

REFERENCE GUIDE
ENVIRONMENTAL AND PUBLIC
PROTECTION CABINET
ENVIRONMENTAL REPORTS

PUBLISHED BY THE
ENVIRONMENTAL QUALITY COMMISSION

Commonwealth of Kentucky
Ernie Fletcher, Governor

The Kentucky Environmental Quality Commission (EQC)

is a seven-member citizen board created under state law with a mission to:

- Facilitate public discussion and resolution of environmental issues.
- Monitor and report on environmental trends and conditions.
- Promote partnerships to improve and protect the environment for future generations.
- Serve as an advisory board to state officials on environmental matters.

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December 15, 2006

My fellow Kentuckians,

Throughout each year, divisions within the Environmental and Public Protection Cabinet that deal with environmental issues – the Department for Environmental Protection, the Department for Natural Resources and other independent commissions - produce reports that detail their activities that include, but are not limited to, research, monitoring, regulatory enforcement and environmental trends. These reports are available to the public by request and on the internet. The EQC recognizes that these reports might be difficult for individual citizens to locate. Therefore, this reference document catalogs the annual, biannual and intermittent reports published by the Department for Environmental Protection, the Department for Natural Resources and the independent environmental commissions within the cabinet. Additionally, this report includes the divisions by which no reports were generated.

This document presents an introduction or abstract to the current available reports as prepared by the divisions, along with contact information for receiving a full copy of each report. These introductions are arranged by department, then by division, then by branch, if applicable.

Please use this reference document as one step in learning more about whom the Cabinet is and what it does.

Sincerely,

A handwritten signature in cursive script, appearing to read "Lindell Ormsbee".

Lindell Ormsbee

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**THE ENVIRONMENTAL AND PUBLIC PROTECTION CABINET,
THE CABINET FOR HEALTH AND FAMILY SERVICES AND
THE COMMERCE CABINET**

The mission of the Environmental and Public Protection Cabinet is to improve the quality of life for all Kentuckians and to enhance Kentucky's economy while protecting Kentucky's environment, workers and the general public.

Secretary: Teresa J. Hill

Telephone: 502-564-2150

Web site: <http://www.eppc.ky.gov/>

The mission of the Cabinet for Health and Family Services is to deliver quality services that enhance the health, safety and wellbeing of all people in the Commonwealth of Kentucky.

Secretary: Mark Birdwhistle

Telephone: 502-564-7042

Web site: <http://www.chfs.ky.gov/>

The mission of the Commerce Cabinet is to provide a single source and brand for Kentucky promotion throughout the state, nation, and the world and manage investment in these assets with a broad, coordinated view for creating economic development.

Secretary: George Ward

Telephone: 502-564-4270

Web site: <http://www.commerce.ky.gov>

One Report:

Mercury Task Force Report

(<http://www.eqc.ky.gov/NR/rdonlyres/D15EAAE0-901B-4B91-838B-6BD175894F97/0/MercuryReport.pdf>)

Mercury Task Force Report
To the
Environmental Quality Commission

Prepared by:
Environmental and Public Protection Cabinet
Cabinet for Health and Family Services
Commerce Cabinet

September 2006



Mercury Task Force Report Executive Summary

On January 22, 2004, the Kentucky Environmental Quality Commission (EQC) made five recommendations to the Governor regarding mercury exposure in Kentucky. In response to these recommendations, the Environmental and Public Protection Cabinet (EPPC) in cooperation with the Kentucky Cabinet for Health and Family Services- Department for Public Health (CHFS-DPH) and the Department of Fish and Wildlife Resources (KDFWR), formed an internal task force to study and respond to these recommendations. The recommendations primarily focus on communicating the risks of exposure to mercury, specifically in fish tissue, in a manner that informs without creating panic or fear. The task force recommends that these communication efforts target high-risk populations such as women who are pregnant, nursing or could become pregnant and children 6 years old and younger. Another important group to target in this outreach effort is subsistence fishers.

The mercury task force has created this report to address each of the five recommendations made by the EQC. The recommendations are: 1) Inform and educate the public on the risks of mercury in fish, 2) target additional outreach efforts at high-risk areas, 3) strengthen testing and analysis of mercury in the environment, 4) strengthen environmental health surveillance and 5) reduce persistent, bioaccumulative and toxic (PBT) chemicals.

Significantly, the U.S. EPA issued two rules in March 2005 that will have profound impacts on mercury emissions in Kentucky and across the nation. The Clean Air Mercury Rule (CAMR) will reduce nationwide mercury emissions from coal-fired power plants in the amount of 38 tons per year by 2010. In 2018 and thereafter, coal-fired power plants will be required to meet a 15-ton per year cap. In Kentucky, the caps are 1.525 tons per year for the years 2010-2017, and 0.602 tons per year in 2018 and thereafter, a reduction of more than 50 percent. According to U.S. EPA, the Clean Air Interstate Rule (CAIR) will achieve the largest reduction in air pollution in more than a decade. Although aimed at capping sulfur dioxide (SO₂) and nitrogen oxides (NO_x) in the eastern United States, it will provide a co-benefit of reducing mercury emissions. When implemented, CAMR and CAIR will result in improved water quality and the attenuation of human health and environmental risks associated with mercury in Kentucky.

State efforts to address mercury in the Commonwealth are ongoing. State government and universities continue to partner on initiatives to reduce mercury in the environment, including funding research and sponsoring collection events. In 2006, the EPPC Division of Waste Management (EPPC-DWM) and the (CHFS-DPH) sponsored four mercury collection events in 2006, with almost 1,000 pounds of mercury and mercury-containing devices collected. EPPC and CHFS-DPH have upgraded Web sites to include new and timely information for citizens to learn more about mercury and mercury contamination.

The CHFS-DPH released an informational brochure developed by the FDA, "What you need to know about Mercury in Fish and Shellfish," marketed to women who might become pregnant, women who are pregnant, nursing mothers and young children. The document is available in English and Spanish.

During Earth Day 2006 the (CHFS-DPH) announced that the Department is taking a proactive approach to mercury reduction and will be taking steps to be mercury free by 2010.

During the 2006 General Assembly, the EPPC sponsored legislation to grant funding to counties and cities for household hazardous waste collection, which will allow for expanded collection of mercury and mercury-containing devices across the Commonwealth. Funding made possible through 2005 legislation enabled the Office of Energy Policy to grant funding for research at Western Kentucky University on the impact of multi-pollution control devices on mercury chemistry and transport.

These efforts are in addition to the collaborative initiatives established between the Department for Environmental Protection (EPPC-DEP), the CHFS-DPH, and the Education Cabinet to assist school officials with guidelines on how to handle mercury spills in schools.

Inform and educate the public on the risks of mercury in fish

Currently, Kentucky has a statewide fish-consumption advisory for mercury based on low-level mercury concentrations found in fish tissue. Kentucky's fish-consumption advisories are "risk based," meaning they categorize risk according to the amount of fish consumed. It is important that our message includes information about the benefits as well as the risks of eating fish. Fish is part of a healthy diet, as well as a healthy economy, so it is crucial that our communication does not create fear or panic but rather accurately conveys the risks of mercury exposure.

Before creating an outreach and awareness campaign, we must first measure the level of awareness about the issue, specifically within the target demographics. We also must know the fish-consumption rates of Kentucky women of childbearing age and children under 6 years old. Studying the target audience will help us identify the group or groups most in need of outreach. This research will also aid us in developing outreach materials that are based on the specific needs of the target audience. The state can and should make use of available resources from the U.S. EPA and other agencies that have developed effective outreach materials.

An important element of the outreach campaign is an informational Web site that will encompass a broad range of mercury-related topics. Currently, each task force agency provides mercury information on its Web site, but there is no single location where a person can find information about mercury-related topics. The task force recommends creation of a state Web site that will be a resource all citizens can use to obtain information about the risk of exposure to mercury.

Target Additional Outreach Efforts at High-risk Areas

Targeting bodies of water most frequented for subsistence fishing will require research. We recommend exploring the use of Census data and other resources to identify populations and geographic locations that are most likely to rely on subsistence fishing. The task force recommends partnering with state universities or other entities to conduct fishing season surveys, if needed, to further identify populations and reliance on subsistence fishing. Efforts should also be made to collect additional fish tissue data to ensure accuracy in determining the actual level of risk at a particular body of water. The task force recommends appropriate signage be posted at high-risk bodies of water.

Strengthen Testing and Analysis of Mercury in the Environment

The EPPC intends to fill vacant positions, use newly acquired resources, and identify funding and staffing resources to supplement and improve the Division of Water's monitoring program. The Division for Air Quality is measuring mercury in rainwater at two sites. The monitoring efforts are expanding by the addition of equipment for four more locations. DPH currently tests fish from Kentucky permitted fish processors for PCBs and pesticides. Further, in 2004, Kentucky State Lab began testing for methylmercury.

Strengthen Environmental Health Surveillance

No surveillance program currently exists for mercury and its associated outcomes. The task force suggests investigating surrounding states' programs to determine how they collect and track data linking environmental exposures to birth defects and developmental and learning disabilities.

Reduce Persistent, Bioaccumulative and Toxic Chemicals

The EPPC-DEP recognizes the importance of identifying and reducing persistent, bioaccumulative and toxic pollutants (PBT) in Kentucky's environment and will continue to assess the impact of contaminants such as PCBs, mercury, dioxins and pesticides on the environment and encourage reductions of these contaminants. Currently, DPH monitors data and issues fish-consumption advisories based on PBTs. DPH also ensures a safe food supply, and works with other agencies such as KDFWR, the Kentucky Department of Agriculture and others to ensure food supplies are free from PBTs.

Conclusion

Mercury contamination is a global problem that warrants our attention. Mercury is present in our environment and even if we were to eliminate domestic emissions today, mercury contamination in the near term would remain a problem. Since most exposure is a result of fish consumption, it is logical to evaluate mercury levels in Kentucky fish, research populations who are most at risk for mercury exposure and communicate the risks of exposure to them in a way that informs but does not create fear or panic.

DEPARTMENT FOR ENVIRONMENTAL PROTECTION

DIVISION OF WATER

Division Description: The Division of Water is charged with the responsibility of managing and protecting the state's waters, both on the surface in lakes, streams and rivers as well as groundwater beneath the surface of the land in the state.

Division Director: David Morgan

Telephone: 502-564-3410

Web site: <http://www.water.ky.gov/>

DEPARTMENT FOR ENVIRONMENTAL PROTECTION

DIVISION OF WATER

Resource Planning and Program Support Branch

Branch Description: The Resource Planning and Program Support Branch provides long-term planning and daily administrative support for the division.

Branch Manager: Ronald Price

Telephone: 502-564-3410

Web site:

http://www.water.ky.gov/homepage_repository/Resource+Planning+and+Program+Support+Branch+Homepage.htm

No Reports Within the Past Two Years

DEPARTMENT FOR ENVIRONMENTAL PROTECTION

DIVISION OF WATER

Water Quality Branch

Branch Description: The Water Quality Branch develops water quality standards and criteria, collects and analyzes physicochemical and biological data for rivers, streams, lakes and wetlands throughout the state and prepares summaries and reports of this information; manages Kentucky Wild Rivers program; and is responsible for implementing the Total Maximum Daily Load (TMDL) program.

Branch Manager: Tom VanArsdall

Telephone: 502-564-3410

Web site: <http://www.water.ky.gov/sw/swmonitor/>

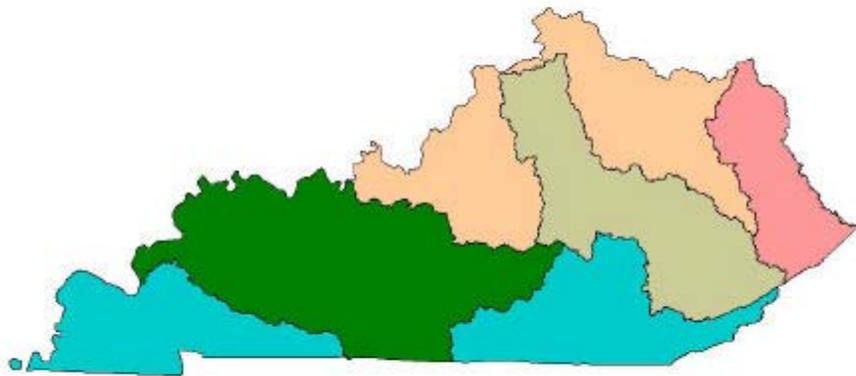
One Report:

2004 Kentucky Report to Congress on Water Quality

(<http://www.water.ky.gov/sw/swmonitor/305b/305b+Reports.htm>)

2004 Kentucky Report to Congress on Water Quality

with emphasis on the Green/Tradewater and
Big Sandy/Little Sandy/Tygarts
Basin Management Units



Kentucky Environmental and
Public Protection Cabinet
Division of Water
April 1, 2004

Chapter 1. Introduction

This report was prepared by the Kentucky Division of Water (DOW) for submittal to the U.S. Environmental Protection Agency (EPA) to fulfill requirements of Section 305(b) of the Federal Water Pollution Control (or Clean Water) Act of 1972 (P.L. 92-500), as subsequently amended. Section 305(b) of the Act requires states to assess and report current water quality conditions to EPA every two years.

The DOW initiated a five-year rotating watershed management approach in 1997. Results from the first basin management unit (BMU), the Kentucky River, were reported in the 2000 305(b) report. The current (2004) report consists primarily of results from monitoring in the fourth and fifth BMUs, the Green/Tradewater BMU in 2001 and the Big Sandy/Little Sandy/Tygarts BMU in 2002. The report also presents a summary of data from the entire state. Data collected by the Ohio River Valley Water Sanitation Commission (ORSANCO) were used to make assessments for the main stem of the Ohio River.

Impaired waters in the Green/Tradewater BMU identified by this report also are listed in the 2004 303(d) report (Kentucky Division of Water, 2004). However, there are reasons that some impaired waters are not 303(d)-listed. For example, compliance problems at facilities with adequate permits are not on the 303(d) report because the total maximum daily load (TMDL) has already been calculated and accounted for in the permit. These issues are discussed in more detail in the 303(d) report.

DEPARTMENT FOR ENVIRONMENTAL PROTECTION

DIVISION OF WATER

Drinking Water Branch

Branch Description: The Drinking Water Branch reviews design and operation plans for drinking water plants and monitors their operation, as well as provides technical assistance to public water systems to resolve problems and issues.

Program Highlight: This division includes the Area-Wide Optimization Program, which is a voluntary program that encourages optimization of surface water treatment plants beyond U.S. EPA drinking water regulatory requirements. Optimization efforts are primarily focused on removing or inactivating microbial contaminants through lower turbidity levels in the finished water. Recent efforts have begun on reducing disinfectant by-product levels in the distribution system. Disinfection by-products are a result of naturally occurring organic matter in the raw water reacting with chlorine used for disinfection purposes and have been attributed to health issues.

Branch Manager: Donna Marlin

Telephone: 502-564-3410

Web site: <http://www.water.ky.gov/dw/>

Two Reports:

Annual Public Water System Compliance Report Summary

Annual Public Water System Compliance Report

(These reports are not available online.)

ANNUAL PUBLIC WATER SYSTEM COMPLIANCE REPORT SUMMARY ABSTRACT

This report is a brief summary of all Kentucky violations to national primary drinking water regulations. This report is arranged by contaminant and subdivided into Maximum Contaminant Level (MCL), Monitoring and Treatment Violations. MCL violations occur when a contaminant exceeds the maximum level allowed in drinking water. Monitoring violations occur when a system fails to perform required monitoring or fails to submit the monitoring by the deadline. Treatment Technique violations occur when a water system fails to meet a specified treatment goal. For more information on this report contact Frank Hall at 502-564-2225, ext. 542.

ANNUAL PUBLIC WATER SYSTEM COMPLIANCE REPORT ABSTRACT

This report is a detailed list of all Kentucky violations to national primary drinking water regulations. This report is arranged by Public Water System then subdivided by contaminant and then further divided into Maximum Contaminant Level (MCL), Monitoring and Treatment Technique violations. MCL violations occur when a contaminant exceeds the maximum level allowed in drinking water. Monitoring violations occur when a system fails to perform required monitoring or fails to submit the monitoring by the deadline. Treatment Technique violations occur when a water system fails to meet a specified treatment goal. For more information on this report contact Frank Hall at 502-564-2225, ext. 542.

DEPARTMENT FOR ENVIRONMENTAL PROTECTION

DIVISION OF WATER

Water Resources Branch

Branch Description: The Water Resources Branch issues permits for construction in floodplains to help prevent losses from flooding, inspects dams listed in the state's inventory and administers the National Flood Insurance Program.

Branch Manager: Art Clay

Telephone: 502-564-3410

Web site:

http://www.water.ky.gov/homepage_repository/Water+Resources+Branch.htm

No Reports Within the Past Two Years

DEPARTMENT FOR ENVIRONMENTAL PROTECTION

DIVISION OF WATER

Watershed Management Branch

Branch Description: The Watershed Management Branch manages and protects the water resources of Kentucky for present and future generations through voluntary, educational and regulatory programs.

Branch Manager: Peter Goodmann

Telephone: 502-564-3410

Web site: <http://www.watersheds.ky.gov/>

Seventeen Reports:

Kentucky River Basin Status Report

(<http://www.watersheds.ky.gov/NR/rdonlyres/41C5E945-D27D-4500-BA66-5673EA7C495C/0/KYRiverBasinStatusReport1997.doc>)

The Licking River Region in Kentucky: Status and Trends

(<http://www.watersheds.ky.gov/NR/rdonlyres/A6985E1F-9E3B-4027-9833-8A127809484D/0/StatusandTrendscomplete.pdf>)

State of the River: A report on the condition of the Salt River watershed, Kentucky, and the minor Ohio River tributaries in the area, November 1998

(<http://www.watersheds.ky.gov/NR/rdonlyres/BDC0C15B-4493-41C4-829A-3C74AFC69598/0/SaltBasinStatuscomplete.pdf>)

Green and Tradewater Basins Status Report

(<http://www.watersheds.ky.gov/NR/rdonlyres/4F2FB127-3729-42D1-85ED-725D18F6771F/0/GTBasinStatusComplete.pdf>)

DEPARTMENT FOR ENVIRONMENTAL PROTECTION

DIVISION OF WATER

Watershed Management Branch

Seventeen Reports (continued):

Cumberland River Basin and Four Rivers Region Status Report

(<http://www.watersheds.ky.gov/NR/rdonlyres/4873F2E1-7A90-476D-8397-417F03D9B587/0/BasinStatusReportAll.pdf>)

Big and Little Sandy River Basin Status Report

(<http://www.watersheds.ky.gov/NR/rdonlyres/E39D7058-7818-477F-971E-6E717FDE5DC1/0/BasinStatusReport.pdf>)

Bankfull Characteristics of Select Streams in the Four Rivers and Upper Cumberland River Basin Management Units

(This report is not available online.)

Grant # C9994861-99, Fleming County Water Resources Coordinator, Workplan # 99-06

(This report is not available online.)

Introduction to Stream Geomorphic Assessment and Restoration on a Watershed Scale

(This report is not available online.)

Grant Number: C-9994861-99, Fleming Creek Clean Water Action Plan

(This report is not available online.)

Obion Creek Stream Corridor Restoration Demonstration Project: Final Report

(This report is not available online.)

Final Report: Herrington Lake – Dix River Clean Water Action Plan

(This report is not available online.)

DEPARTMENT FOR ENVIRONMENTAL PROTECTION

DIVISION OF WATER

Watershed Management Branch

Seventeen Reports (continued):

Final Report: Upper Burning Fork Creek Watershed Restoration Project

(This report is not available online.)

Final Report: Statewide Training Program for Controlling Sediment and Erosion at Construction Sites in Kentucky

(This report is not available online.)

Final Report: Development of Interpretive Materials for Nonpoint Source Pollution Displays

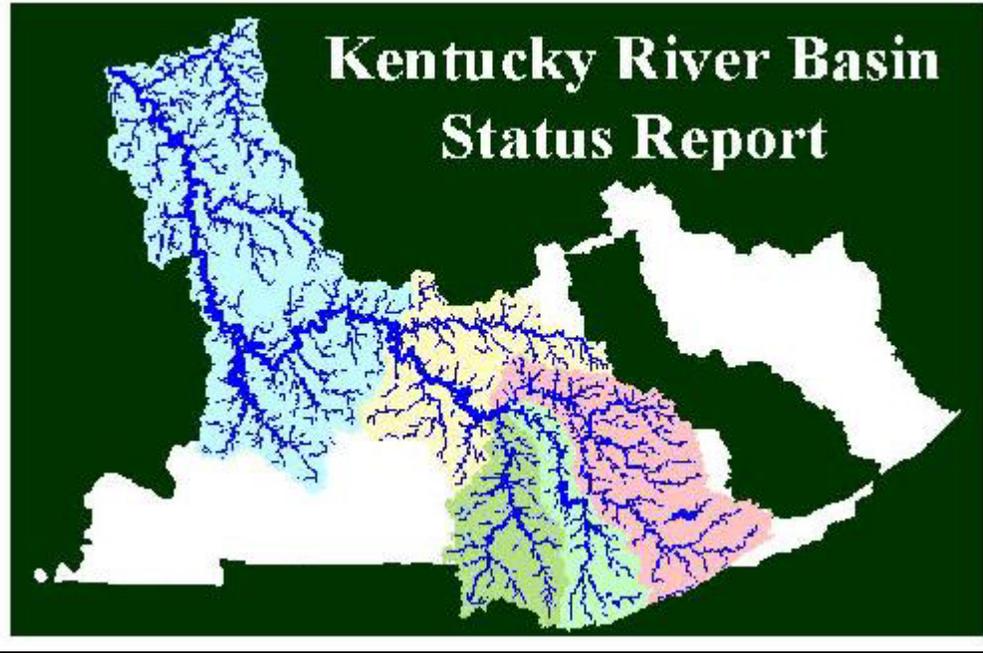
(This report is not available online.)

Upper Cumberland River Watershed Onside Wastewater Project Report #99-24 Final Report

(This report is not available online.)

Results of Expanded Groundwater Monitoring in Watersheds of the Big Sandy River, Little Sandy River and Tygarts Creek (Kentucky Basin Management Unit 5)

(This report is not available online.)



FOREWORD

The Kentucky Watershed Management Framework serves to coordinate and integrate existing programs, tools, resources, groups, and agencies. Through it, the ecological structure and function can be restored, maintained, and protected, and sustainable uses of the watershed can be supported.

