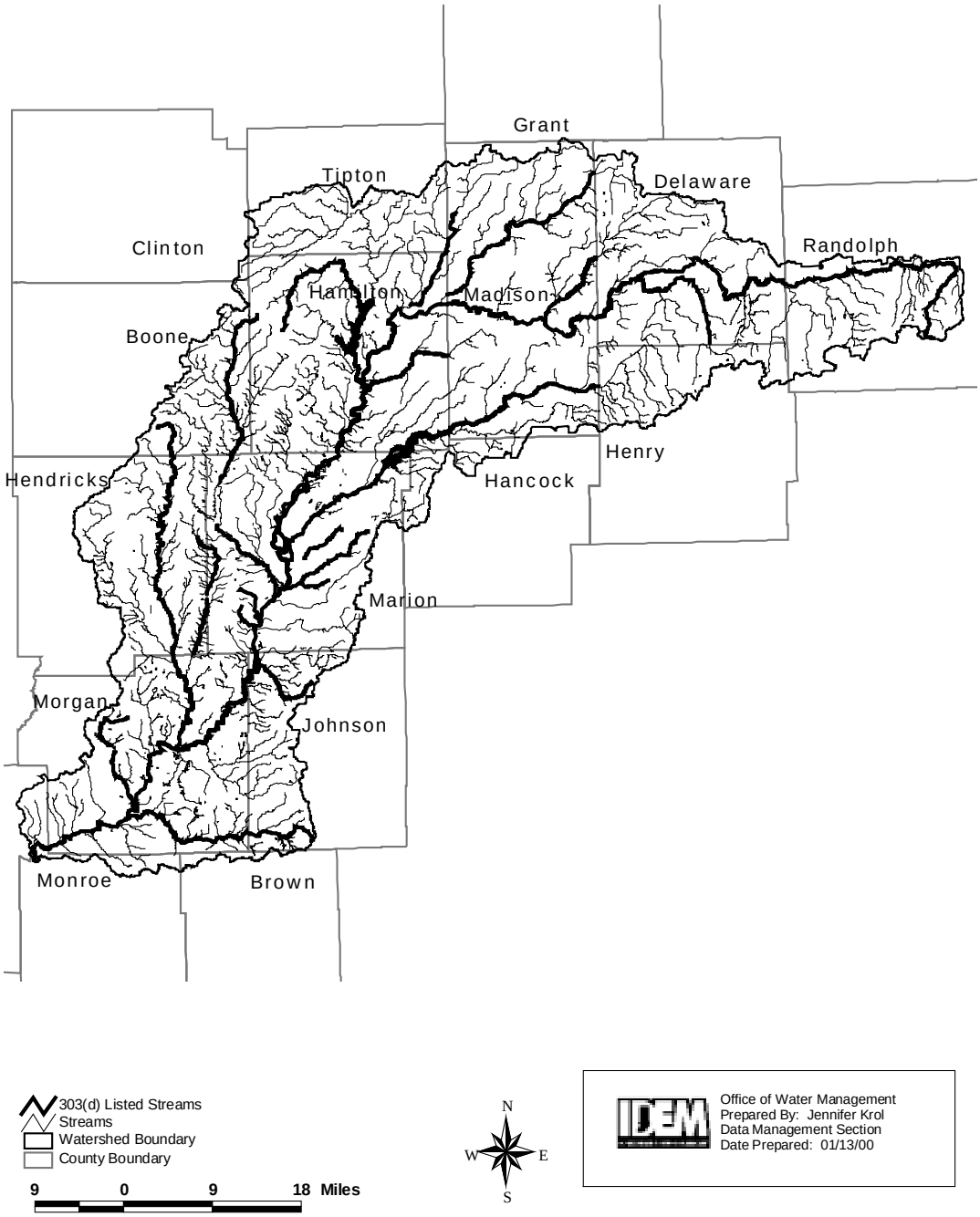
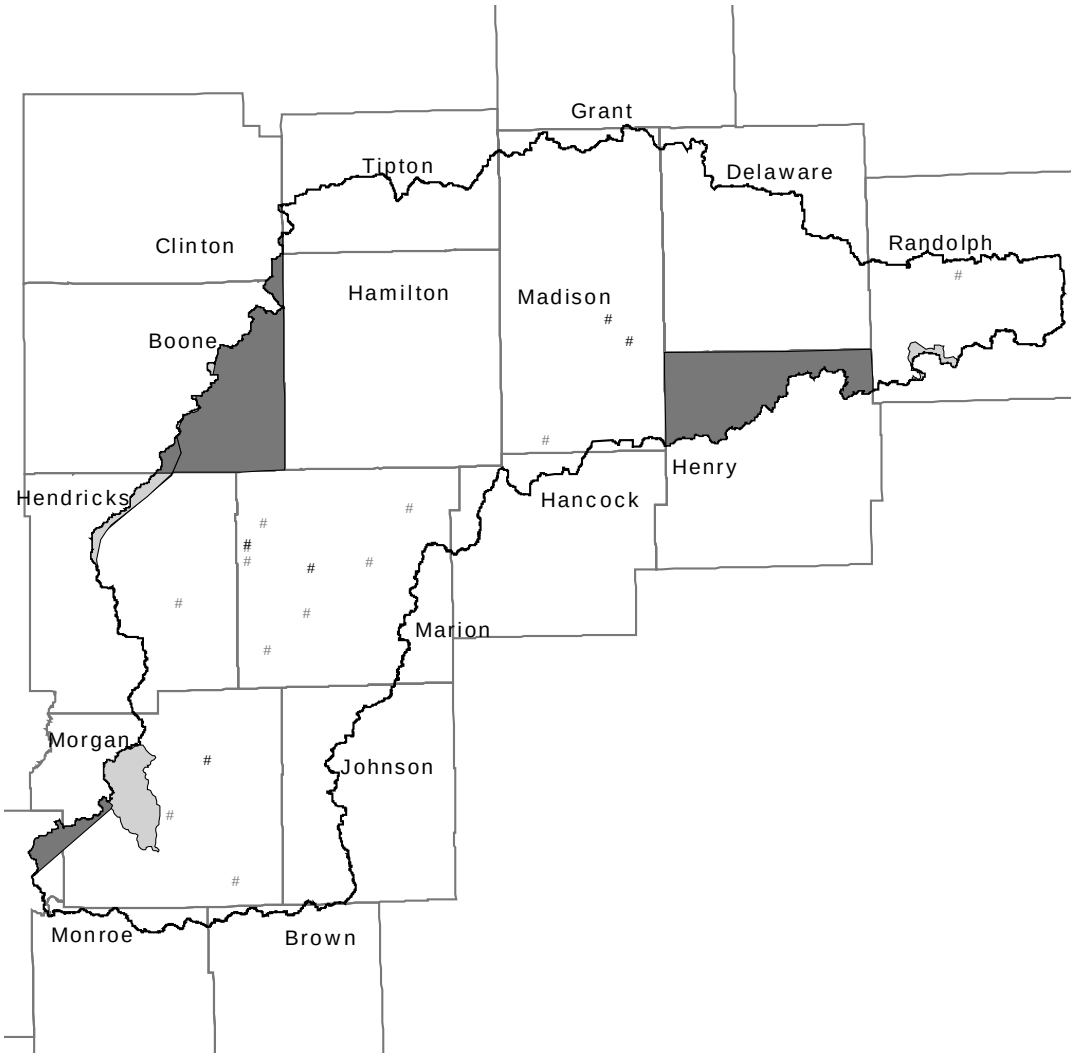


FIGURE 5-1
LARE, S319, EQIP 97 & 98 AREA
UPPER WHITE RIVER WATERSHED



Environmental Quality Incentive Program 98
Environmental Quality Incentive Program 97
Lake and River Enhancement Program
CWA Section 319 Grants Program
Watershed Boundary
County Boundary

10 0 10 20 Miles

Office of Water Management
Prepared By: Jennifer Krol
Data Management Section
Date Prepared: 01/13/00