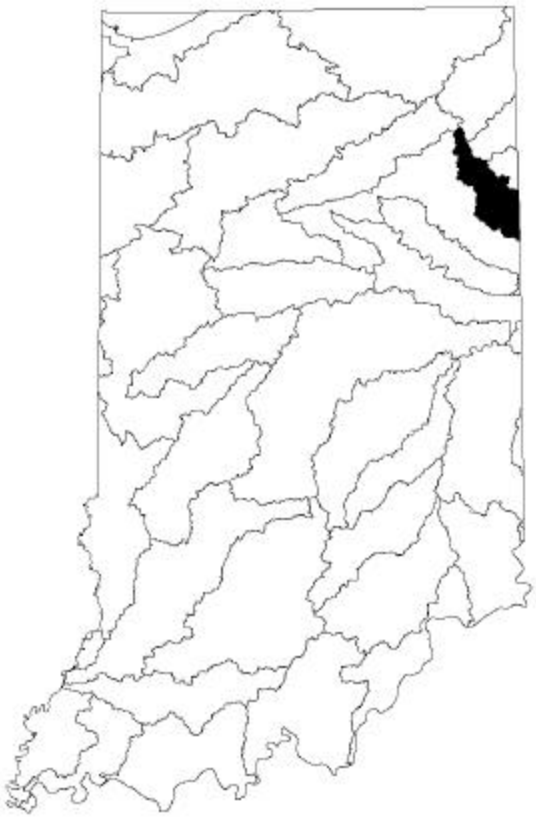
St. Marys River Watershed Restoration Action Strategy

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 (March 2000) was reviewed by stakeholders and revised accordingly. This Third Draft (January 2000) is intended to be a living document to assist restoration and protection efforts of stakeholders in their sub-watersheds. As a "living document" information contained within the WRAS will need to be revised and updated periodically.

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

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EXECUTIVE SUMMARY

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

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

Finally, this Strategy is intended to be a fluid, living document in order to respond to the temporally dynamic quality of our environment. Therefore, this Strategy will require revision when new or different information becomes available. The WRAS for the St. Marys River Watershed that follows describes the Indiana portion of the watershed. Where available, information for the entire watershed is being included.

Overview of the St. Marys River Watershed

The St. Marys River Watershed is located in northeastern Indiana and covers an area of 814 square miles. The St. Marys River originates in New Bremen, Ohio flowing to the Northwest through Auglaize, Mercer, Shelby and Van Wert counties in Ohio. The St. Marys River flows into Indiana through Adams County southwest of Pleasant Mills, near the Indiana State Line and Highway 33. The St. Marys River continues to the northwest flowing through Wells County into Allen County. It joins the St. Joseph River in Fort Wayne to form the Maumee River, which flows northeast and empties into Lake Erie.

The land cover in the watershed is predominantly agriculture, representing approximately 84% of the total land cover. Corn and soybeans comprise the majority of crops produced in the St. Marys River Watershed. Additional land uses include urban areas, wetlands, and wooded areas.

Decatur, Berne, and Fort Wayne are the three major urban areas within the watershed. Decatur is located wholly within the watershed. Berne and Fort Wayne are located within more than one watershed.

Current Status of Water Quality in the St. Marys River Watershed

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. The Clean Water Act Section 303(d) list for Indiana provides a basis of understanding the current status of water quality in the St. Marys River Watershed. The following St. Marys River Watershed waterbodies are on Indiana's 1998 Clean Water Act Section 303(d) list submitted to and approved by EPA:

- **Blue Creek** for dissolved oxygen violations
- **St. Marys River** for Fish Consumption Advisory (PCB, and Mercury)

In addition, various local, state, and federal stakeholders have expressed concern over land use practices that may be impacting water quality.

Water Quality Goal

The overall water quality goal for the St. Marys River Watershed is that all waterbodies meet the applicable water quality standards for their designated uses.

St. Marys River Watershed Restoration Action Strategy Part I: Characterization and Responsibilities

1 Introduction and Purpose of this Document

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 St. Marys 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 St. Marys 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 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 St. Marys River Watershed.

Chapter 2: General Watershed Description- some of the specific topics covered in this chapter includes:

- an overview of the watershed
- hydrology of the watershed
- a summary of land use within the watershed
- natural resources in the watershed
- population statistics
- major water uses in the watershed
- water quality classifications and standards.

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

Chapter 4: Water Quality and Use Support Ratings - This Chapter describes the various types of water quality monitoring conducted by IDEM, summarizes water quality in the watershed based on Office of Water 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. IDEMs TMDL Strategy will also be discussed.

1.2 Stakeholder Groups in the Watershed

The St. Mary's Watershed contains several stakeholder groups that have different missions (Appendix D). The following discussions briefly describe some of the watershed groups.

Adams County Soil and Water Conservation District

The Adams County Soil and Water Conservation District conducted locally led activities that resulted in the Stakeholders developing the following priorities:

1) Adams County has a large number of livestock; the disposal or proper use of animal waste is a concern.
2) The topography and soils of the county are concerns in regards to flooding.
3) Concerns also exist on soil loss and movement due to erosion.

Adams County Planning Commission

The Adams County Planning Commission has been involved in the concern over Intensive Livestock Operations. In 1976, modified in 1997-98, they developed an ordinance that requires certain producers to apply for a county livestock permit. Many areas of the ordinance are more specific than corresponding State rules and legislation.

Wells County Soil and Water Conservation District

The Wells County Soil and Water Conservation District, through locally led meetings and a new process called Vision 2004. Developed the following prioritization of concerns:

1) The need to improve the drainage system in the county.
2) The development and construction in wooded areas.
3) Concern of runoff from sediment and chemical use.
4) Environmental ethics.
5) Pollution.
6) Good source of water
7) Different levels of control
8) Land use.
9) Pasture and grazing in waterways.
10) Air pollution.

Maumee River Basin Commission

Maumee River Basin Commission (MRBC) emerged in 1985 as an alliance between Adams, Allen, De Kalb, Noble, and Steuben Counties, which comprise the Maumee River Basin. The Commission is designed to assist communities in northeast Indiana to curb the threat of flooding. The MRBC is a state agency formed by Indiana Code 13-7-6.1. The MRBC provides regional leadership in planning, promoting, coordinating, and implementing flood control, conservation, and the control and development of resources such as land, water, and man-made improvements (MRBC 1993). The MRBC has several areas of concerns that have impacted the watershed. Some of the projects are listed below:

1) The development of a Water Resource Availability in the Maumee River Basin, Indiana
2) Development of an Erosion and Sediment Control Guide
3) Development of the Resources and Trends of the Maumee River Basin (An Introduction for Flood Control and Related Resource Management in Northeast Indiana)
4) Development of a Master Plan for Flood Control

ACRES Land Trust

ACRES Land Trust is a watershed Alliance/Council concerned with nature preserves and their protection. Ted Heemstra is the contact for this organization.

2 General Watershed Description

This Chapter provides a general description of St. Marys River and its watershed and includes the following:

Section 2.1 St. Marys River Watershed Overview
Section 2.2 Land Cover, Population, and Growth Trends
Section 2.3 Agricultural Activities in the St. Marys River Watershed
Section 2.4 Areas of Special Concern
Section 2.5 Significant Natural Areas in the St. Marys River Watershed
Section 2.6 Surface Water Use Designations and Classifications
Section 2.7 US Geological Survey Water Use Information for the St. Marys River Watershed

2.1 St. Marys River Watershed Overview

The St. Marys River Watershed is an 8 digit (04100004) hydrologic unit code (HUC) watershed located in northeastern Indiana (Figure 2-1). The watershed encompasses 814 square miles in three different counties and approximately 434 miles of perennial streams. It is subdivided into 23 subbasins represented on the map by 14 digit HUCs (figure 2-2). The entire St. Marys River Watershed is located in the Eastern Corn Belt plain ecoregion, which is characterized by smooth plains, with beech/maple hardwood forest, and soils that are good for cropland.

Geology/Soils

The St. Marys River Watershed has had extensive glaciation. The area is comprised mainly of the Till Plain, which consists of gently rolling to flat landscapes. The elevations range from 780 to 840 feet mean sea level. Except where stream valleys dissect the till plain, there is little internal relief. The area is very poorly drained and drainage ditches are commonly used to carry runoff and to lower the characteristically shallow water table within the slow draining till. The St. Marys River itself is comprised of Alluvial and Outwash deposits. The alluvium does not extend significantly beyond the channel. The surrounding clayey or silty soils have high runoff coefficients. These factors contribute large, surface runoff and ultimately flooding of the St. Marys River.

Indiana, particularly in the central region, has some of the most productive soils in the United States. These soils, good management, and climate contribute to consistently increasing crop-yield levels. Soil types in the St. Marys River Watershed are derived from two general groups: Saranac-Eel-Tice and the Blount-Pewamo-Glynwood. The clayey Saranac soils occur in depressional areas that are subject to frequent flooding and are poorly drained. Loamy Tice soils, which appear in slightly higher areas than Saranac soils, are somewhat poorly drained.

The silty, clayey and loamy soils of the Blount-Pewamo-Glynwood association, characterized by very gradual swale and swell topography and occasional areas that have frequent changes of slope, occur on till plains and moraines. In depressional areas, the nearly level, very poorly drained Pewamo soils occur. On relatively higher lying broad flats and slight rises, the nearly level somewhat poorly drained Blount soils appear. Glynwood soils, which are gently sloping,

moderately well drained soils, are located on yet higher convex side slopes. (Maumee Comm. 1996)

Climate

An average winter temperature of 28° F and a summer average temperature of 72° F characterize the climate in the St. Marys River Watershed region. Rainfall averages 36 inches per year with 60% of this falling between April and September during the crop season. Snowfall annually averages 29 inches, which is vital source for soil moisture. The average relative humidity is 60%. The predominant wind is from the southwest. (USDA County Soil Surveys, Adams County)

2.2 Land Cover, Population, and Growth Trends

2.2.1 General Land Cover

The native vegetation of the St. Marys River Watershed consisted of beech-maple hardwood forest. Today this vegetation has been replaced with an intensive agricultural base. The U.S. Geological Survey - Biological Resources Division and the U.S. Fish and Wildlife Service are overseeing the National Gap Analysis Program. In Indiana, Indiana State University and Indiana University are carrying out the Indiana GAP Project which involves an analysis of current vegetative land cover through remote sensing (ISU 1999). This analysis provided vegetative land cover data in 30 x 30 meter grids (Figure 2-3). The following is a summary of vegetative cover in the watershed determined from the GAP image:

7.28%	Urban (impervious, low and high density)
84.17%	Agricultural vegetation (row crop and pasture)
7.08%	Forest vegetation (shrubland, woodland, forest)
1.15%	Wetland vegetation (Palustrine: forest, shrubland, herbaceous)
0.32%	Open Water

The wetland communities that were present in the watershed include floodplain forest, till plains flatwoods, wet prairies, marshes, seeps, and fens. These communities are nearly gone due to the impact of agriculture and urbanization (U.S. Geological Survey, 1994).

2.2.2 Population

The 1990 total population in the three counties that have land portions in the watershed was 357,700 (IBRC). 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 St. Marys River Watershed. For example, Allen County has a greater population than any of the other two counties; however, Allen County has only a small portion of

the land area within the St. Marys River Watershed area (Figure 2-1). A better estimate of the population within the St. Marys River Watershed may be the 1990 and 1995 US Geological Survey Water Use Reports which show a total population in the watershed of 204,040 in 1990 and 197,484 in 1995 (Table 2-6). These reports indicate that the population in the watershed appears to have decreased by about 3.7% between 1990 and 1996.

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. Fort Wayne is the largest city located in the watershed, in terms of population.