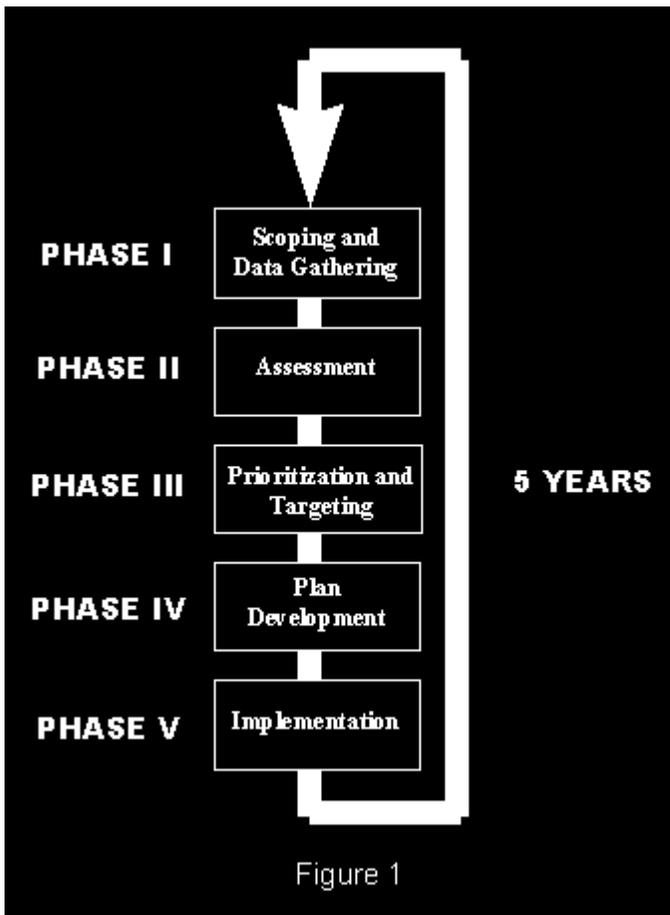
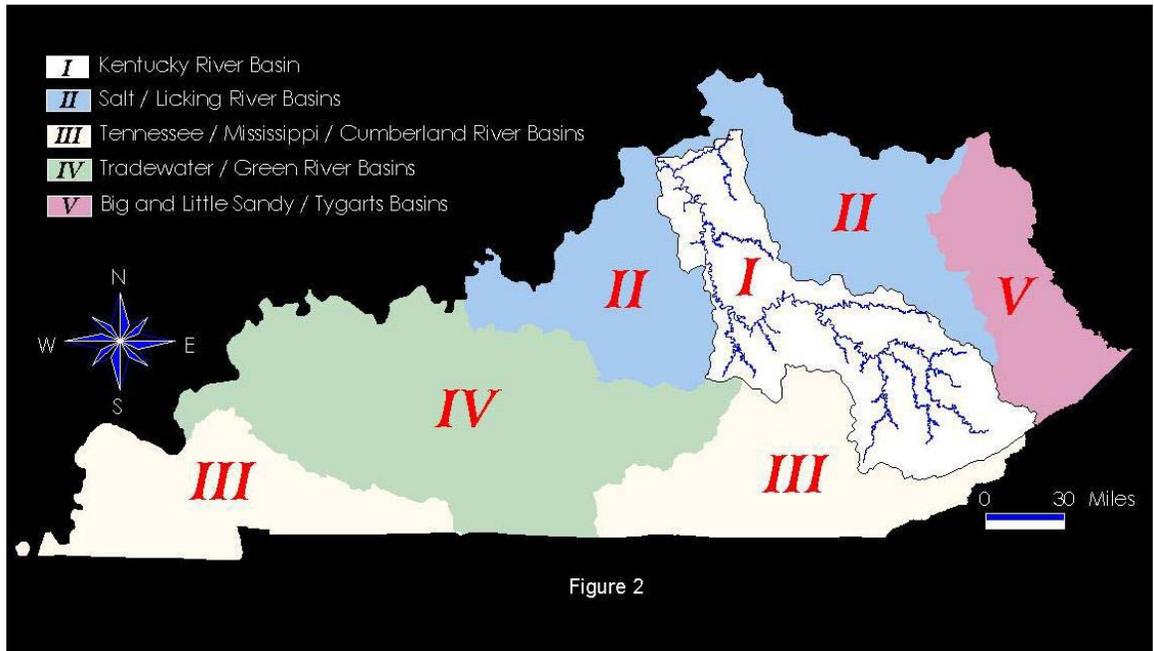


Figure 1

The first activity under Phase I (Scoping and Data Gathering) of the basin management cycle (Fig. 1) is the Basin Status Report. Kentucky is divided into five basin management units (Fig. 2). Each basin management unit produces a Basin Status Report to describe conditions and trends in water quality and quantity as well as watershed integrity.

The information contained in this Basin Status Report for the Kentucky River Basin is intended to provide an interdisciplinary overview of the basin—providing information that will serve as indicators of the basin’s condition and predictors of areas needing attention. This report will assist the Kentucky River Basin Team in preparing a strategic data collection plan and will provide the public with background information on the basin. Phase II will involve review and assessment of the data that have been collected. Phase III of the cycle

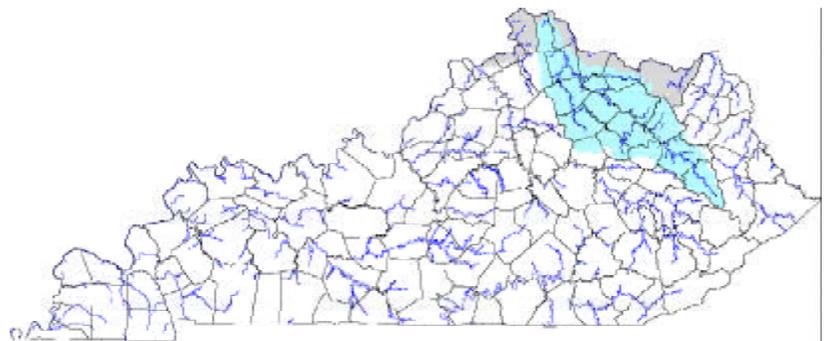
is intended to identify those subwatersheds within the Kentucky River Basin that are in most urgent need of attention. Phase IV will entail development of a watershed management plan and action strategies for the priority watersheds. Phase V will lead to implementation of the management plans.



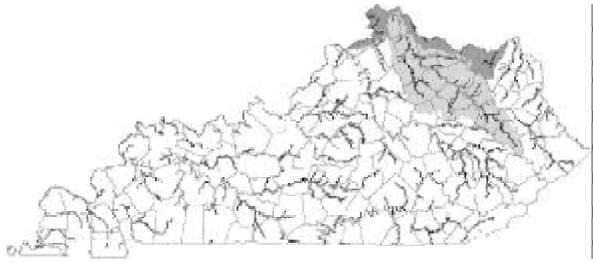
The Licking River Region in Kentucky: Status and Trends



November 1998



The Licking River Region: Status and Trends



This report covers the entire drainage area – or *basin* – of the Licking River and other streams north and east of the basin along the Ohio River. In this report, the entire area is referred to as the Licking River region.

Are the streams in the Licking River region healthy?

That is the main question this report explores. In order to determine if the region's streams are contaminated, we have reviewed water sampling data, assessments of stream and river bank conditions, discharge permits for sewage treatment plants, and activities like farming, development, logging, and mining. We have found that what happens in the river basin – or *watershed* – directly impacts water quality and habitat conditions. Some tributaries in the Licking River region are contaminated with bacteria from sewage or livestock; silt from erosion, construction or logging; algae blooms fed by nutrients from fertilizers or manure; and some pollution from mining and industrial or urban sewage plants. Most of the streams in the region, however, seem to be free of excessive pollution. Maintaining good water quality in the unpolluted parts of the river and cleaning up contamination in other sections will require a closer look at what is happening in the watershed, how it impacts watershed health and what can be done to improve conditions. That is what this report is all about.

Basin or Watershed?

The *basin* of a river or stream is all the land that is drained by a lake, river or stream. Another word for basin is *watershed*, which comes from the observation that water is shed from an area of land and flows downhill into a body of water.

Where did this report come from?

This report was produced by the Licking River Region Team, a group of people representing various agencies and organizations in the watershed. The analysis and recommendations in the following pages are an important part of the Kentucky Watershed Initiative, a statewide effort to assess and improve watershed health in the Commonwealth. The report examines existing conditions in the Licking River watershed and other streams that drain directly into the Ohio River in northeastern Kentucky.

The information and maps that follow were collected from a variety of sources. Federal, state and local agencies provided much of the data, with supplemental information coming from *water monitoring* volunteers organized by the Licking River Watershed Watch, public universities and other organizations. This report will give readers a good, general background on the river basin. Hopefully, it will also spark some interest in exploring conditions within the smaller watersheds that feed into the Licking and Ohio rivers. Addressing issues in these tributary watersheds will require constructive, cooperative local action.

Water monitoring

Water monitoring to determine watershed health can involve many different activities. We can find out if our waters are fishable, swimmable, and drinkable by testing for various pollutants, checking oxygen levels, measuring water clarity and temperature, observing aquatic and terrestrial life, and assessing habitat conditions both in the stream and along the banks.

State of the River

A report on the condition of the Salt River watershed, Kentucky, and the minor Ohio River tributaries in the area
November 1998



INSIDE

- ◆ The Salt River Watershed and minor Ohio River tributaries
- ◆ What is the water quality?
- ◆ What are the primary concerns?
- ◆ What can be done?

The Salt River and Minor Ohio River Tributary Watersheds

Description

The Salt River and the five minor Ohio River tributaries flow through portions of 19 Kentucky counties and drain some 5,200 square miles of land, representing 13% of the state. The main stem of the Salt River is approximately 150 miles long and flows through portions of 15 counties. The Salt River joins the Ohio River at West Point. The minor tributaries drain about 1,200 square miles of land and flow directly into the Ohio River. These areas run adjacent to the Ohio River between Carroll County and Breckinridge County. Louisville, Harrodsburg, Bardstown, Brandenburg, Shepherdsville, and the Fort Knox Military Reservation are all located within these watersheds. Some of the major lakes in these watersheds include Taylorsville Lake, Guist Creek Lake, and Doe Valley Lake.

Overall Quality

There is a total of approximately 3,770 miles of streams and rivers in the Salt River Watershed. Only 650 miles (17%) have been assessed to determine whether these streams meet the water quality standards for swimming and fishing. There are streams within the watershed that are relatively pristine; but in areas with large populations, water quality is poor due to urban runoff, municipal wastewater treatment plants, septic tanks, and discharges from businesses and industry. These sources contribute bacteria and pathogens, silt, metals, chlorine, pesticides, and a wide range of organic chemicals. In Jefferson County, no stream meets the state standards for swimming. In many of the rural areas, stream quality is degraded from siltation, animal waste, nutrients, and pesticides.

There are roughly 200 stream miles found in the tributaries to the Ohio River covered in the Salt River Watershed basin management area. A number of these streams drain urban areas and are known to have water quality problems. The pollution sources are primarily wastewater treatment plants, combined sewer overflows, failing septic systems, and urban runoff, all typical sources of water quality problems in fast-growing urban areas across the country.

What are the Priority Concerns in the Watershed?

One of the priority concerns in the watershed is rapid population growth and urban sprawl. The watershed has a population of just over one million people, or about 27% of Kentucky's population. In comparison, the land area is about 13% of the state. Population pressures are particularly intense in the counties surrounding Jefferson County. The fastest growing counties in the state are located in the watershed. Since 1990, the state's population growth has been 6%. In comparison, the growth rate in Spencer County during the same time period was 35%; Oldham County grew 30%; Trimble, Anderson, and Bullitt increased from 20%-24%. In addition to the impacts of urbanization, water quality is adversely impacted because rural communities are often unprepared to accommodate rapid growth. Sewers and other needed environmental infrastructure are unavailable. In Spencer County, for example, fewer

than 10% of the population has access to public wastewater treatment. In Oldham, Trimble, Henry, Shelby, Bullitt, Nelson, Washington, Marion, Mercer, and Meade counties, fewer than 50% of the households have access to public treatment facilities. These formerly rural counties also do not have the public capacity to assure that water quality is protected. Most of the counties do not have adequate zoning or local ordinances, sufficient local health and building permit staff, or resources to protect water quality adequately.

Other Special Areas and Concerns in the Watershed

Wetlands

Wetlands are essential to the overall health of the watershed. They store water during floods and droughts and filter pollutants from the water. They provide diverse habitats for a wide variety of mammals, reptiles, amphibians, and fish. The total area of wetlands within this watershed is diminishing.

Endangered and Threatened Species

Federally listed endangered (E) and threatened (T) animal species known to occur in the Salt River watershed include the Indiana bat (E), gray bat (E), fanshell mussel (E), and the bald eagle (T). The only federally listed endangered or threatened plant species known to occur in the watershed is running buffalo clover (E).

Freshwater Mussels

The Salt River historically supported a diverse native freshwater mussel fauna. More than 50 species once existed in the watershed, and current records indicate that approximately 20 species still exist, including the federally endangered fanshell. The decline in diversity of freshwater mussel species in the Salt River can be attributed to water-quality degradation, impoundments, channelization, and gravel mining in the watershed.

Drinking Water

There are 36 public water supply systems in the watershed. Five of these rely on surface water: Lebanon (Rolling Fork), Shelbyville (Guist Creek), Taylorsville (Salt River), Springfield (Willisburg Lake), and Louisville (Ohio River). Cities and counties are required to develop water supply plans and are encouraged to protect sources of water for these plants.

Wastewater

There are 314 wastewater discharge points in the watershed. These include 49 public wastewater treatment facilities, 60 industrial discharge points, and 205 other dischargers, including schools, subdivisions, nursing homes, malls, and trailer parks. Although the volume from these smaller plants is low, they typically have a high incidence of violations due to poor management, inadequate funds, and poor design. Since they are often located on smaller streams, they have a great potential for releasing contaminants that render the stream uninhabitable for aquatic life. Over the past decade, the state has implemented a policy to consolidate these small plants.

Green and Tradewater Basins Status Report



March 2001



Description of the Green and Tradewater basins

To understand the health of the watershed, one must also understand the natural conditions of the watershed. The geology, or physiographic makeup of the basin, the type of terrain, the amount of water, population, land-use activities, etc., all have a bearing on where and how pollutants move in the environment and how we are exposed to them. In the end, these natural conditions affect the health of the watershed and the people who live there.

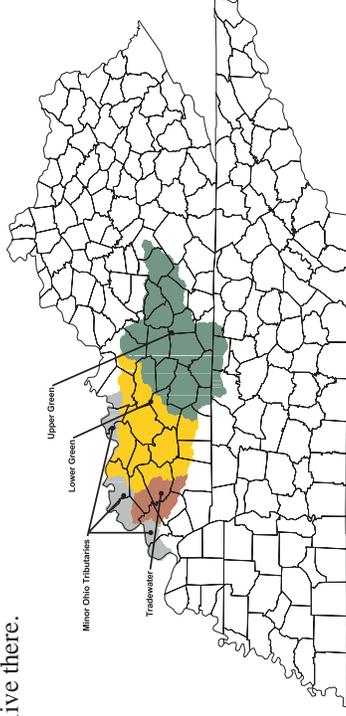
Regions of the watershed

For the purpose of this report, the Green River basin is divided into two regions based on hydrologic units, which divide the overall Green River watershed into sub-basins defined by tributaries within the basin. On this basis, the part of the watershed upstream from the Green's junction, or confluence, with the Barren River near Woodbury is considered the **Upper Green River** basin. Similarly, the areas that drain to the Green downstream from the **Green River** basin referred to as the **Lower Green River** basin.

This report also deals with all of the Tradewater River drainage basin, plus a few smaller watersheds that are minor tributaries to the Ohio River.

Physiography

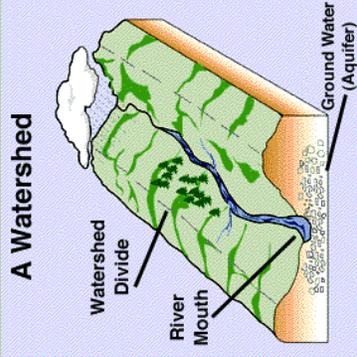
The physiography of a region is influenced by a variety of underlying features. Most important is the type and geometry of bedrock in the area. Surface and groundwater flows are controlled by the nature of these rocks and the associated surface features. There are two main physiographic regions through which the Green and Tradewater Rivers flow. The **headwaters of the Green River** lie in the region known as the Eastern Pennsylvanian. Most of this area is characterized by flat-lying limestones, sandstones, and shales that underlie flat to gently rolling terrain. The limestone areas have well-developed karst topography, characterized by vast sinkhole plains that take virtually all surface water that comes to them and channel it through caves and smaller underground passages below the ground surface. Several springs in this region, discharging from major underground passages, are large enough to support municipal water systems. The **Lower Green River** traverses the Western Coalfield. This region consists primarily of thick



flat-lying sandstone and shale beds and is generally characterized by flat to gently rolling terrain. Groundwater flow is predominantly through fractures, with wells in valleys typically producing more water than wells on ridges. The upper part of the **Tradewater River** Region flows northward from the Western Pennsylvanian. As it approaches its confluence with the Ohio River, it flows over gently rolling terrain underlain mainly by loose sediments such as sand and silt. Groundwater flow there is primarily through the spaces between the grains of sediment. Shallow wells in the area are widely used for domestic water supplies; in addition, deeper wells in confined aquifers provide abundant water for industrial, municipal, and domestic use.

What's different about these watersheds?

In most landscapes, slopes control the runoff from precipitation and stream drainage, with ridgelines forming the drainage boundaries. Underground water in most watersheds and drainage basins tends to follow the lay of the land. However, in soluble limestone terrain or karst regions, the underground drainage may differ from the boundary of its surface watershed and flow through caves and cracks in the rocks beneath the surface ridges. This is sometimes called "misbehaved" karst drainage. In the Mammoth Cave region, 15%-20% of the underground water is misbehaved.



What is a watershed?

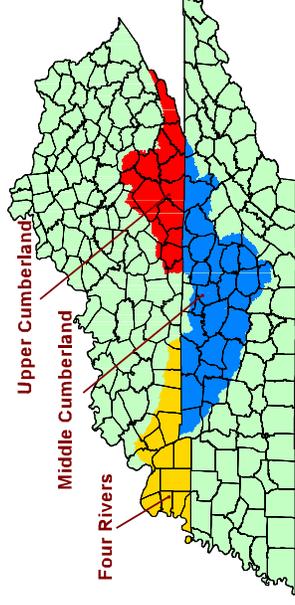
No matter where you live, work, or play, you are in a watershed. A watershed is a geographic area where all water drains to a specific location. This location may be a stream, river, lake, wetland, ocean, or the water may drain underground into the groundwater. A creek drains a small watershed, while a river drains a larger watershed. Every creek, stream, or river that drains into another body of water is considered a tributary to that body of water. The watershed boundaries for a large body of water will include many smaller tributary watersheds. A surface watershed is defined by the surrounding topography. A watershed extends from the end of the drainage area (the lowest point) upgradient to all the highest points that surround the drainage channel.

Cumberland River Basin and Four Rivers Region



Status Report

March 2000



What is a watershed?

No matter where you live, work, or play, you are in a watershed. A watershed is a geographic area where all water running off the land drains to a specific location. This location may be a stream, river, lake, wetland, or ocean; or the water may drain underground into the groundwater. You may live on a creek, which is considered a small watershed. Your creek may join a river, which is a larger watershed. The river may have many smaller creeks, known as tributaries, that drain into it and each of these tributaries has a small watershed associated with it, and each is part of the larger watershed of the river.

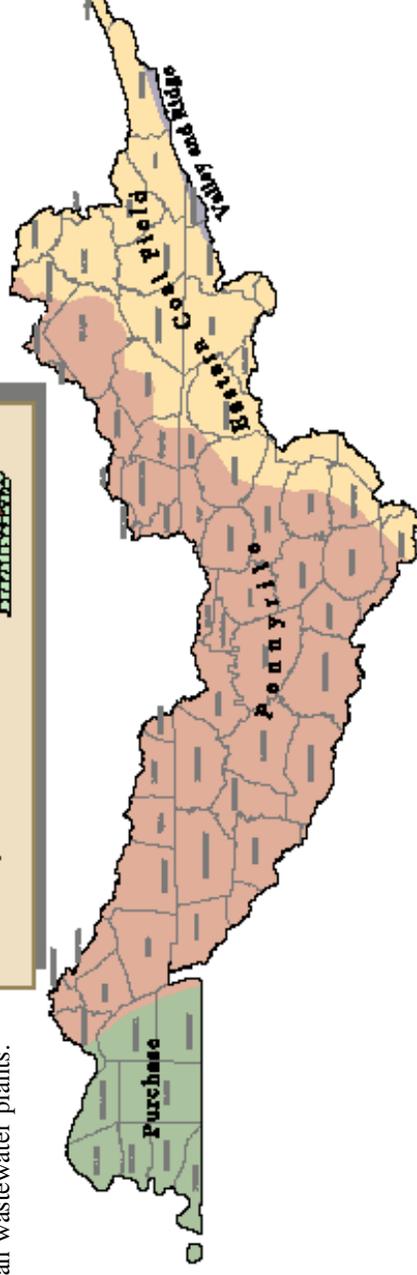
Is the watershed healthy?

That is the main question this report explores. In order to determine if the region's streams are contaminated, we have reviewed water sampling data, assessments of stream and river bank conditions, discharge permits for wastewater treatment plants, and activities like farming, development, logging, and mining. We have found that what happens in the river basin – or *watershed* – directly impacts water quality and habitat conditions. Some tributaries in the Cumberland River basin and the Four Rivers region are contaminated by agriculture (204 miles of streams), urban runoff (283 miles), resource extraction (1,075 miles), municipal wastewater discharges (358 miles), and waste disposal on the land (192 miles). These sources of pollutants contribute bacteria from sewage or livestock; silt from erosion, construction, or logging; algae blooms fed by nutrients from fertilizers or manure; and various pollutants from mining and industrial or urban wastewater plants.

Most of the streams in the region, however, seem to be free of excessive pollution. Maintaining good water quality in the unpolluted parts of the river and cleaning up contamination in other sections will require a closer look at what is happening in the watershed, how it impacts watershed health, and what can be done to improve conditions. That is what this report is all about.

Regions of the watershed

The Four Rivers Region includes the far western portion of Kentucky, with portions of the Lower Cumberland River basin, Lower Tennessee River basin, and direct tributaries to the Ohio and Mississippi rivers. The Upper Cumberland River basin includes the headwaters of the Cumberland basin down to the Kentucky Tennessee state line. The Middle Cumberland River basin is all of the Cumberland River basin in the state of Tennessee.



Basin or Watershed?

The basin of a river or stream is all the land that is drained by a lake, river or stream. Another word for basin is *watershed*, which comes from the observation that water is shed from an area of land and flows downhill into a body of water.

Karst Topography

Karst topography is defined as that type of terrain and geologic region underlain by bedrock that easily dissolves, such as limestone, and characterized by depressions in the ground, or sinkholes, caves, and underground drainage. Because water can enter the subsurface easily through conduits and fractures in the soluble limestone bedrock, karst aquifers are highly susceptible to contamination.

Geography and Stream Health

How does geography affect the health of streams? The lay of the land, soil types, and vegetation in an area can directly affect water quality – especially when the land is cleared or tilled. For example, basins with loose soils, steep hills, or little vegetation are often severely eroded by rainstorms, leaving streams and rivers muddy and subject to flooding from rapid runoff. Vegetation can reduce flooding by slowing down runoff from rainstorms and can even filter out silt and other contaminants before they reach streams. Trees, bushes, and tall grass along stream banks also reduce erosion along the channel and create valuable habitat for birds, mammals, and other creatures.

Description of the Cumberland River Basin and the Four Rivers Region

To understand the health of the watershed, one must also understand the natural conditions of the watershed. The geology, or physiographic makeup of the basin, the type of terrain, the amount of water, population, land-use activities, etc., all have a bearing on where and how pollutants move in the environment and how we are exposed to them. In the end, these natural conditions affect the health of the watershed and the people who live there.

Physiography

The headwaters of the Cumberland River lie within the Eastern Coal Field physiographic region. Although there are some folded and faulted rocks, such as along the Pine Mountains, most of this region is characterized by flat-lying sandstones, shales and sedimentary rocks composed of sedimentary shale and limestone that have been deeply cut, creating steep hillsides and narrow valleys. Groundwater flow in this region is predominantly through cracks in the rocks, with wells in valleys typically producing more water than wells on ridges.

From the Eastern Coal Field, the river flows onto the Pennyrile Plateau. This plateau consists primarily of thick flat-lying limestone, with minor shale beds, and is characterized by flat to gently rolling terrain with well-developed karst topography. Groundwater flow in this region is mostly through well-developed conduits and enlarged fractures. Several springs in this region discharging from major conduits are large enough to support municipal water systems.

The Four Rivers Region in Kentucky is characterized by gently rolling terrain underlain mainly by loose sediments such as sand and silt. Groundwater flow is through the space between the grains of sediment. Shallow wells in the area are widely used for domestic water supplies; in addition,

deeper wells in confined aquifers provide abundant water for industrial, municipal, and domestic use.

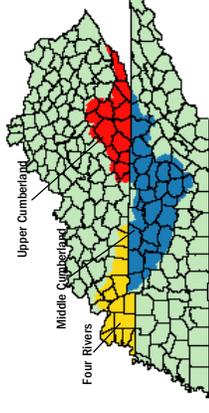
Biodiversity

Because of the variety of biological and physiographic regions that occur in the Cumberland River basin and the Four Rivers region, the natural biodiversity is high compared with many surrounding areas. For example, there are great diversities of fish, aquatic insects, and freshwater mussels, many of which exist only in this part of the state and should be protected. But biodiversity is threatened by pollution, siltation, and loss of habitat. Natural biological systems help humans by filtering and cleansing water, storing and detoxifying pollutants. The Kentucky Biodiversity Task Force is an excellent source of information on the status of Kentucky's plant and animal biodiversity at <http://www.nr.state.ky.us/nrepc/dnr/ksnpc/biodiv.htm>.

While the loss of biodiversity is a concern, the invasion of non-native species also poses a threat to other species and the integrity of the flora and fauna of the state. Exotic species often have no natural predators and can continue to reproduce to levels that will displace and out compete other species. This not only affects the existence of other species but has economic implications as well. The zebra mussel and quagga mussel attach themselves to any available hard substrate, including other mussels and snails, as well as water intakes, discharge structures, mooring and boating structures, etc. Maintenance and clearing of these mussels is very costly, and the costs get passed on to us, the consumers of drinking water systems.

Vegetation

The region is characterized by forest vegetation typical of the oak-hickory forest type, primarily white oaks, red oaks, and hickories, and a large number of other species.



