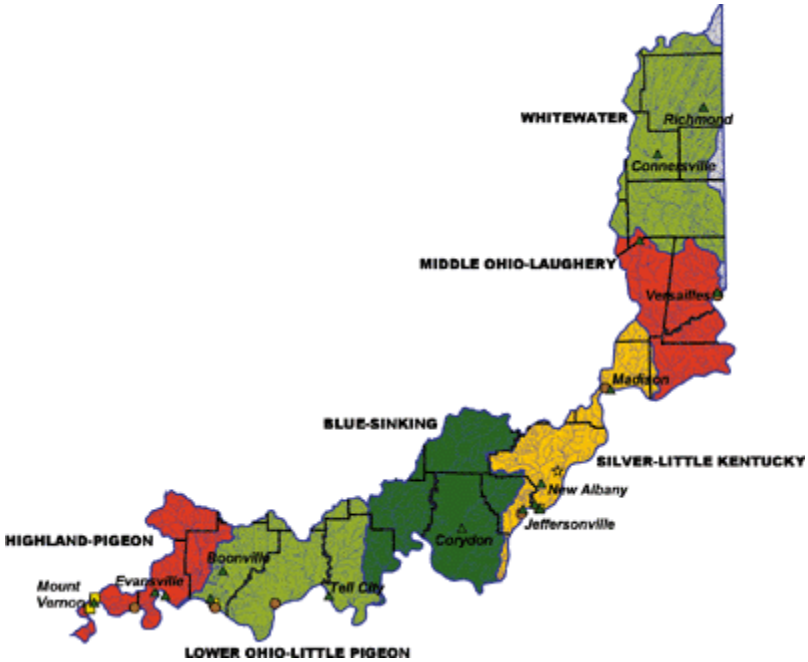
Watershed Restoration Action Strategy for the Silver-Little Kentucky Watershed

Part I: Characterization and Responsibilities



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FOREWORD

The Silver-Little Kentucky Watershed Restoration Action Strategy (WRAS) is intended to be a living document designed 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.

The first draft of the Silver-Little Kentucky WRAS was released for public review during the spring of 2002. A 60-day public comment period followed the public meetings at which this WRAS document was introduced. This final version of the WRAS includes public comments received during the 60-day comment period. For comments to be included in the final version, they were required to be written and submitted to WHPA, Inc. (the firm contracted to produce this WRAS) during the comment period.

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EXECUTIVE SUMMARY

The overall goal and purpose of Part I of the Watershed Restoration Action Strategy (WRAS) is to provide a reference point and map to assist local citizens with improving water quality. The major water quality concerns and recommended management strategies will be addressed in Part II: Concerns and Recommendations of the WRAS. This Strategy broadly covers the entire watershed; therefore, it is intended to be an overall strategy and does not dictate management and activities at the stream site or segment level. Water quality management decisions and activities for individual portions of the watershed are most effective and efficient when managed through sub-watershed plans. However, these sub-watershed plans must also consider the impact on the watershed as a whole.

This Strategy is intended to be a fluid document in order to respond to the changing and dynamic quality of our environment. Therefore, this Strategy will require revision when updated information becomes available. Additionally, the reader may notice that some of the information in this Strategy is provided in duplicate. This is a result of the interconnectedness of the issues discussed and an assumption made by the authors that many readers may only be interested in a few sections of this Strategy.

Overview of the Silver-Little Kentucky Watershed

Silver Creek originates in northern Clark County and flows to the south for approximately 30 miles before discharging into the Ohio River near New Albany, Indiana. The Indiana portion of the watershed also includes Fourteenmile Creek, which is located east of and runs parallel to Silver Creek, discharging into the Ohio River southeast of Charlestown. The western part of the watershed, including Silver Creek and Fourteenmile Creek, is characterized by knob and valley topography. The eastern section of the watershed in Indiana centers around Indian Kentuck Creek. This creek begins in Ripley County and flows to the south before meeting the Ohio River east of Madison, in Brooksburg.

Current Status of Water Quality in the Silver-Little Kentucky Watershed

Section 303(d) of the Clean Water Act requires states to identify waters that do not meet, or are not expected to meet, applicable water quality standards. The Clean Water Act Section 303(d) list for Indiana provides a basis for understanding the current status of water quality in the Silver-Little Kentucky Watershed. The waterbodies listed in Table 0-1 are on Indiana's 1998 Clean Water Act Section 303(d) list submitted to and approved by EPA (IDEM 1998). The 2002 draft 303(d) list has been completed and the final list will be released in October 2002. The draft 2002 list is not included in this document, but is available from IDEM's Office of Water Quality (http://www.state.in.us/idem/water/planbr/wqs/303d.html).

Water Quality Goal

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

Part I, Chapter 1: Characterization and Responsibilities

1. Introduction

The Clean Water Action Plan was developed by federal agencies in 1998 to commemorate the 25th anniversary of the Clean Water Act and to "help revitalize the nation's commitment to our valuable water resources." The Plan proposed 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" (USEPA 1998). A WRAS is essentially a large-scale coordination plan for an eight-digit hydrologic unit watershed. Each year, more assessments and data may become available. 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 have been completed or are 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 Silver-Little Kentucky watershed contains two parts. Part I provides a characterization of water quality in the watershed and agency responsibilities. Part II provides a discussion of resource concerns and recommended strategies.

1.1 Purpose of This Document

The overall goal and purpose of the Watershed Restoration Action Strategy Part I is to provide a reference point and roadmap to assist with improving water quality. Part I is a compilation of information, facts, and local concerns in this watershed. It will serve as a reference document for watershed groups and others involved in the assessment and planning of watershed restoration activities.

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

1.2 Guide to the Use of This Document

Chapter 1: Introduction - This Chapter provides a non-technical description of the purpose of Part 1 of the Strategy. This Chapter also provides an overview of stakeholder groups in the Silver-Little Kentucky watershed.

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

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

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

Chapter 4: Water Quality and Use Support Ratings - This Chapter describes the various types of water quality monitoring conducted by IDEM. It summarizes water quality in the watershed based on Office of Water Quality data, and presents a summary of use support ratings for those surface waters that have been monitored or evaluated.

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

1.3 Stakeholder Groups in the Watershed

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

Natural Resources Conservation Service

The Natural Resources Conservation Service (NRCS), under the U.S. Department of Agriculture (USDA), provides leadership in a partnership effort to help people conserve, maintain, and improve our natural resources and environment. The NRCS offers landowners financial, technical, and educational assistance to implement conservation practices on privately owned land. Using this help, farmers, ranchers, and forest landowners apply practices that reduce soil erosion, improve water quality, and enhance crop land, forest land, wetlands, grazing lands, and wildlife habitat. Incentives offered by USDA promote sustainable agricultural and forestry practices, which protect and conserve valuable farm and forest land for future generations. USDA assistance also helps individuals and communities restore natural resources after floods, fires, or other natural disasters.

Soil and Water Conservation Districts

Local Soil and Water Conservation Districts (SWCD) assist land users and residents in the protection and improvement of the local environment. SWCDs can provide technical and financial assistance to local watershed conservation groups.

Historic Hoosier Hills RC & D, Inc.

The vision of Historic Hoosier Hills Resource Conservation and Development is to serve as a catalyst to motivate local people to solve overall economic and natural resources problems of the area, and to properly develop, utilize, and conserve our natural and human resources. Projects have included implementing an EQIP Grant to provide alternative livestock watering systems as a tool to promote Management Intensive Grazing in southeastern Indiana, and educational activities such as development of a short video which encourages proper harvesting techniques for Southern Indiana hardwoods.

Hoosier River Watch

Hoosier Riverwatch is a state-sponsored water quality monitoring initiative. The program was started in 1994 to increase public awareness of water quality issues and concerns by training volunteers to monitor stream water quality. Hoosier Riverwatch collaborates with agencies and volunteers to:

- Increase public involvement in water quality issues through hands-on training of volunteers in stream monitoring and cleanup activities.
- Educate local communities about the relationship between land use and water quality.
- Provide water quality information to citizens and governmental agencies working to protect Indiana's rivers and streams.

Indiana Karst Conservancy

The Indiana Karst Conservancy is a non-profit organization dedicated to the preservation and conservation of Indiana's unique karst features. The IKC was formed by concerned individuals when it was apparent that no similar group was actively protecting such features for their inherent geological, biological, and archaeological importance. The purposes of the IKC are the management, protection, and acquisition of the karst areas in Indiana. The IKC also supports research and promotes education related to karst and its appropriate use.

River Fields, Inc.

River Fields protects, preserves, and enhances natural and cultural resources of the Ohio River between Westport and West Point on both sides of the River. River Fields advocates appropriate land and water use and urban design. This organization conserves land by acquiring interests in property along the Ohio River and its tributaries. It also educates the community and promotes public involvement in environmental stewardship.

Clark County SWCD

The mission of the Clark County SWCD is to inspire community involvement through teaching, leading and providing technical assistance to keep our natural resources abundant, fertile and clean. In the agricultural community, the Clark County SWCD promotes the development of buffer zones and provides conservation technical information and information on conservation programs that are a source of funding.

The Clark County SWCD addresses urban-related challenges, such as stormwater runoff, erosion, and water pollution from automobile oil and suburban lawns, through education, leadership and providing technical assistance. The Backyard Conservation program targets education activities to urban and suburban dwellers. The District, through IDNR, Division of Soil Conservation, provides technical assistance for urban erosion control (Rule 5). This program requires developers to establish and implement an erosion control plan on new developments disturbing 5 or more acres of land. The District has also recently received a 319 grant to promote urban nonpoint source pollution prevention. The District, through the USDA Natural Resources Conservation Service, also provides technical advisory assistance to County and City drainage boards, local planning commissions and other units of government upon request.
The SWCD's Education Coordinator offers assistance and educational resources to schools and community groups, and provides leadership in the District's conservation education/information program. The SWCD's Natural Resources Educational Facility is home to the 50 Trees of Indiana Exhibit, a wetland, the path of a waterdrop exhibit, a butterfly garden and other wildlife plantings and habitat areas. The area is used throughout the year for group programs as well as enjoyed by thousands during the county 4-H fair.
The Clark County SWCD is currently working with the Clark County Solid Waste Management District to set up a household hazardous waste disposal facility which will be open in the fourth quarter of 2002. This will reduce the amount of household hazardous wastes that are improperly disposed of by pouring down the drain or on the ground, negatively affecting water quality. Once the facility is open, the Solid Waste District will be able to assist in quantifying the types and amounts of household hazardous waste diverted from the watershed through collection at the facility.

Clarks Valley Land Trust

Clark's Valley seeks to preserve and enhance the rural character and natural integrity of land in Clark County and neighboring areas through land stewardship. Clark's Valley, affiliated with the Clark County Soil and Water Conservation District, works hand-in-hand with landowners to develop conservation easements to help protect farmland, sensitive areas, and historic sites.