TABLE 2-1
ST. MARYS WATERSHED COUNTY POPULATION PROJECTIONS
1990-2020*

County	1990	2000	2010	2020	Percent Change (1990 to 2020)
Adams	**31,100**	**33,600**	**36,700**	**40,300**	**+29.6**
Allen	**300,800**	**315,200**	**327,400**	**337,600**	**+12.2**
Wells	**25,900**	**26,800**	**27,900**	**28,700**	**+10.8**

*** IBRC1993**

TABLE 2-2
ST. MARYS RIVER WATERSHED CITY AND TOWN POPULATION ESTIMATES*

City/Town	Census 1990	Estimate 1996	Percent Change (1990 to 1996)
Decatur	**8,642**	**8,965**	**+3.7**
Berne	**3,559**	**3,736**	**+5**
Fort Wayne	**191,839**	**184,783**	**-3.7**

*** IBRC 1997**

2.3 Agricultural Activities in the St. Marys River Watershed

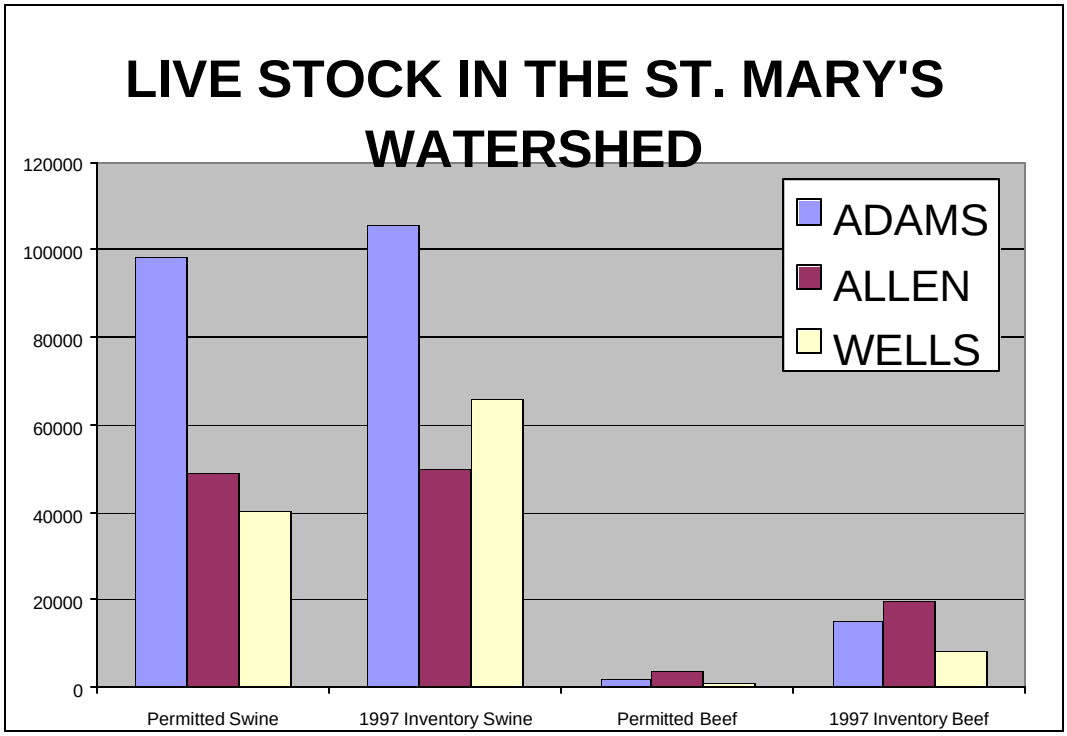
Agriculture is the dominant land use in the St. Marys River Watershed. Section 2.2.1 shows that 84.17 percent of land cover in the watershed are agricultural vegetation. This section provides an overview of the agricultural activities in the watershed. Specifically, Section 2.3.1 describes livestock operations and Section 2.3.2 describes crop production activities.

2.3.1 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 spring 1999, there were 212 permitted livestock operations in the three counties of the watershed. The following chart shows the permitted farms by county.



The Adams County Planning Commission developed an intensive livestock operation ordinance in 1976 and modified it in 1997-1998. This ordinance was in response to the high livestock numbers within the county. Sections of this ordinance are more restrictive than corresponding state rules on confined feeding operations.

Smaller livestock operations do not require a permit from IDEM. Therefore, the actual number of livestock operations in the St. Marys River Watershed is larger than the number of permitted operations. Table 2-3 shows the 1997 distribution of livestock throughout the three counties in the watershed. Swine and poultry make up the largest number of domestic animal raised in the St. Marys River Watershed

2.3.2 Crop Production

As discussed previously, the soils of the St. Marys River Watershed are very good for crop production. Table 2-4 lists the acres of the major crops produced in 1997 throughout the three counties in the watershed. For 1997, total acres of soybeans in the three counties edged out total acres of corn for grain as the number one crop produced. Nearly 45,000 more acres of soybeans than corn were planted in the watershed in 1997. Soybeans and corn for grain are clearly the primary crops produced in the watershed on basis of total acres. Allen county, however, ranked fourth in wheat acres for the state in 1997.

TABLE 2-3
LIVESTOCK IN THE ST. MARYS WATERSHED

1997 Livestock Inventory*								
	Hogs And Pigs		Layers 20 Weeks And Older		Cattle And Calves		Pullets Less 13 Weeks Old	
County	Number	State Rank**	Number	State Rank**	Number	State Rank**	Number	State Rank**
Adams	**105,431**	**9**	**942,178**	**9**	**---**	**---**	**237,394**	**5**
Allen	**49,783**	**30**	**19,780**	**31**	**19,838**	**12**	**--**	**--**
Wells	**65,972**	**22**	**170,689**	**17**	**8,287**	**49**	**D**	**13**

*** USDA 1997**
**** State Rank is out of a total of 92 counties in Indiana**

D Cannot be disclosed

-- Did not rank in the top 5 for that county

TABLE 2-4
CROPS PRODUCED IN THE ST. MARYS WATERSHED

1997 Crop Area*								
	Corn for grain		Soybeans for beans		Wheat		Hay crops	
County	Acres	State Rank**	Acres	State Rank**	Acres	State Rank**	Acres	State Rank**
Adams	**70,784**	**32**	**85,457**	**15**	**11,593**	**8**	**10,073**	**26**
Allen	**85,866**	**19**	**102,944**	**5**	**29,837**	**4**	**10,510**	**22**
Wells	**75,280**	**27**	**87,566**	**14**	**7,831**	**18**	**3,257**	**76**

*** USDA 1997**

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

2.6 Surface Water Use Designations and Classifications

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

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

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

- that will settle to form putrescent or otherwise objectionable deposits;

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

2.7 US Geological Survey Water Use Information for the St. Marys River Watershed

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

TABLE 2-6
1990 & 1995 Water Use Information - St. Marys River Watershed*
(HUC 04100004)

Population and Water Use totals	1990	1995
Total population in the watershed (thousands)	142.67	131.72
Public Water Supply	**1990**	**1995**
Population served by public groundwater supply (thousands)	20.4	24.85
Population served by surface water supply (thousands)	92.52	79.74
Total population served by public water supply (thousands)	112.92	104.59
Total groundwater withdrawals (mgd)	0.7	3.3
Total surface water withdrawals (mgd)	0	0
Total water withdrawals (mgd)	0.7	3.3
Total per capita withdrawal (gal/day)	6.2	31.55
Population self-supplied with water (thousands)	29.75	27.13
Commercial Water Use	**1990**	**1995**
Groundwater withdrawal for commercial use (mgd)	0.29	0.74
Surface water withdrawal for commercial use (mgd)	0	0
Deliveries from public water supplies for commercial use (mgd)	0.82	0.82
Total commercial water use (mgd)	1.11	1.64
Industrial Water Use	**1990**	**1995**
Groundwater withdrawal for industrial use (mgd)	0.84	0.46
Surface water withdrawals for industrial use (mgd)	1.16	1.04
Deliveries from public water suppliers for industrial use (mgd)	3.12	4.13
Total industrial water use (mgd)	5.12	5.63
Agricultural Water Use	**1990**	**1995**
Groundwater withdrawals for livestock use (mgd)	0.49	0.56
Surface water withdrawals for livestock use (mgd)	0.26	0.27
Total livestock water use (mgd)	0.75	0.83
Groundwater withdrawals for irrigation (mgd)	0	0
Surface water withdrawals for irrigation (mgd)	0	0
Total irrigation water use (mgd)	0	0
Mining Use	**1990**	**1995**
Groundwater withdrawals	0	0
Surface water withdrawals	2.24	0.62
Total withdrawals (mgd)	2.24	0.62

Notes:
mgd million gallon per day
gal/day gallon per day

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

3 Causes and Sources of Water Pollution

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

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

3.1 Causes of Pollution

ACauses of pollution@ refers 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 that 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 during the warmest summer months and particularly during low flow periods.

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

3.1.4 Nutrients

The term nutrients in this Strategy refers to two major plant nutrients, phosphorus and nitrogen. These are common components of fertilizers, animal and human wastes, vegetation, and some industrial processes. Nutrients in surface waters come from both point and nonpoint sources. Nutrients are beneficial to aquatic life in small amounts. However, in over-abundance and under favorable conditions, they can stimulate the occurrence of algal blooms and excessive plant growth in quiet waters or low flow conditions. The algal blooms and excessive plant growth often reduce the dissolved oxygen content of surface waters through plant respiration and decomposition of dead algae and other plants. This is accentuated in hot weather and low flow conditions because of the reduced capacity of the water to retain dissolved oxygen.

3.2 Point Sources of Pollution

As discussed previously, sources of these pollution-causing substances are divided into two broad categories: point sources and nonpoint sources. This section focuses on point sources. Section 3.3.1 defines point sources and Section 3.3.2 discusses point sources in the St. Marys 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 that 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 St. Marys River Watershed

As of June 1999, there were 135 NPDES permits within the St. Marys River Watershed (Table 3-2, Figure 3-1).

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, commercial and industrial wastewaters) and stormwater 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. CSOs are point sources subject to NPDES permit requirements including both technology-based and water quality-based requirements of the Clean Water Act. There are numerous CSOs that discharge into the watershed including:

Decatur	4
Fort Wayne	42

Table 3-2
NPDES PERMITTED FACILITIES
ST. MARYS RIVER WATERSHED

NPDES	Facility Name	Maj/Mi	City	County	Status
ING25001	UNITED TECHNOLOGIES	MINOR	BERNE,	ADAMS	INACTIVE
INP00003	CTS CORPORATION, BERNE	MINOR	BERNE	ADAMS	INACTIVE
INP00004	EX-CELL-O CORPORATION	MINOR		ADAMS	INACTIVE
INP00006	UNITED TECH. AUTOMOTIVE	MINOR	BERNE	ADAMS	ACTIVE
INP00019	RUAN TRANSPORT	MINOR	DECATUR	ADAMS	ACTIVE
INP00019	DRIGGS FARMS OF INDIANA,	MINOR	DECATUR	ADAMS	ACTIVE
IN000059	CENTRAL SOYA CO., INC.	MINOR	DECATUR	ADAMS	ACTIVE
IN000085	MONROE WATER TRT PLT	MINOR		ADAMS	INACTIVE
IN000099	H.P. SCHMITT PACKING CO.,	MINOR	DECATUR	ADAMS	INACTIVE
IN000349	HOME DAIRY PRODUCTS, INC.	MINOR		ADAMS	INACTIVE
IN002136	BERNE MUNICIPAL STP	MINOR	BERNE	ADAMS	ACTIVE
IN003516	OAKWOOD COMMUNITY	MINOR		ADAMS	INACTIVE
IN003591	COUNTRY ACRES TRAILER	MINOR		ADAMS	INACTIVE
IN003690	OAKRIDGE ESTATES M.H.P.	MINOR	DECATUR	ADAMS	ACTIVE
IN003907	MONMOUTH ELEMENTARY	MINOR	DECATUR	ADAMS	INACTIVE
IN003931	DECATUR MUNICIPAL STP	MAJOR	DECATUR	ADAMS	ACTIVE
IN004038	MONROE MUNICIPAL STP	MINOR		ADAMS	INACTIVE
IN004419	WHITE HORSE MOBILE HOME	MINOR	DECATUR	ADAMS	ACTIVE
IN004456	MESHBERGER BROS. STONE,	MINOR	BERNE	ADAMS	INACTIVE
IN004457	MESHBERGER BROS. STONE,	MINOR	PLEASANT	ADAMS	ACTIVE
IN004492	COUNTRY ACRES TRAILER	MINOR		ADAMS	INACTIVE
IN004815	MONROE PUBLIC WATER	MINOR	MONROE	ADAMS	ACTIVE
IN005157	GENEVA WATER TREATMENT	MINOR		ADAMS	INACTIVE
IN005541	COUNTRY ACRES	MINOR	DECATUR	ADAMS	ACTIVE
IN005898	UNITED TECH. AUTOMOTIVE,	MINOR	BERNE,	ADAMS	ACTIVE
ING08009	DELI DEPOT MARATHON	MINOR	FORT WAYNE	ALLEN	ACTIVE
ING25001	ALLEN CO WAR MEMORIAL	MINOR	FORT WAYNE	ALLEN	ACTIVE
ING25002	FORT WAYNE METALS	MINOR	FORT WAYNE	ALLEN	ACTIVE
ING25005	MECHANICS LAUNDRY DIV.,	MINOR	FORT WAYNE	ALLEN	ACTIVE
ING49004	HANSON AGGREGATES,	MINOR	EDGERTON	ALLEN	ACTIVE
ING49005	HANSON AGGREGATES,	MINOR	FORT WAYNE	ALLEN	ACTIVE
ING49005	STONECO, FORT WAYNE	MINOR	FORT WAYNE	ALLEN	INACTIVE
IN000035	FT WAYNE-THREE RIVERS FILT	MINOR		ALLEN	INACTIVE
IN000040	VALID KVHQEJFDH	MINOR		ALLEN	INACTIVE
IN000041	PAUL C. BRUDI STONE AND	MINOR		ALLEN	INACTIVE
IN000044	PHELPS DODGE MAGNET WIRE	MAJOR	FORT WAYNE,	ALLEN	INACTIVE
IN000047	NORFOLK & WESTERN RR, FT	MINOR		ALLEN	INACTIVE
IN000048	NORFOLK & WESTERN	MINOR	FORT WAYNE	ALLEN	ACTIVE
IN000052	PHELPS DODGE COPPER	MINOR	FORT WAYNE	ALLEN	INACTIVE
IN000053	OLD CROW BREWING CORP	MINOR		ALLEN	INACTIVE
IN000061	STONE-STREET QUARRIES,	MINOR	HOAGLAND	ALLEN	ACTIVE
IN000064	FALSTAFF BREWING	MINOR	FORT WAYNE	ALLEN	INACTIVE
IN000065	ITT	MINOR	FORT WAYNE	ALLEN	ACTIVE
IN000072	IND & MICH ELECTRIC CO-	MINOR		ALLEN	INACTIVE
IN000079	KUNKLE VALVE COMPANY INC	MINOR		ALLEN	INACTIVE
IN000082	PURITAN UTIL-AREA 3 WATER	MINOR		ALLEN	INACTIVE
IN000083	PURITAN UTIL-AREA 5 WATER	MINOR		ALLEN	INACTIVE