Riparian area

Stream banks and the land along them are called a riparian area. With appropriate vegetation, riparian areas provide natural protection from pollutants that drain off the land. Good riparian management can prevent erosion and flooding. It also provides important habitat for wildlife because it offers food, water, shelter, and a travel corridor.



Biodiversity

Biodiversity is a term that applies to the health and function of streams, lakes and wetlands. Biodiversity is the number and kind of organisms present (or that should be present, including bacteria, plankton, plants, fungi, and animals).

Drinking Water Supplies

Water for drinking must be piped from some well or surface water supply. Public drinking water utilities have to be concerned with the quantity of the supply in order to meet the needs of the public. This can be greatly affected by droughts and other upstream practices. While the water is treated prior to distribution, the raw water that comes from the well, lake, or river must be of high enough quality to allow safe treatment. In times of drought or heavy rainfall, the quality can be adversely affected by discharges of wastewater or pollutants that run off the land. Protecting the drinking water source, or its watershed, is important to everyone.

Consumer Confidence Reports

The Safe Drinking Water Act of 1996 required that all community water systems annually report to water users information about the quality of the water delivered by the system. This report will let you know where your water comes from, how the water is delivered to you home, and violations and levels of regulated contaminants that have been found in the water.

Also included are remnants of the original bottomland hardwood forest, 80 percent of which has been converted to other use, primarily agriculture. Included in the bottomland forest are swampy areas containing such trees as bald cypress and water tupelo. While there is still a good diversity of tree species and some excellent stands scattered throughout the region, the quality of forest resources overall is mixed due to a general lack of resource planning, poor management practices, and impacts from poor harvest techniques and skid roads. As more and more acres of public land such as national forests are becoming off-limits to logging, harvesting pressure is increasing on private forest holdings such as those in the basin. An increasing source of pressure comes from demand for smaller trees that can be used for raw material for paper and chip mills. These demands have increased in number in recent years. This is reflected in the ratio of growth to harvest that is approaching 1:1 in the western part of the basin.

Water resources

The Cumberland River basin and the Four Rivers region are unique portions of the nation. Because of the rich supply of streams and other surface water, water use relies heavily on both surface water and groundwater. Drinking water is drawn almost equally from above-ground and below-ground sources. When you add the fact that much of the karst topography results in an intermingling of the surface and groundwater, these water supplies are very vulnerable to contamination from activities on the land.

There are approximately 27,668 miles of streams in the Four Rivers Region and the Cumberland River basin. These streams start as high-gradient mountain streams in the eastern headwaters of the Cumberland basin and transition

to wider, slower moving streams in the western region. Because of the more gentle terrain and types of soil and geology, the lower portions of the Tennessee and Cumberland Rivers and the tributaries to the Mississippi may have wide meanders and frequently receive much of their stream flow from pockets of wetlands scattered about the region. These wetlands play a critical role in flood control by slowly releasing water to the rivers after a rain. They also play a vital role in providing habitat for wildlife. The Four Rivers area is also rich in man-made lakes, especially in the Land Between the Lakes Region. These impoundments provide flood control, water supply, recreation, and wildlife habitat.

How do people and land use affect a watershed?

Environmental studies in the Four Rivers/Cumberland River region demonstrate the close link between land activities and water quality. Headwaters of the basin contain old oil and gas wells, abandoned coal mines, and poorly logged areas, which can contribute brine, acidity, and silt, respectively, to the river. The middle section of the basin is a mix of urban, forest and agriculture, and the lower section flows through agricultural lands that produce row crops, livestock, and their periodic by-products – water-borne sediments and manure. Fecal contamination can come from hog farms or chicken manure disposal sites, mostly located in the lower Cumberland watershed, but found all over the basin. Manure contamination can also come from dairies along the middle reaches of the river, beef cattle on farms in the middle and lower reaches, and even household pets throughout the watershed.

Storm water runoff from the cities in the middle reaches of the Cumberland basin contains automotive oils, sediment from land clearing activities, particulates from cars and other



sources, nutrients that feed algae blooms, and other urban contaminants. Development and loss of greenspace also causes surges in stream levels due to rapid runoff - from roofs, roads, and parking lots - which erodes stream banks and can cause localized flooding. Finally, the loss of trees, shrubs, and grasses along stream banks causes further instability and erosion, with resulting increases in siltation and decreases in both instream and stream bank habitat. Channelization, the clearing and straightening of stream channels, aggravates both flooding and sedimentation, despite the common notion that it reduces flooding. Power boating can contribute an oily sheen on the water and, with improper disposal and direct discharges of waste holding tanks from houseboats, can degrade water quality. Land application of sewage and sludge from septic systems is practiced in some counties and can lead to runoff of nutrients and bacteria if not done properly. Illegal dumps of solid waste can result in the runoff of any number of pollutants from metals to pesticides to bacteria, depending upon what happens to be in the dump.

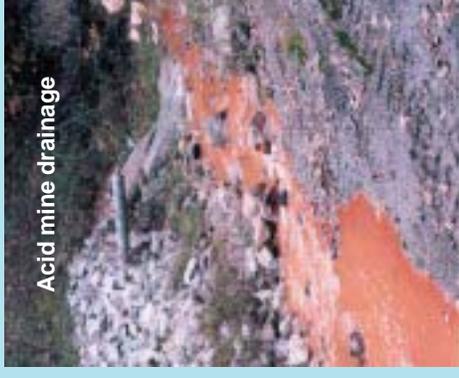
Obviously then, what happens on the land can have a significant impact on water quality in the streams and lakes. The predominant land-use activities within a watershed are

good indicators of the potential contaminant sources within that watershed.

Agricultural land represents about 39.5% of the region and is used to grow crops or raise farm animals. Farmers may apply chemicals such as fertilizers, herbicides, or insecticides that could be carried off into the river by stormwater. Other impacts include soil erosion, resulting in sediments entering the streams, and pathogens and nutrients from animal wastes entering the streams.

Forestland represents about 51% of the region and may be a natural area that is relatively undisturbed or an area where intensive harvesting occurs or something in between. A forest area that is managed as a natural area may have relatively little or no impact on the waters within the watershed. However, a poorly managed forest that is harvested for lumber may impact the watershed through soil erosion, primarily from logging roads.

Residential land includes small communities and suburban areas of homes. Land disturbance during construction as well as land changes affect the hydrology of streams. Many homes depend on septic tanks, which, if not properly



Acid mine drainage

Contaminants and their effects

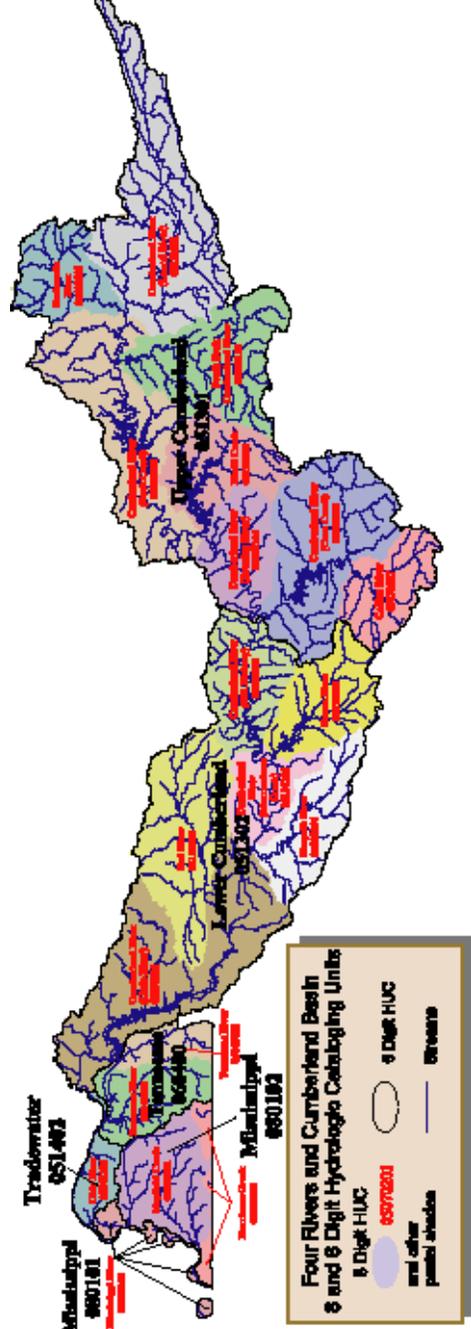
Nutrients – nitrogen and phosphorus can cause an increase in algal growth; when the algae die, their decomposition removes oxygen from the water; these result in low dissolved-oxygen concentrations. The breakdown of some nitrogen compounds by bacteria also lowers dissolved oxygen.

Pesticides – runoff of pesticides into streams results in harm and/or death to beneficial plants and animals that live in or use the water.

Pathogens – a high concentration of pathogens (bacteria, viruses, protozoans) may cause illness in humans and other animals and, in some instances, can cause death.

Sediments – the result of soil erosion causes reservoirs to lose capacity as the silt settles out, reduces suitable habitat in streams, and transports attached contaminants (nutrients and metals).

Metals – are toxic to fish, humans, and other animals and can cause illness, deformities, and death.



maintained, may be sources of bacteria, pathogens, and nutrients. Chemicals applied to lawns, trees, and shrubs by homeowners, such as fertilizers, insecticides, and herbicides, are carried off by stormwater and may harm the quality of the water in the creeks or harm the animals and plants in the creek.

Four Rivers - Cumberland Basin Land Use

Land Cover Classes

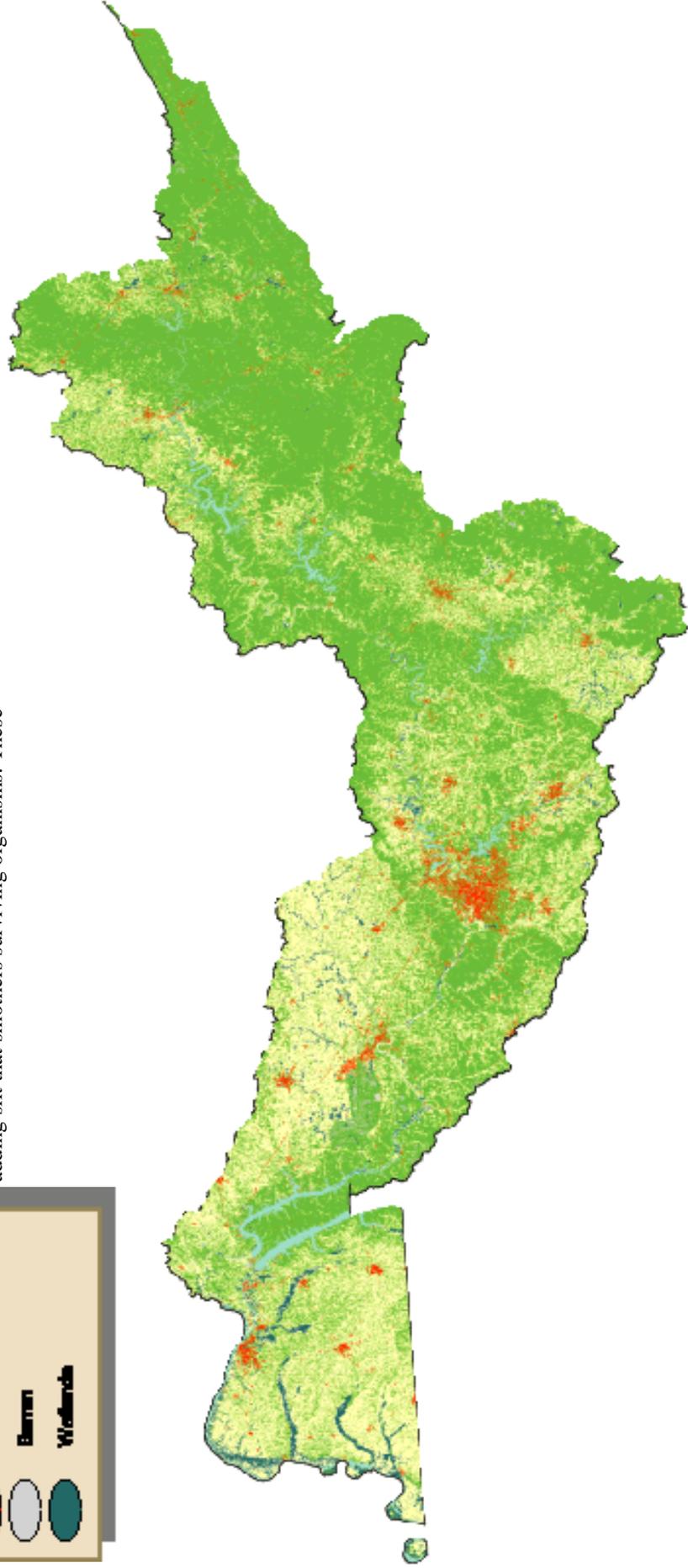


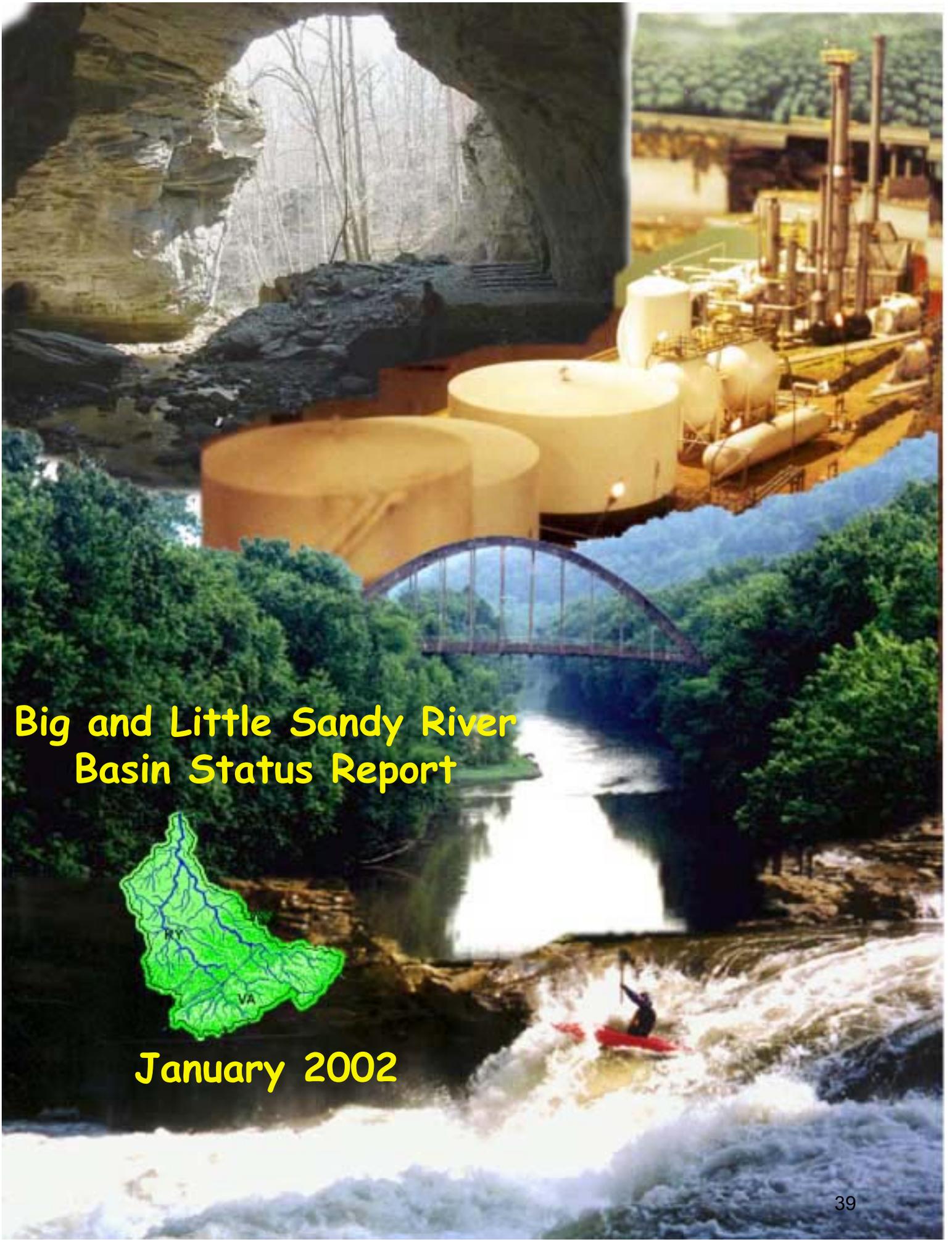
Urban, or built-up land, represents about 5.2% of the region. One of the greatest impacts on water quality and aquatic life from urbanization is the change in water-flow regimes. The increase in impervious surfaces (roads, parking lots, roof tops, etc.) and modifications to “improve” drainage (ditches, storm sewers) result in flash flooding of urban streams and runoff of toxic metals and organic compounds. Flash floods can wash out aquatic insects that are the source of food for fish and can cause bank erosion, adding silt that smothers surviving organisms. These

changes also reduce groundwater recharge, so stream flows in summer months are lower. Dissolved oxygen levels are reduced, and the concentration of toxic materials is increased. Riparian vegetation that normally provides shade and acts as a source of food for aquatic life is removed, threatening the stream’s biological integrity.

Water resources represent about 2.7% of the total land cover.

Other land (1.6% of the area) uses include quarries, transportation corridors, recreational areas, and rural land currently not in productive use.

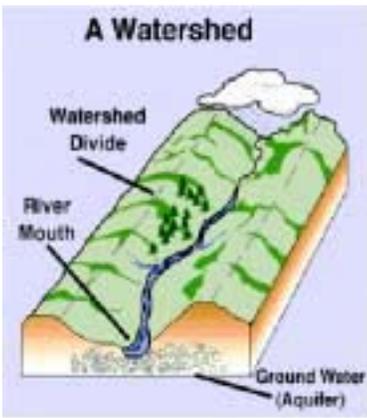




Big and Little Sandy River Basin Status Report



January 2002



What is a watershed?

No matter where you live, work, or play, you are in a watershed. A watershed is a geographic area where all water running off the land drains to a specific location. This location may be a stream, river, lake, wetland, or ocean; or the water may drain underground into the groundwater. You may live on a creek, which is considered a small watershed. Your creek may join a river, which is a larger watershed. The river may have many smaller creeks, known as tributaries, that drain into it, and each of these tributaries has a small watershed associated with it, and each is part of the larger watershed of the river.

Is the watershed healthy?

That is the main question this report explores. In order to determine if the region's streams are contaminated, we have reviewed water sampling data, assessments of stream and river bank conditions, discharge permits for wastewater treatment plants, and land-use activities like farming, development, logging, and mining. What happens in the river basin – or *watershed* – directly impacts water quality, water quantity, and habitat conditions. Some tributaries in the Big and Little Sandy River Basins are contaminated by habitat modification (107 miles of streams), resource extraction (462 miles), waste disposal on the land (261 miles), sewage (283 miles), and many unknown sources (399 miles). These sources of pollutants contribute bacteria from human sewage or livestock; silt from erosion, construction, or logging; algae blooms fed by nutrients from fertilizers or manure; and various pollutants from mining and industrial or urban wastewater plants. That is what this report is all about.

Basin or Watershed?

The *basin* of a river or stream is all the land that is drained by a lake, river or stream. Another word for basin is *watershed*, which comes from the observation that in a healthy watershed, water is stored, as in a shed, in an area of land and is slowly released to flow downhill into a body of water.

Geography and Watershed Health

How does geography affect the health of streams and watersheds? The lay of the land, soil types, and vegetation in an area can directly affect water quality – especially when the land is cleared or tilled. For example, basins with loose soils, steep hills, or little vegetation are often severely eroded by rainstorms, leaving streams and rivers muddy and subject to flooding from rapid runoff; little water is stored in the watershed. Vegetation can reduce flooding by slowing down runoff from rainstorms and can even filter out silt and other contaminants before they reach streams. Trees, bushes, and tall grass along stream banks also reduce erosion along the channel and create valuable habitat for birds, mammals, and other creatures. The vegetation also increases absorption into the ground to provide greater storage capacity for water supplies.

Maintaining good water quality in unpolluted areas of the watershed and improving contamination in other sections will require careful evaluation to determine what is affecting watershed health. This evaluation will show what needs to be done to improve conditions in the watershed.

Why Should I Care?

If we all live in a watershed, then why should you care about watershed management? Watershed management is all about protecting and restoring what is good and useful to the people who live in the watershed and protecting the people and their quality of life, too. Past laws were used to address specific, single-media issues. However, watershed management takes a broader approach and takes into account the interrelatedness of different media and issues. An unhealthy watershed can affect the people living there and biodiversity by:

- Exposure to contaminated water(s) when wading, swimming, or other recreational use; potential consumption of contaminated water(s) during recreational use or contamination of water supplies. Examples of contamination include bacteria (fecal), metals, organics, nutrients, sediment, pH, etc.
- Loss of habitat due to contamination of water or alteration of the physical structure, which alters the flow of water across the land.
- Exposure to flooding from changes in the flow of water in the watershed; risks increase with construction in flood plains, deforestation, or poor management of the watershed, such as poorly planned development.

■ Increases in impervious cover which can result in increased flooding, erosion, loss of habitat, and decreased water quality (only a 10% change in impervious cover in a watershed can make measurable changes in biota and erosion downstream).

■ Loss of surface and groundwater supplies for public drinking water; the droughts of the last two years have been greatly increased by rapid runoff of water, lack of storage in the watershed, and decreased recharging of the ground water aquifers.

Kentucky is a water-rich state. But plenty of water does not necessarily mean having abundant *usable* water. As with all natural resources we must use water wisely. We need clean water for drinking, food production, jobs, transportation, recreation, beauty, and habitat for some of the most unique plants and animals in the world.

Preventing water pollution is difficult, however, because water is dynamic – it flows freely from property to property, from locality to locality, even between the surface and underground. How water is used upstream can and does affect its quality downstream. Since we all live in a watershed, this affects us all.

Because of the complexities of watersheds, management of water resources, like most natural systems, should be done holistically. What one does about water quality, and how one goes about it, is determined largely by one's objectives. The essence of water management problems is simple: man's land-based activities, from which benefits are derived, generate waste and have negative effects upon water resources. Since society values our natural resources, for economic and quality of life reasons, we have passed laws to protect these resources.

At any one point in time, a water management framework is an aggregation of discrete and interrelated activities being carried out by persons and institutions that have widely different responsibility boundaries. The key stakeholders within the framework are Natural Resources and Environmental Protection Cabinet, area development districts, Natural Resources Conservation Service, U.S. Forest Service, local government, citizen groups and private business enterprises. Each of the stakeholders has had and can be expected to have different objectives, concerns, and commitments relative to the management of water quality.

How do we determine watershed health?

Healthy watersheds produce clean water – water that is fishable, swimmable and suitable as a drinking water source. Watersheds that meet these criteria support a wide variety of aquatic life and are a valuable resource. State agencies mostly follow the guidelines in the federal Clean Water Act to determine whether or not the quality of river and stream water is acceptable. Under the Clean Water Act, states set standards for the water based on how it is being used. These uses can consider the high-quality values of a wild and scenic river, a stream's importance as a drinking water source, wildlife habitat, or other uses. The standards include benchmarks for various *parameters* like dissolved oxygen, temperature, acidity, and other measurable qualities.

If a lake, river, or stream meets the standards for fishing, swimming, and drinking water sources, it is said to *fully support* its designated uses (see centerfold map and tables). If it falls short on a few measures, it may only *partially support* its uses. Failure on additional counts can mean that it is *not supporting* its designated uses. The condition of these waters is reported to

Nonpoint Source Pollution- The number one cause of the degradation of Kentucky's waterways is nonpoint source pollution (NPS). It is called nonpoint source pollution because it does not come from a single source, or *point*, such as a sewage treatment plant or an industrial discharge pipe. NPS pollution effects seldom show up overnight—they often go unnoticed for years. This characteristic makes it all the more difficult to control.

NPS pollution occurs mainly through storm water runoff. When it rains, runoff from farmland, city streets, construction sites, abandoned mined lands, logging, and suburban lawns, roofs, and driveways enters our waterways. This runoff often contains harmful substances such as toxins, excess nutrients, and sediments. The greatest impacts in the basin occur from resource extraction (mining, logging) and residential sewage (straight pipes).

There are four major forms of NPS pollution: sediments, nutrients, toxic substances, and pathogens.

- *Sediments* are soil particles carried by rainwater into streams, lakes, and rivers. By volume, sediment is the greatest pollutant of all. It is caused mainly by erosion resulting from bare land, poor farming practices, construction, and development.

- *Nutrients* are substances which help plants and animals live and grow. There are two nutrients that are of the most concern when they become excessive; nitrogen and phosphorus. Fertilizer on lawns and farmlands and animal waste are the main sources of these substances.