Part I, Chapter 2: General Watershed Description

This Chapter provides a general description of the Silver-Little Kentucky Watershed and includes the following:
Section 2.1 Silver-Little Kentucky Watershed Overview
Section 2.2 Land Cover, Population, and Growth Trends
Section 2.3 Agricultural Activities in the Silver-Little Kentucky Watershed
Section 2.4 Significant Natural Areas in the Silver-Little Kentucky Watershed
Section 2.5 Surface Water Use Designations and Classifications
Section 2.6 US Geological Survey Water Use Information for the Silver-Little Kentucky Watershed
Section 2.7 Superfund Sites in the Silver-Little Kentucky Watershed

2.1 Silver-Little Kentucky Watershed Overview

The Silver-Little Kentucky watershed is an 8 digit (05140101) hydrologic unit code (HUC) watershed located in southeastern Indiana and northern Kentucky (Figure 2-1). The watershed encompasses approximately 1253 square miles in thirteen different counties in Indiana and Kentucky and approximately 844 miles of perennial streams (USEPA 2002a). It is subdivided into 73 subbasins represented on the map by 14 digit HUCs (Figure 2-2). The land cover in the watershed is evenly split between agricultural and forest vegetation. The majority of the soils in the watershed have high to very high erosion potential (Figure 2-3).
Silver Creek originates in northern Clark County and flows to the south for approximately 30 miles before discharging into the Ohio River near New Albany, Indiana. The Indiana portion of the watershed also includes Fourteenmile Creek, which is located east of and runs parallel to Silver Creek, discharging into the Ohio River southeast of Charlestown. The western part of the watershed, including Silver Creek and Fourteenmile Creek, is characterized by knob and valley topography. The eastern section of the watershed in Indiana centers around Indian Kentuck Creek. This creek begins in Ripley County and flows to the south before meeting the Ohio River east of Madison, in Brooksburg.
The Silver-Little Kentucky Watershed is located primarily in the Eastern Corn Belt plains ecoregion, which is characterized by rolling plains, with beech/maple vegetation, and soils that are good for cropland. The eastern portion of the watershed is located in the Interior Plateau ecoregion, which is characterized by open hills, irregular plains, and tablelands. Oak-hickory forest dominates, with some areas of bluestem prairie and cedar glades, and a diverse fish fauna is present (US EPA 1999).

2.2 Land Cover, Population, and Growth Trends

2.2.1 General Land Cover

Native vegetation in the Silver-Little Kentucky watershed is an upland mixed hardwood forest in varied stages of succession. The U.S. Geological Survey - Biological Resources Division and the U.S. Fish and Wildlife Service are overseeing the National Gap Analysis Program (GAP). In Indiana, Indiana State University and Indiana University are carrying out the Indiana GAP Project which involves an analysis of current vegetative land cover through remote sensing (ISU 2001). This analysis provides vegetative land cover data in 30 by 30-meter grids (Figure 2-4). The following is a summary of vegetative cover in the watershed determined from the GAP image:

7.0% Urban (impervious, low and high density)
44.8% Agricultural vegetation (row crop and pasture)
46.0% Forest vegetation (shrubland, woodland, forest)
1.7% Wetland vegetation (Palustrine: forest, shrubland, herbaceous)
0.4% Open Water

2.2.2 Population

The 2000 total population in the eight counties that have land portions in the watershed was 319,096 (Census 2001). 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 Silver-Little Kentucky watershed. For example, only a portion of Floyd and Ripley Counties are within the land area of the Silver-Little Kentucky watershed (Figure 2-1). A better estimate of the population within the Silver-Little Kentucky watershed may be the 1995 U.S. Geological Survey Water Use Reports, which show a total population in the watershed of 165,570 in 1995 (Table 2-7).
The U.S. Census and the Indiana Business Research Center also provide information about the population in cities and towns (IBRC 1997). Table 2-2 contains population estimates for various cities and towns located within the watershed.

2.3 Agricultural Activities in the Silver-Little Kentucky Watershed

Agriculture is one of the dominant land uses in the Silver-Little Kentucky Watershed. Section 2.2.1 shows that 44.8 percent of land cover in the watershed is agricultural vegetation. This section provides an overview of the agricultural activities in the watershed.

2.3.1 Livestock Operations

Livestock production within the watershed encompasses several species, and the overall composition changes from county to county. Hogs and cattle are produced in all eight counties. Clark, Harrison, and Washington counties produce significant numbers of layers and Jefferson County produces a number of horses and ponies. See Table 2-3 for livestock inventory numbers. Some animals are raised in open lots or pastures and some are raised in confined feeding lots or buildings.
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 1999a).
Indiana law defines a confined feeding operation as any livestock operation engaged in the confined feeding of at least 300 cattle, or 600 swine or sheep, or 30,000 fowl, such as chickens, ducks and other poultry. The IDEM regulates these confined feeding operations, as well as smaller livestock operations which have violated water pollution rules or laws, under IC 13-18-10.
As of October 1999, there were 52 livestock producers operating under the Confined Feeding Rules in the eight counties of the watershed (IDEM 1999). Table 2-3 shows livestock numbers from the USDA Agricultural Census "inventory" animals in each county (USDA 1997).

2.3.2 Crop Production

The soils of the Silver-Little Kentucky watershed are not especially good for crop production, and the rugged topography makes farming difficult. Table 2-4 lists the acres of the major crops produced in 1997 throughout the eight counties in the watershed. For 1997, total acres of soybeans for beans edged out total acres of corn for grain as the number one crop produced in the eight counties. Corn and soybeans are clearly the primary crops produced in the

watershed on the basis of total acres. Hay is also an important crop in the watershed, as Harrison County is the top hay producer in the state.

2.4 Significant Natural Areas in the Silver-Little Kentucky Watershed

In 1993, the Indiana Natural Resources Commission (NRC) adopted its "Outstanding Rivers" List for Indiana. This listing is referenced in the standards for utility line crossings within floodways, formerly governed by IC 14-28-2 and now controlled by 310 IAC 6-1-16 through 310 IAC 6-1-18. Except where incorporated into a statute or rule, the "Outstanding Rivers List" is intended to provide guidance rather than to have regulatory application (NRC 1997). To help identify the rivers and streams which have particular environmental or aesthetic interest, a special listing has been prepared by IDNR's Division of Outdoor Recreation. This listing is a corrected and condensed version of a list compiled by American Rivers and dated October 1990. The NRC has adopted the IDNR listing as an official recognition of the resource values of these waters. A river included in the "Outstanding Rivers List" qualifies under one or more of 22 categories. Table 2-5 presents the rivers in the Silver-Little Kentucky watershed which are on the "Outstanding Rivers List" and their significance.

State Parks, Forests, Nature Preserves, and Recreation Areas

Table 2-6 lists a number of parks, forests, nature preserves and other recreational areas within the counties included in the Silver-Little Kentucky Watershed. Since all the special areas in these counties are listed, some of the areas may be located outside of the Silver-Little Kentucky Watershed.

2.5 Surface Water Use Designations and Classifications

The following uses are designated by the Indiana Water Pollution Control Board (327 IAC 2-1-3 [327 IAC 2-1.5-5 for the Great Lakes system]):

- Surface waters of the state are designated for full-body contact recreation.
- All waters, except limited use waters, will be capable of supporting a well-balanced, warm water aquatic community and, where natural temperatures will permit, will be capable of supporting put-and-take trout fishing. All waters capable of supporting the natural reproduction of trout as of February 17, 1977, shall be so maintained.
- All waters, which are used for public or industrial water supply, must meet the standards for those uses at the point where water is withdrawn.
- All waters, which are used for agricultural purposes, must meet minimum surface water quality standards.
- All waters in which naturally poor physical characteristics (including lack of sufficient flow), naturally poor or reversible man-induced conditions, which came into existence prior to January 1, 1983, and having been established by use attainability analysis, public comment period, and hearing may qualify to be classified for limited use and must be evaluated for restoration and upgrading at each triennial review of this rule.
- All waters, which provide unusual aquatic habitat, which are an integral feature of an area of exceptional natural beauty or character, or which support unique assemblages of aquatic organisms may be classified for exceptional use (or designated as outstanding state resource waters in the Great Lakes system).

All waters of the state, at all times and at all places, including the mixing zone, shall meet the minimum conditions of being free from substances, materials, floating debris, oil, or scum attributable to municipal, industrial, agricultural, and other land use practices, or other discharges (327 IAC 2-1-6 [327 IAC 2-1.5-8 for the Great Lakes system]):

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

2.5.1 Surface Water Classifications in the Silver-Little Kentucky Watershed

The statewide classifications discussed in Section 2.5 apply to all stream segments in the Silver-Little Kentucky Watershed. There are no waters in the Silver-Little Kentucky Watershed that are currently designated for limited or exceptional use by the Indiana Water Pollution Control Board in 327 IAC 2-1-11 (1997).

2.6 US Geological Survey Water Use Information for the Silver-Little Kentucky Watershed

The U.S. Geological Survey's (USGS) National Water-Use Information Program is responsible for compiling and disseminating the nation's water-use data. The USGS works in cooperation with local, State, and Federal environmental agencies to collect water-use information at a site-specific level. USGS also compiles the data from hundreds of thousands of sites to produce water-use information aggregated up to the county, state, and national levels. Every five years, data at the state and hydrologic region level are compiled into a national water-use data system. Table 2-7 shows the USGS Water-Use information for the Silver-Little Kentucky Watershed for 1995 (USGS 2001).

2.7 Superfund Sites in the Silver-Little Kentucky Watershed

Superfund is a program administered by the EPA to locate, investigate, and clean up the worst hazardous waste sites throughout the United States. Before the Superfund Program was established in 1980, hazardous wastes were often left in the open, where they seeped into the ground, flowed into rivers and lakes, and contaminated soil and groundwater. Consequently, where these practices were intensive or continuous, there were uncontrolled or abandoned hazardous waste sites. These sites include abandoned warehouses, manufacturing facilities, processing plants, and landfills (USEPA 2002b).

There are no Superfund (CERCLA) sites listed in the Silver-Little Kentucky Watershed.

Part I, Chapter 3: Causes and Sources of Water Pollution

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

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

3.1 Causes of Pollution

'Causes of pollution' 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, pesticides, toxicants (such as heavy metals, polychlorinated biphenyls [PCBs], chlorine, pH, ammonia, and cyanide), 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.

3.1.1 *E. coli* Bacteria

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

E. coli water quality standards have been established in order to ensure safe use of waters for water supplies and recreation. 327 IAC 2-1-6 Section 6(d) (327 IAC 2-1.5-8(e)(2) for Great Lakes system) 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.

There are two segments of the Silver-Little Kentucky watershed that appear on Indiana's 303(d) list for impairment due to *E. coli* contamination. These segments are currently scheduled for TMDL development from 2000-2004.

3.1.2 Toxic Substances

327 IAC 2-1-9(45) (327 IAC 2-1.5-2(84) for Great Lakes system) 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 in 327 IAC 2-1-6 (327 IAC 2-1.5-8 for Great Lakes system). 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. These standards are listed in 327 IAC 2-1-6 (327 IAC 2-1.5-8 for Great Lakes system). Point source discharges of metals are controlled through the National Pollution Discharge Elimination System (NPDES) permit process. Mass balance models are employed to determine allowable concentrations for a permit limit. Municipalities with significant industrial users discharging wastes to their treatment facilities limit the heavy metals from these industries through a pretreatment program. Source reduction and wastewater recycling at waste water treatment plants (WWTP) also reduces the amount of metals being discharged to a stream. Nonpoint sources of metal 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.