Table 3-2 (continued)

NPDES	Facility Name	Maj/Mi	City	County	Status
IN000084	CLEARWATER UTIL., INC FT	MINOR	FORT WAYNE	ALLEN	INACTIVE
IN000089	MECHANICS LAUNDRY	MINOR	FORT WAYNE,	ALLEN	INACTIVE
IN000090	MONROEVILLE WATER WORKS	MINOR	MONROEVILLE	ALLEN	ACTIVE
IN000093	ALLEN DAIRY PRODUCTS, INC.	MINOR		ALLEN	INACTIVE
IN000094	GLADIEUX REFINERY, INC.	MINOR	FORT WAYNE	ALLEN	INACTIVE
IN000095	STAUB BROS INC	MINOR		ALLEN	INACTIVE
IN000096	NIPSCO,	MINOR		ALLEN	INACTIVE
IN000097	GENERAL ELECTRIC CO., FT	MINOR	FORT WAYNE	ALLEN	INACTIVE
IN000258	STONECO, FT. WAYNE QUARRY	MINOR	FORT WAYNE	ALLEN	ACTIVE
IN000328	FRANCE STONE CO, ARDMORE	MINOR	FORT WAYNE	ALLEN	INACTIVE
IN002034	NEW HAVEN STP	MINOR	NEW HAVEN	ALLEN	ACTIVE
IN002142	MONROEVILLE MUNICIPAL STP	MINOR	MONROEVILLE	ALLEN	ACTIVE
IN002290	S & D FACILITIES INC	MINOR		ALLEN	INACTIVE
IN002300	GRABIL MUNICIPAL STP	MINOR		ALLEN	INACTIVE
IN002311	HUNTERTOWN MUNICIPAL STP	MINOR		ALLEN	INACTIVE
IN002510	NORTHERN INDIANA PUBLIC	MINOR		ALLEN	INACTIVE
IN002524	HERITAGE HIGH SCHOOL	MINOR	MONROEVILLE	ALLEN	INACTIVE
IN002525	HARLAN ELEM SCHOOL TRMT	MINOR		ALLEN	INACTIVE
IN002526	LEO ELEM AND H.S. TRMT PLT	MINOR		ALLEN	INACTIVE
IN002569	INTERNATIONAL HARVESTER,	MINOR		ALLEN	INACTIVE
IN002680	ESSEX INTERNATIONAL INC.	MINOR		ALLEN	INACTIVE
IN003010	ARCOLA SCHOOL	MINOR		ALLEN	INACTIVE
IN003051	HOAGLAND ELEM. SCHOOL	MINOR		ALLEN	INACTIVE
IN003219	FORT WAYNE MUNICIPAL STP	MAJOR	FORT WAYNE	ALLEN	ACTIVE
IN003341	GENERAL ELECTRIC SERVICE	MINOR		ALLEN	INACTIVE
IN003444	ARCOLA REST AREA US30	MINOR	ARCOLA	ALLEN	ACTIVE
IN003530	CLEARWATER UTILITIES	MINOR		ALLEN	INACTIVE
IN003531	DIVERSIFIED UTILITIES INC-	MINOR		ALLEN	INACTIVE
IN003532	DIVERSIFIED UTILITIES INC-	MINOR		ALLEN	INACTIVE
IN003533	DIVERSIFIED UTILITIES INC-	MINOR		ALLEN	INACTIVE
IN003534	DIVERSIFIED UTILITIES INC-	MINOR		ALLEN	INACTIVE
IN003535	DIVERSIFIED UTILITIES INC-	MINOR		ALLEN	INACTIVE
IN003536	DIVERSIFIED UTILITIES INC-	MINOR		ALLEN	INACTIVE
IN003537	UTILITY CENTER INC.-MAIN	MAJOR	FORT WAYNE	ALLEN	ACTIVE
IN003538	PINE VALLEY WWTP	MINOR		ALLEN	INACTIVE
IN003607	GCI, INC.	MINOR	FORT WAYNE	ALLEN	INACTIVE
IN003614	RAYTHEON	MINOR	FORT WAYNE	ALLEN	ACTIVE
IN003616	REA MAGNET WIRE CO., INC.	MINOR	FORT WAYNE	ALLEN	INACTIVE
IN003625	PATTONS SHADY ACRES	MINOR		ALLEN	INACTIVE
IN003691	HART MOTEL	MINOR		ALLEN	INACTIVE
IN003705	MARATHON OIL COMPANY	MINOR		ALLEN	INACTIVE
IN003706	MARATHON SERVICE STATION	MINOR		ALLEN	INACTIVE
IN003715	SOMERDALE MOBILE HOME	MINOR		ALLEN	INACTIVE
IN003727	LAFAYETTE CENTRAL ELEM.	MINOR		ALLEN	INACTIVE
IN003879	THOMAS MOBILE HOME PARK	MINOR		ALLEN	INACTIVE
IN004213	NAVISTAR INTERNATIONAL	MINOR		ALLEN	INACTIVE
IN004239	UTILITY CENTER, INC.-	MAJOR	FORT WAYNE	ALLEN	ACTIVE

Table 3-2 (continued)

NPDES	Facility Name	Maj/Mi	City	County	Status
IN004243	DIVERSIFIED UTL INC-ABOITE	MINOR		ALLEN	INACTIVE
IN004244	DIVERSIFIED UTL CO-LIBERTY	MINOR		ALLEN	INACTIVE
IN004247	LAKE RIVER SUBDIV & MOBILE	MINOR		ALLEN	INACTIVE
IN004529	HESSEN UTILITIES, INC.	MINOR	FORT WAYNE	ALLEN	ACTIVE
IN004545	FORT WAYNE METALS	MAJOR		ALLEN	INACTIVE
IN004811	ALLEN CNTY REGNAL SWR DIS.	MINOR	ARCOLA	ALLEN	ACTIVE
IN004861	FORT WAYNE WIRE DIE, INC.	MINOR	FORT WAYNE	ALLEN	ACTIVE
IN004868	ITT AEROSPACE/OPTICAL	MINOR	FORT WAYNE	ALLEN	INACTIVE
IN005087	WHISPERING PINES CNTRY	MINOR	DECATUR	ALLEN	ACTIVE
IN005110	FORT WAYNE AIR SERVICE	MINOR		ALLEN	INACTIVE
IN005218	HAVENWOOD FOREST SUBD.	MINOR	WOODBURN	ALLEN	ACTIVE
IN005230	B & B CUSTOM PLATING	MINOR	HOAGLAND	ALLEN	ACTIVE
IN005305	SEYFERT FOODS INC	MINOR		ALLEN	INACTIVE
IN005442	CHEMICAL WASTE MGT. OF	MINOR	FORT WAYNE	ALLEN	INACTIVE
IN005451	ALLEN COUNTY MEMORIAL	MINOR	FORT WAYNE	ALLEN	INACTIVE
IN005476	POLY-HI/MENASHA	MINOR	FORT WAYNE	ALLEN	INACTIVE
IN005598	FORT WAYNE METALS	MINOR	FORT WAYNE	ALLEN	INACTIVE
IN005624	AMOCO OIL COMPANY, ST. #	MINOR	FORT WAYNE	ALLEN	INACTIVE
IN005720	SAINT JOSEPH SCHOOL	MINOR		ALLEN	ACTIVE
IN005733	DELI DEPOT MARATHON	MINOR	FORT WAYNE,	ALLEN	INACTIVE
IN005785	NORTHCREST SHOPPING	MINOR	FORT WAYNE,	ALLEN	INACTIVE
IN005877	TOWNE AIR FREIGHT, INC.	MINOR	FORT WAYNE,	ALLEN	INACTIVE
IN005975	SWEETWATER SOUND, INC.'S	MINOR	FORT WAYNE	ALLEN	ACTIVE
IN006012	DUPONT WATER TREATMENT	MINOR	FORT WAYNE	ALLEN	ACTIVE
IN010943	BRUICK MUNICIPAL	MINOR		ALLEN	INACTIVE
IN010968	NOWAK & WILLIAMS SUPPLY	MINOR		ALLEN	INACTIVE
IN010977	BAER FIELD WATER PLANT	MINOR		ALLEN	INACTIVE
IN010983	MILL ROAD ESTATES M.H.P.	MINOR		ALLEN	ACTIVE
IN000429	OSSIAN CANNING CO	MINOR		WELLS	INACTIVE
IN002074	OSSIAN MUNICIPAL STP	MINOR	OSSIAN	WELLS	ACTIVE
IN002174	CORNING GLASS WORKS	MINOR		WELLS	INACTIVE
IN003053	NORWELL JR & SR HIGH	MINOR	OSSIAN	WELLS	INACTIVE
IN003329	BLUFFTON SWG TRMT PLT	MINOR		WELLS	INACTIVE
IN003666	STERLING CASTING CORP	MINOR		WELLS	INACTIVE
IN004178	STONEY CREEK MOBILE HOME	MINOR	ZANESVILLE	WELLS	INACTIVE
IN004452	GERBER LOCKER COMPANY	MINOR		WELLS	INACTIVE
IN004487	BLUFFTON CAR WASH	MINOR		WELLS	INACTIVE
IN004917	ZANESVILLE SOUTHWEST	MINOR	ZANESVILLE	WELLS	INACTIVE
IN005480	ZANESVILLE S.E. SANITARY	MINOR	ZANESVILLE	WELLS	INACTIVE

3.3 Nonpoint Sources of Pollution

Nonpoint source pollution refers to runoff that enters surface waters through stormwater runoff, contaminated ground water, snowmelt or atmospheric deposition. There are many types of land use activities that can serve as sources of nonpoint source pollution including land development, construction, mining operations, crop production, animal feeding lots, timber harvesting, failing septic systems, landfills, roads and paved areas. Stormwater from large urban areas (>100,000 people) and from certain industrial sites is technically considered a point source since NPDES permits are required for piped discharges of stormwater from these areas.

Sediment and nutrients are major pollution-causing substances associated with nonpoint source pollution. Others include E. coil 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 St. Marys Watershed.

3.3.1 Agriculture

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

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

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

3.3.2 Urban/Residential

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

drainage systems that rapidly transport stormwater to nearby surface waters. This increase in volume and rate of runoff can result in streambank erosion and sedimentation in surface waters.

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

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

The population figures discussed in Section 2.3.2 are good indicators of where urban development and potential urban water quality impacts are likely to occur.

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 absorbtion field malfunctions 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. However, road construction is widespread and often involves stream crossings in remote or undeveloped areas of the basin.

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

This section provides a detailed overview of water quality monitoring, water quality, and use support ratings in the St. Marys River Watershed and includes the following:

Section 4.1 Water Quality Monitoring Programs
Section 4.2 Summary of Ambient Monitoring Data for the St. Marys River Watershed
Section 4.3 Fish Consumption Advisories
Section 4.4 Clean Water Act Section 305(b) Report
Section 4.5 Clean Water Act Section 305(b) Assessment and Use-Support Methodology

4.1 Water Quality Monitoring Programs

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

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. Field staff from the Survey Section and the Biological Studies Section perform this assessment. 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 Local Volunteer Monitoring Programs

The monitoring by local volunteer groups has been limited in the St. Marys River Watershed. The Belmont FFA conducted volunteer monitoring in June and July 1996. This group again conducted monitoring in November 1996. Sites include Willshire, Ohio (bridge), Blue Creek (quarter mile from Willshire), Yellow Creek (near Prices on 33), St. Marys River (1200 North). Samples were analyzed for nitrate, phosphate, temperature, pH, and turbidity (Adams SWCD). There also exists water quality records from 1970 by the Indiana State Board of Health.