- *Toxic Substances* are chemicals which cause human and wildlife health problems. They include organic and inorganic chemicals and metals, pesticides, formaldehyde, household chemicals, gasoline, motor oil, battery acid, roadway salt, and so on.

- *Pathogens* are disease-causing microorganisms present in human and animal waste. Most pathogens are bacteria.

Organisms as indicators

Healthy streams have low levels of contaminants and contain a diversity of plants and animals. Certain mussels and insect larvae (caddisfly, stonefly, mayfly) are often used as indicators of good water quality, similar to the coal mine canaries used to detect poisonous gases. Since these mussels and larva can live only in relatively clean water, their presence usually indicates that problems are few in that section of the stream.



Water quality indicator: Aquatic insects

Kentucky Water Quality Standards

The following parameters, or measurable criteria, are only a few of those used to define Kentucky's water quality standards. The criteria are listed below. For example, if a water sample shows more than 200 fecal coliform CFUs in a 100 milliliter sample, the water would be considered contaminated.

- Dissolved Oxygen: >4.0 Milligrams per liter
- pH (measures acidity): 6-9 Standard units (7.0-neutral)
- Fecal coliform: 200 Colony-Forming Units per 100 milliliters of water
- Temperature: 89 Deg.

Important Sections of the Clean Water Act

Clean Water Act

§208 – Areawide Waste

Treatment Management

§303 – Water Quality

Standards and Implementation Plan

§305 – Water Quality Inventory

§319 – Nonpoint Source

Management Programs

§401 & §404 - Water Quality

Certification and Permits for Dredged and Fill Materials

§402 – National Pollutant Discharge Elimination System

Congress, as required by the Clean Water Act, Section 305(b). Bodies of water that do not support their designated uses must have cleanup plans that identify and quantify the problem pollutants and specify how they will be reduced. Sometimes the pollutants come from wastewater treatment plants, other times they are carried into the water by runoff from towns, farms, new developments, or other areas.

Watershed health means more than good water chemistry. In addition to chemical analyses, watershed health can be measured by observing plant and animal life. For example, certain species are *indicators*. Also, habitat is important to watershed and stream health. Vegetation in the riparian area - especially shrubs and trees - provides food and cover for terrestrial and aquatic life. Riparian vegetation also holds stream banks in place and helps to filter soil erosion and other polluted runoff. The amount and type of vegetation along a stream, lake, or sinkhole determines riparian health.



Trout Perch indicator of high quality water

Watershed health also means having good storage and retention capabilities in the basin. That is, under ideal conditions, as rain falls upon the earth, water either evaporates, soaks into the ground, or runs off into streams, lakes, and rivers. For water to soak into the ground, the water must encounter some obstacles that slow its flow down hill, such as retention basins, trees, leaf litter in a forest, even grass. All these things cause water flow to slow down enough for it to soak into the ground. A hard-packed clay field or a parking lot will simply shed the water, forcing it to run downstream. Conversely, if the water can soak into the ground, it recharges the groundwater for wells and will slowly release it to our streams and lakes. This run-off/soak-in cycle has two effects: In times of high flow, it can cause all the water to run off so rapidly that it results in flooding. Or, in times of low flow, it can result in streams that run completely dry because there is no runoff or spring seepage to keep the rivers flowing.

During times of low stream flow, which occur more often in the late summer and early fall, streams may have less suspended silt but may be rich and green from algae growth. During times of low flow, most of the water in streams comes from groundwater inflow.

While state officials have information from samples collected on the Big and Little Sandy Rivers, much of the water in the basin has not been tested. An interagency workgroup is coordinating efforts to increase the amount of monitoring conducted in the region. By working together, tax dollars can be stretched and better information provided on the condition of the watershed. Also, citizens active in the Big and Little Sandy River Watershed Watch have collected data to raise public awareness. Reducing concentrations of pollutants that exceed state standards will require a considerable amount of cooperative action and analysis.

Project Final Report

for

A Grant Awarded Through the
Section 319(h) Nonpoint Source
Implementation Program
Cooperative Agreement
#C9994861-99

under the

Section 319(h) Kentucky
Nonpoint Source Implementation
Grant Workplan "Stream
Geomorphic Reference Reaches
and Bankfull Regional Curves"

Kentucky Division of
Water NPS 99-12
MOA 04096249

July 1, 2004 to
December 31, 2005

Bankfull Characteristics of Select Streams in the Four Rivers and Upper Cumberland River Basin Management Units

UNIVERSITY of LOUISVILLE
STREAM INSTITUTE

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Frankfort, Kentucky



Regional curves provide a baseline of stream characteristics that are useful in the design of stream restorations (Rosgen, 1998) and in the evaluation of stream stability, which includes the assessment of channel siltation, degradation, and bank erosion. In Kentucky, stream geomorphic assessment and restoration design currently are being conducted without the benefit of regional curves for geomorphic parameters. The main purpose of this project was to provide quantitative descriptions (regional curves) that would represent expected values and variation of bankfull flow and channel cross-sectional area, width, and depth in riffles as a function of upstream contributing drainage area in the Four Rivers and Upper Cumberland river basin management units of Kentucky.

Kentucky Division of Water requested that streams over the entire Four Rivers and Upper Cumberland river basin management units (RBMUs) be included in the project, which would necessitate collecting data from only the portions of the physiographic regions falling within those RBMUs. These two RBMUs include all watersheds with tributaries that drain to the Cumberland, Tennessee, and Mississippi Rivers in Kentucky. Because a second project on stream morphology in the Mississippi Embayment (Parola *et al.*, 2005) was initiated during this project, this assessment was completed at sites in the Mississippian Plateau and Land Between the Lakes regions of the Four Rivers river basin management unit and in the Mississippian Plateau and Eastern Kentucky Coal Field regions of the Upper Cumberland river basin management unit.

The intention of the project team was to use standard and well established procedures reported in Rosgen (1996), the *Interagency Stream Corridor Restoration Handbook* (FISRWG, 1998), and Harrelson *et al.* (1994) to obtain bankfull data from stream reaches at or near gauge stations with more than 10 years of recorded data. These techniques involve identification of the bankfull stage using (1) indicators described by Harrelson *et al.* (1994) at or near a gauge station and (2) measurement of stream bankfull cross section characteristics on a riffle at or near the gauge station. Determinations of bankfull flow, the active floodplain, and geometric characteristics of all but a few streams in the river basin management units were complicated, however, because of channel response to extensive and intensive human disturbance. Consequently, the intended method was revised to use only ungauged sites where bankfull indicators were consistent and less ambiguous.

Following reconnaissance, 17 ungauged reaches along 13 streams were selected for assessment. Using HEC-RAS 2.2 (see USACE, 1998), bankfull flow was calculated using (1) estimates of the channel roughness coefficient (Manning n) based on Limerinos (1970) and pebble count data, (2) estimates of bankfull depth at individual cross sections, and (3) cross section data. Each site was classified according to the method developed by Rosgen (1996). Bankfull flow discharge, depth, width, and cross-sectional area for each ungauged site in the Eastern Kentucky Coal Field physiographic region were plotted as a function of basin drainage area. Power

functions relating channel bankfull flow characteristics to the upstream drainage area were developed for the data of the Eastern Kentucky Coal Field, although the portion of the Eastern Kentucky Coal Field represented by the Upper Cumberland RBMU is relatively small (31.0% of the physiographic region's land area). The data represents a very small population of streams that are moderately or deeply entrenched (B-type or F-type channels, respectively) and have bed material surface D_{50} in the very coarse gravel or small cobble size class. The curve information will be most applicable for stream assessment and for stream restorations in the same region of the Eastern Kentucky Coal Field and in other regions where the hydrology and sediment supply are similar.

A separate assessment of Mississippi Embayment streams was conducted (Parola *et al.*, 2005) during the same period as this assessment project. Additional data is required from the Mississippian Plateau to conduct separate regression analyses for that physiographic region and to determine differences between streams of different physiographic regions.

Consistent and reliable bankfull indicators were found in mainly two types of streams: (1) Rosgen F-type channels, located in alluvial valleys, in which an identifiable bankfull bench depositional feature formed within the F-type channel and (2) in higher gradient and less entrenched B-type channels located in valleys where the planform is confined by the valley sides. Reconnaissance of gauge stations and examination of ungauged streams in forested and currently protected watersheds in three different physiographic regions indicated that stream reaches that are not responding to either recent disturbances or legacy effects are rare. Even in protected, heavily forested, and in some cases, pristine-looking watersheds, Kentucky streams appear to be responding to current and legacy effects, including channel modifications and land-use changes.

Grant # C9994861-99

Fleming County Water Resources Coordinator

Workplan # 99-06

M-04088283

7/1/04-6/30/06

Submitted by: Fleming County Conservation District

Executive Summary

The main objective of this project is to educate the people of the Fleming Creek Watershed on water quality issues and Best Management Practices (BMPs). This objective was accomplished by coordinating Farm Field Days where BMPs were demonstrated and explained, and water quality issues were addressed by professionals in these fields. Environmental Safety Field Days were held for the Fifth Grade students of the county to educate them on several environmental issues as well as safety issues. One public meeting was held to educate residents about the Fleming Creek Watershed and issues concerning the water quality of this watershed. The meeting was an excellent forum to discuss best management practices that improve water quality on landowners' farms.

Technical assistance was provided to all farmers requesting this service or referred to another agency that could better assist them. Landowners were assisted in the office in completing their agricultural water quality plans. Landowners were informed via newspaper if owning 10 acres or more they were required to complete an agricultural water quality plan.

Water monitoring was conducted through this project in conjunction with the Licking River Watershed Watch program. Water samples were collected three times a year and delivered to Watershed Watch personnel who oversaw the testing for the entire Licking

River Watershed. Watershed Watch is a volunteer organization where the sampling is used only for information, not as scientific data.

The Fleming County Conservation District's primary goal is striving for the education of our youth on the importance of conservation of our natural resources. This is achieved doing the following:

- Conducting and promoting the Conservation Art and Drawing Contests in all Fleming County schools annually. This educates approximately 2400 students on various conservation themes. The themes vary on a yearly cycles, educating on water quality, trees, soil quality, and air quality. These contests help make students better conservation stewards.
- Offering two conservation educational scholarships to Fleming County Seniors who have completed conservation essays during their senior year. The research needed to develop these essays will make these "soon to be adults" better conservation stewards. The research may also generate interest in a conservation career.
- Providing educational materials, pertaining to art and drawing topics, to all Fleming County School libraries. This allows all members of the community to learn good conservation practices.
- Providing seedlings for students as well as landowners in Fleming County to observe Arbor Day and Earth Day each April. Trees help prevent soil erosion resulting in better water quality.
- Place a display board in schools and public libraries to promote conservation education. This also will allow for our future generation to become better conservation stewards.

- Continue to work with students and landowners on the importance of water testing with Kentucky Watershed Watch.
- Continuing to support the outdoor classroom at Ward Elementary School and Hillsboro Elementary School and assist in the development of any new outdoor classrooms as needed. These areas help promote better conservation stewardship.
- Conducting an Environmental and Safety Field Day for all Fleming County fifth grade students. This allows students to learn about water quality, soil quality, and trees. Increased knowledge will make them better conservation stewards.
- Providing conservation education to school classes and community groups as requested. This is in the form of demonstrations with our Enviroscope, which shows what community activities affect water quality.

Project Final Report

for

A Grant Awarded through Section 319(h) Nonpoint Source Implementation Program
Cooperative Agreement (#C9994861-99)

under the

Section 319(h) Kentucky Nonpoint Source Implementation Grant Workplan

Introduction to Stream Geomorphic Assessment and Restoration on a Watershed Scale

Kentucky MOA M-04121023

Kentucky DOW NPS 99-32

April 1, 2004 to September 30, 2005

Arthur C. Parola, Jr., Ph.D., Professor

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of

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Kentucky Division of Water

Kentucky Department for Environmental Protection

Frankfort, Kentucky

Executive Summary

Section 319 of the Federal Clean Water Act Amendment of 1987 charges states with the development of programs to manage nonpoint sources of pollution from various land use activities. Educational initiatives implemented through cooperating organizations, agencies and institutions constitute an important component of the Kentucky Nonpoint Source Management Program. The University of Louisville Research Foundation and the Kentucky Division of Water entered into an agreement to implement an educational initiative with the goal of improving the state of knowledge and practice of (1) geomorphic assessment and management of watersheds, and (2) the use of stream restoration to improve water quality and stream habitat on a watershed scale. The three primary objectives established to meet this goal were:

1. The development and delivery of a 4-day workshop for water resources professionals and basin coordinators to introduce stream geomorphic assessment and restoration on a watershed scale.
2. The development and delivery of a similar 2-day workshop for state and municipal government managers responsible for decisions that affect watersheds.
3. The enhancement of the recently completed Wilson Creek restoration to be implemented by incorporating additional habitat structures, modifying flood conveyance areas, extending the zone of native riparian vegetation, and extending the restoration along a tributary. The recent restoration and its enhancement would be used to demonstrate (a) the importance of assessment and its implementation into the design of stream restoration, (b) construction techniques and issues, and (c) how stream restorations can be used to improve watershed conditions.

Two training workshops were planned, developed and delivered: a 4-day workshop for 30 water resources professionals and basin coordinators to introduce stream geomorphic assessment and restoration on a watershed scale; and a 2-day workshop for 17 federal, state and municipal government managers responsible for decisions that affect watersheds. The workshops were delivered as a combination of lectures and field stream walks, including a demonstration of the Wilson Creek restoration enhancement for the second workshop. The enhancement of Wilson Creek included revegetation and stabilization of channel banks, modification of floodplain topography, and the creation and planting of floodplain wetlands.

Grant Number: C-9994861-99
Fleming Creek Clean Water Action Plan
Work Plan Number: 99-29
Memorandum of Agreement Number: M-04068174
Beginning Date: January 1, 2001
Ending Date: November 30, 2005
Submitted By: Emily Crain Anderson
Fleming County Conservation District

Executive Summary

The overall goal of the Fleming Creek Clean Water Action Plan was to reduce non-point source pollution in the Fleming Creek Watershed and improve the bacterial and biological integrity of the streams within the project area. The primary focus of this project was and is to restore and remove the impaired use designation of streams within the Fleming Creek watershed. This is being accomplished by implementing demonstration Best Management Practices (BMPs) on agricultural operations and implementing the whole-farm planning process in two sub-watersheds within the Fleming Creek watershed. Water quality issues addressed in this project were bacteria, nutrients, and sediment, as well as other pollutants from non-point sources including livestock operations and cropland. The whole-farm planning process was used to identify and evaluate the implementation of agricultural BMPs that when fully implemented will permit sustained use of the natural resources and meet specific quality criteria. BMPs installed with cost-share assistance through this project included livestock exclusion fencing, rotational grazing establishment, including pasture division fencing, alternative livestock watering facilities, and pasture and hayland seeding for improved forage quality, stream crossings, critical area plantings, heavy use areas, stream crossings, and grassed waterways. During the on-farm planning phase all resource concerns were addressed to reduce the maximum amount of non-point source pollution as possible from entering Fleming Creek.

To assess the improvement of stream health within the Fleming Creek watershed bacteriological and biological monitoring were conducted in 2004 and 2005 by Redwing Ecological, an independent contractor. After collected data was compiled and analyzed it was determined there was a slight improvement in water quality compared to the Fleming Creek Watershed Non-Point Source Demonstration Project – Final Report May 2000 on a majority of the samples sites.

A project oversight committee facilitated, directed, reviewed and approved progress of the project as it was implemented. The Oversight committee consisted of representatives from local, state, and national organizations.

Through educational outreach cooperators and landusers were introduced to proven technologies that produced sustaining economic viability while improving water quality within their watershed. Technology demonstrations of implemented BMPs were presented to producers at field days and public meetings in the area to encourage implementation and adoption of the practices displayed, while showcasing the needed operation and maintenance required to fully gain the benefits of the installed BMPs.

**Obion Creek Stream Corridor Restoration
Demonstration Project
Final Report**

Grant Number C9994861-99

Application Number 99-14

Memorandum of Agreement Number M-00262703

Project Period 10/15/2000 – 09/30/2005

submitted by:

Obion Creek Watershed Conservancy District
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with
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University of Louisville

September 2005

Acknowledgments

The Obion Creek Watershed Conservancy District Board of Directors acknowledges the support and assistance of the following partners; without the dedication and cooperation of these partners this project would not have been successfully completed.

- Jackson Purchase RC&D Foundation, Inc.
- University of Louisville, J. B. Speed School of Engineering
- Kentucky Department of Fish and Wildlife Resources
- Hickman County Conservation District
- Kentucky Division of Water
- Douglas Amphibious, Inc.
- Kentucky Division of Conservation
- Natural Resources Conservation Service
- US Army Corps of Engineers
- Kentucky Nature Preserves Commission

Executive Summary

This document is available online at www.jpfr.org

The goal of the Obion Creek Stream Corridor Restoration Project was to restore a naturalized flow of the unconsolidated bottom low-gradient stream. The expected output for the project was to re-create over a mile of meandering stream channel where a previously channelized reach had filled with sediment and debris. The project site is located immediately downstream of Highway 307 in Hickman County on Kentucky Department of Fish and Wildlife Resources property, in the Wallace Tract of the Obion Creek Wildlife Management Area. The principal outcomes for the project were reducing nonpoint source pollution, siltation and sedimentation. Co-lateral outcomes include the protection and potential restoration of the bottomland hardwood forest present at the site before it was altered, the reduction of the loss of the wetland habitat from sedimentation, the development of aquatic habitat that had been destroyed, and the improved safety of vehicular traffic on KY-307 because of the much lower chance of flooding of the road.

Channel and spoil berm construction activities commenced in August 2003. Clearing and channel construction phases were completed in late December 2003. Soils excavated from the channel were saturated upon removal and required a period of time for de-watering so that they could be shaped into the designed berms. Soils were allowed to dry until summer 2004, and final berm shaping was completed by September 2004. The project successfully met its goal of restoring naturalized channel where none existed before.

FINAL REPORT

C9994861-99-23

Herrington Lake – Dix River Clean Water Action Plan

M – 01008282

February 01, 2001 – November 30, 2005

submitted by the
Kentucky Heritage
Resource Conservation and Development Council, Inc.
227 Morris Drive
Harrodsburg Kentucky 40330-1086

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Funding for this project was provided in part by a grant from the U.S. Environmental Protection Agency (EPA) through the Kentucky Division of Water, Nonpoint Source Section to the Kentucky Heritage RC&D Council, Inc. via DOC as authorized by the Clean Water Act Amendment of 1987, Section 319(h) Nonpoint Source Implementation Grant # C9994861-99-23. mention of trade names or commercial products, if any, does not constitute endorsement. This document was printed on recycled paper.

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EXECUTIVE SUMMARY

This Herrington Lake – Dix River Clean Water Action Plan Project targeted an expanded area of the 97-18 Section 319(h); Herrington Lake – Dix River Watershed Spears Creek – Mocks Branch. It originally included Cane Run and Hanging Fork, but was later expanded to include adjacent watershed between the named tributaries.

This project came at the right time – when interest was high in the 97-18 Section 319(h) project. This project afforded the RC&D the opportunity to install more BMPs that lead to a perceived improvement in water quality. It was a perceived improvement in that there was no monitoring associated with this project.

The purpose of this project was to address water quality by implementing whole-farm planning processes. Identifying, evaluating and implementing those agricultural BMPs for demonstration purposes that, when fully implemented, will permit sustained use of the material resources and meet specific water quality criteria. Through educational outreach, cooperators and landusers will attain a higher level of management by implementing proven technologies – sustaining economic viability while improving the water quality within the watershed.

A variety of BMPs were installed throughout this project. They primarily included waste storage facilities, alternative water systems, stream crossings, fence, and heavy use areas.

A watershed coordinator was employed at various times during this project. The coordinator helped producers install BMPs on their farms by showing them where and how the practices should be installed. The coordinator kept in contact with the farmers to keep local interest up. At the onset of the project, much of the coordinators time was spent evaluating and inventorying resources; targeting project work areas; and contacting producers within the watershed area.

Although water quality monitoring was not a part of this project, the 97-18 Section 319(h) project did entail monitoring. The amount of monitoring conducted at the funds available for monitoring did not seem adequate to show positive results. A copy of the 97-18 Section 319(h) monitoring report is available from the Kentucky Division of Water.

Lastly, two field days were hosted to show farmers how BMPs functioned on the ground, and to hear from other producers how the BMPs worked and their advantages. Farm field days are one of the most effective means of sharing and transferring information to local producers.

Final Report

Upper Burning Fork Creek Watershed Restoration Project

Grant #: C9994861-03

NPS Project Number: 03-16

Submitted by Tetra Tech

June 30, 2006

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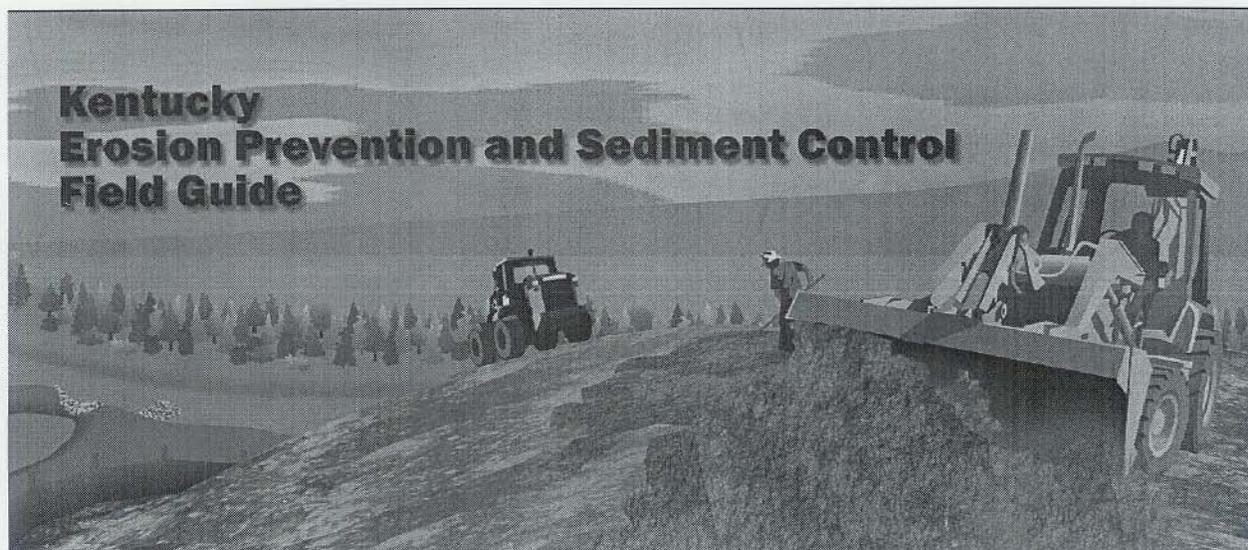
Tetra Tech would like to acknowledge the staff of the Kentucky Division of Water Nonpoint Source Section, the Magoffin County Health Department, the Licking River Watershed Watch group, and the Gateway Area Development District for their assistance in this effort.

Executive Summary

This project was focused on reducing bacteria and nutrient loads to Upper Burning Fork Creek by addressing poor wastewater treatment systems in the area. However, due to the recently announced plan to extend public sewer service to most of the project area, the original project scope is being amended.

This report will provide a brief summary of activities that occurred under the original scope of work, from October 2004 until June of 2006. The original project is being closed out on June 30, 2006, so that a new project with an amended scope of work can be initiated. That project will be similar to the original one, but will focus on Rose Run Creek in Bath County, rather than Upper Burning Fork Creek in Magoffin County.

Final Report



Statewide Training Program for Controlling Sediment and Erosion at Construction Sites in Kentucky

Grant #: C9994861-01

MOA #: M02159736

NPS Project Number: 01-09

Submitted by Tetra Tech

August 21, 2002 – June 30, 2005

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Executive Summary

This project consisted of three distinct components:

- Production of a Field Guide on construction site erosion and sediment control
- Production of a Technical Reference on construction site erosion and sediment control
- Development and delivery of at least 10 workshops on ESC at various statewide locations

The Field Guide – initially proposed as a black and white 3-ring binder document, was changed significantly into a 4” x 9” full color, laminated, 100-page document that includes color photographs, original drawings and graphics, and summary text, tables, and bulleted information appropriate for construction supervisors and workers.

The Technical Reference is a 150 pp document containing best management practices for controlling sediment and other polluted runoff from construction sites. This document, designed for planners, engineers, and others involved in providing design and other technical services, is intended to serve as a primary reference statewide.

Workshops conducted under this project consisted of ten initially, but expanded to 23 due to cost savings in the original project, additional funds provided by an amendment to the project, and the high demand for workshops among cities and towns across the state.