There are three segments of the Silver-Little Kentucky watershed that appear on Indiana's 303(d) list for impairment due to metal contamination. Two segments are listed for their mercury concentrations, and the third is listed for lead. All three segments are currently scheduled for TMDL development from 2010-2012.

Polychlorinated biphenyls (PCBs)

Polychlorinated biphenyls (PCBs) were first created in 1881 and began to be commercially manufactured around 1929. 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. The PCB contamination present in our surface waters and environment today is the result of historical waste disposal practices. There are three segments of the Silver-Little Kentucky watershed that appear on Indiana's 303(d) list for impairment due to PCB contamination. These three segments are currently scheduled for TMDL development from 2010-2012.

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 (327 IAC 2-1.5-8 for Great Lakes system).

Ammonia is not a significant source of pollution in this watershed. There are no segments of the Silver-Little Kentucky watershed currently appearing on Indiana's 303(d) list for impairment due to ammonia contamination.

Pesticides

Pesticides include a broad array of chemicals used to control plant growth (herbicides), insects (insecticides), fungi (fungicides), and other organisms. Pesticides enter surface waters primarily through nonpoint source runoff from agricultural lands and urban areas. While some pesticides undergo biological degradation by soil and water bacteria, others are very resistant to degradation. Such nonbiodegradable compounds may become "fixed" or bound to clay particles and organic matter in the soil, making them less available. However, many pesticides are not permanently fixed by the soil. Instead they collect on plant surfaces and enter the food chain, eventually accumulating in wildlife such as fish and birds. Many pesticides have been found to negatively affect both humans and wildlife by damaging the nervous, endocrine, and reproductive systems or causing cancer (Kormondy 1996).

Pesticide contamination is due not only to current nonpoint sources of pesticides, but also to legacy pesticides, or those pesticides that are no longer being used but are still persistent in the environment. Thus, measurements of pesticide pollution may not be accurate estimates of the amount of pesticides currently being discharged into surface waters, but rather reflections of both past and present pesticide use.

Pesticides are not a significant source of pollution in this watershed. There are no segments of the Silver-Little Kentucky watershed currently appearing on Indiana's 303(d) list for impairment due to pesticide contamination.

Cyanide

Cyanide is used in several manufacturing processes, including metal finishing and glass manufacturing, and consequently it may enter surface waters through industrial runoff. Cyanide ties up the hemoglobin sites that bind oxygen to red blood cells, resulting in oxygen deprivation. This condition is known as cyanosis and is characterized by a blue skin color. Cyanide also causes chronic effects on the thyroid and central nervous system (Davis & Cornwell 1998). Most water quality monitoring programs measure total cyanide. This may overestimate the threat posed by cyanide contamination however, as total cyanide is a waste product of wastewater treatment plants. The parameter of

concern to human health is free cyanide, which is included in measurements of total cyanide but different methods must be used to measure it separately.
Cyanide is not a significant source of pollution in this watershed. There are no segments of the Silver-Little Kentucky watershed currently appearing on Indiana's 303(d) list for impairment due to cyanide contamination.

3.1.3 Oxygen-Consuming Wastes

Oxygen-consuming wastes include decomposing organic matter or chemicals, which reduce dissolved oxygen in water through chemical reactions, creating what is known as biochemical oxygen demand (BOD). 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 2-1 Section 6(b)(3) states that concentrations of dissolved oxygen shall average at least five milligrams per liter per calendar day and shall not be less than four milligrams per liter at any time. Salmonid waters which support cold water fish have a higher dissolved oxygen requirement. In these waters, dissolved oxygen concentrations shall not be less than six milligrams per liter at any time and shall not be less than seven milligrams per liter in areas where spawning and imprinting occur during the season in which they occur. Dissolved oxygen concentrations in the open waters of Lake Michigan shall not be less than seven milligrams per liter at any time (327 IAC 2-1.5-8(d)(1)).
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 temperature also generally allows for retention of higher dissolved oxygen concentrations. Low dissolved oxygen levels tend to occur more often in warmer, slow-moving waters. In general, the lowest dissolved oxygen concentrations occur during the warmest summer months and particularly during low flow periods.
Sources of dissolved oxygen depletion include wastewater treatment plant effluent, the decomposition of organic matter (such as leaves, dead plants and animals) and organic waste matter that is washed or discharged into the water. Sewage from human and household wastes is high in organic waste matter. Bacterial decomposition can rapidly deplete dissolved oxygen levels unless these wastes are adequately treated at a wastewater treatment plant. In addition, excess nutrients in a water body may lead to an over-abundance of algae and reduce dissolved oxygen in the water through algal respiration and decomposition of dead algae. Also, some chemicals may react with and bind up dissolved oxygen. Industrial discharges with oxygen-consuming wasteflow may be resilient instream and continue to use oxygen for a long distance downstream.
Oxygen-consuming wastes are not a significant source of pollution in this watershed. There are no segments in the Silver-Little Kentucky watershed appearing on Indiana's 303(d) list for impairment due to oxygen-consuming wastes.

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 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.
Nutrients are not a significant source of pollution in this watershed. There are no segments of the Silver-Little Kentucky watershed currently appearing on Indiana's 303(d) list for impairment due to nutrient contamination.

3.2 Point Sources of Pollution

As discussed previously, sources of water pollution are divided into two broad categories: point sources and nonpoint sources. This section focuses on point sources. Section 3.2.1 defines point sources and Section 3.2.2 discusses point sources in the Silver-Little Kentucky Watershed.

3.2.1 Defining Point Sources

Point sources refer to discharges that enter surface waters through a pipe, ditch or other well-defined point of discharge. The term applies to wastewater and stormwater discharges from a variety of sources. Wastewater point source discharges include municipal (city and county) and industrial wastewater treatment plants and small domestic wastewater treatment systems that may serve schools, commercial offices, residential subdivisions and individual homes. Stormwater point source discharges include stormwater collection systems for medium and large municipalities which serve populations greater than 100,000 and stormwater discharges associated with industrial activity as defined in the Code of Federal Regulations (40 CFR 122.26(a)(14)). The primary pollutants associated with point source discharges are oxygen-demanding wastes, nutrients, sediment, color and toxic substances including chlorine, ammonia and metals.

Point source dischargers in Indiana must apply for and obtain a National Pollutant Discharge Elimination System (NPDES) permit from the state. Discharge permits are issued under the NPDES program, which is delegated to Indiana by the US Environmental Protection Agency (EPA). See Chapter 5 for a description of the NPDES program and permitting strategies.

3.2.2 Point Source Discharges in the Silver-Little Kentucky Watershed

As of June 1999, there were 129 active NPDES permits within the Silver-Little Kentucky watershed (Table 3-3, Figure 3-1). Of the 129 active NPDES permits, 9 are for major discharges (see Table 5-1 for a definition of a major discharge). Another point source covered by NPDES permits is combined sewer overflows (CSO). A combined sewer system is a wastewater collection system that conveys sanitary wastewater (domestic, commercial and industrial wastewater) 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. Table 3-2 shows the CSOs in the Silver-Little Kentucky watershed.

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

3.3 Nonpoint Sources of Pollution

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

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

3.3.1 Agriculture

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

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

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

3.3.2 Urban/Residential

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

Urban drainage systems, including curb and guttered roadways, also allow urban pollutants to reach surface waters quickly and with little or no filtering. Pollutants include lawn care pesticides and fertilizers, automobile fluids, lawn and household wastes, road salts, and *E. coli* bacteria (from animals and failing septic systems). Household hazardous wastes have the potential to severely contaminate the water if disposed of improperly by pouring down the drain or on the ground. 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 streams results in degraded waters. Many waters adjacent to urban areas are rated as biologically poor. This degradation also exists in lakes, which have been heavily influenced by adjacent urban development.
The population figures discussed in Section 2.3.2 are good indicators of where urban development and potential urban water quality impacts are likely to occur. Concentrated areas where urban development is high may lead to further water quality problems associated with the addition of impervious surfaces next to surface waters.

3.3.3 Onsite Wastewater Disposal

Septic systems contain all of the wastewater from a household or business. A complete septic system consists of a septic tank and an absorption field to receive effluent from the septic tank. The septic tank removes some wastes, but the soil absorption field provides further absorption and treatment. Septic systems can be a safe and effective method for treating wastewater if they are sized, sited, and maintained properly. However, if the tank or absorption field malfunction or are improperly placed, constructed or maintained, nearby wells and surface waters may become contaminated.
Some of the potential problems from malfunctioning septic systems include:

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

Pollutants associated with onsite wastewater disposal may also be discharged directly to surface waters through direct pipe connections between the septic system and surface waters (straight pipe discharge). However, 327 IAC 5-1-1.5 specifically states that "point source discharge of sewage treated or untreated, from a dwelling or its associated residential sewage disposal system, to the waters of the state is prohibited".

3.3.4 Construction

Construction activities that involve excavation, grading or filling can result in significant erosion and, consequently, sedimentation in streams, 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.

3.3.5 Degraded Wetlands

Healthy wetlands and riparian areas perform valuable water quality-related functions by filtering water and trapping sediments and pollutants. The ability of wetland and riparian areas to remove NPS pollutants from surface water runoff is determined by plant species composition, geochemistry and hydrogeomorphic characteristics. Any changes to these characteristics can affect the filtering capacities of these areas. Activities such as channelization, which modify the hydrology of floodplain wetlands, can alter the ability of these areas to retain sediment when they are flooded and result in erosion and a net export of sediment from the wetland (Reinelt and Horner 1990).
Management measures have been developed for the control of NPS pollution through the protection and restoration of wetlands and riparian areas and the use of vegetated treatment systems. Information on degraded wetlands as potential contributors to nonpoint source pollution and the management measures for NPS pollution abatement is available in the USEPA Draft Guidance entitled "National Management Measures to Protect and Restore Wetlands and Riparian Areas for the Abatement of Nonpoint Source Pollution" (USEPA 2001).

Part I, Chapter 4: Water Quality and Use Support Ratings in the Silver-Little Kentucky Watershed

This section provides a detailed overview of water quality monitoring, water quality, and use support ratings in the Silver-Little Kentucky watershed and includes the following:
Section 4.1 Water Quality Monitoring Programs
Section 4.2 Summary of Ambient Monitoring Data for the Silver-Little Kentucky Watershed
Section 4.3 Fish Consumption Advisories
Section 4.4 Clean Water Act Section 305(b) Report
Section 4.5 Clean Water Act Section 305(b) Assessment and Use-Support: Methodology

4.1 Water Quality Monitoring Programs

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

4.1.1 Office of Water Quality Programs

The Water Quality Assessment Branch of the Office of Water Quality is responsible for assessing the quality of water in Indiana's lakes, rivers and streams. This assessment is performed by field staff from the Survey Section and the Biological Studies Section. Virtually every element of IDEM's surface water quality management program of IDEM is directly or indirectly related to activities currently carried out by this Branch. The biological and surface water monitoring activities identify stream reaches, watersheds or segments where physical, chemical and/or biological quality has been or would be impaired by either point or nonpoint sources. This information is used to help allocate waste loads equitably among various sources in a way that would ensure that water quality standards are met along stream reaches in each of the nearly 100 stream segments in Indiana.
The purpose of the Surveys Section is to provide the water quality and hydrological data required for the assessment of Indiana's waters by conducting Watershed/Basin Surveys and Stream Reach Surveys. In 1996, the Section began a five-year comprehensive study (Basin Monitoring Strategy) of the State's ten major watersheds. Information from these studies is being 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

There are numerous local volunteer monitoring programs actively working throughout the Silver-Little Kentucky watershed. Almost all of these volunteer monitoring programs are conducted through schools and county Soil and Water Conservation Districts. The individual volunteer monitoring programs in the watershed receive support and guidance from Indiana WaterWatchers, IDNR's Hoosier Riverwatch, and various other groups. The main focus of the various watershed volunteer monitoring programs is education.