The Adams County SWCD will begin monitoring in the watershed through a 319 grant from IDEM. The purpose of the monitoring will be for nitrates and phosphates.

A database that would hold the volunteer monitoring data for the St. Marys River Watershed does not exist. In addition, the data collected by the various volunteer monitoring groups are for educational purposes and may not have a consistent level of quality. Therefore, the data and information collected by the volunteer monitoring groups are not readily accessible or usable by the Office of Water Quality. However, IDNR's Hoosier Riverwatch is initiating a new, higher level of volunteer monitoring training. Volunteer monitors receiving Hoosier Riverwatch's Level II training will be certified and be able to collect and produce data at consistent, higher level of quality. In addition, Hoosier Riverwatch and IDEM's Office of Water Quality are working toward creating a volunteer monitoring database that would make volunteer monitoring data readily accessible.

4.2 Summary of Ambient Monitoring Data for the St. Marys 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 St. Marys 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 St. Marys River Watershed are provided in Appendix A. 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 ST. MARYS RIVER WATERSHED 1986 TO 1995

Parameter	STM-0.2 St Mary's River Ft. Wayne, Spy Run Bridge	STM-11 St. Marys River At Ft. Wayne, Ferguson Rd.	STM-37 St. Marys River At Pleasant Hills, S.R. 101 Bridge
Biological Oxygen Demand	↔	↔	↘
Chemical Oxygen Demand	↔	↘	↘
Dissolved Oxygen	↔	↔	↑
E. coli	↓	↔	↔
Ammonia	↔	↔	↔
Nitrite + Nitrate	↘	↘	↘
Total phosphorus	↓	↓	↓
Total Residue	↘	↘	↔
Total Residue, Filterable	?	?	?
Total Residue, Nonfilterable	↔	↘	↔
Copper	↓	?	?
Cyanide (total)	↔	?	↔

Notes

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

4.3 Fish Consumption Advisories

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

The 1999 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% 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 2 months (6 meals per year) for adult males and females. Women who are pregnant or breastfeeding, women who plan to have children and children under the age of 15 do not eat.
- Group 5 - No consumption (DO NOT EAT)

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 St. Marys River Watershed, the following waterbodies are under the 1999 fish consumption advisory:

County	Species	Size	Group	Contaminant
Allen County	Bigmouth Buffalo	20-25 inch	3	Mercury/PCBs
		25+ inch	4	Mercury/PCBs
	Black Redhorse	12-15 inch	2	Mercury/PCBs
		15+ inch	3	Mercury/PCBs
	Channel Catfish	13-15 Inch		
		15 + inch		
	Largemouth Bass	Up to 15 inch	3	Mercury/PCBs
	Quillback	9-14 inch	2	Mercury/PCBs
		14+ inch	3	Mercury/PCBs
	Silver Redhorse	17+ inch	3	Mercury/PCBs
	White Suckers	8-11 inch	2	Mercury/PCBs
		11+ inch	3	Mercury/PCBs

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. "Indiana 305(b) Report 1994-95" provides the most recent comprehensive report on water quality in the St. Marys Watershed and is the baseline report for areas of the state for which water quality assessments have not yet been updated (IDEM 1994-95). The methodology of the Clean Water Act Section 305(b) assessment and use support ratings is discussed in Section 4.5.

Appendix B contains the listing of the St. Marys River Watershed waterbodies assessed, status of designated use support, probable causes of impairment, and stream miles affected. This assessment was largely based on data collected during the summer of 1994. From examination of Appendix B, it is readily apparent that the majority of water quality impairments are because of E. coil water quality standard violations. However, the Office of Water Quality later reviewed the E. coil data and determined that the E. coli samples collected during the summer of 1994 did not meet quality control criteria in terms of sample holding times. Therefore, the Office of Water Quality contracted the U.S. Geological Survey to do an E. coil study of the Upper Wabash Basin (including the St. Marys River Watershed) in order to better characterize the magnitude and extent of E. coil problems in waterbodies. In addition, the Office of Water Quality altered their sampling protocols for the summer 1998 intensive sampling of waters in the St. Marys River Watershed in order to ensure E. coil samples would meet quality control criteria.

The Office of Water Quality determines use support status for each stream and waterbody in accordance with the assessment guidelines provided by EPA

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

(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;
- E. coil monitoring results.

The assessment process was applied to each data-sampling program. Then the individual assessments were integrated into an overall assessment for each waterbody by use designation: aquatic life support, fish consumption, 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. coil) 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 4-2 (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 St. Marys 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 Nonpoint Source Control Programs
Section 5.1.4 Integrating Point and Nonpoint Source Pollution Control Strategies
Section 5.1.5 Potential Sources of Funding for Water Quality Projects

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

Authorities for some of the programs and responsibilities carried out by the Office of Water Quality are derived from a number of federal and state legislative mandates outlined below.

Federal Authorities for Indiana's Water Quality Program

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.

- The Clean Water Act Section 301 - Prohibits the discharge of pollutants into surface waters unless permitted by EPA.

- The Clean Water Act Section 303(c) - States are responsible for reviewing, establishing and revising water quality standards for all surface waters.

- The Clean Water Act Section 303(d) - Each state shall identify waters within its boundaries for which the effluent limits required by 301(b)(1) A and B are not stringent enough to protect any water quality standards applicable to such waters.

- The Clean Water Act Section 305(b) - Each state is required to submit a biennial report to the EPA describing the status of surface waters in that state.

- The Clean Water Act Section 319 - Each state is required to develop and implement a nonpoint source pollution management program.

- The Clean Water Act Section 402 - Establishes the National Pollutant Discharge Elimination System (NPDES) permitting program. Allows for delegation of permitting authority to qualifying states (which Indiana has received).

- The Clean Water Act Section 404/401 - Section 404 regulates the discharge of dredge and fill materials into navigable waters and adjoining wetlands. Section 401 requires the Corps to receive a state Water Quality Certification prior to issuance of 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 Solid and Hazardous Waste.

The purpose of the NPDES permit is to control the point source discharge of pollutants into the waters of the State such that the quality of the water of the State is maintained in accordance with

the standards contained in 327 IAC 2. The NPDES permit requirements must ensure that the minimum amount of control is imposed upon any new or existing point source through the application of technology-based treatment requirement contained in 327 IAC 5-5-2. According to 327 IAC 5-2-2, "Any discharge of pollutants into waters of the State as a point source discharge, except for exclusions made in 327 IAC 5-2-4 is prohibited unless in conformity with a valid NPDES permit obtained prior to discharge." This is the most basic principal of the NPDES permit program.

The majority of NPDES permits have existed since 1974. This means that most of the permit writing is for permit renewals. Approximately 10% of each year's workload are 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 permitted applied for a renewal before the current permit expires.

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

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

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

5.1.3 Nonpoint Source Control Programs

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

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

The state's NPS Program, administered by the IDEM Office of Water 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 $8 million of federal funds for the development of over 120 projects.

The federal Clean Water Act contains nonpoint source provisions in several sections of the Act including the Section 319 Nonpoint Source Program, the Section 314 Clean Lakes Program (no longer funded), the Section 104(b)(3) Watershed Management Program, and the Section 205(j) Water Quality Planning Program. The Section 319 program provides for various voluntary projects throughout the state to prevent water pollution and also provides for assessment and management plans related to water bodies in Indiana impacted by NPS pollution. Section 314 has assessment provisions that assist in determining the nonpoint and point source water quality impacts on lakes and provides recommendations for improvements, but no longer receives funding. Section 104(b)(3) provides assistance in the development of watershed management planning efforts and education/information and implementation projects. Section 604(b) provides

for planning activities relating to the improvement of water quality from nonpoint and point sources. The Watershed Management Section within the Planning Branch of the Office of Water Managment 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.

Through Clean Water Act Section 319(h) grants, EPA makes monies available to the states on an annual basis. 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 St. Marys 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 six major river basins, and water quality data and other information will be collected and analyzed from each basin (or group of basins) once every five years. The schedule for implementing the TMDL Strategy is proposed to follow this rotating basin plan to the extent possible. The TMDL Strategy discusses activities to be accomplished in three phases. Phase One involves planning, sampling and data collection and would take place the first year. Phase Two involves TMDL development and would occur in the second year, and Phase Three is the TMDL implementation and would occur the third year. It is expected that some phases, especially implementation of TMDLs (Phase Three) in the basin(s), may take more than one year to fully accomplish.

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

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

5.1.5 Potential Sources of Funding for Water Quality Projects

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

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

Section 319(h) Grants

EPA offers Clean Water Act Section 319(h) grant moneys to the state 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. Agencies, environmental groups, university researchers, and others in the state

that have expertise in nonpoint source pollution problems are invited to submit Section 319(h) proposals to the Office of Water 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 target high priority watersheds?
- Is there sufficient nonfederal cost-share match available (25% of project costs)?
- Are measurable outputs identified?
- Is monitoring required? Is there a Quality Assurance/Quality Control plan for monitoring?
- If a Geographical Information System is used, is it compatible with that of the state?
- Is there a commitment for educational activities and a final report?

Office of Water 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. 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 the Office of Water Quality 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:

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 E 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 T-by-2000 soil conservation and water quality program under guidelines established by the State Soil Conservation Board, primarily through the SWCDs in direct service to 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 and sediment on their land. Regional urban conservation specialists work primarily with developers, contractors, and others to address erosion and sediment concerns in urban settings, developments under construction, and in landfills. The Lake and River Enhancement staff (LARE) oversee all administrative, operational, and technical aspects of the LARE program, which provides financial assistance to local entities concerned with improving and maintaining water quality in public-access lakes, rivers, and streams.

The St. Marys River Watershed has had two LARE projects, both in Adams County. Statewide there have been 116 lake projects and 53 watershed projects under the LARE program.

5.2.1 Division of Water

The IDNR, Division of Water (DOW) is charged by the State of Indiana to maintain, regulate, collect data, and evaluate Indiana's surface and ground water resources.
The Engineering Branch of the DOW includes Dam and Levee Safety, Project Development, Surveying, Drafting, and Computer Services. The Dam and Levee Safety Section performs geotechnical and hydraulic evaluation on existing and proposed dams and levees throughout the State. The Project Development Section provides technical support to locally funded water resource projects along with engineering leadership and construction management to State funded water resource projects. The remaining sections provide support services to all Sections within the DOW such as reservoir depth mapping, topographic mapping, highwaters marks, design of publications and brochures, and computer procurement and maintenance.

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

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

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

5.3 USDA/Natural Resources Conservation Service Water Quality Programs

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

Conservation Technical Assistance (CTA)

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

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

Conservation Farm Option (CFO)

The Conservation Farm Option is a pilot program for producers of wheat, feed grains, cotton, and rice. The program's purposes include conservation of soil, water, and related resources, water quality protection and improvement, wetland restoration, protection and creation, wildlife habitat development and protection, or other similar conservation purposes. Eligibility is limited to owners and producers who have contract acreage enrolled in the Agricultural Market Transition Act program, i.e. production flexibility contracts. The CFO is a voluntary program. Participants are required to develop and implement a conservation farm plan, which becomes part of the CFO contract covering a ten-year period. CFO is not restricted as to what measures may be included in the conservation plan, so long as they provide environmental benefits.

Conservation of Private Grazing Land Initiative (CPGL)

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

Conservation Reserve Program (CRP)

The Conservation Reserve Program reduces soil erosion, protects the Nation's ability to produce food and fiber, reduces sedimentation in streams and lakes, improves water quality, and 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 nonstructural measures to solve resource problems.

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

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

Part II: Concerns and Recommendations

January 2001

Prepared by

Indiana Department of
Environmental Management
Office of Water Quality

FOREWORD

The First Draft (October 1999) of the Watershed Restoration Action Strategy (WRAS) was reviewed internally by IDEM and revised accordingly. The Second Draft (March 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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St Marys 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 St Marys 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 St Marys River Watershed contains several stakeholder groups that have different missions. The following discussions briefly describe some of the watershed groups.

Adams County Soil and Water Conservation District

The Adams County Soil and Water Conservation District conducted locally led activities that resulted in the Stakeholders developing the following priorities:

1) Adams County has a large number of livestock; the disposal or proper use of animal waste is a concern.
2) The topography and soils of the county are concerns in regards to flooding.
3) Concerns also exist on soil loss and movement due to erosion.