Final Report



Development of Interpretive Materials for Nonpoint Source Pollution Displays

Grant #: C9994861-03

KY NPS Project Number: 03-11

Submitted by Tetra Tech

Tt Project Number 14375

March 1, 2004 – June 30, 2005

Executive Summary

This project was limited in scope to producing two large, fold-out informational brochures designed for multiple purposes:

- Provide interpretation for watershed models depicting various nonpoint pollution issues
- Serve as a stand-alone awareness and education brochure regarding NPS issues
- Raise the level of understanding on NPS pollution and best management practices

Tetra Tech worked with the KY Division of Water and other partners to create, design, publish, and distribute 60,000 copies of each of the two the brochures. One of the brochures focuses on nonpoint source pollution problems and management practices in urban areas, the other deals with NPS problems and BMPs for rural areas.

Half of the brochures (30,000 of each) were distributed to public agencies, watershed organizations, university staff, and other partners after publication. The other half of the brochures were sent to the KY Division of Water for distribution at events where the watershed models are displayed.

**UPPER CUMBERLAND RIVER WATERSHED ONSITE
WASTEWATER PROJECT # 99-24**

FINAL REPORT

Grant # C9994861

**Work Plan Title:
Upper Cumberland River Watershed Onsite Wastewater
Project # 99-24**

MOA # M-04102639

July 01, 2004 – June 30, 2006

**Submitted by:
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A. EXECUTIVE SUMMARY

The Cumberland River Onsite Wastewater Project began in 2001 as an effort to provide wastewater treatment to approximately 36 mobile homes in the Lewis Mobile Home Park in the Crummies Creek community of Harlan County. The project was needed due to failure of traditional septic systems at the mobile home park and the negative impact on the waters of Crummies Creek and Little Creek.

The Crummies Creek community is one of the lowest income areas of Harlan County and Eastern Kentucky. It has a high unemployment rate and a low per capita income. The median household income for the Crummies Creek area is well below the poverty line rate. It is also located in the Upper Cumberland River watershed, which currently has more than 187 miles of streams impaired by pathogens from point and nonpoint sources.

A 319 Nonpoint Source Pollution Grant was sought to reduce pathogen pollutants in the Crummies Creek area and to eliminate a minimum of 36 straight pipes and failing septic systems in the mobile home community and to demonstrate an "alternative" onsite system in the project area. The project was a good fit for 319 NPS Grant funding due to its location in the headwaters of the watershed, as well as strong local support for the project.

The Harlan County Conservation District proposed to install an onsite demonstration wastewater treatment system at the Lewis Mobile Home Park located near the confluence of Crummies Creek and Little Creek. The conservation district envisioned a non-traditional, decentralized community treatment and subsurface disposal system. The park was originally designed for thirty-six homes and the landowner wants to maintain that number of spaces for residents. The system will consist of a recirculating media filter that will treat effluent from the 36 homes. The treated wastewater will be dispersed into the soil through a drip irrigation system. The contractor, Maxim Engineering, Inc. will operate and maintain the system for three years. After the three year O & M Agreement expires, the landowner, a certified wastewater plant operator, will take over operation and maintenance of the system.

During the course of this project the sponsors learned several lessons regarding this type of project. One being that in the event a project is being placed on property owned by individuals, the landowner be required to sign a type of agreement insuring that there is something firmly in place obligating all parties, not just the project sponsors and granting agencies. Another being that the agencies where permits and approvals are required

should be more involved in the planning stage to avoid any delays with the necessary approvals and permits.

We believe the objectives of the project have been accomplished by the following project activities:

1. An "alternative" onsite cluster system has been installed to treat the wastewater of the residents of the Lewis Mobile Home Park.
2. A public education campaign has been conducted to provide education about nonpoint source pollution.
3. Water quality monitoring has been conducted before and after BMP installation.

The treatment and disposal system provides several opportunities for the introduction of recent technological advances in the alternative wastewater field. These include the woven textile filter media in the Advantex Treatment System, the pressure drip disposal system, and the chamber bed system. This will provide local officials and local contractors a chance to learn about these systems, meeting the goal for a demonstration onsite wastewater project.

**Results of Expanded Groundwater Monitoring in Watersheds of
the Big Sandy River, Little Sandy River, and Tygarts Creek
(Kentucky Basin Management Unit 5)**

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and

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Frankfort, Kentucky 40601

Grant Number: C9994861-01
NPS Project Number: 01-06
MOA or Grant Agreement Number: M-02250966
University of Kentucky Research Foundation Number: 4-66263
Project Period: July 1, 2002 to March 31, 2005

EXECUTIVE SUMMARY

The Kentucky Geological Survey and the Kentucky Division of Water are evaluating groundwater quality throughout the Commonwealth to determine regional conditions, assess impacts of nonpoint-source contaminants, provide a baseline for tracking changes, and provide essential information for environmental-protection and resource-management decisions. These evaluations include summarizing existing regional groundwater-quality data and reporting the results of expanded, focused groundwater collection programs in specific areas. This report summarizes groundwater sampling and analyses in Kentucky Basin Management Unit 5 (watersheds of the Big Sandy River, Little Sandy River, and Tygarts Creek in eastern Kentucky).

Thirty wells and springs were sampled quarterly between the fall of 2002 and the summer of 2003. Temperature, pH, and conductance were measured at the sample site, and concentrations of a selected group of major and minor inorganic ions, metals, nutrients, pesticides, and volatile organic chemicals were measured at the Kentucky Division of Environmental Services laboratory. The new analytical data were combined with groundwater-quality records retrieved from the Kentucky Groundwater Data Repository. This repository is maintained by the Kentucky Geological Survey and contains reports received from the Division of Water's Ambient Groundwater Monitoring Program as well as results of investigations by the U.S. Geological Survey, U.S. Environmental Protection Agency, U.S. Department of Energy, Kentucky Geological Survey, Kentucky Division of Pesticide Regulation, and other agencies. Statistical measures such as the number of measured concentrations reported, the number of sites sampled, quartile values (maximum, 75th percentile, median, 25th percentile, and minimum), and the number of sites at which water-quality standards were exceeded were used to summarize the data, and probability plots were used to illustrate the distribution of reported concentrations. Maps were used to show well and spring locations and sites where water-quality standards were met or exceeded. Box-and-whisker diagrams were used to compare values between major watersheds, water from wells versus water from springs, and total versus dissolved metal concentrations. Plots of concentrations versus well depth were used to compare groundwater quality in shallow, intermediate, and deep groundwater flow systems.

Table E1 summarizes the findings. Water properties, inorganic anions, and metals are primarily controlled by natural factors such as bedrock lithology. Some exceptionally high values of conductance, chloride, and sulfate may be affected by nearby oil and gas production, leaking waste disposal systems, or other anthropogenic factors, and some exceptionally low pH values may indicate

acid mine drainage. Ammonia and nitrate concentrations show a probable contribution from nutrient applications and waste-disposal practices. Synthetic organic chemicals such as pesticides and refined volatile organic compounds do not occur naturally. Although these chemicals rarely exceed water-quality criteria in the project area, their detection indicates there has been some degradation of groundwater quality. The occurrence of these synthetic chemicals should continue to be monitored, and renewed efforts are needed to protect the groundwater resource.

Table E1. Summary of nonpoint-source effects on groundwater quality in Basin Management Unit 5.

	Parameter	No strong evidence for nonpoint source impact on groundwater quality	Some evidence for nonpoint source impact on groundwater quality	Clear evidence for nonpoint source impact on groundwater quality
Water Properties	Conductance	X		
	Hardness	X		
	pH	X		
	Total dissolved solids	X		
	Total suspended solids	X		
Inorganic Ions	Chloride	X		
	Sulfate	X		
	Fluoride	X		
Metals	Arsenic	X		
	Barium	X		
	Iron	X		
	Manganese	X		
	Mercury	X		
Nutrients	Ammonia nitrogen		X	
	Nitrate nitrogen			X
	Nitrite nitrogen	X		
	Orthophosphate	X		
	Total phosphorus	X		
Pesticides	2,4-D		X	
	Alachlor		X	
	Atrazine		X	
	Cyanazine	X		
	Metolachlor		X	
	Simazine		X	
Volatile Organic Compounds	Benzene		X	
	Ethylbenzene		X	
	Toluene		X	
	Xylenes		X	
	MTBE		X	

DEPARTMENT FOR ENVIRONMENTAL PROTECTION
DIVISION OF WATER
Kentucky Pollution Discharge Elimination System Branch

Branch Description: The Kentucky Pollutant Discharge Elimination System Branch issues permits to control the amount of pollutants that can be discharged to the surface waters of the commonwealth.

Branch Manager: Jory Becker

Telephone: 502-564-3410

Web site: http://www.water.ky.gov/homepage_repository/KPDES.htm

No Reports Within the Past Two Years

DEPARTMENT FOR ENVIRONMENTAL PROTECTION

DIVISION OF WATER

Groundwater Branch

Branch Description: The Groundwater Branch oversees the Wellhead Protection Program and Groundwater Protection Plans and trains and certifies water well drillers.

Branch Manager: Peter Goodmann

Telephone: (502) 564-3410

Web site: <http://www.water.ky.gov/gw/>

Five Reports:

Expanded Groundwater Monitoring for Nonpoint Source Pollution Assessment in the Kentucky River Basin: Final Report

(http://www.water.ky.gov/gw/monitoring/gwreports/GWB-GWQ-NPS-BMU_reports.htm)

Expanded Groundwater Monitoring for Nonpoint Source Pollution Assessment in the Salt and Licking River Basins: Final Report

(http://www.water.ky.gov/gw/monitoring/gwreports/GWB-GWQ-NPS-BMU_reports.htm)

Summary and Evaluation of Groundwater Quality in Kentucky Basin Management Unit 3 (Upper Cumberland, Lower Cumberland, Tennessee, and Mississippi River Basins) and 4 (Green and Tradewater River Basins)

(http://www.water.ky.gov/gw/monitoring/gwreports/GWB-GWQ-NPS-BMU_reports.htm)

Assessment of Nonpoint Source Pollution Impacts on Groundwater in the Headwaters of the North Fork of the Kentucky River Basin

(http://www.water.ky.gov/gw/monitoring/gwreports/GWB-GWQ-NPS_reports.htm)

DEPARTMENT FOR ENVIRONMENTAL PROTECTION

DIVISION OF WATER

Groundwater Branch

Five Reports (continued):

Project Title: Identification and Prioritization of Karst Groundwater Basins in Kentucky for Targeting Resources for Nonpoint Source Pollution Prevention and Abatement

(http://www.water.ky.gov/gw/monitoring/gwreports/GWB-GWQ-NPS_reports.htm)

**Expanded Groundwater Monitoring
for Nonpoint Source Pollution Assessment
in the Kentucky River Basin:
Final Report**

By

James S. Webb
Jolene M. Blanset
Robert J. Blair

Groundwater Branch
Kentucky Division of Water
14 Reilly Road
Frankfort, KY 40601

Grant Number: C9994861-97
Workplan Number: 09
NPS Project Number: 97-09
Project Period: 10/01/1996 to 10/30/2004

EXECUTIVE SUMMARY

The Groundwater Branch of the Kentucky Division of Water collected 118 groundwater samples from 37 sites in the Kentucky River Basin (Basin Management Unit 1) in support of basin-wide efforts to characterize water resources. Sites representative of ambient groundwater quality were chosen for sampling, rather than sites down gradient from known point sources of contamination. Analytical data from an additional 20 sites sampled for other programs, such as the Statewide Ambient Groundwater Monitoring Program and pesticides monitoring through an MOA with the Division of Pesticides, were also included in this report. Samples were analyzed for approximately 250 parameters, including nutrients, total and dissolved metals, pesticides, residues, major anions, and volatile organic compounds, including methyl-tert-butyl-ether (MTBE), benzene, toluene, ethylbenzene, and xylenes (BTEX). From these analytes, 30 parameters indicative of nonpoint source impacts to groundwater quality as well as naturally occurring ambient groundwater quality were selected for inclusion in this report. Results from this study are summarized in Table 1.

Several parameters are controlled primarily by underlying bedrock geology and are indicative of naturally occurring water chemistry. These include pH, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), conductivity, hardness, sulfate, chloride, fluoride, iron, manganese, lead, arsenic, barium and mercury. In some areas, oil and gas drilling or production may elevate some parameters such as chlorides, sulfate, or barium, but no sites in this study appear to be impacted by oil and gas operations. Acid mine drainage is known to reduce pH in surface water, but groundwater in BMU 1 shows no widespread impacts, although groundwater quality may be influenced locally. Nutrients (nitrate-N, nitrite, ammonia-N, orthophosphate-P and total phosphorus) are difficult to interpret because they are both naturally occurring and anthropogenic. However, the data suggest that natural levels may be elevated through agricultural and waste-disposal practices. Pesticides and volatile organic compounds do not

Table 1. Nonpoint Source Impacts to Groundwater in BMU 1

	PARAMETER	NO NPS INFLUENCE ON GROUNDWATER QUALITY	POSSIBLE NPS INFLUENCE ON GROUNDWATER QUALITY	DEFINITE NPS INFLUENCE ON GROUNDWATER QUALITY
Bulk Water Quality Parameters	Conductivity	•		
	Hardness (Ca/Mg)	•		
	pH	•		
Anions	Chloride	•		
	Fluoride	•		
	Sulfate	•		
Metals	Arsenic	•		
	Barium	•		
	Iron	•		
	Lead		•	
	Manganese	•		
	Mercury	•		
Nutrients	Ammonia-N		•	
	Nitrate-N		•	
	Nitrite-N	•		
	Orthophosphate-P		•	
	Total phosphorous		•	
Pesticides	Alachlor			•
	Atrazine (incl. desethyl)			•
	Cyanazine	•		
	Metolachlor			•
	Simazine			•
Residues	Total Dissolved Solids		•	
	Total Suspended Solids		•	
Volatile Organic Compounds	Benzene			•
	Ethylbenzene	•		
	Toluene			•
	Xylenes			•
	MTBE			•

occur naturally in groundwater and therefore these parameters are indicative of either point or nonpoint sources of contamination. The pesticides atrazine (including a degradation by-product, atrazine desethyl), metolachlor, alachlor and simazine were detected in groundwater in BMU 1. Volatile organic compounds detected were benzene, toluene, xylenes and MTBE, but only in a limited number of sites.

Expanded Groundwater Monitoring
For Nonpoint Source Pollution Assessment
In the Salt and Licking River Basins:
Final Report

By

James S. Webb

Jolene M. Blanset

Robert J. Blair

Kentucky Division of Water

Groundwater Branch

14 Reilly Road

Frankfort, KY

Grant Number: C9994861-96
Workplan Number: N/A (Re-obligated Funds)
NPS Project Number: 96-16
MOA or Grant Agreement Number: N/A
Project Period: 12/98-06/02

EXECUTIVE SUMMARY

In order to conduct a more adequate assessment of groundwater resources in the Salt and Licking River basins, Kentucky Watershed Basin Management Unit Number 2 (BMU 2), the Groundwater Branch of the Kentucky Division of Water (KDOW) collected 120 raw-water samples at 37 wells and springs in BMU 2. Sites selected represented ambient groundwater conditions and the various hydrogeologic flow regimes found in the basin. Samples were analyzed for pesticides (including the most commonly used herbicides), total and dissolved metals, nutrients, major inorganic ions, residues and volatile organic compounds, including trichloroethylene (TCE), benzene, toluene, ethylbenzene, xylenes and methyl-tert-butyl ether (MTBE). Additionally, data from 33 other ambient groundwater monitoring sites were data analyzed for this project. The Division of Water sampled these other sites for various other projects, most commonly, the Division's Ambient Groundwater Monitoring Program.

Ambient groundwater quality in BMU 2 is generally good, with land-use the primary determining factor. At some sites, naturally occurring constituents, including iron and manganese, impair groundwater quality. Additional naturally occurring constituents that may also impact groundwater include nitrate-nitrogen, ammonia, total phosphorus and ortho-phosphate. Because these nutrients occur both naturally and through anthropogenic activity, the impact of man's contribution to naturally occurring groundwater chemistry is difficult to assess.

Constituents not naturally occurring that have impacted groundwater in BMU 2 are several common agricultural herbicides, including atrazine and metolachlor and volatile organic compounds, including benzene and MTBE. In BMU 2, the occurrence of herbicides is the result of nonpoint source pollution. The occurrence of volatile organic compounds occurs via point source releases or from nonpoint sources such as urban storm-water runoff.

**SUMMARY AND EVALUATION OF GROUNDWATER
QUALITY IN KENTUCKY BASIN MANAGEMENT UNIT 3
(UPPER CUMBERLAND, LOWER CUMBERLAND,
TENNESSEE, AND MISSISSIPPI RIVER BASINS)
AND 4 (GREEN AND TRADEWATER RIVER BASINS)**

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Grant Number: C9994861-99
Workplan Number: 10
NPS Project Number: 99-10
MOA or Grant Agreement Number: M00107337
Project Period: 03/01/2000 to 06/30/2004

EXECUTIVE SUMMARY

In order to conduct a more adequate assessment of groundwater resources in the Salt and Licking River basins, Kentucky Watershed Basin Management Unit Number 2 (BMU 2), the Groundwater Branch of the Kentucky Division of Water (KDOW) collected 120 raw-water samples at 37 wells and springs in BMU 2. Sites selected represented ambient groundwater conditions and the various hydrogeologic flow regimes found in the basin. Samples were analyzed for pesticides (including the most commonly used herbicides), total and dissolved metals, nutrients, major inorganic ions, residues and volatile organic compounds, including trichloroethylene (TCE), benzene, toluene, ethylbenzene, xylenes and methyl-tert-butyl ether (MTBE). Additionally, data from 33 other ambient groundwater monitoring sites were data analyzed for this project. The Division of Water sampled these other sites for various other projects, most commonly, the Division's Ambient Groundwater Monitoring Program.

Ambient groundwater quality in BMU 2 is generally good, with land-use the primary determining factor. At some sites, naturally occurring constituents, including iron and manganese, impair groundwater quality. Additional naturally occurring constituents that may also impact groundwater include nitrate-nitrogen, ammonia, total phosphorus and ortho-phosphate. Because these nutrients occur both naturally and through anthropogenic activity, the impact of man's contribution to naturally occurring groundwater chemistry is difficult to assess.

Constituents not naturally occurring that have impacted groundwater in BMU 2 are several common agricultural herbicides, including atrazine and metolachlor and volatile organic compounds, including benzene and MTBE. In BMU 2, the occurrence of herbicides is the result of nonpoint source pollution. The occurrence of volatile organic compounds occurs via point source releases or from nonpoint sources such as urban storm-water runoff.

waste-disposal practices. Synthetic organic chemicals such as pesticides (2,4-D, alachlor, atrazine, cyanazine, metolachlor, and simazine) and volatile organic compounds (benzene, ethylbenzene, toluene, xylene, and MTBE) do not occur naturally in groundwater. Detection of these man-made chemicals in groundwater must be attributed to contamination.

Table E1. Summary of nonpoint source effects on groundwater quality in BMU 3 and 4.

	Parameter	No clear evidence for nonpoint source impact on groundwater quality	Some evidence for nonpoint source impact on groundwater quality	Clear evidence for nonpoint source impact on groundwater quality
Water Properties	Conductance		X	
	Hardness		X	
	pH		X	
	Total dissolved solids	X		
	Total suspended solids	X		
Inorganic Ions	Chloride		X	
	Sulfate		X	
	Fluoride	X		
Metals	Arsenic	X		
	Barium	X		
	Iron	X		
	Manganese	X		
	Mercury	X		
Nutrients	Ammonia-nitrogen		X	
	Nitrate-nitrogen			X
	Nitrite-nitrogen	X		
	Orthophosphate		X	
	Total phosphorus		X	
Pesticides	2,4-D			X
	Alachlor			X
	Atrazine			X
	Cyanazine			X
	Metolachlor			X
	Simazine			X
Volatile Organic Compounds	Benzene			X
	Ethylbenzene			X
	Toluene			X
	Xylenes			X
	MTBE			X

ASSESSMENT OF NONPOINT SOURCE POLLUTION
IMPACTS ON GROUNDWATER IN THE
HEADWATERS OF THE NORTH FORK OF THE
KENTUCKY RIVER BASIN

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Grant Number: C9994861-98
Workplan Number: 98-04
NPS Project Number: 98-04
Project Period: 01/01/98 to 06/30/2004

EXECUTIVE SUMMARY

ASSESSMENT OF NONPOINT SOURCE POLLUTION IMPACTS ON GROUNDWATER IN THE HEADWATERS OF THE NORTH FORK OF THE KENTUCKY RIVER BASIN

SECTION 319 NONPOINT SOURCE PROJECT - FFY 1998

The goals of this project were to assess nonpoint source (NPS) impacts on groundwater primarily from improper or “straight pipe” sewage disposal and secondarily from coal mining in a portion of the North Fork of the Kentucky River Basin in Letcher County. The Kentucky Geological Survey estimates 70% of the residents use groundwater as the source of drinking water (Carey and Stickney, 2001). The area has well documented problems related to the discharge of untreated domestic waste directly to surface water through “straight pipes”, but the impacts to groundwater are less well known.

Most of the soils in Letcher County are unsuitable for conventional on-site septic systems (USDA-SCS, 1965). The area’s highly dissected topography concentrates the population in the stream valleys, where close spacing of homes and small lot size makes the use of conventional septic systems impossible or ineffective for most existing homes. Low incomes and high unemployment have limited the use of expensive alternate on-site disposal systems. Because of these factors, wells are vulnerable to NPS pollution, especially if they are poorly constructed or maintained.

To solicit participation in this project, door-to-door surveys were conducted on Crams Creek, Pine Creek, and Bottom Fork roads. Participants’ wells or springs were inspected and property was surveyed for potential sources of NPS pollution. Participants were counseled

individually and provided information on water quality, analytical results, well maintenance, and any other pertinent environmental issues.

Eighty-seven wells and springs serving an estimated 350 persons were included in the study: 31 properly constructed drilled wells, 40 drilled wells that did not meet current standards, nine shallow hand-dug wells, and seven water supply springs (including two mine adits.) Field-tests for nitrate-N, nitrite-N, ammonia-N, detergents, phosphate, pH, conductivity, soluble iron and manganese were conducted on all wells and springs and several samples were confirmed by laboratory analysis. Twenty participants opted for additional biological testing for total coliform, *E. Coli* and fecal coliform bacteria. Caffeine (and metabolites) were analyzed on wells and springs with significant bacteria contamination.

Although detections of nitrate-N and ammonia-N indicate NPS impacts, probably from straight pipe discharge of wastes, no pervasive or widespread NPS pollution of groundwater was found in this study. However, groundwater is threatened locally by numerous potential NPS sources. Other important concerns for groundwater users are substandard well and distribution system construction and inadequate system maintenance and disinfection. The project demonstrated that on-site inspection by trained personnel is a viable method to promote the protection and appropriate use of this resource.

Hand-dug wells showed little indication of NPS pollutants such as NO_3^- , NO_2^- , PO_4^- , Fe, Mn, or low pH from septic systems or mining, but bacteria were significantly higher in these wells than in drilled wells. Bacterial contamination is common in hand-dug wells because these wells produce shallow soil water where bacteria flourish and because these wells are inherently difficult or impossible to disinfect and seal.

Eight samples (9%) collected in the study contained detectable quantities of nitrate-N, but

none exceeded the nitrate-N Maximum Contaminant Level (MCL) for drinking water of 10.0 mg/L. Fifty percent (50%) of the hand-dug wells compared to only 13% of the properly constructed wells contained nitrate-N. Ammonia-N was detected in 16 of 83 samples, or 19.3%. Anionic surfactants, an indicator of soaps, detergents, and oil and gas drilling foams were indicated by field tests in eight, or 9.2% of wells.

Residents claim that coal mining has impacted groundwater quantity in the area, but water quantity was beyond the scope of this investigation. However, for the limited parameters included in this study, no widespread impacts on water quality from mining were noted.

**Project Title: Identification and Prioritization of Karst
Groundwater Basins in Kentucky for Targeting
Resources for Nonpoint Source Pollution Prevention
and Abatement**

Joseph A. Ray, Phillip W. O'dell, and Jack R. Moody
Technical Services Section

Jolene M. Blanset and Robert J. Blair
Data Management and Support

Groundwater Branch
Kentucky Division of Water
14 Reilly Road
Frankfort, Kentucky 40601

Grant Number: C9994861-97
Workplan Number: 97-17
Report Period: 1997-2004

FINAL
January 14, 2005

EXECUTIVE SUMMARY

This project investigated the water quality of 12 large karst springs, their drainage basins, and several neighboring basins in the Pennyroyal Plateau over a four-year period. The purpose was to identify and evaluate impacts from nonpoint source (NPS) pollution in sensitive karst watersheds of north-central and western Kentucky. Ninety-six quarterly water-quality samples were collected at these large springs from January 1999 through May 2001. Key parameters that reflect NPS pollution include nutrients and herbicides, applied mainly to row crops. Nitrate-N and atrazine were of special concern because of moderate to elevated levels measured in the spring waters. Nitrate-N levels fluctuated somewhat throughout the study period with medians ranging from about 1-6 mg/L (compared to the Maximum Contaminant Level [MCL] allowed in public drinking water of 10 mg/L). Atrazine detections peaked in the spring application season, sometimes well above the MCL of 0.003 mg/L.