The following volunteer monitoring programs are involved in conservation and/or education activities in the Silver-Little Kentucky watershed:

Group Name: Beargrass Creek Task Force
Contact: Kurt D. Mason
Contact Address: 4229 Bardstown Rd Ste 202
Louisville, KENTUCKY 40218-3241
Contact Phone: 502-499-1900
Contact Email: jccd@iglou.com
URL: http://members.iglou.com/jccd/
Activity: Watershed Alliance/Council
Description: Bioengineering restoration project on streambank, donation of streambank easements, formation of "No Mow Zones" along Creek, formalized community training projects

Group Name: Friends of Beargrass Creek
Contact: Bruce W. Scott
Contact Address: 3025 Wenworth Ave
Louisville, KENTUCKY 40206
Contact Phone: (502) 897-6804
Contact Email: bwscott@usa.net
Activity: Watershed Alliance/Council

Group Name: Harrods Creek Task Force
Contact: Dr. David Wicks
Contact Address: 6215 Deep Creek Court
Prospect, KENTUCKY
Contact Phone: 502-228-7432
Contact Email: wicks@lousville.edu
Activity: Watershed Alliance/Council
Description: Monitor and protect Harrods Creek.

Group Name: Kentucky Environmental Quality Commission
Contact: Leslie Cole, Executive Director
Contact Address: Ash Annex 14 Reilly Road
Frankfort, KENTUCKY 40601
Contact Phone: 502-564-2150
Contact Email: EQC@mail.nr.state.ky.us
URL: http://www.state.ky.us/agencies/eqc/eqc.html
Activity: Other
Description: To monitor environmental trends; promote partnerships to improve and protect the environment; facilitate public understanding, discussion and resolution of environmental issues; and advise state officials on environmental matters.

Group Name: Oldham County Soil & Water Conservation District
Contact: Donna Williams
Contact Address: 105 East Adam Street
LaGrange, KENTUCKY 40031
Contact Phone: (502) 222-5123
Contact Email: occd@iglou.com
Activity: Watershed Alliance/Council

Group Name: River Fields, Inc.
Contact: Meme Sweets Runyon or Dave French
Contact Address: 643 W Main Street Suite 200
Louisville, KENTUCKY 40202-2921
Contact Phone: 502-583-3060
Contact Email: rivefld s@aol.com
Activity: Restoration/Conservation Project
Description: River Fields, which is celebrating its 41st anniversary this year, is one of the oldest river conservation organizations in the United States. It is both an advocacy group and a land trust. In its advocacy role River Fields is not opposed to development. Instead, it promotes environmentally sensitive land and water use based on factual information and reasonable decision-making with public involvement.

Group Name: Save The Valley, Inc.
Contact: Richard Hill
Contact Address: 3800 W. H&H Rustic Lane
Madison, INDIANA 47250
Contact Phone: 812-273-6015
Contact Email: phill@venus.net
URL: http://www.oldmadison.com/stv/
Activity: Volunteer Monitoring
Description: Save the Valley is a non-profit volunteer organization incorprated in the Commonwealth of Kentucky and Licensed in the State of Indiana. Our purpose is to hold the line and prevent further pollution of our air, water, and land in the Valley of the Ohio River between Lawrenceburg, Indiana and Louisville, Kentucky. STV represents environmental and public interest before regulatory agencies and at all levels of the court system.

4.2 Summary of Ambient Monitoring Data for the Silver-Little Kentucky Watershed

The fixed station-monitoring program managed by IDEM's Office of Water Management has been monitoring surface water chemistry throughout the state since 1957. The data set from 1986 to 1995 was analyzed using the Seasonal Kendall test. This test deduces if a statistical change in the surface water chemistry occurred over a certain time period. No fixed station monitoring sites existed in the Silver-Little Kentucky watershed from 1986 to 1995. As a result, no Seasonal Kendall analysis can be conducted for this watershed. For a more in-depth discussion of this analysis as it applies to other watersheds, please refer to the 1997 Indiana Fixed Station Statistical Analysis (IDEM 1998b).

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 (ISDH, IDNR, and IDEM 2001). 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 2001 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, the majority contained at least some mercury. However, not all fish tissue samples had mercury at levels considered harmful to human health. If they did, they are listed in Table 4-3. Because of past, widespread agricultural and industrial use of these materials, their great stability and persistence in the environment, and the potential for bioaccumulation, it is not surprising that concentrations exceeding safe levels have been found in some species. Criteria for placing fish on the Indiana Fish Consumption Advisory are developed from the Great Lakes Task Force risk-based approach.

Table 4-2 shows the ISDH definitions for each Advisory Group.

Table 4-3 shows the waterbodies in the Silver-Little Kentucky Watershed that are under the 2001 fish consumption advisory.

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. To date, one five-year monitoring cycle to survey the surface water quality of the State has been completed. The second survey cycle was begun in 2001. Appendix B contains the listing of the Silver-Little Kentucky watershed waterbodies assessed, status of designated use support, probable causes of impairment, and stream miles affected (IDEM 1998a). The methodologies of the Clean Water Act Section 305(b) assessment and use support ratings are discussed in Section 4.5.

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

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

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

The assessment process was applied to each data sampling program. The individual assessments were integrated into an overall assessment for each waterbody by use designation: aquatic life support, fish consumption, and recreational use. River miles in a watershed appear as one waterbody while each lake in a watershed is reported as a separate waterbody. Physical/chemical data for toxicants (total recoverable metals), conventional water chemistry parameters (dissolved oxygen, pH, and temperature), and bacteria (*E. coli*) were evaluated for exceedance of the Indiana Water Quality Standards (327 IAC 2-1-6). U.S. EPA 305(b) Guidelines were applied to sample results as indicated in Table 4-4 (U.S. EPA 1997).

Part I, Chapter 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 Silver-Little Kentucky watershed. Chapter 5 includes:
Section 5.1 Indiana Department of Environmental Management Water Quality Programs
Section 5.2 Indiana Department of Natural Resources Water Programs
Section 5.3 USDA/Natural Resources Conservation Service Water Programs

5.1 Indiana Department of Environmental Management Water Quality Programs

This Section describes the water quality programs managed by the Office of Water Quality within IDEM and includes:
Section 5.1.1 State and Federal Legislative Authorities for Indiana's Water Quality Program
Section 5.1.2 Indiana's Point Source Control Program
Section 5.1.3 Indiana's Nonpoint Source Control Programs
Section 5.1.4 Integrating Point and Nonpoint Source Pollution Control Strategies
Section 5.1.5 Potential Sources of Funding for Water Quality Projects

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

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

Federal Authorities for Indiana's Water Quality Program:

- The Clean Water Act Section 301 - Prohibits the discharge of pollutants into surface waters unless permitted by EPA.
- The Clean Water Act Section 303(c) - States are responsible for reviewing, establishing and revising water quality standards for all surface waters.
- The Clean Water Act Section 303(d) - Each state shall identify waters within its boundaries for which the effluent limits required by 301(b)(1)(A) and (B) are not stringent enough to protect any water quality standards applicable to such waters. Requires states to develop Total Maximum Daily Loads that set the maximum amount of pollution that a water body can receive without violating water quality standards.
- The Clean Water Act Section 305(b) - Each state is required to submit a biennial report to the EPA describing the status of surface waters in that state.
- The Clean Water Act Section 319 - Each state is required to develop and implement a nonpoint source pollution management program.
- The Clean Water Act Section 402 - Establishes the National Pollutant Discharge Elimination System (NPDES) permitting program. Allows for delegation of permitting authority to qualifying states (which Indiana has received).
- The Clean Water Act Section 404/401 - Section 404 regulates the discharge of dredge and fill materials into navigable waters and adjoining wetlands. Section 401 requires the U.S. Army Corps of Engineers to receive a state Water Quality Certification prior to issuance a 404 permit.

State Authority 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. The state rulemaking authority for water is the Water Pollution Control Board. The board holds monthly meetings that are open to the public. Information on agendas, draft rules, and meeting notices can be obtained by contacting IDEM (see Appendix C).

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 National Pollutant Discharge Elimination System (NPDES) permit program, authorized by the Federal Water Pollution Control Act Amendments of 1972 (also referred to as the Clean Water Act). The State of Indiana was granted primacy from U.S. EPA to issue NPDES permits on January 1, 1975 through a Memorandum of Agreement. These permits place limits on the amount of pollutants that may be discharged to waters of the State by each discharger. Limits are set at levels protective of both the aquatic life in the waters which receive the discharge and human health.

U.S. EPA, Region V, has oversight authority for Indiana's 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 regulates Stormwater, Combined Sewer Overflow (CSO), and variance requests through a special projects group currently known as the Urban Wet Weather Group. Land Application of waste treatment plant sludge is no longer a part of the Office of Water Quality but is now a part of the Office of Land Quality (formerly Office of Solid and Hazardous Waste).

The purpose of the NPDES permit is to control the point source discharge of pollutants into the waters of the State such that the quality of the water of the State is maintained in accordance with the standards contained in 327 IAC 2. The NPDES permit requirements must ensure that the minimum amount of control is imposed upon any new or existing point source through the application of technology-based treatment requirements 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.

There are several different types of permits that are issued in the NPDES permitting program. Table 5-1 lists and describes the various permits. The majority of NPDES permits have existed since 1974. This means that most of the permit writing is for permit renewals. Approximately 10 percent of each year's workload is attributed to new permits, modifications and requests for estimated limits. NPDES permits are designed to be re-issued every five years but are administratively extended in full force and effect indefinitely if the permittee applies for a renewal before the current permit expires.

The federal Clean Water Act Section 104(b)(3) is the authority for NPDES-related State Program Grants. The Section 104(b)(3) program provides for developing, implementing and demonstrating new concepts or requirements that will improve the effectiveness of the NPDES permit program. A project proposed for assistance by this program should deal predominantly with water pollution sources and activities regulated by the NPDES program and produce a strong, beneficial value for the statewide NPDES permit program. Organizations eligible for Section 104(b)(3) funding include State water pollution control agencies, interstate agencies, Tribes, colleges and universities, and other public or nonprofit organizations. For-profit entities, private associations and individuals are not eligible to receive this assistance. The Section 104(b)(3) grant program is administered by the Watershed Management Section within the Planning Branch of the IDEM Office of Water Quality.

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 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 education and outreach in order to improve the way land is managed. Through the use of federal funding for the installation of best management practices (BMPs), the development of watershed management plans, and the implementation of watershed restoration pollution prevention activities, the NPS Program reaches out to citizens so that land is managed in such a way that less pollution is generated.