Adams County Planning Commission

The Adams County Planning Commission has been involved in the concern over Intensive Livestock Operations. In 1976, modified in 1997-98, they developed an ordinance that requires certain producers to apply for a county livestock permit. Many areas of the ordinance are more specific than corresponding State rules and legislation.

Wells County Soil and Water Conservation District

The Wells County Soil and Water Conservation District, through locally led meetings and a new process called Vision 2004. Developed the following prioritization of concerns:

1) The need to improve the drainage system in the county.
2) The development and construction in wooded areas.
3) Concern of runoff from sediment and chemical use.

4) Environmental ethics.
5) Pollution.
6) Good source of water
7) Different levels of control
8) Land use.
9) Pasture and grazing in waterways.
10) Air pollution.

Maumee River Basin Commission

Maumee River Basin Commission (MRBC) emerged in 1985 as an alliance between Adams, Allen, De Kalb, Noble, and Steuben Counties, which comprise the Maumee River Basin. The Commission is designed to assist communities in northeast Indiana to curb the threat of flooding. The MRBC is a state agency formed by Indiana Code 13-7-6.1. The MRBC provides regional leadership in planning, promoting, coordinating, and implementing flood control, conservation, and the control and development of resources such as land, water, and man-made improvements (MRBC 1993). The MRBC has several areas of concerns that have impacted the watershed. Some of the projects are listed below:

1) The development of a Water Resource Availability in the Maumee River Basin, Indiana
2) Development of an Erosion and Sediment Control Guide
3) Development of the Resources and Trends of the Maumee River Basin (An Introduction for Flood Control and Related Resource Management in Northeast Indiana)
4) Development of a Master Plan for Flood Control

ACRES Land Trust

ACRES Land Trust is a watershed Alliance/Council concerned with nature preserves and their protection. Ted Heemstra is the contact for this organization.

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 St Marys River watershed. This multi-organization effort formed the basis of the Unified Watershed Assessment for Indiana.

Indiana's Unified Watershed Assessment (UWA)

The UWA workgroup gathered a wide range of water quality data that could be used to characterize Indiana's water resources. These data were used in Alayers@ 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 that concerned the water column, organisms living in the water, or the suitability of the water for supporting aquatic ecosystems. Each Alayer@ of information/data was partitioned by percentiles into scores. The scores ranged between 1 and 5, with a score of 1 indicative of good water quality or minimum impairment, and a score of 5 indicating heavily impacted or degraded water quality. The scoring derived through the UWA process is presented in Table 2-1.

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

- Lake Fishery: Large mouth bass community information for lakes
- Stream Fishery: Small mouth bass community information for streams
- 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.

From this scoring, it is evident that stream fishery, aquatic life use support, and qualitative habitat evaluation index are the key concerns. However all categories are of concern based on the ranking for the St. Marys River watershed.

TABLE 2-1
RESULTS OF THE UNIFIED WATERSHED ASSESSMENT FOR ST MARYS RIVER

Data/Information Layer	St Marys River (04100004) Score
Lake Fishery	*
Stream Fishery	5
Aquatic Life Use Support	5
Fish Consumption Advisories	3
Fish Index of Biotic Integrity	*
Qualitative Habitat Evaluation Index	5
Lake Trophic Scores	*
Sediment Potential	3

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

* No score determined

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 St. Marys Watershed 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. EPA approved Indiana's 303(d) list 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. However, during the summer of 1998, extensive data were collected in the St Marys River Watershed in order to specifically address Section 303(d) listed streams and TMDLs in the watershed. Currently, the data from this sampling are being evaluated to determine how to address the Section 303(d) listed waterbodies. Part I of the WRAS briefly outlines IDEM=s strategy for developing TMDLs.

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

- **Blue Creek** for dissolved oxygen violations
- **St Marys River** for Fish Consumption Advisory (PCB, and Mercury)

4 Priority Issues and Recommended Management Strategies

Part I provided the existing water quality information for the St Marys 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 St Marys River Watershed will also enhance the natural and recreational values of St Marys River. Each subsection below focuses on a single priority issue.

4.1 Data\Information and Targeting

Stakeholder groups identified a need for more water quality data and information in order to prioritize and target specific areas of the St Marys River watershed. In addition to targeting areas, stakeholders identified the need for more data and information about the actual impact on water quality from nonpoint sources. Success in restoring water quality in the St Marys River 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: In December 1999 the Adams County Soil and Water Conservation District will begin a volunteer water quality monitoring program. This work is being done

as part of a 319 grant from IDEM. The grant specifically targeting nutrient management in the St Marys River watershed. Information gained from this volunteer monitoring will be included in the Watershed Action Strategy for the St Marys River watershed.

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

Recommended Management Strategy 3: As discussed in Part I, there has been little coordination between individual volunteer water quality monitoring groups within the St Marys River watershed. In addition, a database that would hold the volunteer water quality monitoring data for the St Marys River Watershed does not exist. However, Hoosier Riverwatch and IDEM are currently working on a partnership to develop a statewide volunteer monitoring database.

4.2 Streambank Erosion and Stabilization

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

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

Structural stabilization of specific streambank areas in the St Marys River Watershed may solve problems on a temporary basis. However, a comprehensive understanding of drainage, stream flows and energies, and land management practices is required to adequately approach this problem. Conservation partners (local, state, and federal) are actively working within their specific geographic areas (typically at the county level); however, this may not facilitate solving the streambank cutting and erosion problems because efforts may not be coordinated between headwater and downstream areas. For example, the Maumee River Basin Commission has been working on flood control. One effort being developed is taking areas of known flooding and removing that area from agricultural production. These areas are then developed into filterstrip areas. This can help reduce sediment, nutrient, and pesticide loading.

4.3 Failing Septic Systems and Straight Pipe Discharges

Local county health departments and other stakeholders have identified failing septic systems and straight pipe discharge from septic tanks as significant sources of water pollution in the St Marys River

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 St Marys River watershed.

Recommended Management Strategy: To further educational efforts, the direct impact of communities discharging their septic tank effluent to waterbodies needs to be adequately characterized. This will involve coordination between the Office of Water Quality, local health departments, 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, illegal dischargers will be required to cease discharge until they obtain an appropriate NPDES permit.

4.4 Water Quality - General

The Clean Water Act Section 303(d) list presented in Section 6.3 lists water quality limited waterbodies for the St Marys River 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. Completion of a TMDL will involve loading allocations of a pollutant to both point and nonpoint sources. The TMDL development process is in its early stages for the St Marys River watershed. This will involve meetings with stakeholder groups linked to the Section 303(d) waterbodies. As TMDLs are developed, this Watershed Restoration Action Strategy will be amended to incorporate the final TMDLs.

4.5 Fish Consumption Advisories

As noted in Part I and Part II, fish consumption advisories are clearly major concerns and priority issues within the St Marys River watershed.

Recommended Management Strategy 1: The St Marys River fish consumption advisories are related to PCB contamination and mercury; continued monitoring will give a better assessment of these problems and corrective actions that may be taken. Also, development of TMDLs, as addressed in Section 4.4, will be a primary strategy.

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 St Marys River watershed. Finally, very few regulatory control mechanisms exist to control nonpoint source pollution.

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

state, and federal stakeholders. Implementation of nonpoint source controls will involve a blend of funding assistance and regulatory action, where applicable.

Recommended Management Strategy 2: Numerous funding mechanisms, such as Conservation Reserve Program, Environmental Quality Incentive Program, Lake and River Enhancement program, and 319(h) grants, exist to promote practices to reduce nonpoint source pollution in the watershed. In addition, to effectively address nonpoint source pollution in the watershed, the prioritization and targeting discussed previously in Part II should be used to allocate further application of resources.

Recommended Management Strategy 3: The St Marys River Watershed has high livestock inventories. Although not shown in Part I due to disclosure problems, this watershed has counties that rank in the top ten counties in Indiana for hogs and pigs and poultry. Most of the watershed is in agricultural production (84%, see Part 1 - section 2.2.1). In an effort to better understand the impact of livestock and waste management and crop production management practices, the Allen County and Adams County Soil and Water Conservation Districts are working with IDEM through 319 grants to identify concerns and work with agricultural producers to address these concerns.

4.7 Point Sources - General

Illegal 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 illegal point sources and non-complying point sources. Improving compliance of NPDES dischargers and identifying illegal 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 illegal 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 a fluid, living document that will be revised or amended as new information becomes available. Section 5.1 discusses expectations derived from the Strategy and how progress will be measured. Specific revisions and amendments to the Watershed Restoration Action Strategy are discussed in Section 5.2. Finally, the Watershed Restoration Action Strategy will be reviewed by all stakeholders before it becomes final, as described in Section 5.3.

5.1 Expectations and Measuring Progress

The St Marys 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.

Measurement of progress is critical to the success of any plan. Water quality improvements will not take place overnight. Measuring progress in terms of water quality will be provided through the Office of Water Quality Assessment Branch's rotating basin-monitoring strategy. 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 listed in section 5.2.1.

5.2.1 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 St Marys River Watershed will occur during the sampling season of 2000. The information from the 2000 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 2000, if sufficient information becomes available.

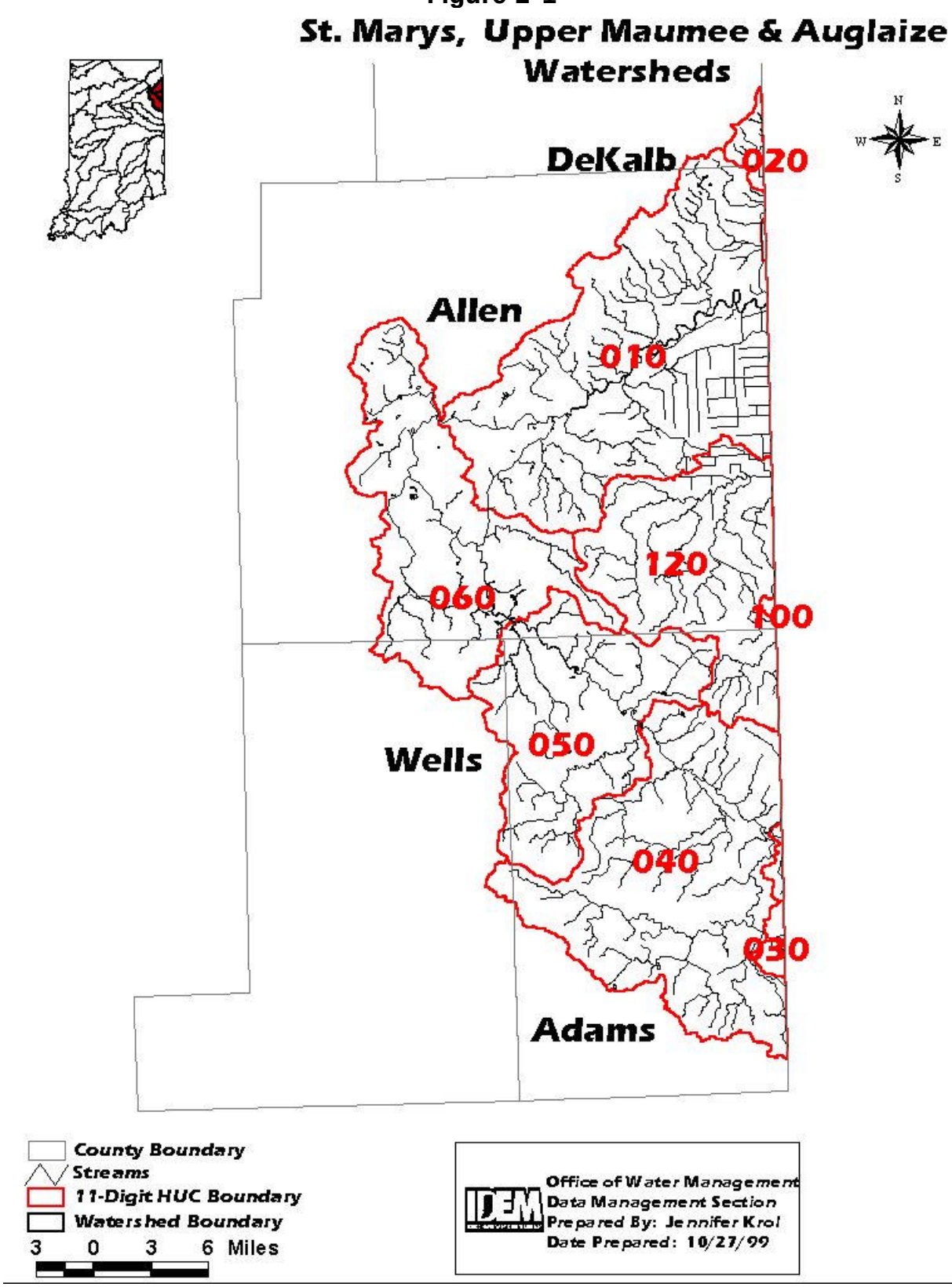
5.3 Review of the Watershed Restoration Action Strategy