Karst terrane is well known for complex groundwater drainage systems, which are sensitive to pollution. In order to correctly attribute NPS impacts observed at springs to the appropriate watersheds, groundwater-tracing studies were conducted from 1997-2000 to more accurately identify basin boundaries. Two major areas were investigated in this project: the northeastern (NE) portion of the Pennyroyal Plateau, primarily in Meade and Breckinridge counties, and the southwestern (SW) portion of the Pennyroyal Plateau, largely in Christian and Trigg counties.

Forty-two groundwater tracer tests were completed and 261 km (162 mi) of subsurface flow routes within 19 groundwater basins were mapped for the first time or replicated. These basins represent total land areas of 670 km² (258 mi²) and base-flow water supply of 850 L/s (30 ft³/s). This improved mapping of complex karst watersheds can be used to more accurately develop Total Mean Daily Loading (TMDL) assessments of regional streams. The Kentucky Geological Survey in cooperation with the Kentucky Division of Water will also publish subterranean flow-route and groundwater basin-boundary data in the karst-atlas mapping project. The study areas are located on the Tell City (NE) and Hopkinsville (SW), 1:100,000 quadrangles.

An additional assessment of watershed area and aquifer yield (base flow per unit area or UBF) was achieved by measuring spring discharges during dry-season base-flow conditions. Thirty-two springs were gaged in combined study areas, from 1997-2001, resulting in the following conclusions:

(a) A direct relationship exists between base-flow discharge and basin area, within uniform hydrogeologic setting. However, UBF in the SW study area is 25%-30% greater than in comparable areas of the NE. This is likely due to slightly higher rainfall and increased groundwater storage within thicker soils of the SW study area.

(b) Within the NE study area, basins typified by sinkhole-plain topography yielded twice the UBF as did basins draining dissected sandstone caprock. This is a consequence of greater sustained groundwater storage in soil-mantled limestone than in sandstone-capped plateaus.

After spring-basin boundaries were delineated, digital land-cover data were evaluated to quantify the variety and concentration of agricultural activities. Based on average percentage of row

crops and pasture and hay, the SW study area, which is more level and arable, contains about twice the number of acres in agriculture versus the NE study area. Conversely, the more rugged NE study area is covered by four times more deciduous forest than in the SW. These fundamental differences result in better overall water quality in the NE than in the SW.

Based on water quality and land use, the impacts of NPS pollution of these karst springs and basins were ranked and prioritized. As expected, the more intensive agricultural basins of the SW generally ranked higher on this priority list than those in the NE. This priority ranking can be used to more appropriately focus resources to address NPS pollution, such as education and training, technical and financial assistance, and best management practice (BMP) implementation and modification.

Education outreach has been accomplished by participation in agriculture field meetings, karst field trips and regional watershed meetings. Groundwater maps and data have been and will be distributed to landowners and stakeholders. A poster summarizing the final report will be presented at conferences and distributed to government agencies and the public. The completed report will also be available at the Kentucky Division of Water website. Additionally, the karst-basin delineation and the priority ranking methods can be used as technical guidance for evaluating NPS pollution within similar complex karst groundwater basins.

<i>Rank</i>	<i>Spring</i>		<i>Weighted Value</i>
	<i>Southwest</i>	<i>Northeast</i>	
1	River Bend		9.15
2	Wright		8.83
3	Mill Stream		7.83
4	King		7.53
5	Cooks		7.10
6	Barkers Mill		6.88
7		French Creek	6.88
8	Walton		6.53
9		Boiling	5.68
10		Buttermilk Falls	4.05
11		Head of Wolf	4.00
12	Brelsford		3.58

Nonpoint-Source Pollution Priority Ranking of Twelve Sampled Karst Springs

DEPARTMENT FOR ENVIRONMENTAL PROTECTION

DIVISION OF WATER

Facilities Construction Branch

Branch Description: The Facilities Construction Branch is responsible for programs related to funding, planning, design and construction of wastewater treatment and collection systems.

Branch Manager: Shafiq Amawi

Telephone: 502-564-3410

Web site: http://www.water.ky.gov/homepage_repository/fcb.htm

No Reports Within the Past Two Years

DEPARTMENT FOR ENVIRONMENTAL PROTECTION

DIVISION OF WATER

Field Operations Branch

Branch Description: The Field Operations Branch inspects water and wastewater treatment plants to monitor their operations and assure the safety of the public's drinking water and the state's streams, provides technical assistance, responds to complaints from citizens and responds to environmental emergencies and natural disasters involving land, air or water.

Branch Manager: Tom Gabbard

Telephone: 502-564-3410

Web site: http://www.water.ky.gov/homepage_repository/dwfo.htm

No Reports Within the Past Two Years

DEPARTMENT FOR ENVIRONMENTAL PROTECTION

DIVISION FOR AIR QUALITY

Division Description: The Division for Air Quality is the state agency primarily responsible for implementing programs to achieve and maintain state and federal air quality standards in the commonwealth of Kentucky. The division regulates the amount of air pollution that may be released into the air by industry and other stationary sources. To meet its obligations, the division staff operate a comprehensive program involving air quality monitoring, planning, construction and operation permitting, compliance inspections and enforcement.

Program Highlight: Kentucky's current air quality monitoring network includes 143 monitors that are located in 31 counties. The locations of the monitoring stations are selected using U.S. EPA guidance and in general are established near populous areas or pollutant sources. Each year the station locations are reviewed to ensure that adequate coverage is being provided. Data from the network are used to demonstrate compliance with and/or progress toward meeting ambient air quality standards and to identify pollution trends. The data are also used to provide pollutant levels for daily air quality index reporting and to detect elevated pollutant levels for activation of emergency control procedures.

Division Director: John Lyons

Telephone: 502-573-3382

Web site: <http://www.air.ky.gov/>

Two Reports:

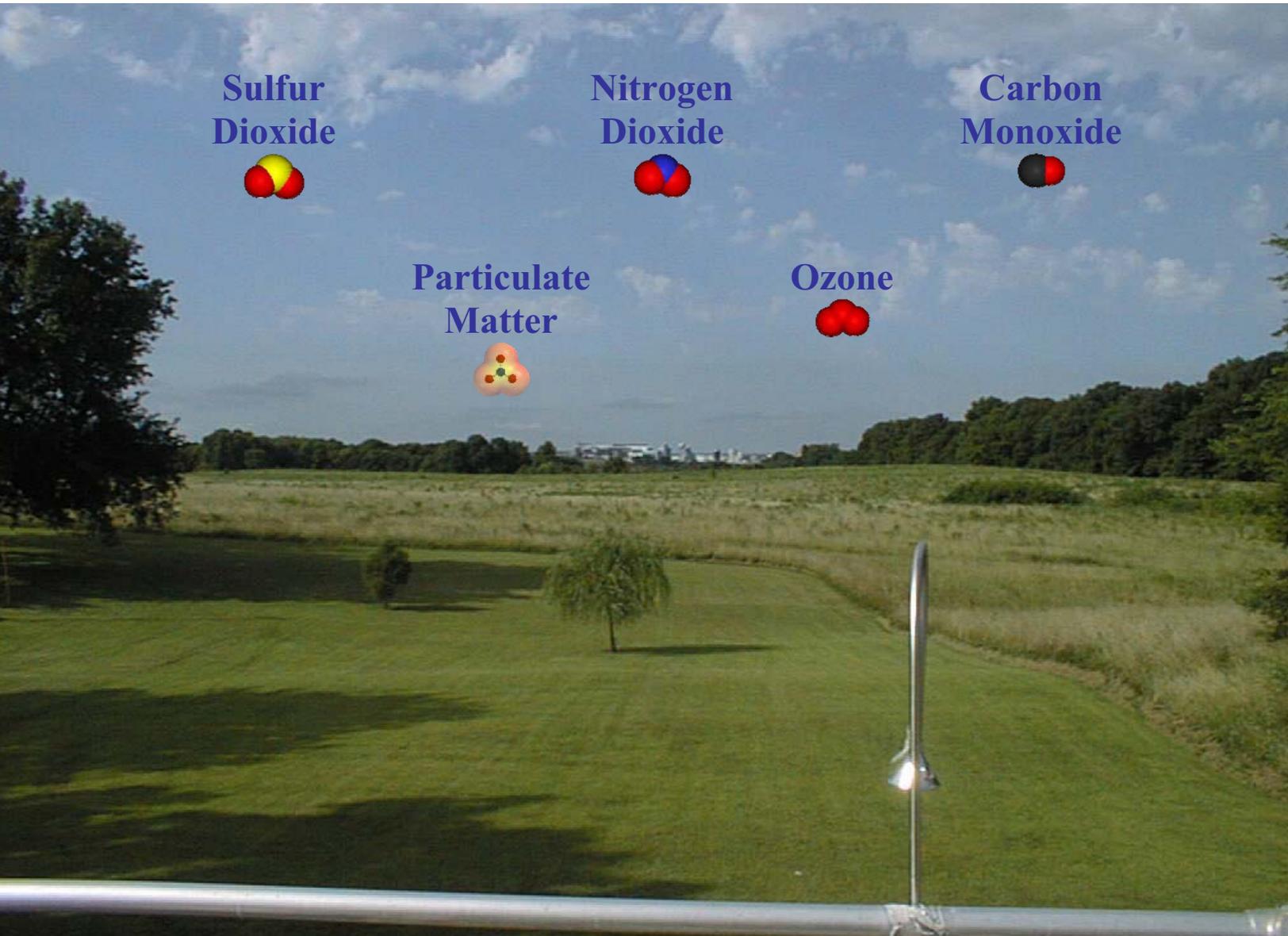
Kentucky Ambient Air Quality Annual Report 2005

Kentucky Air Quality Surveillance Network 2006

(<http://www.air.ky.gov/programs/airmonitoring/Kentucky+Ambient+Air+Quality+Annual+Report+and+Air+Quality+Surveillance+Network.htm>)

Kentucky Ambient Air Quality Annual Report 2005

An Annual Summary of Ambient Air Monitoring Conducted in Kentucky



**Sulfur
Dioxide**



**Nitrogen
Dioxide**



**Carbon
Monoxide**



**Particulate
Matter**



Ozone



Introduction

The Technical Services Branch of the Kentucky Division for Air Quality produces the Ambient Air Quality Annual Report. This report presents a summary of statistical results from monitoring outdoor concentrations of air pollutants in the Commonwealth during the calendar year 2005.

The primary source of data for this report is the Air Quality Surveillance Network operated by the Kentucky Division for Air Quality. The report also contains monitoring data collected by the Louisville Metro Air Pollution Control District, the National Park Service and some industries.

Network Design and Operation

Since July 1967, the state has operated an air quality monitoring network. The 2005 network included 129 monitors in 37 counties (this total includes monitors operated by the Louisville Metro Air Pollution Control District, the National Park Service at Mammoth Cave and industries).

The monitoring station locations are selected with U.S. Environmental Protection Agency guidance (40 CFR 58, Appendix D) and, in general, are established near high population areas or air pollution sources. Each year the site locations are reviewed to ensure that adequate coverage is being provided.

Many staff hours are devoted to the operation of the monitoring network. Division staff routinely visits our sites to calibrate and maintain the monitoring equipment, collect samples, and verify and document data from the continuous monitors.

Because it is imperative that the air monitoring data be accurate and precise, the Division for Air Quality has an extensive quality assurance program. Staff members audit every air monitor quarterly to ensure that each is operating properly. This audit includes monitors operated by the Louisville Metro Air Pollution Control District, the National Park Service and industrial networks.

Monitoring data is used in several ways. The data is utilized to demonstrate compliance with and/or progress made toward meeting ambient air quality standards and to identify pollution trends. The data also assists in evaluating public health impacts and the possible need to initiate emergency control procedures.

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The public has access to the monitoring data through this annual report and, on a daily basis, through the Air Quality Index (AQI) message on our website: www.air.ky.gov or toll free at: 1-800-AIR-IN-KY. The AQI is a 24-hour report on Kentucky's air quality. During the summer months, the public can also access daily ozone level reports through EPA's AIRNOW website at www.epa.gov/airnow.

Report Organization

This report contains sections on each criteria pollutant with the monitoring data contained in a table arranged alphabetically by county. Wet deposition, toxics, industrial data, mercury monitoring and attainment designations are presented in separate sections.

The report has been composed and arranged in an attempt to make it "user friendly." Included in the report are: a National Ambient Air Quality Standards table; a table listing monitors by county; maps indicating monitor locations; and pollutant trends graphs.

If you have suggestions or questions concerning this report, please contact Andrea Keatley, Technical Services Branch, Division for Air Quality, 803 Schenkel Lane, Frankfort, KY 40601.



Kentucky Air Quality Surveillance Network 2006



Commonwealth of Kentucky
Environmental & Public Protection Cabinet
Department for Environmental Protection
Division for Air Quality
803 Schenkel Lane
Frankfort, Kentucky 40601



INTRODUCTION

The State Division for Air Quality has operated an air quality-monitoring network in the Commonwealth since July 1967. The Louisville Metro Air Pollution Control District, a local agency, has maintained a subnetwork in its area of jurisdiction since January 1956. Since that time the networks have been expanded in accordance with the U. S. Environmental Protection Agency's regulations to reflect the current overall network of 44 stations, which monitor the major pollutants including those for which national ambient air quality standards have been issued.

In October 1975, the U. S. EPA established a work group to critically review and evaluate current air monitoring activities at that time. This group was named the Standing Air Monitoring Working Group (SAMWG). The SAMWG review indicated several areas where deficiencies existed which needed correction. The principal areas needing correction were: there were more monitoring sites than needed in some areas to assess air quality; existing regulations did not allow for flexibility to conduct special purpose monitoring studies; data reporting was untimely and incomplete and there existed a lack of uniformity in station location and probe siting, sampling methodology, quality assurance practices, and data handling procedures which resulted in data of unknown quality.

In August 1978, recommendations developed by SAMWG to remedy the deficiencies in the existing monitoring activities were combined with the requirements of a new Section 319 of the Clean Air Act and included in a proposed revision to the Regulations. Section 319 provided for the development of uniform air quality monitoring criteria and methodology; reporting of a uniform air quality index in major urban areas; and the establishment of an air quality monitoring system nationwide which utilizes uniform monitoring criteria and provides for monitoring stations in major urban areas that supplement State monitoring.

In May 1979 the new regulations were finalized by the Federal Environmental Protection Agency requiring certain modifications and additions be included in the State Implementation Plan for air quality surveillance. These regulations require each state to operate a network of monitoring stations designated as State and Local Air Monitoring Stations (SLAMS) that measure ambient concentrations of air pollutants for which standards have been established. The SLAMS designation contains provisions concerning the conformity to specific siting and monitoring criteria not previously required. Regulations provide for an annual review of the monitoring network to insure objectives are being met and to identify needed modification. Finally, the Air Quality Surveillance Plan content provides for having a SLAMS network description available for public inspection and submission to the U.S. Environmental Protection Agency upon request.

The SLAMS network description as provided for in 40 CFR Part 58 must contain the following information for each monitoring station in the network:

1. The Aerometric Information Retrieval System (AIRS) site identification form for existing stations.
2. The proposed location for scheduled stations.
3. The sampling and analysis method used by each monitor.

4. The operating schedule for each monitor.
5. The monitoring objective and spatial scale of representativeness for each monitor.

The document which follows constitutes the Kentucky SLAMS network description and is organized into three main parts:

- (1) Station Description Format: An outline of the designations, parameters, monitoring methods, and the basis for site selection.
- (2) Network Summaries: Presenting the total number of sites and monitors in each region and for the state. Also included is a listing of all stations and location.
- (3) SLAMS Station Description: Each SLAMS station is described in detail as per the outline in (1) above.

Modification to the network as determined by an annual review process will be made each year to maintain a current up-to-date network description document.

DEPARTMENT FOR ENVIRONMENTAL PROTECTION

DIVISION OF WASTE MANAGEMENT

Division Description: The Division of Waste Management regulates the proper management of solid and hazardous wastes and the operations and removal of underground petroleum storage tanks (USTs), as well as ensures the proper cleanup of contaminated sites, including state and federal Superfund sites.

Division Highlights: The Division of Waste Management encompasses several different programs with issues ranging from responding to environmental emergencies, dealing with issues related to illegal dumps and historic landfills, promoting appropriate management of hazardous wastes and constituents, providing local assistance on solid waste and recycling issues, ensuring proper solid and special waste management and minimizing underground storage tank releases by implementation of educational and regulatory programs as well as cleaning up UST releases.

Division Director: Bruce Scott

Telephone: 502-564-6716

Web site: <http://www.waste.ky.gov/>

DEPARTMENT FOR ENVIRONMENTAL PROTECTION

DIVISION OF WASTE MANAGEMENT

Program Planning and Administration Branch

Branch Description: The Program Planning and Administration Branch promotes sound waste management programs by providing administrative and operational support to all branches in the division through efficient and effective financial administration, personnel management and regulatory development.

Branch Manager: Position is currently unoccupied.

Telephone: 502-564-6716

Web site: <http://www.waste.ky.gov/branches/ppa/>

One Report:

Division of Waste Management Annual Report (2005-2006)

(<http://www.waste.ky.gov/NR/rdonlyres/DF72D341-A529-4772-8C33-5CE360FF4936/0/AnnualReportEdited.pdf>)

Division of Waste Management Annual Report

2005-2006



Commonwealth of Kentucky
Environmental and Public Protection Cabinet
Department for Environmental Protection
Division of Waste Management

www.waste.ky.gov
www.recycle.ky.gov



EXECUTIVE SUMMARY

The largest division of the Department for Environmental Protection with over 275 staff positions, the Division of Waste Management (DWM) oversees a vast array of programs dealing with solid waste management, recycling, hazardous waste, underground storage tanks (USTs) and site remediation at contaminated properties such as "brownfields." DWM is a regulatory agency; permits from DWM are required for certain facilities to ensure that wastes are managed properly. These include solid waste disposal facilities (landfills) and entities that transport, store and dispose of hazardous waste (TSDs).

- The division has completed a comprehensive review of its regulations germane to two major program areas: hazardous waste and underground storage tanks. In 2006 the division foresees promulgating new regulatory amendments to completely overhaul these two programs. Hazardous waste regulations will be updated to match federal standards adopted through 2005 [with a few appropriate Kentucky-specific standards]. The UST program will change the way cleanups are financed through the Petroleum Storage Tank Environmental Assurance Fund. Tank cleanups will be done faster, more efficiently and at lower cost under the revised program.
- The number of pending solid waste permits (the backlog) has dropped dramatically from over 250 in the summer of 2004 to 50 in December 2005.
- Prices for certain recyclable materials are going up (PET, steel, aluminum). Recycling commodities prices are holding at solid sustainable levels with some commodities, such as aluminum beverage cans, scrap copper, scrap steel and plastic containers (PETE and HDPE) at historic highs. The long-term outlook (over the next 5 – 7 years) is for continued favorable pricing levels to recyclers.
- Recycling in Kentucky is improving slightly but still lags behind the national average.
- Over 85 percent of Kentucky households receive door-to-door garbage collection service.
- Waste disposal is 15 percent cheaper at Kentucky landfills than the average of surrounding states. While cheaper disposal prices may help encourage proper disposal they also can adversely affect the ability to build recycling infrastructure as an alternative to high waste disposal costs.
- There are roughly 2,500 known underground storage tank cleanup projects to be completed in Kentucky.
- In 2005-06, the DWM reimbursed counties over \$1.1 million for the cleanup of 361 illegal open dumps.
- During 2004, the counties reported collecting 697,047 bags of litter at a cost of \$9.4 million.

- In 2005, DWM conducted 5,951 inspections (roughly 500 per month on average) and issued 793 notices of violation.
- In 2005, DWM conducted waste tire amnesty days in 35 counties and collected over 1.2 million waste tires.
- A total of 60 major state Superfund sites have been remediated since 1993. Since 2003, 67 removals/responses for smaller sites (abandoned or leaking drums, mercury assessments and removals, soil cleanups, etc.) have been conducted.
- The number of incidents per day to be addressed by the cabinet's Environmental Response Team has nearly doubled since 2003.

The division is considering promoting legislation to address the following areas:

- Increasing the bonding (financial assurance) requirement for waste tire accumulators, transporters, and processors. Presently, the \$1 per tire bonding requirement outlined in KRS 224.50-862 is insufficient to address remediation costs for tire facilities that improperly disposed of waste tires. Kentucky recently completed a multi-million dollar cleanup to address a landfill that was ablaze due in part to improper management of waste tires.
- Creating an allowance in the statute (KRS 224.01-400) for the cabinet to seek a windfall lien to recoup costs incurred in remediating releases to the environment. This would provide a cost recovery mechanism (similar to the federal government's authority) to assure the state is compensated when taxpayers' funds are used to conduct cleanups at private property.
- Making revisions to the waste tire statutes (KRS 224.50-850 through -880) to provide for reporting by registered waste accumulators/transporters/processors of the number of waste tires accepted and final disposition (recycled or landfilled), increasing the number of waste tires a tire retailer may accumulate without having to register to be in line with usual transportation methods, providing that certain state and local government recycling facilities may accumulate the same number of waste tires as a tire retailer without having to register and eliminating the exemption from registration for salvage/junkyards.

DEPARTMENT FOR ENVIRONMENTAL PROTECTION

DIVISION OF WASTE MANAGEMENT

Solid Waste Branch

Branch Description: The Solid Waste Branch ensures proper solid and special waste management practices through the implementation of comprehensive permitting, monitoring and training.

Branch Manager: Ron Gruzesky

Telephone: 502-564-6716

Web site: <http://www.waste.ky.gov/branches/sw/>

No Reports Within the Past Two Years

DEPARTMENT FOR ENVIRONMENTAL PROTECTION

DIVISION OF WASTE MANAGEMENT

Hazardous Waste Branch

Branch Description: The Hazardous Waste Branch promotes waste minimization and ensures appropriate management and remediation of the release of hazardous wastes and hazardous constituents through permitting, registration and reporting requirements.

Branch Manager: April Webb

Telephone: 502-564-6716

Web site: <http://www.waste.ky.gov/branches/hw/>

No Reports Within the Past Two Years

DEPARTMENT FOR ENVIRONMENTAL PROTECTION

DIVISION OF WASTE MANAGEMENT

Superfund Branch

Branch Description: The Superfund Branch ensures the appropriate response at all locations with a release or threatened release of a hazardous substance, pollutant or contaminant or petroleum or petroleum product (other than from a regulated underground storage tank) through identification, assessment and remediation/management.

Branch Manager: Fazi Sherkat

Telephone: 502-564-6716

Web site: <http://www.waste.ky.gov/branches/sf/>

No Reports Within the Past Two Years

DEPARTMENT FOR ENVIRONMENTAL PROTECTION

DIVISION OF WASTE MANAGEMENT

Recycling and Local Assistance Branch

Branch Description: The Recycling and Local Assistance Branch provides assistance and promotes proper management of solid waste programs in Kentucky.

Branch Manager: Position is currently unoccupied.