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. The NPS Management Plan was prepared in 1989, partially based on findings from the NPS Assessment Report, which was also completed that year. The NPS Management Plan was updated and received EPA approval in 1999. Some of the objectives of the Management Plan include the education of land users and the reduction and remediation of NPS pollution caused by erosion and sedimentation of forested and agricultural lands and urban runoff. Other objectives address pesticide and fertilizer use, land application of sludge, animal waste practices, past and present mining practices, on-site sewage disposal, and atmospheric deposition.

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 approximately $23 million of federal funds for the development of over 299 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), 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 it is currently not funded by Congress. Section 205(j) provides for planning activities relating to the improvement of water quality from nonpoint and point sources by making funding available to municipal and county governments, regional planning commissions, and other public organizations. For-profit entities, non-profit organizations, private associations, and individuals are not eligible for funding through Section 205(j).

The Watershed Management Section within the Planning Branch of the Office of Water Quality provides for the administration of the Section 319 funding source for the NPS-related projects, as well as Section 205(j) grants. Clean Water Act Section 319(h) grant monies are made available to the states on an annual basis by EPA. Agencies and organizations in the state that deal with NPS problems submit proposals to the Office of Water Quality each year for use of these funds in various projects.

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

5.1.4 Integrating Point and Nonpoint Source Pollution Control Strategies

Two key long-term objectives of watershed management are integrating point and nonpoint source pollution controls and determining the amount and location of the remaining assimilative capacity in a watershed. 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). The U.S. 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 developing 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 IDEM Office of Water Quality has reorganized its work activities around a five-year rotating basin schedule. The waters of the state have been grouped geographically into major river basins, and water quality data and other information will be collected and analyzed from each basin, or group of basins, once every five years. The schedule for implementing the TMDL Strategy is proposed to follow this rotating basin plan to the extent possible. Supplemental data collection (i.e. collection during a year other than the one prescribed in the Surface Water Quality Monitoring Strategy) may also be required to complete the TMDL process. The TMDL Strategy discusses activities to be accomplished in three phases. Phase One involves planning, sampling and data collection and will take place the first year. Phase Two involves TMDL development and will occur in the second year, and Phase Three is the TMDL implementation and will 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.

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

5.1.5 Potential Sources of Funding for Water Quality Projects

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

If a local government, environmental group, university researcher, or other individual or agency wants to find funding to address a local water quality problem, it is well worth the time to prepare a thorough but concise proposal and submit it to applicable funding agencies. Even if a project is not funded, follow-up should be done to determine what changes may be needed in order to make the application more competitive.

Section 319(h) Grants

EPA offers 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. Projects are usually two to three years in length. Section 319(h) grants are intended to be used for project start-up, not as a continuous funding source. Units of government, nonprofit groups, and universities in the state that have expertise in nonpoint source pollution problems are invited to submit Section 319(h) proposals to the Office of Water Quality

Office of Water Quality staff review proposals for minimum 319(h) eligibility criteria such as:

- Does it support the state NPS Management Program objectives?
- Does the project address targeted, high priority watersheds?
- Are there sufficient non-federal cost-share matching funds available (25% of project costs, either cash or in-kind services)?
- Are measurable outputs identified?
- Is monitoring required? Is there a Quality Assurance/Quality Control plan for monitoring?
- If a Geographical Information System/Global Positioning System is used, is it compatible with that of the state?
- Is there a commitment for educational activities and a final report?
- Are upstream sources of NPS pollution addressed?
- Are local stakeholders involved in the project?

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

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

IDEM Office of Water Quality
Watershed Management Section
100 N. Senate Avenue
P.O. Box 6015
Indianapolis, IN 46206-6015
(317) 233-8803

Other Sources of Funding

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

5.2 Indiana Department of Natural Resources Water Programs

5.2.1 Division of Soil Conservation

The Division of Soil Conservation's mission is to ensure the protection, wise use, and enhancement of Indiana's soil and water resources. The Division's employees are part of Indiana's Conservation Partnership, which includes the 92 soil and water conservation districts (SWCDs), the USDA Natural Resources Conservation Service, and the Purdue University Cooperative Extension Service. Working together, the partnership provides technical, educational, and financial assistance to citizens to solve erosion and sediment-related problems occurring on the land or impacting public waters.

The Division administers the Clean Water Indiana soil conservation and water quality protection program under guidelines established by the State Soil Conservation Board, primarily through the local SWCDs in direct service to landusers. The Division staff includes field-based resource specialists who work closely with landusers, assisting in the selection, design, and installation of practices to reduce soil erosion on agricultural land. The Stormwater and Sediment Control Program works primarily with developers, contractors, realtors, property holders and others to address erosion and sediment concerns on non-agricultural lands, especially those undergoing development.

The Lake and River Enhancement (LARE) program utilizes a watershed approach to reduce non-point source sediment and nutrient pollution of Indiana's and adjacent states' surface waters to a level that meets or surpasses state water quality standards. To accomplish this goal, LARE provides technical and financial assistance to local entities for qualifying projects that improve and maintain water quality in public access lakes, rivers, and streams.

Hoosier Riverwatch is a water quality monitoring initiative which aims to increase public awareness of water quality issues and concerns through hands-on training of volunteers in stream monitoring and cleanup activities. Hoosier Riverwatch collaborates with agencies and volunteers to educate local communities about the relationship between land use and water quality and to provide water quality information to citizens and governmental agencies working to protect Indiana's rivers and streams.

5.2.2 Division of Water

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

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

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

The Regulations Branch of DOW is made up of Stream Permits, Lake Permits, Permit Administration, Public Assistance, and Legal Counsel. The Stream Permits Section is responsible for reviewing permit applications for construction activity in the 100 year regulatory floodway along Indiana's waterways. The Lake Permits Section reviews construction projects at or below the legal lake level for all of Indiana's public freshwater lakes. Permit Administration Section provides administrative support to Branch staff, maintains the application database, and coordinates the application review process with other Divisions. The Public Assistance Section provides technical assistance on possible permit applications on proposed construction projects, investigates and mediates unpermitted construction activities and in some cases, with the support of Legal Counsel, pursues legal action for violation of State laws.

5.3 USDA/Natural Resources Conservation Service Water Quality Programs

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

Conservation of Private Grazing Land Initiative (CPGL)

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

Conservation Reserve Program (CRP)

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

Conservation Technical Assistance (CTA)

The purpose of the CTA program is to assist landusers, communities, units of state and local government, and other Federal agencies in planning and implementing conservation systems. The purpose of the conservation systems is 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.

One objective of the program is to assist individual landusers, communities, conservation districts, and other units of State and local government and Federal agencies to meet their goals for resource stewardship and assist individuals in complying with State and local requirements. NRCS assistance to individuals is provided through conservation districts in accordance with the Memorandum of Understanding signed by the Secretary of Agriculture, the Governor of the State, and the conservation district. Assistance is provided to landusers voluntarily applying conservation practices and to those who must comply with local or State laws and regulations.

Another objective is to provide assistance to agricultural producers to comply with the highly erodible land (HEL) and wetland (Swampbuster) provisions of the 1985 Food Security Act as amended by the Food, Agriculture, Conservation and Trade Act of 1990 (16 U.S.C. 3801 et. seq.), the Federal Agriculture Improvement and Reform Act of 1996, and wetlands requirements of Section 404 of the Clean Water Act. NRCS makes HEL and wetland determinations and helps landusers develop and implement conservation plans to comply with the law. The program also provides technical assistance to participants in USDA cost-share and conservation incentive programs.

NRCS collects, analyzes, interprets, displays, and disseminates information about the condition and trends of the Nation's soil and other natural resources so that people can make good decisions about resource use and about public policies for resource conservation. They also develop effective science-based technologies for natural resource assessment, management, and conservation.

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.

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

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

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 floodplain management assistance. The focus of these plans is to identify solutions that use land treatment and non-structural measures to solve resource problems.

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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Part I Tables

TABLE 0-1: WATERS OF THE SILVER-LITTLE KENTUCKY ON INDIANA'S 1998 303(D) LIST

ID	Waterbody	Parameter of Concern	Priority for TMDL development
IN-0201FCMRC-1998	DEAM LAKE	FCA - MERCURY	2010-2012
IN-0203ECOLI-1998	OHIO RIVER	E. COLI	2000-2004
IN-0203FCPCB-1998	OHIO RIVER	FCA - PCBS	2010-2012
IN-0203LEAD-1998	OHIO RIVER	LEAD	2010-2012
IN-0205ECOLI-1998	OHIO RIVER	E. COLI	2000-2004
IN-0205FCPCB-1998	OHIO RIVER	FCA - PCBS	2010-2012
IN-0207FCMRC-1998	SILVER CREEK	FCA - MERCURY	2010-2012
IN-0207FCPCB-1998	SILVER CREEK	FCA - PCBS	2010-2012
KY21001427-1998	BEARGRASS CREEK	METALS ORGANIC ENRICHMENT/LOW DISSOLVED OXYGEN	First Priority
KY21009223-22.1-1998	SPRING DITCH	PATHOGENS	First Priority
KY21010558-1998	GOOSE CREEK	ORGANIC ENRICHMENT/LOW DISSOLVED OXYGEN PATHOGENS	First Priority
KY21012402-1998	HITE CREEK	UNKNOWN TOXICITY	First Priority
KY21013710-1998	JERICHO LAKE	NUTRIENTS	Second Priority
KY21015900-1998	LITTLE GOOSE CREEK	ORGANIC ENRICHMENT/LOW DISSOLVED OXYGEN PATHOGENS	First Priority
KY21017889-1998	MIDDLE FORK BEARGRASS CREEK	METALS ORGANIC ENRICHMENT/LOW DISSOLVED OXYGEN	First Priority
KY21018099-1998	MILL CREEK	HABITAT ALTER. (NON-FLOW) ORGANIC ENRICHMENT/LOW DISSOLVED OXYGEN PATHOGENS SILTATION	First Priority
KY21018112-9.7-	MILL CREEK CUTOFF	PATHOGENS	First Priority

1998			
KY21019123-1998	MUDDY FORK	PATHOGENS	Second Priority
KY21020129-10-1998	OHIO RIVER	UNKNOWN PATHOGENS PCBS PRIORITY ORGANICS	Second Priority
KY21020129-11-1998	OHIO RIVER	PATHOGENS PCBS PRIORITY ORGANICS	Second Priority
KY21021927-01-1998	POND CREEK	CHLORINE NUTRIENTS	Second Priority
KY21022864-1998	REFORMATORY LAKE	NUTRIENTS	First priority
KY21025942-1998	SOUTH FORK BEARGRASS CREEK	ORGANIC ENRICHMENT/LOW DISSOLVED OXYGEN PATHOGENS	First Priority

FCA - Fish Consumption Advisory
PCB - Polychlorinated Biphenyls
Hg - Mercury
***Only waters for which fish tissue data support issuance of fish consumption advisories are individually cited above. The Indiana Department of Health has issued a general fish consumption advisory for all other waters of the state. This advisory was based on extrapolation of the fish tissue data that were available and generally recommends that if no site-specific advisory is in place for a waterbody, the public should eat no more than one meal (8 oz.) per week of fish caught in these waters. Women of child bearing age, women who are breast feeding, and children up to 15 years of age should eat no more than one meal per month. The basis for this general advisory is widespread occurrence of mercury or PCBs (or both) in most fish sampled throughout the state. Please refer to the most recent Fish Consumption Advisory booklet available through the Indiana Department of Health (317/233-7808). Sources of the mercury and PCBs are unknown for the most part, but it is suspected that they result from air deposition.