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
St Marys	04100004030	nd	nd	nd	nd	nd	nd	nd	1	5	4	1	1	5	5	3
	04100004040	nd	nd	nd	nd	nd	nd	nd	2	5	4	2	2	5	5	3
	04100004050	nd	nd	nd	nd	nd	nd	nd	2	5	4	3	2	5	5	3
	04100004060	nd	nd	nd	5	nd	nd	nd	3	4	4	4	3	4	3	2

Figure 2-1


St. Marys, Upper Maumee & Auglaize Watersheds
DeKalb
020
Allen
010
120
060
100
Wells
050
040
030
Adams
N
W
E
S
County Boundary
Streams
11-Digit HUC Boundary
Watershed Boundary
3 0 3 6 Miles
IDEM
Office of Water Management
Data Management Section
Prepared By: Jennifer Krol
Date Prepared: 10/27/99

APPENDIX A

BENCHMARK CHARACTERISTIC ANALYSIS

OF DATA FROM FIXED STATIONS IN THE

ST. MARYS RIVER WATERSHED

1991 TO 1997

Station: STM-11

	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	181.84	172.5588	191.1212	184	13638	84	270	159	209	186	50	1627.244	40.33912	4.65796	-0.18295	0.2774	-0.27618	0.548211
Ammonia (mg/l as N)	75	0.143333	0.110997	0.175669	0.1	10.75	0.05	0 7	0 05	0 2	0 65	0.15	0.019752	0.140543	0.016228	1.981788	0.2774	4.023114	0 548211
BOD (mg/l)	35	3.385714	2.659776	4.111653	2 8	118.5	0.5	9 3	1.6	4 9	8 8	3 3	4.465966	2.113283	0.35721	1 000152	0.397694	0 477423	0 777794
COD (mg/l)	75	27.47067	25.41905	29.52228	27 1	2060 3	7	54	22	33	47	11	79 51291	8 917001	1.029647	0.068647	0.2774	0 394106	0 548211
Cyanide (mg/l)	0																		
Nitrate (mg/l as N)	75	3.878667	3.106105	4 651228	3.1	290.9	0 05	13	1 3	5 5	12 95	4 2	11.27488	3 357808	0.387726	1.229601	0 2774	0.872472	0 548211
Total Phosphorus (mg/l as P)	75	0 284933	0.256451	0.313418	0.28	21.37	0 09	0 69	0.19	0 34	0 6	0.15	0.015325	0.123796	0.014295	1.081728	0.2774	1.593585	0 548211
Total Solids (mg/l)	75	594.4	567.2704	621.5296	581	44580	300	866	507	680	566	173	13903.73	117.9141	13.61554	0.111862	0.2774	-0.51887	0 548211
Suspended Solids (mg/l)	75	81.92	64.98836	98 85164	69	6144	2	420	32	102	418	70	5415.561	73 5905	8.497499	2 486664	0.2774	8.712768	0 548211
Dissolved Solids (mg/l)	0																		
Sulfate (mg/l)	0																		
TKN (mg/l as N)	0																		
E. coli (CFU/100ml)	72	1586.667	735.2686	2438.065	465	114240	10	25000	170	1550	24990	1380	1.3E+07	3623.148	426.9921	5.061566	0.282898	28.72023	0 558831
TOC (mg/l)	0																		
Hardness (mg/l)	75	302.6533	287 6563	317.6504	310	22699	126	478	260	359	352	99	4248 716	65.18218	7.526589	-0.38564	0.2774	0.234012	0.548211
Chloride (mg/l)	0																		
Dissolved Oxygen (mg/l)	56	10.15321	9 672581	10.63385	10.06	568 58	6 94	15.85	9 085	11 32	8 91	2 235	3 221073	1 794735	0 239832	0.479066	0.319	0 739352	0 628256
pH	57	7.866491	7 767074	7.965908	7.81	448 39	6 98	8 89	7 62	8 14	1 91	0 52	0 140387	0 374683	0.049628	0 206058	0 316327	0 289279	0 623134
Copper (ug/l)	10	5.36	2.670833	8.049167	4 4	53 6	2	11	2	9	9	7	14 13156	3.759196	1.188762	0 376061	0.687043	-1.8291	1.334249
Iron (ug/l)	10	1887	831.084	2942.916	1750	18870	230	5000	740	2800	4770	2060	2178779	1476.069	466.7739	0 916813	0 687043	0 808154	1 334249
Zinc (ug/l)	10	10.375	6.094225	14.65578	9 7	103 75	2 25	24	6 1	13	21 75	6 9	35 80958	5.984111	1.892342	1 194985	0.687043	2 437032	1 334249

Station: STM- 2

	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	Std.Err. Skewness	Skewness	Kurtosis	Std.Err. Kurtosis
Alkalinity (mg/l)	74	184.1622	173.3243	195	184	13628	71	300	155	214	229	59	2188.275	46.779	5.437948	-0.02895	0.279197	-0.03026	0.551684
Ammonia (mg/l as N)	74	0.191216	0.147646	0.234786	0.1	14.15	0.05	1.1	0.05	0.3	1.05	0.25	0.035367	0.188061	0.021862	2.131527	0.279197	6.551765	0.551684
BOD (mg/l)	35	4.242857	3.084815	5.400899	3.7	148.5	0.5	14	1.7	5.6	13.5	3.9	11.36487	3.371183	0.569834	1.512501	0.397694	2.258686	0.777794
COD (mg/l)	74	28.11757	25.93262	30.30251	27.1	2080.7	5.8	66	23	34	60.2	11	88.94037	9.43082	1.096311	0.901875	0.279197	3.136369	0.551684
Cyanide (mg/l)	73	0.039822	-0.0283	0.107939	0.005	2.907	0.005	2.5	0.005	0.005	2.495	0	0.085235	0.29195	0.03417	8.543186	0.281029	72.99052	0.555223
Nitrate (mg/l as N)	74	3.453378	2.688772	4.217985	2.45	255.55	0.05	13	1	4.7	12.95	3.7	10.89167	3.300252	0.383647	1.310173	0.279197	1.209389	0.551684
Total Phosphorus (mg/l as P)	74	0.255946	0.232332	0.27956	0.24	18.94	0.07	0.62	0.19	0.32	0.55	0.13	0.010389	0.101926	0.011849	1.202009	0.279197	2.956813	0.551684
Total Solids (mg/l)	74	532.9189	509.9388	555.8991	531.5	39436	240	977	478	581	737	103	9838.377	99.18859	11.53044	0.881983	0.279197	5.065688	0.551684
Suspended Solids (mg/l)	74	70.77027	56.63314	84.9074	60.5	5237	6	388	32	82	382	50	3723.412	61.01977	7.093404	2.584458	0.279197	9.880135	0.551684
Dissolved Solids (mg/l)	1	200				200	200	200											
Sulfate (mg/l)	0																		
TKN (mg/l as N)	74	1.589189	1.418483	1.759895	1.45	117.6	0.2	5.7	1.1	2	5.5	0.9	0.542895	0.736814	0.085653	2.566667	0.279197	12.45983	0.551684
E. coli (CFU/100ml)	69	3734.058	164.6704	7303.446	530	257650	10	120000	210	1800	119990	1590	2.2E+08	14858.44	1788.746	7.31311	0.288737	57.15985	0.570095
TOC (mg/l)	0																		
Hardness (mg/l)	74	290.2838	275.2387	305.3289	297	21481	128	453	252	340	325	88	4217.055	64.93886	7.548989	-0.49341	0.279197	0.202781	0.551684
Chloride (mg/l)	0																		
Dissolved Oxygen (mg/l)	55	10.01091	9.402389	10.61943	9.85	550.6	5.42	15.61	8.41	11.24	10.19	2.83	5.066831	2.250962	0.30352	0.446378	0.321742	0.246859	0.633507
pH	57	7.879123	7.773886	7.984359	7.9	449.11	6.9	8.78	7.62	8.06	1.88	0.44	0.157305	0.396616	0.052533	0.005083	0.316327	0.082579	0.623134
Copper (ug/l)	73	6.258904	5.506731	7.011077	6	456.9	2	18	4.3	7.9	16	3.6	10.39301	3.223819	0.377319	1.267981	0.281029	2.761905	0.555223
Iron (ug/l)	73	2673.699	2048.535	3298.863	2100	195180	10	17000	1000	3300	16990	2300	7179499	2679.459	313.6069	2.948409	0.281029	12.0767	0.555223
Zinc (ug/l)	73	18.00959	15.41821	20.60097	15	1314.7	7.2	60	10	20	52.8	10	123.3581	11.10667	1.299937	1.730824	0.281029	3.031247	0.555223

Station: STM-37

•	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)	72	185.1667	176.1847	194.1486	183.5	13332	100	288	166	206	188	40	1460.986	38.22285	4 504606	0.133419	0.282898	0.378311	0.558831
Ammonia (mg/l as N)	71	0.117606	0 091362	0.143849	0.05	8 35	0 05	0 6	0 05	0 1	0 55	0 05	0.012293	0.110873	0.013158	2.313894	0.284805	5 994409	0 562511
BOD (mg/l)	35	3.211429	2.640697	3.782161	3	112.4	1 2	8 3	1.7	4 2	7.1	2.5	2 760454	1.661461	0.280838	1.108427	0 397694	1.259728	0 777794
COD (mg/l)	71	28.16479	26.16393	30.16565	28	1999 7	2 5	57.2	23.4	32.3	54 7	8 9	71 45803	8 453285	1.00322	0 54625	0 284805	2.839698	0.562511
Cyanide (mg/l)	72	0.005847	0.005238	0.006457	0.005	0.421	0.005	0.02	0.005	0.005	0.015	0	6 7E-06	0 002593	0.000306	4.102301	0 282898	18.37859	0 558831
Nitrate (mg/l as N)	71	3.78662	2.934608	4 638632	3	268 85	0.05	18	0.8	5.4	17.95	4 6	12.95714	3 599603	0.427194	1.476959	0 284805	2.771191	0 562511
Total Phosphorus (mg/l as P)	71	0.258592	0.229549	0.287634	0 24	18.36	0 05	0.79	0.18	0.32	0.74	0.14	0.015055	0.122699	0.014562	1.75373	0 284805	5 808527	0 562511
Total Solids (mg/l)	72	570.2778	552.1682	588.3874	575	41060	397	727	515	623.5	330	108.5	5939.161	77.06595	9.08231	-0.14646	0.282898	-0 4688	0.558831
Suspended Solids (mg/l)	72	71.23611	58.8633	83.60893	67.5	5129	4	264	31	92.5	260	61.5	2772.324	52 65286	6.205199	1.463581	0.282898	3.186084	0.558831
Dissolved Solids (mg/l)	0																		
Sulfate (mg/l)	0																		
TKN (mg/l as N)	0																		
E. coli (CFU/100ml)	70	1418	862.9899	1973.01	515	99260	10	11000	180	1800	10990	1620	5417984	2327.656	278.2082	2.909575	0.28675	8.774777	0.566265
TOC (mg/l)	0																		
Hardness (mg/l)	72	307.4167	293 5941	321 2392	317	22134	110	442	269	344	332	75	3460.049	58 82218	6.932261	-0 7489	0.282898	1.18519	0.558831
Chloride (mg/l)	0																		
Dissolved Oxygen (mg/l)	53	9.828113	9.370148	10.28608	9 9	520 89	6 42	13 64	8 76	10 7	7 22	1 94	2 760569	1 661496	0.228224	0.242103	0 327446	-0.29655	0.64442
pH	55	7.881455	7 799857	7.963052	7 9	433 48	7.1	8.41	7 72	8 1	1 31	0 38	0 091105	0 301836	0.0407	-0.66247	0 321742	0.223001	0.633507
Copper (ug/l)	11	4.236364	2.560264	5.912463	4 4	46 6	2	9 2	2	5 9	7 2	3 9	6.224545	2.494904	0.752242	0.749445	0 660687	-0.36861	1.279416
Iron (ug/l)	9	1440	702.1487	2177.851	1100	12960	240	3200	810	1900	2960	1090	921425	959.9088	319.9696	0.64934	0 717137	-0.30096	1.399708
Zinc (ug/l)	11	8.940909	6.562723	11.3191	8 2	98.35	2 25	15	6 8	12	12 75	5 2	12.53141	3.539973	1 067342	-0.17762	0.660687	0.167751	1.279416

APPENDIX B

ST. MARYS RIVER WATERSHED WATERS ASSESSED

IN THE CLEAN WATER ACT SECTION 305(b)

REPORT 1994 TO 1995

St. Marys Watershed Waters Assessed In The Clean Water Act Section 305(b) Report 1994-1995

Waterbody	Nearest Town(s)	Status of Designated Use Support	Method of Assessments	Probable Cause of Impairment	Miles Affected	Comments
St. Marys River	State Line to Near Fort Wayne	FS (Aquatic Life) NS (Recreational)	Monitored (c)	E. coil	11.2	CSO problems and submerges of outlying septic systems during flooding: Decatur sewage problems.
St. Marys River	Fort Wayne	FS (Aquatic Life) NS (Recreational)	Monitored (c) (b)	E. coil	7.5	Pesticide (dieldrin) found in sediment at low level of concern.
St. Marys River	Fort Wayne	FS (Aquatic Life) NS (Recreational)	Monitored (c)	E. coil	8.2	Pesticides in sediment is low level of concern. Poly-nuclear Aromatic Hydrocarbons (PAH's) in sediment at low level concern. Copper and zinc found at medium concern levels in sediment. 4, menthylphenol found at low levels of concern in sediment.