Telephone: 502-564-6716

Web site: <http://www.waste.ky.gov/branches/rla/>

One Report:

2004 Statewide Municipal Solid Waste Management Update

(<http://www.waste.ky.gov/branches/rla/2004+Statewide+Solid+Waste+Report.htm>)

2004 STATEWIDE MUNICIPAL SOLID WASTE MANAGEMENT UPDATE

Environmental and Public Protection Cabinet Division of Waste Management

Executive Summary

BACKGROUND

Kentucky has made great strides in the proper management of its solid waste since the late '60's when the first solid waste legislation was passed. Some milestones:

- *1966 - Counties began formal solid waste planning* -- Kentucky Revised Statute (KRS) Chapter 109 gave counties the ability to establish "109 boards" to address solid waste issues.
- *1982 - State laws were expanded* -- To provide funding to counties and penalties for noncompliance.
- *1991 through 2003 - Counties developed five-year plans and submitted annual reports* -- Subsequent legislation furthered the development of county responsibility and state oversight. Counties develop five-year solid waste plans providing for cleanup of illegal open dumps and litter, recycling, access for all households to garbage collection and solid waste education programs. The counties submit annual progress reports to the Environmental and Public Protection Agency providing the basis for cabinet recommendations to the Governor and the General Assembly.
- *1996 - Cabinet initiated illegal open dump abatement program* -- The goal is to eliminate and prevent illegal open dumps across the Commonwealth.
- *1998 - Kentucky Recycling and Marketing Assistance (KRMA)* -- The KRMA program and advisory board were established to develop recycling infrastructures for local governments.
- *1998 and 2001 - PRIDE Programs established* -- Federal funds for local illegal open dump cleanup and solid waste education began to flow into eastern and central Kentucky counties through the establishment of the Eastern Kentucky and Bluegrass PRIDE (Personal Responsibility in a Desirable Environment) programs.
- *2001 - Kentucky Certified Clean County Program is created* -- The creation of the Kentucky Certified Clean County Program (KCCCP) in 2001 provided \$4 million for cleanups of illegal open dumps for counties with mandatory garbage collection.
- *2002 - House Bill 174 provides ongoing funding* -- The 2002 Kentucky legislature established a statewide, ongoing funding mechanism for the cleanup of illegal open dumps, litter and abandoned landfills. An environmental remediation fee of \$1.75/ton on waste disposed and an annual road fund allotment of \$5 million generate approximately \$15 million annually for these cleanup programs.

ACHIEVEMENTS

- *Illegal open dumping declines* - *Illegal open dumping* has declined over 85% in the last eleven years. Over 22,000 illegal open dumps have been cleaned since 1993.
- *Litter abatement activities increase* - The KY Pride fund, Eastern KY PRIDE, Bluegrass PRIDE, Department of Transportation, Adopt-A-Highway and cities and counties contributed to the cleanup of 13,942,720 pounds of litter during 2004. The average cost per pound of litter picked up is \$0.67.
- *Recycling* – Kentuckians recycled 22% of common household recyclables (aluminum, cardboard, steel, plastic, newspaper, glass and paper), the same rate as in 2003. However, Kentuckians recycled 32.5% of all municipal solid waste in 2004, which included sludge, concrete, compost, and asphalt in addition to the common household recyclables. We are recycling more but we are also creating more waste as shown by the increase of 222,381 tons of Kentucky waste disposed in landfills in 2004.

- *Curbside collection increases* - Participation in **curbside** garbage collection has increased by 23.1% since 1993. The 2004 statewide household participation rate for all collection types is at an all time high of **88.67%**.
- *Waste Tire Amnesty Program* - Nearly 1.4 million waste tires were recovered in 2004 and recycled at a cost of \$1,515,412.00 or \$1.08 per passenger tire equivalent (PTE). The recycled tires are used for tire-derived fuel and crumb rubber for athletic fields and schools and community parks.
- *Kentucky's crowning achievement in cleanup* - Keep America Beautiful recognized Kentucky in 2004 as the No. 1 state for waste tire cleanup and recycling during the Great American Cleanup. Kentucky contributed 864,000 of the 1.2 million waste tires cleaned up and recycled nationwide during the March through May campaign.
- *Crumb Rubber Grant* - The Waste Tire Trust Fund awarded twenty-one grants totaling \$979,000 to assist schools and communities in projects using crumb rubber from waste tires for athletic fields, gyms, parks and community playgrounds.
- *Cabinet Secretary Wilcher makes recycling a priority for the state:*
 - Recycling staff collaborated with the Kentucky Transportation Cabinet to implement a simple but effective application for recycling glass utilizing pulverized glass aggregate (PGA) in road construction projects.
 - Expansion of recycling by state government offices in 2006.
 - A recent EPA grant awarded to Kentucky will fund four e-scrap recycling workshops to address reuse, recycling, and regulatory issues of electronics across the state beginning October 2005 and culminating in March 2006.
 - Meetings with recycling businesses, industries, counties, cities, non-profit and environmental groups to inform cabinet on strategies to improve recycling in Kentucky.
 - Recycling initiative with state parks underway.
- *The Division of Waste Management's state government office paper recycling program thrives* – Currently serving 111 building locations in Frankfort and collecting office paper, computer paper, newsprint and cardboard. The shredding of confidential documents provides a zero cost alternative to state and local governments with increasing volume each year. Over 3,173,550 pounds were recycled, an increase of 15% over 2003.
 - The program is self-sustaining and revenue generated from the program allowed the purchase of three new trucks to replace its aging fleet of trucks. The trucks were purchased with program funds from the sale of recycled paper and cardboard and have messages on both sides to encourage the *4 R's* – *REDUCE, REUSE, RECYCLE, and REWARDS!* The trucks were delivered and placed in service in the fall of 2004.
 - Governor Fletcher and Cabinet Secretary LaJuana S. Wilcher performed an official unveiling of one of the new trucks featuring a version of the new state brand during the kick off of the cabinet's 2005 Earth Week activities.

CONCLUSIONS

Kentucky households recycle approximately 22% of their household solid waste, compared to the national average of 26.7%. Since 1998, there has been an overall decline in recycling nationwide and Kentucky's trends through the 90's and into the present mirror the national recycling trends. Recycling rates declined from 1998 through 2002 and increased in 2003 and 2004.

A major component in recycling trends is the commodity markets. As with most commodity market trends, there was a decline during the same time frame, and as markets have picked up, recycling is becoming more profitable. Kentucky lacks adequate infrastructure to capitalize on these improved trends. By reallocating existing funds to make recycling infrastructure goals attainable and working with our manufacturers of recycled content products, Kentuckians can recycle and divert these valuable materials away from the landfills to manufacturers for feedstock.

Kentucky's lower than average recycling rate reflects a lack of state level funding for local governments' recycling infrastructure. Additionally, the 25% waste reduction goal expired and waste disposed has increased each year with an overall increase since 1993 of 44 %. Most of the surrounding states provide state grants for recycling efforts on a county level. Cabinet staff continues to encourage regionalization efforts for recycling efforts and market development; however, without a dedicated funding source, the options for counties and state development are limited.

RECOMMENDATIONS

Recycling in Kentucky is at a crossroads. A long-term commitment is necessary to successfully develop a strong recycling infrastructure. Past efforts have failed due to lack of sustained support. Priority for sustainable recycling goals must remain consistent. The cabinet's role in Kentucky's recycling future is clearly that of leadership. Kentucky state government is leading the way by improving its recycling.

To bring the state on par and beyond the national average, Kentucky must provide state level funding for recycling to local governments. The advancement of the state as a whole in recycling efforts will require a dedicated funding mechanism and the provision of guidance to shape a strong recycling infrastructure in the Commonwealth. State government needs to be the role model for the counties regarding recycling.

The success of the crumb rubber grants and the overall success of the Waste Tire Trust Fund program need to be extended to further explore Kentucky-based marketing and products that can effectively promote future market research. Kentucky cannot afford, environmentally and economically, to fall further behind surrounding states. It is essential that all communities develop effective recycling programs.

While the Commonwealth has made significant progress in addressing illegal open dumps, tire cleanups and litter abatement, additional focus and financial support are required to improve local recycling programs.

A dedicated funding source enabled Kentucky to become a national leader in tire recycling. Equally important is the necessity of dedicated funding to support the development of local and regional recycling infrastructure. Kentucky can be a leader in this endeavor as well.



DEPARTMENT FOR ENVIRONMENTAL PROTECTION

DIVISION OF WASTE MANAGEMENT

Field Operations Branch

Branch Description: The Field Operations Branch identifies and abates imminent threats to human health and the environment through fair and equitable inspections, technical assistance and education. The branch performs inspections at sites managing solid waste, hazardous waste, underground storage tanks and PCBs.

Branch Manager: Wally Blair

Telephone: 502-564-6716

Web site: <http://www.waste.ky.gov/branches/fo/>

No Reports Within the Past Two Years

DEPARTMENT FOR ENVIRONMENTAL PROTECTION

DIVISION OF WASTE MANAGEMENT

Underground Storage Tank Branch

Branch Description: The Underground Storage Tank (UST) Branch develops and implements a regulatory and educational program for minimizing releases through new UST system installation standards and existing UST system upgrade standards and for cleaning up UST system releases to an acceptable level.

Branch Manager: Rob Daniell

Telephone: 502-564-6716

Web site: <http://www.waste.ky.gov/branches/ust/>

No Reports Within the Past Two Years

DEPARTMENT FOR ENVIRONMENTAL PROTECTION
DIVISION OF ENVIRONMENTAL SERVICES

Division Description: The Division of Environmental Services provides centralized laboratory testing for the Divisions for Air Quality, Water and Waste Management in order to assess the environmental status of the commonwealth.

Division Director: Gleason Wheatley

Telephone: 502-564-6120

Web site: <http://www.dep.ky.gov/lab/>

No Reports Within the Past Two Years

DEPARTMENT FOR ENVIRONMENTAL PROTECTION

DIVISION OF ENFORCEMENT

Division Description: The Division of Enforcement uses a clear and consistent approach in bringing about and maintaining compliance with the Cabinet's regulatory programs by using appropriate and reasonable measures to resolve cases in a timely manner.

Division Director: Susan Green

Telephone: 502-564-2150

Web site <http://www.dep-enforcement.ky.gov/>

No Reports Within the Past Two Years

DEPARTMENT FOR ENVIRONMENTAL PROTECTION

DIVISION FOR COMPLIANCE ASSISTANCE

Division Description: The Division of Compliance Assistance helps Kentucky's facilities excel in their environmental compliance, recognizes environmental leadership throughout the commonwealth and facilitates activities that enhance the welfare of Kentucky's citizens and the environment.

Program Highlight: This division implements KY EXCEL, which offers a nonregulatory approach that allows the department to work cooperatively with all of Kentucky's citizens to recognize and reward the many voluntary efforts conducted each year.

Division Director: Aaron Keatley

Telephone: 502-564-0323

Web site: <http://www.dca.ky.gov/>

No Reports Within the Past Two Years

DEPARTMENT FOR ENVIRONMENTAL PROTECTION
ENVIRONMENTAL RESPONSE TEAM SECTION

Section Description: The Environmental Response Team is trained to respond immediately to environmental emergencies such as accidents where hazardous materials may have been spilled.

Section Supervisor: Robert Francis

Telephone: 502-564-2150

Web site: <http://www.dep.ky.gov/enviroemergencies/>

One Report:

Environmental Response Team Section

(This report is not available online)

ENVIRONMENTAL RESPONSE TEAM SECTION

The Environmental and Public Protection Cabinet is mandated to protect human health and to provide for efficient, coordinated, and effective action to minimize damage to air, land, and waters of the Commonwealth from toxic or hazardous releases of pollutants and contaminants. To achieve this goal, the Department of Environmental Protection formed the Environmental Response Team (ERT) in 1980.

The statutory mandate in KRS 224.01-400 mandates a Cabinet 24 hour environmental response line and designates the Cabinet as the lead agency for emergency spill responses. In addition KRS 224.46-580 mandates the Cabinet to respond effectively and timely to emergencies created by releases per 224.01-400.

ERT is a departmental function composed of staff with various environmental discipline backgrounds from DOW, DAQ, DWM, and DENF with the majority of the staff from the regional offices. The Environmental Response Team (ERT) Section is composed of three full time staff, 24 part-time responders (365 days per year 24 hours a day) and 9 alternates. (See attached staffing chart)

ERT is operationally based in the DEP Commissioner's office in Frankfort.

ERT responsibilities include:

- Maintain a 24 hour emergency report/notification phone line for spills and releases
- Coordinate and transfer non-emergency and post emergency incidents to appropriate DEP staff
- Serve as On-Scene Coordinator to releases of toxic and hazardous substances, pollutants and contaminants that threaten the environment
- Coordinate with local and state agencies, US EPA, other federal agencies and adjacent state's agencies related to environmental releases
- Provide staffing and coordination of EPPC efforts for KY Emergency Operations Center (EOC) during activation of EOC due to natural disasters such as flooding and tornadoes.
- Assist in training and planning activities of other local and state agencies

**EPPC/DEP ENVIRONMENTAL RESPONSE TEAM
KY EMERGENCY OPERATIONS PLAN RESPONSIBILITIES
ERT SUPPORT ROLES FOR KY EOC**

During an emergency event in Kentucky the KY Emergency Operations Plan (coordinated by the KY Division of Emergency Management) is activated which places requirements on the EPPC/DEP and the Environmental Response Team to work within a framework with other state, local and federal agencies to coordinate efforts to mitigate the emergency.

Beyond the routine response activities by ERT, the KY EOP places specific duties on the EPPC Cabinet to provide the following activities:

- Provide on-scene coordinator
- Provide staffing to State Emergency Operations Center
- Provide technical assistance and initial evaluation of pollution hazards
- Assist in early assessment of extent of hazard by dispatching staff to spill/release site when required
- Approve and direct on-site operations plan for cleanup, treatment or containment and mitigation of environmental damage
- Assure proper disposal of resulting waste materials
- Establish environmental sampling, testing and analysis programs to measure environmental effects
- Determine environmentally safe concentrations for water quality and ensure safe public drinking water supplies effected by releases
- Coordinate with US Environmental Protection Agency, Federal Region IV Regional Response Team, US Army Corps of Engineers, US Coast Guard and other federal agencies

KRS 224.01-400 mandates coordination by requiring “consultation with other federal, state, and local agencies, and private organizations.” It must occur at all stages and in all elements of emergency response activities. This coordination is managed by use of the Incident Command System (ICS) as set forth in the KY Emergency Operations Plan and the OSHA safety standards.

The Incident Command System is a standardized system of incident management based upon a chain of command and common terminology for all responding agencies. ICS incorporates the concept of a unified command system, which are employed at large incidents where multiple agencies have jurisdictional concerns.

ERT has daily coordination/communication activity with the KYDEM’s Emergency Operations Center duty officers who receive the initial calls on the ERT 24 hour phone after normal work hours. The duty officers receive and log the calls and forward the information to the ERT coordinator on call at that time. The duty officers also perform the same services for several other state agencies including the State Fire Marshal, Dept. of Agriculture and Dept. for Health Services (Radiation Branch). They are also in communication with several other agencies such as KSP, DOT, Fish and Wildlife, KVE, KY National Guard, and the regional and local DEM emergency managers.

COORDINATION/COMMUNICATION

WHAT IS THE PREFERRED CHAIN OF COMMAND AND NOTIFICATION PROCEDURE FOR DEP/EPPC?

The present notification/communication structure is as follows:

- ERT receives and evaluates incidents
- ERT makes decision on response and severity of incident
- ERT notifies appropriate Branch Managers and Director of appropriate Division if situation warrants
- ERT notifies Commissioner of significant incident
- Commissioner notifies EPPC Secretary if necessary

WHAT IS THE PREFERRED METHOD FOR DECLARATION OF EMERGENCY BY THE SECRETARY?

Some emergency situations due to unknown or unresponsive responsible parties may require the Cabinet to act to control/cleanup releases. The past procedure for these situations has been:

- ERT determines that an emergency situation exists requiring immediate response to prevent/limit environmental damage due to the situation
- ERT determines that a responsible party is either unknown or unresponsive
- ERT notifies the Commissioner and asks for approval to authorize and acquire necessary contractors to deal with the emergency
- Commissioner gives verbal approval to ERT to proceed under spending guidelines
- Commissioner notifies EPPC Secretary and gains upward approvals for emergency declaration
- ERT processes documentation for contractor and emergency declaration

WHAT IS PREFERRED COST RECOVERY PROCEDURE?

Presently there are three cost recovery procedures.

- For non-enforcement actions expenditures are calculated and a letter is sent to the responsible party requesting payment. Failure to pay results in formal enforcement action.
- Cost recovery associated with formal enforcement action is included in an overall settlement calculation.
- If the preceding two procedures fail to recover ERT costs, reimbursement from the Federal OPA fund is sought.

ERT CENTRAL OFFICE STAFF

ROBERT FRANCIS, ERT SUPERVISOR
DAVID LEO, ENVIRONMENTAL TECHNOLOGIST III
KERI GREENIDGE, ADMINISTRATIVE ASSISTANT

ERT RESPONDERS BY AREA

- AREA I: KEVIN USHER (DAQ-PADUCAH)
BILL CLARK (DAQ-PADUCAH)
VINCE PRIDDLE (DOW-PADUCAH)
MARGIE WILLIAMS (DWM-PADUCAH) - ALTERNATE
- AREA II: PEYTON ADAMS (DOW-MADISONVILLE)
NEIL BERRY (DWM-MADISONVILLE)
LARRY TICHENOR (DWM-MADISONVILLE)
MAC CANN (DAQ-OWENSBORO) - ALTERNATE
REBECCA ELLIOTT (DAQ-OWENSBORO) - ALTERNATE
- AREA III: KERRY MCDANIEL (DWM-COLUMBIA)
ROBBIE MCGUFFEY (DWM-BOWLING GREEN)
BILL BAKER (DOW-BOWLING GREEN)
MIKE SAPP (DWM-BOWLING GREEN) - ALTERNATE
- AREA IV: KEITH SIMMS (DWM-LOUISVILLE)
TODD GILES (DOW-FLORENCE)
SHELBY SEBASTIAN (DWM-FLORENCE)
ROB STALEY (DWM-LOUISVILLE)
- AREA V: RICK SELHORST (DAQ-ASHLAND)
RODNEY MAZE (DWM-MOREHEAD)
PHILIP CARTER (DWM-MOREHEAD)
DANNY FRALEY (DOW-MOREHEAD) - ALTERNATE
- AREA VI: TOM JONES (DOW-LONDON)
KEITH BLAIR (DOW-LONDON)
BILL BELCHER (DWM-LONDON)
JEFF LITTERAL (DOW-LONDON) - ALTERNATE
- AREA VII: FERRIS SEXTON (DOW-HAZARD)
DAMON WHITE (DOW-HAZARD)
ROGER MARTIN (DOW-HAZARD)
ROBERT STIDHAM (DWM-HAZARD) - ALTERNATE
- AREA VIII: JEFF CUMMINS (DENF-FRANKFORT)
BARBARA RISK (DOW-FRANKFORT)
BRIAN SCHRADER (DWM-COLUMBIA)
JAMES MCCLOUD (DWM-LONDON) - ALTERNATE

ENVIRONMENTAL INCIDENT NOTIFICATIONS

Year	Incidents	Incidents / day	Emergency Responses
2005	5720	15.67	327
2004	3650	10	242
2003	3130	8.57	132
2002	3265	8.94	96
2001	3029	8.30	152
2000	3066	8.41	201
1999	3654	10.01	221
1998	4327	11.44	219
1997	4102	11.24	199
1996	3976	10.86	255
1995	3749	10.24	218
1994	3499	9.59	227
1993	3071	8.74	118
1992	2478	6.77	144

All incidents and notifications received thru the ERT section are evaluated and responded to according to the established DEP business rules as follows:

- **Emergency** - on site response within 2 hours of notification
- **High Priority**
- - DEP staff will make site visit for follow-up within 2 working days of notification
- **Routine**- DEP staff will make site visit or contact notifier with 5 working days of notification

Several major incidents with severe or potentially catastrophic impacts to human health or the environment occurred in the last seven fiscal years. These included the largest incidents of their kind and the largest environmental release Kentucky has ever managed.

DATE	INCIDENT	COUNTY	IMPACTS	ERT TIME
12-06-05	Canal Barge Co.- Tugboat sank in the Tennessee River threaten to release 40,000 gallons of diesel fuel.	Marshall	Surface Water	22 days
11-23-05	BP Pipelines - 14,000 gallons of Xylene released from a pipeline hit by a farmer	Todd	Surface Water, Soil, Air	10 days
1-26-05	Mid-Valley Oil- Pipeline release of 268,000 gallons of crude oil into the Kentucky River	Owen	Soil, Surface Water, Drinking Water intakes in Louisville.	35 days
6-18-04	AK Steel- Unknown amount of fuel leaked from underground piping, which entered into the WWTP sewer lines.	Boyd	Soil, WWTP impacted	3 days
5-10-04	Catlettsburg Refining LLC- 12,000 gallons of crude oil ejected into the air and re-settled onto the ground & the Big Sandy River from a failed flare	Boyd	Soil, Surface Water	4 days
3-19-04	Trans-Kentucky Transportation- 6000 gallons of diesel released	Mason	Soil, Surface Water	12 days
1-29-04	Norfolk Southern Railway- 3250 gallons of diesel release	Scott	Groundwater, Drinking Water Intakes, Soil	5 days
8-14-03	Xylene Tanker Wreck	Pike	Big Sandy River degradation - downstream water intakes effected	5 days
8-4-03	Jim Beam bourbon warehouse fire- 800,000 gallons of bourbon released	Nelson	Stream degradation - Fishkill in Salt River	8 days
5-20-03	Pesticide tanker truck wreck-Diazinon	Jefferson	Groundwater, surface water, soils contamination	7 days
2-2-03	CTA Acoustics Factory fire	Laurel	Air contamination - surface water runoff to stream	3 days
8-26-02	CSX RR derailment- ammonium nitrate release	Laurel	Stream degradation - water intake impacted	11 days
1-29-02	Westlake Monomers-air	Marshall	Air release resulting in local	4 days

	release of chlorine and vinyl chloride		evacuations and plume movement	
11-8-01	Waxler Barge incident-gasoline barge release	Jefferson	Gasoline barge on Ohio River rupture in lock on Ohio River	3 days
10-11-00	Martin Co. Coal Co. coal slurry release	Martin	Slurry release from slurry impoundment - 90 miles of stream effected - 350,000 public water customers effected	85 days
5-10-00	Fire at Wild Turkey/ Boulevard Distilleries	Anderson	Bourbon warehouse fire - release to KY River – Major fishkill on 60 miles of river - 83,600 public water customers effected	16 days
4-25-00	Norfolk Southern RR railcar fire	Boyle	RR car fire – hazardous chemicals (toxic and explosive) - 50% of Danville evacuated- air release	5 days
1-27-00	Marathon/Ashland crude oil pipeline rupture	Clark	Release of 600,000 gallons of crude oil – threatened water supply of 515,300 customers downstream	12 days
11-8-99	Marathon/ Ashland – Catlettsburg Refinery tank explosion	Boyd	Process tank explosion - release of intermediate product to stream and Big Sandy River	4 days
10-2-99	KY Utilities diesel fuel spill	Mercer	300,000 gallons of diesel threatened 116,00 water customers downstream	11 days
8-8-99	Illinois RR derailment	McCracken	Derailment of 6 RR cars containing vinyl chloride - threatened catastrophic air release	3 days
8-8-99	Barge collision-gasoline barge and cumene barge	Henderson	Collision of Waxler gasoline barge and MAP cumene barge - 100,000 gallons of product released to Ohio River	5 days

DEPARTMENT FOR NATURAL RESOURCES

DIVISION OF FORESTRY

Division Description: The Division of Forestry provides forest stewardship assistance to private landowners and is responsible for preventing and controlling forest fires.

Division Director: Leah MacSwords

Telephone: 502-564-4496

Web site: <http://www.forestry.ky.gov/>

Five Reports:

Kentucky's Growing Gold

(<http://www.forestry.ky.gov/programs/utilize/Kentuckys+Growing+Gold+Bulletin.htm>)

Primary Wood Industries of Kentucky 2001

(<http://www.forestry.ky.gov/NR/rdonlyres/21A9597C-0B02-4388-AC69-EF18477BA733/0/2001wooddirectory.pdf>)

Status of Kentucky's Forest Biennial Report December 2002

(http://www.forestry.ky.gov/NR/rdonlyres/CD25DFC5-C20D-415F-AED2-19CE88B0AB0B/0/2002biennial_rpt.pdf)

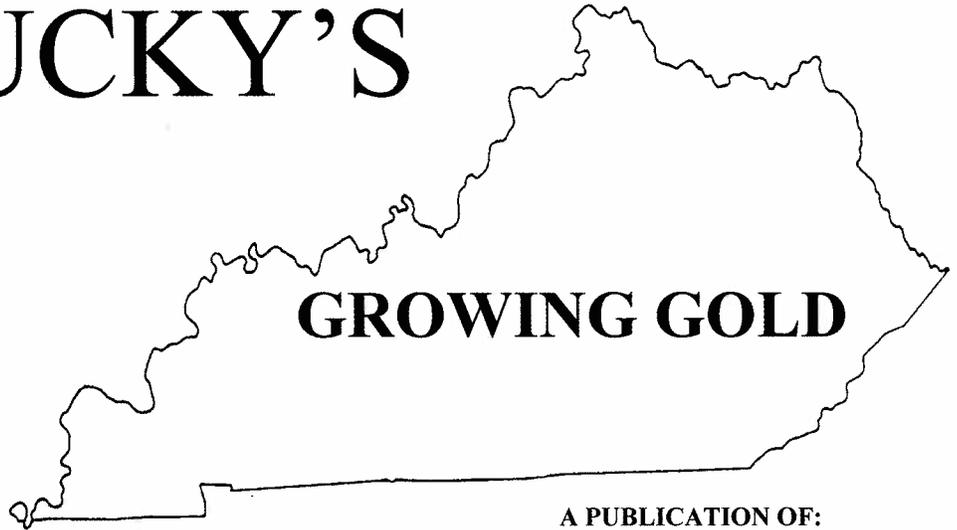
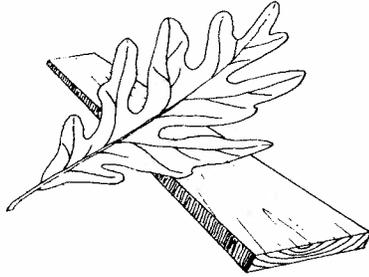
Governor's Task Force on Wildland Arson

(<http://www.forestry.ky.gov/NR/rdonlyres/E17493CF-A511-4F8C-8BB7-D724A911AE85/0/govwildlandfiretaskforce.pdf>)

Forestry Best Management Practices Board Five Year Review Report

(This report is not available online.)