TABLE 2-1: SILVER-LITTLE KENTUCKY COUNTY POPULATION PROJECTIONS 1990-2020

County	1990	2000	2010	2020	Percent Change (1990 to 2020)
Clark	87777	96472	102115	105311	19
Floyd	64404	70823	79867	82883	28
Harrison	29890	34325	40119	42317	41
Jefferson	29797	31705	34270	35340	18
Ripley	24616	26523	29977	30983	25
Scott	20991	22960	24967	25739	22
Switzerland	7738	9065	10385	11012	42
Washington	23717	27223	31490	33050	39

(from IBRC 1999)

TABLE 2-2: SILVER-LITTLE KENTUCKY CITY AND TOWN POPULATION ESTIMATES

City/Town	Census 1990	Estimate 1996	Percent Change (1990 to 1996)
Brooksburg	79	83	5
Charlestown	5859	6001	2
Clarksville	20461	20273	0
Hanover	3608	3866	7
Jeffersonville	24750	27057	9
Madison	12214	12826	5
New Albany	38317	40273	5
New Market	626	664	6
Sellersburg	6048	6348	4
Utica	571	586	2

(from IBRC 1997)

TABLE 2-3: LIVESTOCK IN THE SILVER-LITTLE KENTUCKY WATERSHED

	1997 Livestock Inventory							
	Hogs and pigs		Cattle and calves		Horse and pony		Layers 20 weeks and older	
County	Number	State Rank*	Number	State Rank*	Number	State Rank*	Number	State Rank*
Clark	3506	83	14056	24	583	29	(D)	29
Floyd	1864	86	3332	82	362	50	@	@
Harrison	5953	78	24294	8	@	@	(D)	21
Jefferson	3699	82	14068	23	875	12	276	66
Ripley	33316	42	15012	20	426	41	1014	36
Scott	1253	87	4675	71	312	62	343	63
Switzerland	(D)	79	7809	52	350	53	462	52
Washington	17299	62	30138	3	@	@	69439	24

* State Rank is out of a total of 92 counties in Indiana
@ - indicates species is not in the top 4 for this county
D - Numbers not disclosed by USDA-NASS
(from USDA 1997)

TABLE 2-4: CROPS PRODUCED IN THE SILVER-LITTLE KENTUCKY WATERSHED

	1997 Crops							
	Corn for grain		**Soybeans for beans**		**Wheat**		**Hay crops**	
County	**Acres**	**State Rank***	**Acres**	**State Rank***	**Acres**	**State Rank***	**Acres**	**State Rank***
Clark	16708	80	26368	73	5898	28	11241	18
Floyd	3264	89	4228	89	454	87	4685	58
Harrison	18929	78	23913	77	5831	31	24281	1
Jefferson	11714	82	33164	67	3247	64	11375	17
Ripley	48345	62	45078	57	5292	33	8829	30
Scott	9693	83	19156	80	1800	80	3946	64
Switzerland	4304	88	4478	88	@	@	9503	28
Washington	34083	68	30036	69	4097	52	21895	5

* State Rank is out of a total of 92 counties in Indiana
@ - indicates species is not in the top 4 for this county
D - Numbers not disclosed by USDA-NASS
(from USDA 1997)

TABLE 2-5: OUTSTANDING RIVERS LIST FOR INDIANA

In 1993, the Natural Resources Commission adopted its "Outstanding Rivers List for Indiana." The listing was published in the Indiana Register on March 1 of that year as Information Bulletin #4 in Volume 16, Number 6, page 1677 through 1680 (sometimes cited as 16 IR 1677). The listing has also been specifically incorporated by reference into statutes and rules. Notably, the listing is referenced in the standards for utility line crossings within floodways, formerly governed by IC 14-28-2 and now controlled by 310 IAC 6-1-16 through 310 IAC 6-1-18. See, also, the general permit for logjam removals, implemented as an emergency rule and pending for adoption as a permanent rule at 310 IAC 6-1-20. Except where incorporated into a statute or rule, the listing is intended to provide guidance rather than to have regulatory application.

I. INTRODUCTION

To help identify the rivers and streams which have particular environmental or aesthetic interest, a special listing has been prepared by the division of outdoor recreation of the department of natural resources. The listing is a corrected and condensed version of a listing complied by American Rivers and dated October 1990. There are about 2,000 river miles included on the listing, a figure which represents less than 9% of the estimated 24,000 total river miles in Indiana. The natural resources commission has adopted the listing as an official recognition of the resource values of these waters.

A river included in the listing qualifies under one or more of the following 22 categories. An asterisk indicates that all or part of the river segment was also included in the "Roster of Indiana Waterways Declared Navigable," 15 IR 2385 (July 1992). [Note: this listing is now included in the 1997 "Roster of Indiana Waterways Declared Navigable or Nonnavigable."] A river designated "EUW" is an exceptional use water. A river designated "HQW" is a high quality water, and a river designated "SS" is a salmonoid stream.

1. Designated National Wild and Scenic Rivers. Rivers that Congress has included in the National Wild and Scenic System pursuant to the National Wild and Scenic River Act, Public Law 90-452.
2. National Wild and Scenic Study Rivers. Rivers that Congress has determined should be studied for possible inclusion in the National Wild and Scenic Rivers System.
3. Federally Protected Rivers other than Wild and Scenic. Rivers subject to federal legal protection other than pursuant to the National Wild and Scenic Rivers Act, such as National Rivers and Waterways and National Recreation Areas.
4. State designated Scenic Rivers. Rivers included in state river conservation systems or otherwise protected pursuant to an act of the state legislature.
5. Nationwide Rivers Inventory Rivers. The 1,524 river segments identified by the National Park Service in its 1982 "Nationwide Rivers Inventory" as qualified for consideration for inclusion in the National Wild and Scenic Rivers System.
6. Hydro Ban Rivers. Rivers on which Congress has prohibited future hydropower development.
7. Rivers Identified in State Inventories or Assessments. Outstanding rivers from state inventories or assessments, i.e., rivers identified as having statewide or greater significance.
8. Atlantic Salmon Restoration Rivers. Rivers undergoing active Atlantic salmon restoration efforts and identified by the U.S. Fish and Wildlife Service for planned restoration.
9. Federal Public Lands Rivers. Rivers identified in U.S. Forest Service and Bureau of Land Management resource planning as potential additions to the National Wild and Scenic Rivers System.
10. State Fishing Rivers. Rivers identified by states as having outstanding fishing values, such as Blue Ribbon Trout Streams.
11. State Heritage Program Sites. Rivers identified by state natural heritage programs or similar state programs as having outstanding ecological importance.
12. Priority Aquatic Sites. Rivers identified in "Priority Aquatic Sites for Biological Diversity Conservation," published by the Nature Conservancy in 1985.
13. Canoe Trails. State-designated canoe/boating routes.
14. Outstanding Whitewater Streams. Rivers listed in the American Whitewater Affiliation's 1990 Inventory of American Whitewater.
15. Locally Protected Rivers. Rivers protected through local and private protection strategies.
16. State Park Rivers. Rivers protected by inclusion in a state park or state preserve.
17. Other Rivers. Miscellaneous rivers identified as having outstanding ecological, recreational, or scenic importance.
18. High Water Quality Rivers. "Outstanding Resources Waters" designated by states and other rivers identified by states as having outstanding water quality.
19. National Natural Landmark Rivers. Rivers designated as, or included within, National Natural Landmarks.
20. State Study Rivers. Rivers that have been formally proposed for state protection or designation.
21. BOR Western Rivers. Rivers listed in the Bureau of Outdoor Recreation's 1982 "Western U.S. Water Plan" proposal as exhibiting identified free-flowing values.
22. State legislated Wabash River Heritage Corridor.

II. LISTING OF OUTSTANDING RIVERS AND STREAMS IN THE SILVER-LITTLE KENTUCKY WATERSHED

River	Significance	County	Segment
Fourteen-Mile Creek*	11	Clark	Confluence of East and West Forks to confluence with Ohio River
Indian-Kentuck Creek*	17	Jefferson, Ripley	Confluence with Vestal Branch to confluence with Ohio River

TABLE 2-6: SPECIAL AREAS IN THE SILVER-LITTLE KENTUCKY WATERSHED

County	Special Area	Manager	Access
CLARK	ASH ESTATES	LOCAL- JEFFERSON PARK BOARD	OPEN-
CLARK	CHARLESTOWN MILITARY RESERVATION	DNR STATE PARKS	CLOSED-
CLARK	CHARLESTOWN STATE PARK	DNR STATE PARKS	OPEN-
CLARK	CLARK STATE FOREST	DNR FORESTRY	OPEN-
CLARK	DEAM LAKE STATE RECREATION AREA	DNR FORESTRY	OPEN-
CLARK	FALLS OF THE OHIO STATE PARK	DNR STATE PARKS	OPEN-
CLARK	JEFFERSONVILLE PARK	LOCAL- JEFFERSONVILLE PARK BOARD	OPEN-
CLARK	JEFFERSONVILLE SCHOOL PARK	LOCAL- JEFFERSONVILLE SCHOOL BOARD	OPEN-
CLARK	LAPPING MEMORIAL PARK	LOCAL- CLARKSVILLE PARK BOARD	OPEN-
CLARK	MOSHER PARK	LOCAL- CLARKSVILLE SCHOOL BOARD	OPEN-
CLARK	NINE PENNY BRANCH (RUN WOODS) NATURE PRESERVE	DNR NATURE PRESERVES	OPEN-
CLARK	RED OAK RANCH	PRIV- THE NATURE CONSERVANCY	RESTRICTED-
CLARK	WHITE OAK NATURE PRESERVE	DNR FORESTRY	OPEN-
FLOYD	BROCK-SAMPSON NATURE PRESERVE	DNR NATURE PRESERVES	OPEN-
FLOYD	BROCK-SAMPSON NATURE PRESERVE ADDITION	DNR NATURE PRESERVES	OPEN-
FLOYD	EDWARDSVILLE PARK	LOCAL- FLOYD COUNTY PARK BOARD	OPEN-
FLOYD	HARDIN RIDGE NATURE PRESERVE	DNR NATURE PRESERVES	OPEN-
FLOYD	HARDIN RIDGE PRESERVE (BULLEIT TRACT)	PRIV- THE NATURE CONSERVANCY	RESTRICTED-
HARRISON	BUFFALO TRACE PARK	LOCAL- PALMYRA PARK BOARD	OPEN-
HARRISON	DEAM (CHARLES C.) NATURE PRESERVE	DNR FORESTRY	OPEN-
HARRISON	DEWEY HICKMAN PRESERVE	PRIV- THE NATURE CONSERVANCY	RESTRICTED- BY PERMISSION ONLY
HARRISON	DR CLAPP BARRENS	PRIV-	RESTRICTED- BY PERMISSION ONLY
HARRISON	FLINT BARRENS NATURE PRESERVE	DNR NATURE PRESERVES	RESTRICTED- BY PERMISSION ONLY
HARRIS	HARRISON SPRING NATIONAL NATURAL	U.S. NATIONAL PARK SERVICE	OPEN-