APPENDIX C

POTENTIAL STAKEHOLDERS FOR

THE ST. MARYS RIVER WATERSHED

POTENTIAL STAKEHOLDERS FOR THE ST. MARY'S WATERSHED

Decatur City Mayor
225 West Monroe Street
Decatur, IN 46733

Adams Co. Building & Planning Comm.
313 West Jackson Street # 338
Decatur, IN 46733

Adams County Council
112 South 2nd Street
Decatur, IN 46733

Adams County Commissioners
112 South 2nd Street
Decatur, IN 46733

Adams County Drainage Board
112 South 2nd Street
Decatur, IN 46733

Adams County Extension Office
13 West Jefferson Street # 213
Decatur, IN 46733

Adams County Surveyor
112 South 2nd Street
Decatur, IN 46733

Adams County Solid Waste District
3775 N 200 W
Decatur, IN 46733

Adams County Health Department
313 West Jefferson Street # 314
Decatur, IN 46733

USDA Farm Service Agency
210 E. Monroe Street # 1
Decatur, IN 46733

Adams County SWCD
210-2 east Monroe Street
Decatur, IN 46733

USDA-NRCS
P.O. Box 4020
Decatur, IN 46733

Berne City Mayor
158 W. Franklin Street
Berne, IN 46711

Adams County Cooperative Extension
313 West Jefferson Street # 213
Decatur, IN 46733

WELLS COUNTY

County Surveyor
102 W. Market Street # 107
Bluffton, IN 46714
(219) 824-6414

Wells County Plan Commission
223 W. Washington Street
Bluffton, IN 46714
(219) 824-6407

Wells County Health Department
223 W. Washington Street
Bluffton, IN 46174
(219) 824-6489

USDA NRCS
117 W. Harvest Road
Bluffton, IN 46174
(219) 824-0624

Cooperative Extension Service
1240 South 4-H Road
Bluffton, IN 46714

(219) 824-6412

Wells County SWCD
117 W. Harvest Road
Bluffton, IN 46714
(219) 824-1930

USDA Farm Service Agency
117 West Harvest Road
Bluffton, IN 46174
(219) 824-0624

Allen County

Fort Wayne Mayor's Office
1 East Main Street # 900
Fort Wayne, IN 46802
(219) 427-1111

Fort Wayne City Council
1 East Main Street # 122
Fort Wayne, IN 46802
(219) 427-1221

Allen County Commissioners
1 East Main Street # 200
Fort Wayne, IN 46815
(219) 449-7555

Allen County Extension Service
4001 Crescent Avenue
Fort Wayne, IN 46815
(219) 481-6826

Fort Wayne Flood Control
1 East Main Street # 760
Fort Wayne, IN 46802
(219) 427-1135

Fort Wayne Solid Management
1 East Main Street # 930
Fort Wayne, IN 46802
(219) 427-1345

Fort Wayne Water Pollution
5510 Lake Avenue
Fort Wayne, IN 46802
(219) 427-1143

Zoning Land Use Management
1 East Main Street Fl 8
Fort Wayne, IN 46802
(219) 427-1129

Allen County Health Department
Gary Chapple, REHS
1 East Main Street Fl
Fort Wayne, IN 46802
(219) 449-7695

USDA NRCS
2010 Inwood Drive
Fort Wayne, IN 46815
(219) 426-5441

Natural Resources Department
1903 Saint Marys Avenue
Fort Wayne, IN 46808
(219) 426-0807

Allen County SWCD
2010 Inwood Drive
Ft. Wayne, IN 46815
(219) 426-4637

Maumee River Basin Commission
5521 Oak Valley Place, Suite 205
Fort Wayne, IN 46845
(219) 449-7871

Acres Land Trust
Ted Heemstra
www.acres-land-trust.org

State St. Marys River 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 St. Marys River Watershed Stakeholders

USDA Natural Resources Conservation Service

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

NRCS Field Representatives are located in the counties.

U.S. EPA Region 5

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

U.S. Army Corps of Engineers

Louisville District

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

APPENDIX 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 Management

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

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

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

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

PRIVATE FUNDING SOURCES

National Fish and Wildlife Foundation

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

Individual Utilities

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

Indiana Hardwood Lumbermen's Association

Indiana Tree Farm Program

The Nature Conservancy

Land acquisition and restoration.
Southern Lake Michigan Conservation Initiative
Blue River Focus Area
Fish Creek Focus Area
Natural Areas Registry
Hoosier Landscapes Capitol Campaign

Conservation Technology Information Center (CTIC)

'Know Your Watershed' educational materials are available

Indiana Heritage Trust

Land acquisition programs

Ducks Unlimited

Land acquisition and habitat restoration assistance

Quail Unlimited

Pheasants Forever

Sycamore Land Trust

Acres Inc.

Land trust

Oxbow, Inc.

Land trust

SOURCES OF ADDITIONAL FUNDING OPPORTUNITIES

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

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

FIGURE 2-1
ST. MARY'S WATERSHED

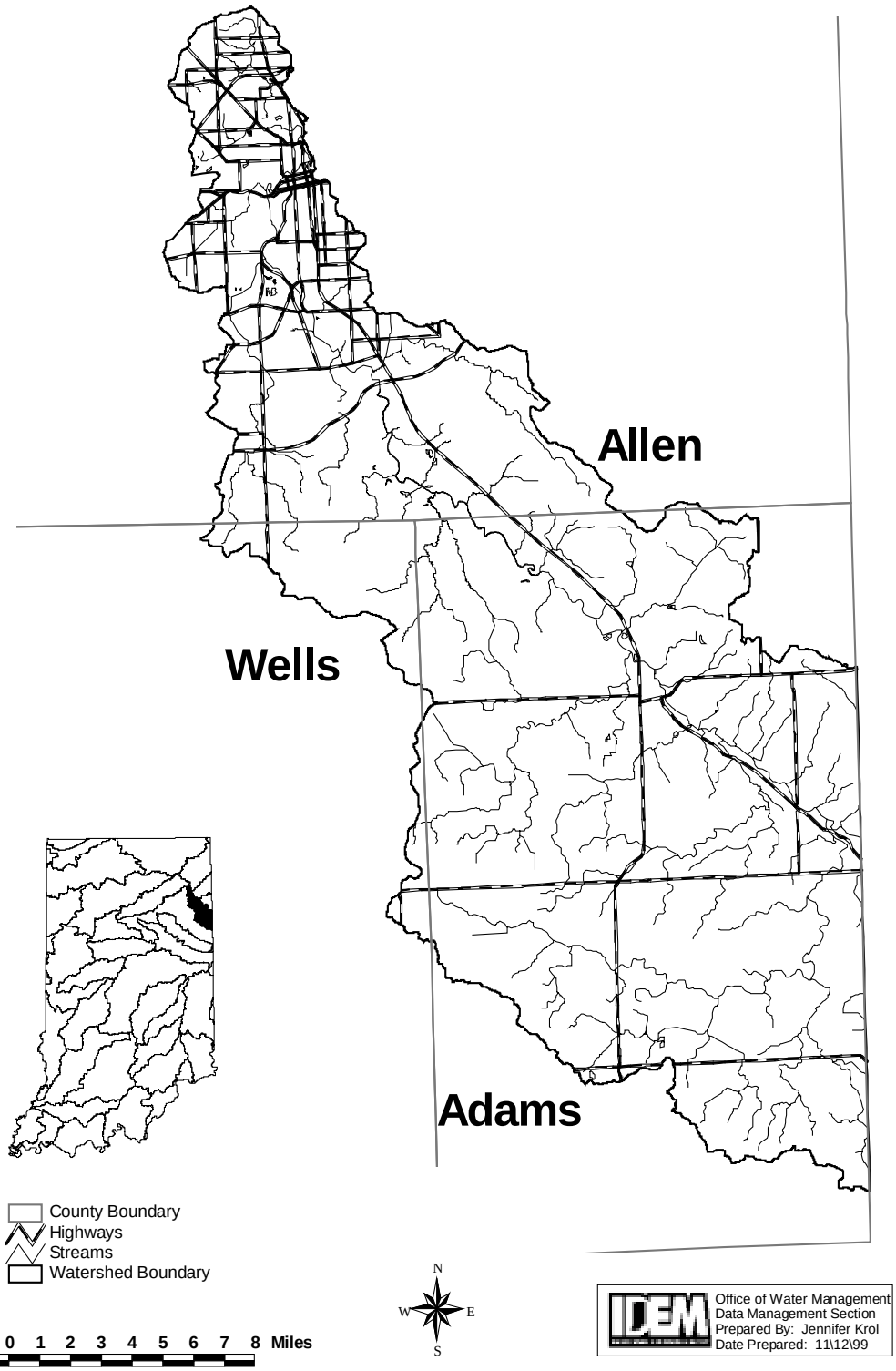


FIGURE 2-2
14-DIGIT HYDROLOGICAL UNIT CODE
ST. MARY'S WATERSHED

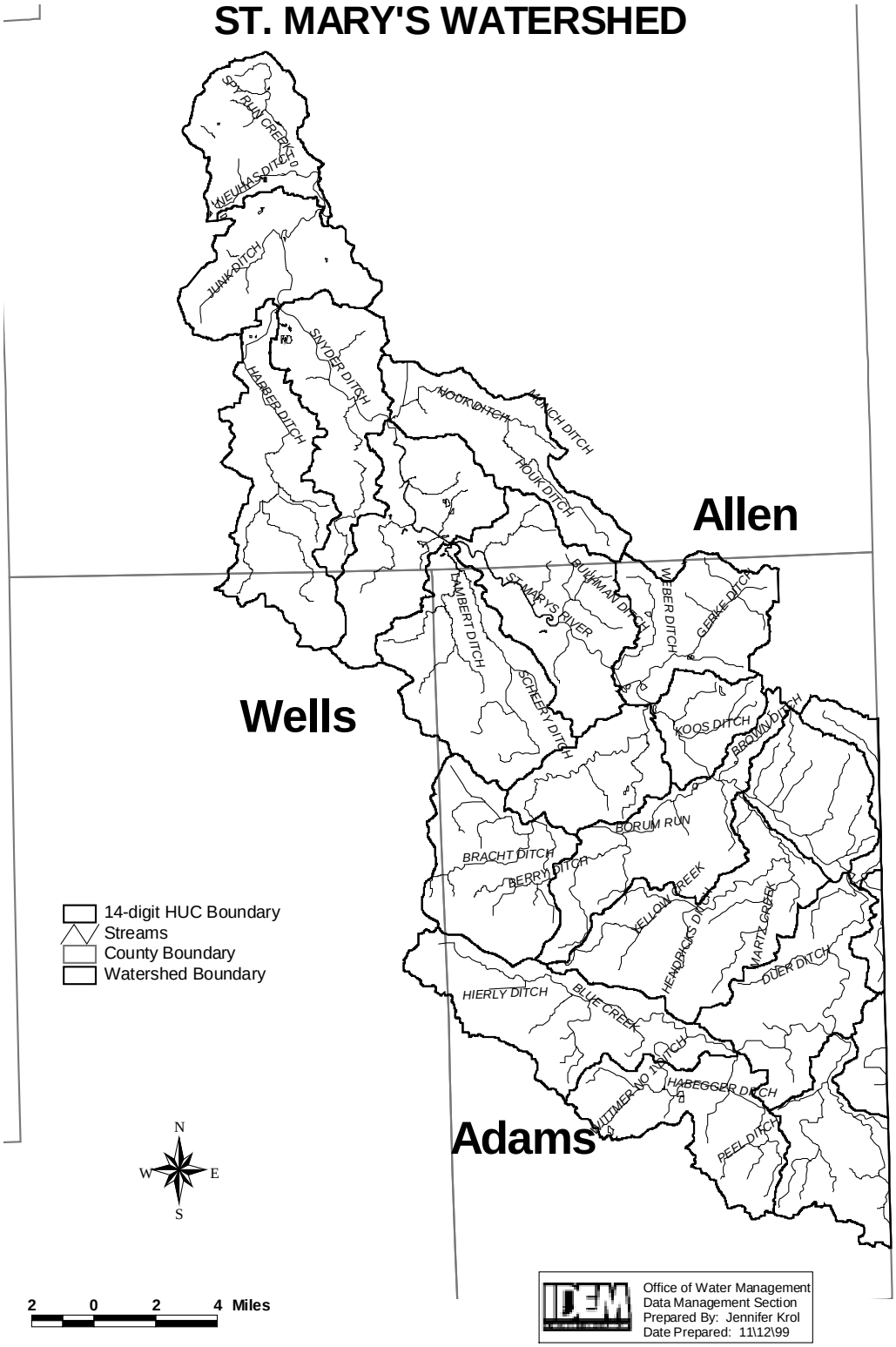


FIGURE 2-3
VEGETATIVE LAND COVER
ST. MARY'S WATERSHED

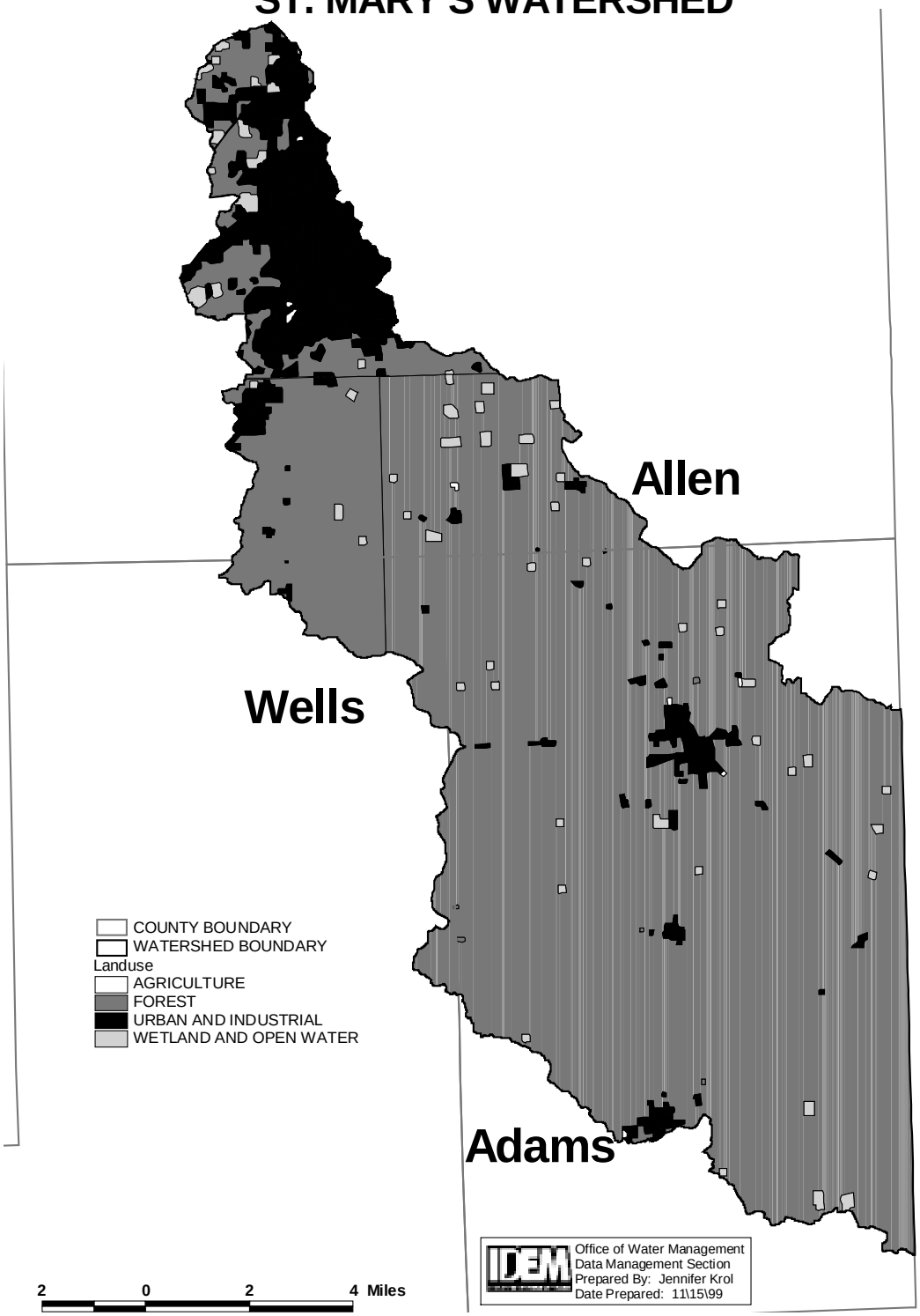


FIGURE 3-1
NPDES FACILITIES
ST. MARY'S WATERSHED

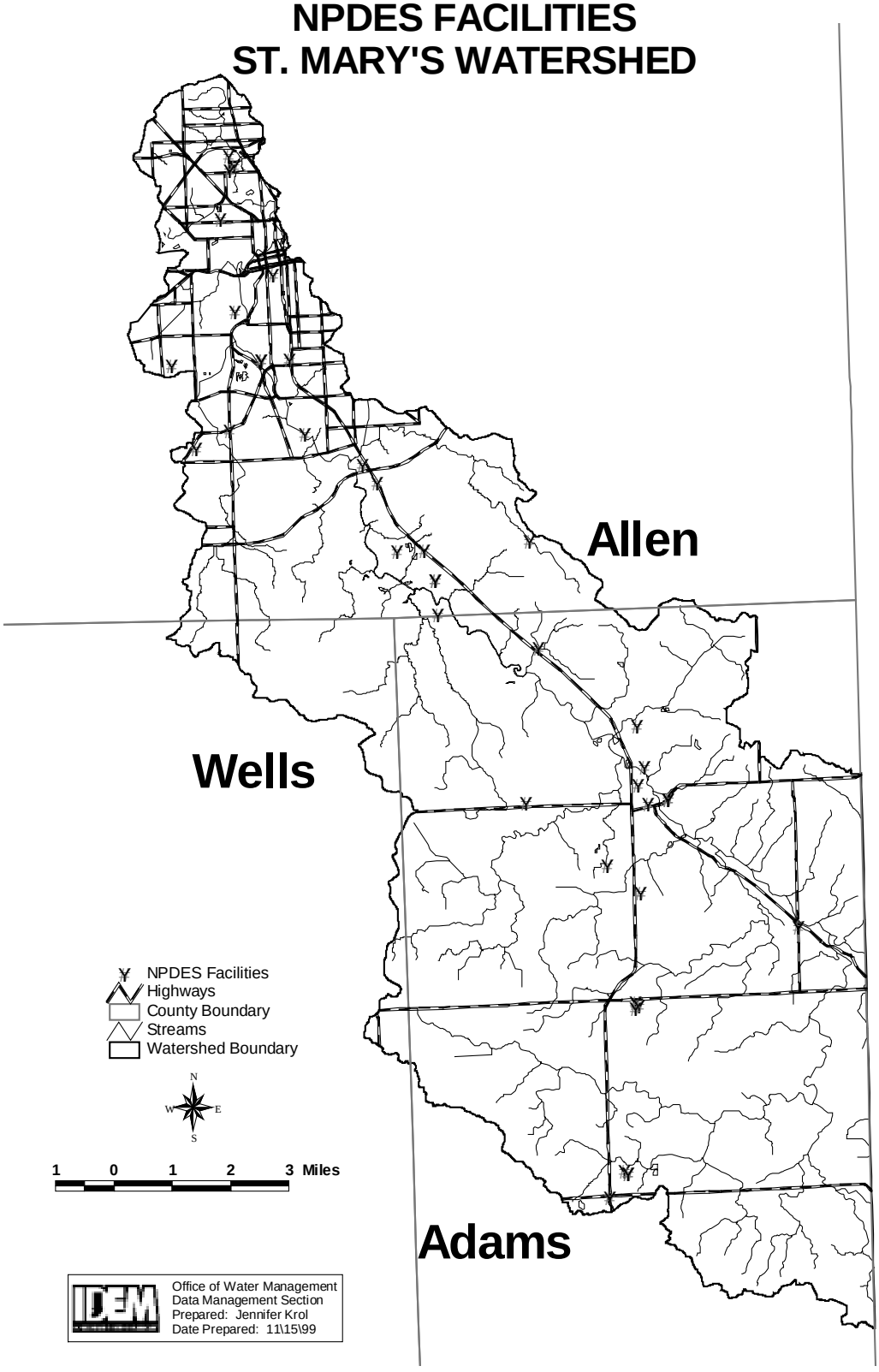


FIGURE 3-1
CLEAN WATER ACT SECTION 303(d) LISTED STREAMS
ST. MARY'S WATERSHED

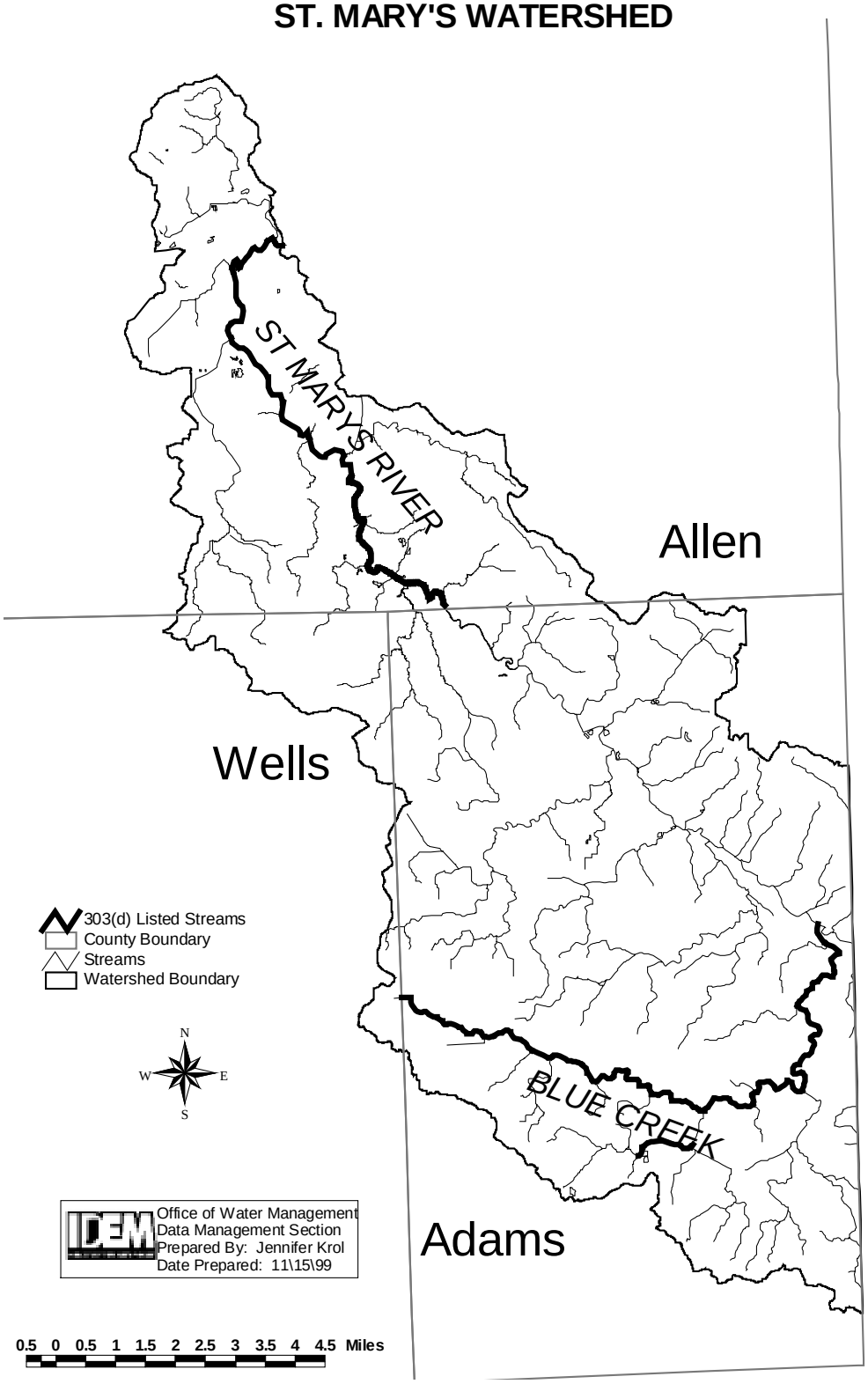


FIGURE 3-1
S319 AND EQIP AREAS
ST. MARY'S WATERSHED