County	Special Area	Manager	Access
ON	LANDMARK		
HARRIS ON	HARRISON-CRAWFORD STATE FOREST	DNR FORESTRY	OPEN-
HARRIS ON	HAYSWOOD NATURE PRESERVE	LOCAL- HARRISON CO. PARKS AND RECREATION	OPEN-
HARRIS ON	HOG LANE BARRENS	PRIV- THE NATURE CONSERVANCY	RESTRICTED-
HARRIS ON	INDIAN CREEK WOODS	LOCAL- HARRISON CO. PARKS AND RECREATION	OPEN-
HARRIS ON	MAYME HINTIN (MARTIN) GLADE	PRIV- THE NATURE CONSERVANCY	RESTRICTED- BY PERMISSION ONLY
HARRIS ON	MOSQUITO CREEK (AGAVE GLADE) NATURE PRESERVE	DNR NATURE PRESERVES	RESTRICTED- BY PERMISSION ONLY
HARRIS ON	NO NAME- PRIV OR LOCAL	LOCAL-	OPEN-
HARRIS ON	POST OAK CEDAR NATURE PRESERVE	DNR FORESTRY	OPEN-
HARRIS ON	SCOUT MOUNTAIN NATURE PRESERVE	DNR FORESTRY	CLOSED-
HARRIS ON	SOUTH HARRISON PARK	LOCAL- HARRISON CO. PARKS AND RECREATION	OPEN-
HARRIS ON	SPHIRE TRACT MANAGED AREA	PRIV- THE NATURE CONSERVANCY	RESTRICTED- BY PERMISSION ONLY
HARRIS ON	STONER HILL GLADES	PRIV- THE NATURE CONSERVANCY	RESTRICTED- BY PERMISSION ONLY
HARRIS ON	TEEPLE GLADE NATURE PRESERVE	PRIV- THE NATURE CONSERVANCY	RESTRICTED- BY PERMISSION ONLY
HARRIS ON	THREE-WAY SEDGE SINKHOLE SWAMP	PRIV- THE NATURE CONSERVANCY	RESTRICTED- BY PERMISSION ONLY
HARRIS ON	WALTER Q. GRESHAM MEMORIAL PARK	LOCAL- HARRISON CO. PARKS AND RECREATION	OPEN-
HARRIS ON	WYANDOTTE WOODS STATE RECREATION AREA	DNR FORESTRY	OPEN-
JEFFERS ON	CHELSEA FLATWOODS	PRIV- THE NATURE CONSERVANCY	OPEN-
JEFFERS ON	CLIFTY CANYON NATURE PRESERVE	DNR STATE PARKS	OPEN-
JEFFERS ON	CLIFTY FALLS STATE PARK	DNR STATE PARKS	OPEN-
JEFFERS ON	CLIFTY FALLS STATE PARK SWIMMING POOL	DNR STATE PARKS	OPEN-
JEFFERS ON	JEFFERSON PROVING GROUNDS	U.S. DEPT. OF DEFENSE	CLOSED-

County	Special Area	Manager	Access
JEFFERS ON	OFFICER'S WOODS	LOCAL-	OPEN-
RIPLEY	BATESVILLE MEMORIAL POOL	LOCAL- BATESVILLE PARK BOARD	OPEN-
RIPLEY	BISCHOFF RESERVOIR (BATESVILLE) PUBLIC ACCESS SITE	DNR FISH & WILDLIFE	OPEN-
RIPLEY	DOGWOOD NATURE PRESERVE	DNR STATE PARKS	OPEN-
RIPLEY	FALLING TIMBER NATURE PRESERVE (FALLING TIMBER)	DNR STATE PARKS	OPEN-
RIPLEY	FALLING TIMBER NATURE PRESERVE (HENDERSON BEND)	DNR STATE PARKS	RESTRICTED-
RIPLEY	FALLING TIMBER NATURE PRESERVE (HIGH BLUFF)	DNR STATE PARKS	RESTRICTED-
RIPLEY	JEFFERSON PROVING GROUNDS	U.S. DEPT. OF DEFENSE	CLOSED-
RIPLEY	LAUGHERY BLUFF NATURE PRESERVE	DNR STATE PARKS	OPEN-
RIPLEY	LIBERTY PARK	LOCAL- BATESVILLE PARK BOARD	OPEN-
RIPLEY	VERSAILLES FLATWOODS NATURE PRESERVE	DNR STATE PARKS	OPEN-
RIPLEY	VERSAILLES STATE PARK	DNR STATE PARKS	OPEN-
SCOTT	CLARK STATE FOREST	DNR FORESTRY	OPEN-
SCOTT	HARDY LAKE	DNR RESERVOIRS	OPEN-
SCOTT	VIRGINIA PINE-CHESTNUT OAK NATURE PRESERVE	DNR FORESTRY	OPEN-
SWITZER LAND	MARKLAND DAM PARK	LOCAL- SWITZERLAND COUNTY PARKS & REC.	OPEN-
WASHIN GTON	BIG SPRING NATURE PRESERVE	DNR NATURE PRESERVES	OPEN-
WASHIN GTON	CHARLES SPRING MANAGED AREA	DNR NATURE PRESERVES	RESTRICTED-
WASHIN GTON	CHRISTIAN CHURCH PLAYGROUND	LOCAL- SALEM PARK BOARD	OPEN-
WASHIN GTON	CLARK STATE FOREST	DNR FORESTRY	OPEN-
WASHIN GTON	ELK CREEK FISH AND WILDLIFE AREA	DNR FISH & WILDLIFE	OPEN-
WASHIN GTON	INDIAN-BITTER NATURE PRESERVE	DNR FORESTRY	OPEN-
WASHIN GTON	JACKSON-WASHINGTON STATE FOREST	DNR FORESTRY	OPEN-
WASHIN	SALEM COMMUNITY PARK	LOCAL- SALEM PARK BOARD	OPEN-

County	Special Area	Manager	Access
GTON			
WASHINGTON	WHITE/MUSCATATUCK RIVER PUBLIC ACCESS SITE	DNR FISH & WILDLIFE	OPEN-

TABLE 2-7: 1995 WATER USE INFORMATION FOR THE SILVER-LITTLE KENTUCKY WATERSHED

Population and Water Use totals	**1995**
Total population in the watershed (thousands)	165.57
Public Water Supply	**1995**
Population served by public groundwater supply (thousands)	111.68
Population served by surface water supply (thousands)	46.47
Total population served by public water supply (thousands)	158.15
Total groundwater withdrawals (mgd)	16.91
Total surface water withdrawals (mgd)	6.01
Total water withdrawals (mgd)	22.92
Total per capita withdrawal (gal/day)	144.93
Population self-supplied with water (thousands)	7.42
Commercial Water Use	**1995**
Groundwater withdrawal for commercial use (mgd)	1.36
Surface water withdrawal for commercial use (mgd)	0.44
Deliveries from public water supplies for commercial use (mgd)	2.26
Total commercial water use (mgd)	0.61
Industrial Water Use	**1995**
Groundwater withdrawal for industrial use (mgd)	0.56
Surface water withdrawals for industrial use (mgd)	3.98
Deliveries from public water suppliers for industrial use (mgd)	3.82
Total industrial water use (mgd)	0.5
Agricultural Water Use	**1995**
Groundwater withdrawals for livestock use (mgd)	0.09
Surface water withdrawals for livestock use (mgd)	0.35
Total livestock water use (mgd)	0.35
Groundwater withdrawals for irrigation (mgd)	0.0
Surface water withdrawals for irrigation (mgd)	0.01
Total irrigation water use (mgd)	0.01

Notes:
mgd: million gallons per day
gal/day: gallons per day
(from USGS 2001)

- 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 publishes a national circular.

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

Cause	Activity associated with cause
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
Toxic Chemicals	Pesticide/herbicide applications, household hazardous waste, 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
Nutrients	Fertilizer on agricultural crops and residential/commercial lawns, animal wastes, leaky sewers and septic tanks, direct septic discharge, atmospheric deposition, wastewater treatment plants

TABLE 3-2: COMBINED SEWER OVERFLOWS IN THE SILVER-LITTLE KENTUCKY WATERSHED

Community	CSO Outfalls
Jeffersonville	16
Madison	7

(from ICAA 2000)

TABLE 3-3: NPDES PERMITTED FACILITIES IN THE SILVER-LITTLE KENTUCKY WATERSHED

NPDES	Facility Name	Major/ Minor	City	County	Status
IN0001031	STEM CHESTER B INC	MINOR		FLOYD	INACTIVE
IN0001163	INDIANA ARMY AMMUNITION PLANT	MAJOR	CHARLESTOWN	CLARK	ACTIVE
IN0001759	INDIANA-KENTUCKY ELECTRIC CORP	MAJOR	MADISON	JEFFERSON	ACTIVE
IN0002071	ESSROC MATERIALS, INC.	MINOR	SPEED	CLARK	ACTIVE
IN0002593	HOOKER CHEMICAL CORP NPR	MINOR		CLARK	INACTIVE
IN0002666	CALDWELL/MOSER LEATHER CO.,INC	MINOR	NEW ALBANY	FLOYD	ACTIVE
IN0002721	SELLERSBURG STONE CO. - NPR	MINOR		CLARK	INACTIVE
IN0002798	PSI GALLAGHER GEN. STATION	MAJOR	NEW ALBANY,	FLOYD	ACTIVE
IN0003638	COLGATE-PALMOLIVE COMPANY	MAJOR	CLARKSVILLE	CLARK	ACTIVE
IN0003832	STEM CHESTER B INC	MINOR		FLOYD	INACTIVE
IN0004367	IDNR	MINOR		CLARK	INACTIVE
IN0004731	EDWARDSVILLE WATER CORPORATION	MINOR	NEW ALBANY	FLOYD	INACTIVE
IN0004863	MARTIN MARIETTA AGGREGATES-NPR	MINOR		CLARK	INACTIVE
IN0020419	SELLERSBURG MUNICIPAL STP	MAJOR	SELLERSBURG	CLARK	ACTIVE
IN0020508	CHARLESTOWN MUNICIPAL STP	MINOR	CHARLESTOWN	CLARK	ACTIVE
IN0020613	CLARKSVILLE S MUNICIPAL STP	MINOR		CLARK	INACTIVE
IN0020621	CLARKSVILLE N MUNICIPAL STP	MINOR		CLARK	INACTIVE
IN0020702	HANOVER MUNICIPAL STP	MINOR	HANOVER	JEFFERSON	ACTIVE
IN0023302	JEFFERSONVILLE MUNICIPAL STP	MAJOR	JEFFERSONVILLE	CLARK	ACTIVE
IN0023884	NEW ALBANY MUNICIPAL STP	MAJOR	NEW ALBANY	FLOYD	ACTIVE
IN0023965	OAK PARK CONSERVANCY DISTRICT	MINOR	JEFFERSONVILLE	CLARK	ACTIVE
IN0025313	MARATHON ASHLAND, CLARKSVILLE	MINOR	CLARKSVILLE	CLARK	ACTIVE
IN0025666	MADISON MUNICIPAL STP	MAJOR	MADISON	JEFFERSON	ACTIVE
IN0030147	DEAM LAKE STATE RECREATION ARE	MINOR	BORDEN	CLARK	ACTIVE
IN0030155	HENRYVILLE CORRECTIONAL UNIT	MINOR	HENRYVILLE	CLARK	ACTIVE
IN0031283	HENRYVILLE REST AREA	MINOR		CLARK	INACTIVE
IN0031542	HENRYVILLE REST AREA-NORTHBOUN	MINOR		CLARK	INACTIVE
IN0032247	GREATER CLARK CNTY SCHOOLS	MINOR		CLARK	INACTIVE
IN0032492	INDIANA GLASS SAND CORP	MINOR		FLOYD	INACTIVE
IN0035521	HENRYVILLE MEMBERSHIP SAN CORP	MINOR	HENRYVILLE	CLARK	ACTIVE
IN0036277	EDWARDSVILLE WTR CORP	MINOR		FLOYD	INACTIVE
IN0037796	SUN OIL CO OF PENNSYLVANIA-BUL	MINOR		FLOYD	INACTIVE

NPDES	Facility Name	Major/ Minor	City	County	Status
IN0037826	DAYS INN_MOTEL	MINOR		CLARK	INACTIVE
IN0037877	LOUISVILLE HARDWOODS, INC.	MINOR	NEW ALBANY,	FLOYD	ACTIVE
IN0038555	HENRYVILLE REST AREA NORTH I65	MINOR	HENRYVILLE	CLARK	ACTIVE
IN0039691	SILVER LAKE MOBILE HOME PARK	MINOR	CLARKSVILLE	CLARK	INACTIVE
IN0041165	GREATER CLARK SCHOOLS-WILSON S	MINOR		CLARK	INACTIVE
IN0042315	IDNR CLIFTY FALLS STATE PARK	MINOR		JEFFERSON	INACTIVE
IN0043028	LONGWORTH VILLA	MINOR	CHARLESTOWN	CLARK	ACTIVE
IN0043621	NEW PROVIDENCE (BORDEN)_STP	MINOR	BORDEN	CLARK	ACTIVE
IN0044075	BOYER LOCKER PLANT	MINOR		CLARK	INACTIVE
IN0044440	COUNTRY ESTATES SUBDIVISION	MINOR		JEFFERSON	INACTIVE
IN0044601	L. THORN CO.	MINOR	NEW ALBANY	FLOYD	INACTIVE
IN0044687	GREEN ACRES MOBILE HOME PARK	MINOR		FLOYD	INACTIVE
IN0044857	NEW ALBANY CONCRETE SERVICE IN	MINOR	NEW ALBANY	FLOYD	INACTIVE
IN0045501	MARTIN MARIETTA AGG. HANOVER Q	MINOR		JEFFERSON	INACTIVE
IN0045691	MARBLE HILL NVC. GEN. STATION	MINOR		JEFFERSON	INACTIVE
IN0047058	CLARKSVILLE MUNICIPAL STP	MAJOR	CLARKSVILLE	CLARK	ACTIVE
IN0048291	NEW ALBANY, IN-AM WATER COMPAN	MINOR	NEW ALBANY	FLOYD	ACTIVE
IN0048356	MIDWEST ENERGY RESOURCES CO.	MINOR		CLARK	INACTIVE
IN0048801	MARTIN MARIETTA, UTICA SAND &	MINOR	JEFFERSONVILLE	CLARK	INACTIVE
IN0049212	SELLERSBURG PUBLIC WATER SUP.	MINOR	SELLERSBURG	CLARK	ACTIVE
IN0050334	STARLITE RECREATION FACILITIES	MINOR		CLARK	INACTIVE
IN0050512	OLE STONER PLACE SUBDIVISION	MINOR		CLARK	INACTIVE
IN0050725	CHARTER OIL COMPANY	MINOR		JEFFERSON	INACTIVE
IN0051454	HAAS CABINET COMPANY	MINOR	SELLERSBURG	CLARK	ACTIVE
IN0051896	B.T. ENERGY CORPORATION	MINOR		FLOYD	INACTIVE
IN0052132	SOUTHERN HILL ESTATES	MINOR	BORDEN,	CLARK	ACTIVE
IN0053082	BERRY MATERIALS CORP	MINOR		JEFFERSON	INACTIVE
IN0053431	PROFILE EXTRUSION COMPANY	MINOR	JEFFERSONVILLE,	CLARK	INACTIVE
IN0053571	MULZER CRUSHED STONE, CHARLEST	MINOR	CHARLESTOWN	CLARK	ACTIVE
IN0053961	MEMPHIS AUTO/TRUCK STOP WWTP	MINOR	MEMPHIS	CLARK	ACTIVE
IN0055221	AMOCO OIL CO. STATION #450	MINOR	JEFFERSONVILLE	CLARK	INACTIVE
IN0055638	WHEELER GOLF COURSE	MINOR	BORDEN	CLARK	INACTIVE
IN0057177	T.G. WATSON UTILITIES WWTP	MINOR	JEFFERSONVILLE	CLARK	ACTIVE

NPDES	Facility Name	Major/ Minor	City	County	Status
IN0059056	SCOTTSBURG WATER PLANT	MINOR	SCOTTSBURG	SCOTT	ACTIVE
IN0059439	HENRYVILLE REST AREA SOUTH I65	MINOR	HENRYVILLE	CLARK	ACTIVE
IN0059781	CAESARS WORLD RIVERBOAT GAMING	MINOR	BRIDGEPORT	HARRISON	ACTIVE
IN0060186	NATIONWIDE TRUCK SERVICE	MINOR	CLARKSVILLE	CLARK	ACTIVE
IN0060194	MULZER CRUSHED STONE, BARGE WT	MINOR	CHARLESTOWN	CLARK	ACTIVE
IN0060224	SOUTHERN INDIANA OPERATIONS &	MINOR	JEFFERSONVILLE	CLARK	ACTIVE
IN0060470	BROOKSBURG SEWER	MINOR	BROOKSBURG	JEFFERSON	ACTIVE
IN0061042	SPRING HILLS WWTP	MINOR	FLOYDS KNOBS	FLOYD	ACTIVE
IN0109401	TRI-CITY PLATING	MINOR		CLARK	INACTIVE
IN0109533	WASHINGTON TOWNSHIP RSD	MINOR	NEW WASHINGTON	CLARK	ACTIVE
ING080016	AMOCO OIL COMPANY, ST. #450	MINOR	JEFFERSONVILLE	CLARK	INACTIVE
ING080084	DAIRY MART STORE #341	MINOR	MADISON	JEFFERSON	INACTIVE
ING080100	DAIRY MART STORE #173	MINOR	JEFFERSONVILLE	JEFFERSON	ACTIVE
ING250032	PROFILE EXTRUSION COMPANY	MINOR	JEFFERSONVILLE,	CLARK	INACTIVE
ING250033	METALITE CORPORATION	MINOR	NEW ALBANY,	FLOYD	ACTIVE
ING250039	ALUMNITEC INCORPORATED	MINOR	JEFFERSONVILLE	JEFFERSON	ACTIVE
ING250040	HITACHI CABLE INDIANA, INC.	MINOR	NEW ALBANY	FLOYD	ACTIVE
ING340024	MIDWEST RESOURCE RECOVERY CNTR	MINOR	CHARLESTOWN	CLARK	ACTIVE
ING340050	TRANSMONTAIGNE, NEW ALBANY TER	MINOR	NEW ALBANY	FLOYD	ACTIVE
ING490004	M & M CONSTRUCTION MATERIALS	MINOR	NEW ALBANY	FLOYD	ACTIVE
ING490021	SELLERSBURG STONE COMPANY, INC	MINOR	SELLERSBURG	CLARK	ACTIVE
ING490023	MARTIN MARIETTA, UTICA SAND &	MINOR	JEFFERSONVILLE,	CLARK	INACTIVE
ING490031	LITERS, INC., JEFFERSONVILLE	MINOR	JEFFERSONVILLE,	CLARK	ACTIVE
ING490032	LITERS, INC., SELLERSBURG	MINOR	SELLERSBURG	CLARK	ACTIVE
INL020419	SELLERSBURG MUNICIPAL STP	MINOR		CLARK	ACTIVE
INL020702	HANOVER MUNICIPAL STP	MINOR		JEFFERSON	ACTIVE
INL023302	JEFFERSONVILLE MUNICIPAL STP	MINOR		CLARK	ACTIVE
INL023884	NEW ALBANY MUNICIPAL STP	MINOR		FLOYD	ACTIVE
INL025666	MADISON MUNICIPAL STP	MINOR		JEFFERSON	ACTIVE
INL047058	CLARKSVILLE MUNICIPAL STP	MINOR		CLARK	ACTIVE
INP000028	HILLERICH AND BRADSBY CO. INC.	MINOR	JEFFERSONVILLE	CLARK	INACTIVE

(from IDEM 2001)

TABLE 4-1: RESULTS OF SEASONAL KENDALL ANALYSIS FOR STATIONS LOCATED IN THE SILVER-LITTLE KENTUCKY WATERSHED 1986 TO 1995

There are no Seasonal Kendall results for the Silver-Little Kentucky Watershed.

TABLE 4-2: ISDH DEFINITIONS FOR FISH CONSUMPTION ADVISORY GROUPS

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

Carp generally are contaminated with both PCBs and mercury. Except as otherwise noted, carp in all Indiana rivers and streams fall under the following risk groups:
Carp, 15-20 inches - Group 3
Carp, 20-25 inches - Group 4
Carp over 25 inches - Group 5
(from ISDH, IDNR, and IDEM 2001)

TABLE 4-3: 2001 INDIANA FISH CONSUMPTION ADVISORY

Location	Species	Fish Size (inches)	Contaminant	Group
Deam Lake				
Clark County	Largemouth Bass	10-12 12+	❍ ❍	2 3
Ohio River				
ALL COUNTIES	**Carp**	15-19 **20+**	■ ■	3 **5**
	Channel Catfish	13-18 19-21 **21+**	■ ■ ■	3 4 **5**
	Flathead Catfish	Up to 22 22+	■ ■	3 4
	Freshwater Drum	15 15+	■ ■	3 4
	Hybrid Striped Bass	12+	■	3
	Largemouth Bass	11-13 13+	■ ■	2 3
	Paddlefish**	ALL	■	3
	Sauger	13-16 16+	■ ■	3 4
	Smallmouth Buffalo	15-17 17+	■ ■	3 4
	Smallmouth Bass	13-15 **15+**	■ ■	4 **5**
	Spotted Bass	12-13 13+	■ ■	2 3
	Walleye	Up to 19 19+	■ ■	3 4
	White Bass	11-13 13+	■ ■	3 4
***Special Note- this fish has been added as a precaution due to elevated levels of PCBs that have been noted in preliminary tissue and egg samples.*				
Silver Creek				
Floyd County	Carp	21-25 25+	■ ■	3 4
	Channel Catfish	17-20 20+	■ ■	3 4
	Freshwater Drum	15-18 18+	■❍ ■❍	2 3
	Smallmouth Bass	15+	■	2

*❍ = Mercury, ■ = PCBs
(from ISDH, IDNR, and IDEM 2001)

TABLE 4-4: CRITERIA FOR USE SUPPORT ASSESSMENT (U.S. EPA 305(B) GUIDELINES)

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 statewide 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 (IDEM 1998))

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