KENTUCKY'S



GROWING GOLD

A PUBLICATION OF:
 KENTUCKY DIVISION OF FORESTRY
 FRANKFORT, KENTUCKY 40601

A SERVICE TO KENTUCKY'S FOREST PRODUCTS INDUSTRY AND TIMBERLAND OWNERS

VOL. XLVI, NO. 2

EDITOR: CHRISTOPHER G. NEVINS

SPRING 2006

THE FOLLOWING MARKED TIMBER FOR SALE IS A LISTING OF TIMBER MARKED BY THE KENTUCKY DIVISION OF FORESTRY FOR PRIVATE WOODLAND OWNERS. THE LIST WAS CURRENT AS OF DATE OF SUBMISSION TO THE PRINTERS. IF YOU WANT FURTHER INFORMATION ON MARKED TIMBER, PLEASE REFER TO THE "COUNTY GUIDE TO DISTRICT FORESTERS' OFFICES" INSIDE THE BACK COVER AND CALL THE APPROPRIATE DISTRICT FORESTER.

MARKED TIMBER FOR SALE

<u>LOCATION</u>	<u>SPECIES AND VOLUME</u>		<u>CONTACT</u>
CENTRAL DISTRICT			
<u>ALLEN CO.</u> LOCATED EAST OF SCOTTSVILLE, OFF HWY 98 & ON SOUTH SIDE OF CAPITAL HILL RD, APPROX 1/5 MILE FROM BARREN COUNTY LINE. 20 ACRES 212 TREES MARKED	YELLOW POPLAR RED OAK HARD MAPLE WHITE OAK ASH	26062 10934 8129 7526 3586	BEECH MISCELLANEOUS CHERRY WALNUT TOTAL BF (DOYLE) 62681
			2350 1991 1120 983 615-776-3776
<u>HART CO.</u> LOCATED 4 MILES EAST OF CANMER, ON BOTH SIDES OF DAVIS BEND RD. 42 ACRES 556 TREES MARKED	YELLOW POPLAR BEECH WHITE OAK RED OAK HARD MAPLE HICKORY	32682 29811 26668 24394 20012 18854	ASH CHERRY BLACKGUM SOFT MAPLE MISCELLANEOUS WALNUT TOTAL BF (DOYLE) 177903
			13527 4317 3310 2000 1774 554
			BYRON CORBETT 107 EASTVIEW DR. BARDSTOWN, KY 40004 502-348-6032



PRIMARY WOOD INDUSTRIES OF KENTUCKY 2001 ABSTRACT

“Primary Wood Industries of Kentucky 2001” has been prepared by the Kentucky Division of Forestry to provide information about markets for standing timber, cut logs and bolts, and wood products produced in these markets for resale. The directory is divided into four sections: Industry Type Index, Primary Wood Industry Listing By County, Product Index, and Alphabetical Index.

Status of Kentucky's Forests Biennial Report December 2002



STATUS OF KENTUCKY'S FORESTS BIENNIAL REPORT - DECEMBER 2002

Introduction

Ninety-three percent of Kentucky's 12.7 million acres (one-half of the state) of forestland is privately owned. This forestland provides multiple benefits to the citizens of the Commonwealth, including timber production, wildlife habitat, recreational opportunities, quality water and aesthetic beauty. The passage of the Kentucky Forest Conservation Act (KFCA) mandated that the Natural Resources and Environmental Protection Cabinet's Division of Forestry ensure healthy, sustainable forests that are ecologically sound, provide economic opportunities and benefit the overall quality of life for all Kentuckians.

Executive Summary

On March 31, 1998, Gov. Paul E. Patton signed the Kentucky Forest Conservation Act into law. The primary objectives of the act are to protect water quality from nonpoint source pollution generated from commercial timber-harvesting operations, educate landowners about the importance of proper forest management for multiple benefits, and educate loggers on proper timber harvesting techniques in the Commonwealth. The following report highlights the accomplishments from the last two years since the passage of the Kentucky Forest Conservation Act as well as a brief accomplishment summary of other division programs.

Kentucky Master Logger (KML) Program (KRS 149.342)

- The KML program has held 121 training workshops resulting in 5,031 certifications.
- The program has held 56 continuing education classes for master loggers to maintain their designation.

Forestry Best Management Practices Board (KRS 149.350)

- Gov. Patton appointed the 13-member board on May 7, 1999.
- The board serves as the primary source of BMP expertise and currently submits changes to the Kentucky Agriculture Water Quality Authority.

Inventory of Kentucky's Forests (KRS 149.338)

- Panel 3 of the Forest Inventory and Analysis (FIA) project is 100 percent complete.
- Forest Health Monitoring and ozone plots are 100 percent complete.
- The Timber Product Output (TPO) Survey for 1999 was completed and published in May 2002.
- The Delivered Log Price Survey (DLPS) is currently publicized quarterly in the division's "Growing Gold" publication.

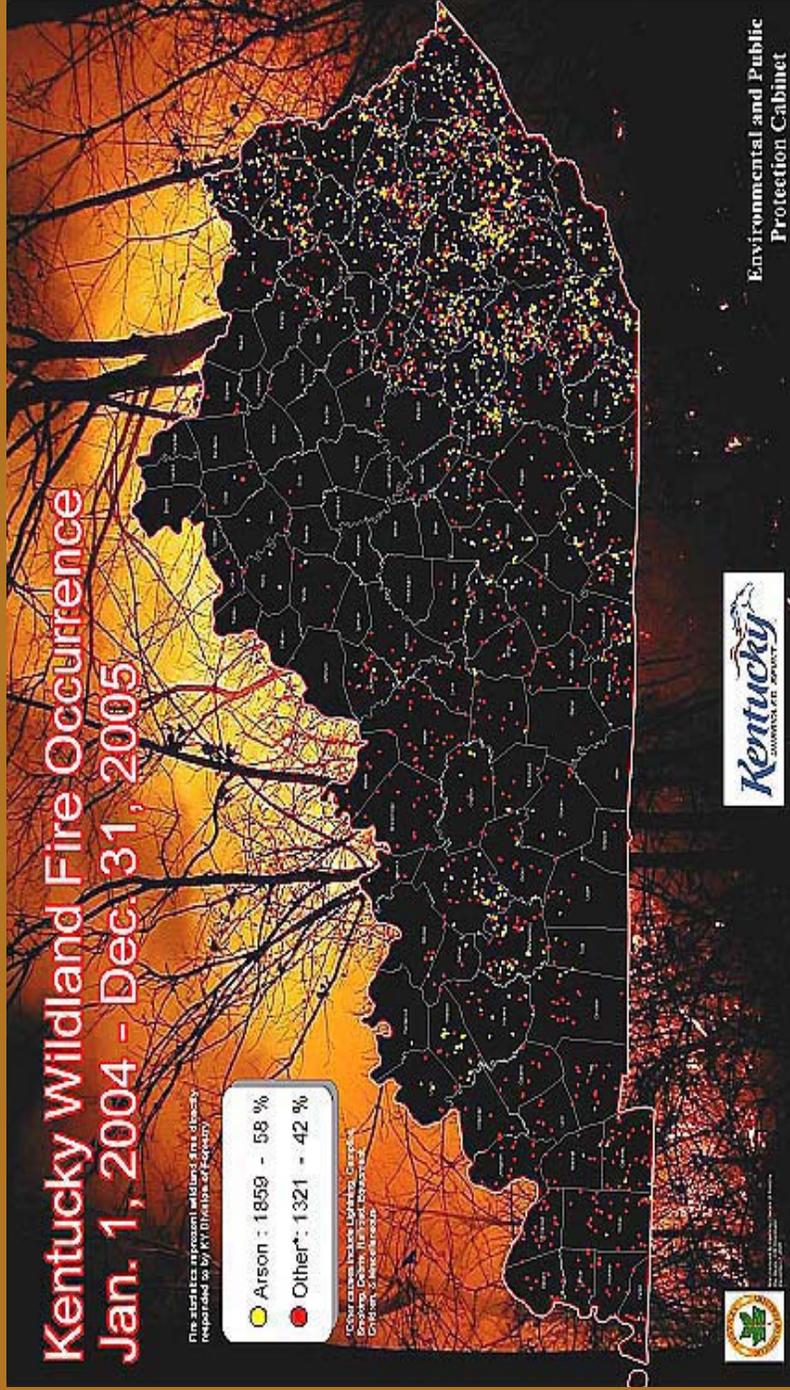
Forest Stewardship Incentives Fund (FSIF) (KRS 149.340)

Money was not appropriated for the FSIF. Therefore, the only funding source is civil penalties from violations of the KFCA. At this time, only \$2,455 in civil penalties have been collected from violators of the timber harvesting provisions act.



Governor's Task Force on Wildland Arson

Final Report - October 31, 2006



II. Executive Summary

Over half of Kentucky's wildland fires are deliberately set. Wildland fires threaten a resource that provides \$8 billion annually to the economy of the Commonwealth. Over the last decade, wildland fires have taken the lives of four firefighters and three citizens. Just within the last six years, 132 structures worth \$550,000 and 15 homes worth \$450,000 were destroyed. The seriousness of Kentucky's wildland fire problem is easily seen in the increasing cost of suppressing these fires. In the past six years, the Kentucky Division of Forestry alone spent more than \$20,109,000 in the suppression of wildland fires. (See the Actual Wildland Fire Cost chart on page 3.) Costs incurred by the USDA Forest Service, local fire departments and state and local agencies increases this amount significantly. Of much greater impact, however, is the irreplaceable loss in value of our forest resource and the value added to our state's economy by industries and businesses, including tourism and recreation, that are dependent on the forests. Our state cannot sustain losses of this magnitude year after year and assume there will continue to be a forest resource to provide for strong and viable forestry-related businesses and industries. In an effort to find both short-term and long-term solutions to the wildland arson problem in Kentucky, Governor Ernie Fletcher announced formation of the Wildland Arson Task Force on December 10, 2005. The Task Force met monthly throughout the summer, and its findings and recommendations are contained in this report.

Recommendations

The Task Force recommends a two-fold approach to addressing the wildland arson problem in Kentucky. Law enforcement is a critical component. Positions and funding should be provided to the Division of Forestry to establish a law enforcement unit within the agency. By having trained law enforcement officers with proper equipment, the division can address the need to investigate and prosecute wildland arson. The Kentucky Revised Statutes must also be reviewed and amended to strengthen the penalties once arsonists are found and prosecuted.

A second key component is public awareness and education. The Task Force recommends funding be provided to the division to initiate a comprehensive media campaign. Education of local officials and prosecutors will strengthen support for addressing wildland arson. For a sustained long-term approach, these efforts must include a strong fire prevention program in Kentucky's schools.

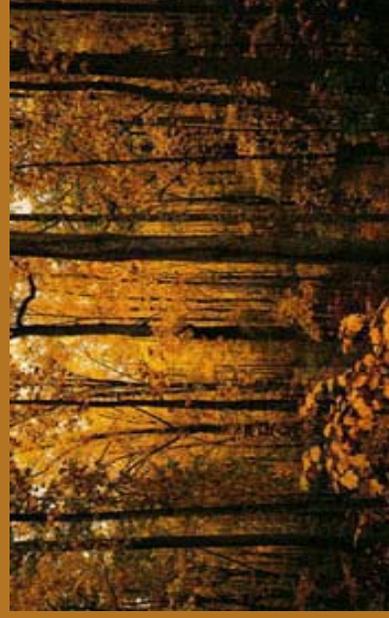
A complete list of recommendations begins on Page 7.

The members of the Wildland Arson Task Force thank Governor Fletcher for this opportunity to meet and discuss solutions to the wildland arson problem plaguing Kentucky. The Task Force welcomes the opportunity to discuss its findings with the Governor, his staff, and Environmental and Public Protection Cabinet officials.



Actual Wildland Fire Costs

Fiscal Year	KDF Budget	Necessary Government Expense	Total
00	\$240,000	\$3,428,700	\$3,668,700
01	\$240,000	\$3,540,400	\$3,780,400
02	\$240,000	\$6,063,900	\$6,303,900
03	\$240,000	\$1,157,100	\$1,397,100
04	\$240,000	\$1,593,700	\$1,833,700
05	\$240,000	\$1,146,200	\$1,386,200
06	\$240,000	\$1,499,700	\$1,739,700
TOTAL	\$1,680,000	\$18,429,700	\$20,109,700



Forestry Best Management Practices Board
Five Year Review Report
of
1998 Kentucky Forest Conservation Act
KRS 149.330 to KRS 149.355
and the Regulations
402 KAR 3:020 and 402 KAR 3:030

12/15/2004

Executive Summary

The Kentucky Forest Conservation Act (KFCA) was passed during the 1998 Regular Session of the Kentucky General Assembly. It mandated that loggers were to use “best management practices” (BMPs) during timber harvesting operations to reduce the potential for water pollution. The Act also created a governor’s appointed Forestry Best Management Practice Board (the Board) to periodically update the BMPs plus review, assess, and advise on issues relating to the implementation of the portions of the Act relating to timber harvesting. The Board has a duty to review no sooner than every five years and is hereby giving its first five year report.

The KFCA, in the opinion of the Best Management Practices Board, has proven to be very wise and effective legislation. The Board recognizes that the Act has improved practices at logging sites that have resulted in a reduction of the delivery of sediments, organic matter and other pollutants to streams. This provides many significant benefits to the Commonwealth. Woodland owners have benefited from more educational programs and field days that the Act provided. Loggers have benefited from improved environmental and safety training and the use of BMPs fostered by this legislation has improved the standing of the logging community. The Board believes that the General Assembly should reflect very positively on its wisdom in creating the Act.

While this groundbreaking legislation has improved practices, thorough review of the implementation of the Act indicates several areas that can and should be improved. This report outlines these areas and provides recommendations for addressing deficiencies. The following represent the primary matters of concern:

Regulatory Matters

- The growing number of recalcitrant bad actors, who have, after a four step administrative process, remained in violation, and have repeatedly violated the Kentucky Forest Conservation Act;
- Inefficiencies in the four part administrative process to handle noncompliance with BMP requirements in the Act.
- Collection of only \$29,035.51 of the \$127,095.50 (as of 12/15/2004) in fines imposed against the bad actors referenced above;
- Inadequate pricing of the Kentucky Master Logger (KML) Program as specified by administrative regulation;
- A needed for change in the education requirements of the KML Program as specified by the administrative regulation;
- A need for a temporary KML designation to allow newcomers to work while waiting to attend the next available Master Logger class
- Need for codification of the relationship between the Kentucky Forest Conservation Act and the Kentucky Agriculture Water Quality Act;

Funding Matters

No funding for the administration and expenses associated with the working of the Board; No funding for the Forest Stewardship Incentives Fund the KFCA created for landowner assistance.

DEPARTMENT FOR NATURAL RESOURCES
DIVISION OF CONSERVATION

Division Description: The Division of Conservation provides assistance to conservation districts and landowners to implement sound soil and water management practices.

Division Director: Steve Coleman

Telephone: 502-573-3080

Web site: <http://www.conservation.ky.gov>

No Reports Within the Past Two Years

DEPARTMENT FOR NATURAL RESOURCES
OFFICE OF TECHNICAL AND ADMINISTRATIVE SUPPORT

Office Description: The Office of Technical and Administrative Support is charged with the fiscal, administrative and technical activities of DNR.

Executive Director: Larry Adams

Telephone: 502-564-2320

Web site: <http://www.dnr.ky.gov/techadminsupport>

No Reports Within the Past Two Years

DEPARTMENT FOR NATURAL RESOURCES
DIVISION OF MINE RECLAMATION AND ENFORCEMENT

Division Description: The Division of Mine Reclamation and Enforcement regulates all surface and underground coal mining and enforces surface mining reclamation laws for coal and non-coal mining sites.

Division Director: Paul Rothman

Telephone: 502-564-2150

Web site: <http://www.dmre.ky.gov/>

Seven Reports:

Bond Release Report

(This report is not available online.)

Coal Explorations Report

(This report is not available online.)

Inspectable Units Report

(This report is not available online.)

Regional Activity Report (coal)

(This report is not available online.)

Penalties and Assessments Report (coal)

(This report is not available online.)

Bond Forfeitures (coal)

(This report is not available online.)

***Twenty-Third Annual Evaluation Summary Report for the Regulatory
and Abandoned Mine Land Reclamation Programs***

[EQC Note: This report is published by the Federal Office of Surface Mining]

<http://www.osmre.gov/oversight/kentucky2005.pdf>

ABSTRACT

Bond Releases Report – This is a report on completed coal mining permits (tallies for both statewide totals and by regional office). This report includes totals for phase bond release reductions, administrative releases, total releases, and bond release denials. These tallies are further broken down into acreages and dollar amounts.

Coal Explorations Report – This report addresses coal exploration permits by type of exploration (drilling, trenching, etc.) and status of reclamation (nondisturbed, active, inactive). This report includes statewide totals and by regional office.

Inspectable Units Report – This report addresses the total number of coal mine permits – statewide or by region – and is further divided into type of permit (prep plants, surface, underground), as well as the status of the permit (nondisturbed, active, temporarily inactive, phase of reclamation, suspension, pending forfeiture).

Regional Activity Report (coal) – This report tallies – statewide and by region – the number of aerial inspections conducted, complaint investigations conducted, preliminary permit applications received, citizen-accompanied inspections, Exploration Permits received, Minor Field Revisions received, Requests for Temporary Cessation Status received, and Reclamation Deferments received during the month.

Penalties and Assessments Report (coal) – This report compiles – both statewide and by region – the number of noncompliances issued, the number of cessation orders issued, the performance standards cited, the assessments processed, open records (Freedom of Information Act) requests, the number of cases processed, and the amounts of penalties assessed and collected by the Office of Administrative Hearings. This report also includes the number of “Pattern of Violation” reviews and meetings conducted during the month, as well as the number of Agreed Orders granted.

Bond Forfeitures Report (coal) – This report tallies for both the state and the region, the number of Bonds Forfeited, including the amount of excess bonds collected, as well as the number of acres affected by the forfeiture. This report includes a year-to-date total.

Office of Surface Mining

Twenty-Third Annual Evaluation Summary Report

for the

Regulatory and Abandoned Mine Land Reclamation Programs

Administered by the Commonwealth

of

Kentucky

for

Evaluation Year 2005

(July 1, 2004, to June 30, 2005)

I. Introduction

The Surface Mining Control and Reclamation Act of 1977 (SMCRA) created the Office of Surface Mining (OSM) to oversee the implementation of and provide Federal funding for State regulatory programs that have been approved by OSM as meeting the minimum standards specified by SMCRA. This report contains summary information regarding the approved Kentucky regulatory program and the effectiveness of the program in meeting the applicable purposes of SMCRA as specified in Section 102. This report covers the period of July 1, 2004, to June 30, 2005.

Detailed background information and comprehensive reports for the program elements evaluated during the Evaluation Year (EY) are available for review and copying at the OSM Lexington Field Office (LFO).

The format for this report is established by OSM Directive REG-8. REG-8 enables OSM and states to take innovative, results-oriented evaluation approaches tailored to individual State programs and stakeholder interests and needs. During the EY, OSM and the states develop state-specific oversight plans or performance agreements to identify specific program areas and evaluation methodologies directed toward end-results measurement.

The oversight process provides two national measurements of end results: (1) the number and degree of off-site impacts resulting from mining and (2) the number of acres meeting all reclamation requirements as documented by different phases of bond release. The revised process allows OSM to focus oversight on those aspects of the State program that both OSM and the State determine to be most important.

The following list of acronyms is used in this report:

A&E	Administration and Enforcement
ACSI	Appalachian Clean Streams Initiative
AMD	Acid Mine Drainage
AML	Abandoned Mine Land
AMLIS	Abandoned Mine Land Inventory System
AMLR	Abandoned Mine Land Reclamation
BMP	Best Management Practices
CO	Cessation Order
COE	U.S. Army Corps of Engineers
CY	Calendar Year
DAML	Division of Abandoned Mine Lands

DMS	Document Management System
DNR	Department for Natural Resources
DSMRE	Department for Surface Mining Reclamation and Enforcement
eCRI	Electronic Citizens Request for Inspection
EIS	Environmental Impact Statement
eMIR	Electronic Mine Inspection Report
EPPC	Environmental and Public Protection Cabinet
EY	Evaluation Year
FBMS	Financial and Business Management System
FCR	Fine Coal Refuse
FOD	Field Office Director
FY	Fiscal Year
GIS	Geographic Information System
KAR	Kentucky Administrative Regulation
LFO	Lexington Field Office
LTT	Long-Term Treatment
MSHA	Mine Safety and Health Administration
NC	Notice of Non-Compliance
NRC	National Research Council
OMSL	Office of Mine Safety and Licensing
OSM	Office of Surface Mining
PHC	Probable Hydrologic Consequences
RA	Regulatory Authority
RAM	Reclamation Advisory Memorandum
RD	Regional Director
SMCRA	Surface Mining Control and Reclamation Act of 1977
SMIS	Surface Mining Information System
SOAP	Small Operator Assistance Program
TDN	Ten-Day Notice
UK	University of Kentucky
USFWS	U.S. Fish and Wildlife Service

DEPARTMENT FOR NATURAL RESOURCES

DIVISION OF MINE PERMITS

Division Description: The Division of Mine Permits provides permitting, regulation and oversight of surface coal mining activities.

Division Director: Paul Ehret

Telephone: 502-564-2320

Web site: <http://www.minepermits.ky.gov/>

One Report:

Twenty-Third Annual Evaluation Summary Report for the Regulatory and Abandoned Mine Land Reclamation Programs

[EQC Note: This report is published by the Federal Office of Surface Mining]

(<http://www.osmre.gov/oversight/kentucky2005.pdf>)

Office of Surface Mining

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CY	Calendar Year
DAML	Division of Abandoned Mine Lands

DMS	Document Management System
DNR	Department for Natural Resources
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eCRI	Electronic Citizens Request for Inspection
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SOAP	Small Operator Assistance Program
TDN	Ten-Day Notice
UK	University of Kentucky
USFWS	U.S. Fish and Wildlife Service

DEPARTMENT FOR NATURAL RESOURCES

DIVISION OF ABANDONED MINE LANDS

Division Description: The Division of Abandoned Mine Lands protects the public from health and safety problems caused by mining prior to 1982.

Division Director: Steve Hohmann

Telephone: 502-564-2141

Web site: <http://www.aml.ky.gov/>

One Report:

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Office of Surface Mining

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UK	University of Kentucky
USFWS	U.S. Fish and Wildlife Service

DEPARTMENT FOR NATURAL RESOURCES

DIVISION OF OIL AND GAS CONSERVATION

Division Description: The Division of Oil and Gas Conservation provides permitting, regulation and oversight of oil & gas production.

Program Highlight: This division administers a plugging program initiated in 1984 to plug abandoned oil and gas wells in Kentucky. The agency reached a milestone with the plugging of the 3,000th abandoned well in 2006. Abandoned wells are identified by the agency's inspectors and prioritized based on potential environmental and safety hazards to the general public. Funding for the program is generated entirely from bond forfeitures for violations and noncompliance of oil and gas well operators. This allows for the agency to remove potential hazards from the environment and public without any costs to the citizens of the commonwealth.

Division Director: Rick Bender

Telephone: 502-573-0147

Web site: <http://www.dogc.ky.gov>

No Reports Within the Past Two Years

DEPARTMENT FOR NATURAL RESOURCES

OFFICE OF MINE SAFETY AND LICENSING

Office Description: The Office of Mine Safety and Licensing ensures that all coal mines in the commonwealth are provided with a safe working environment, providing effective education and training to coal miners to foster safe work practices and ensuring that mine safety laws are enforced fairly and consistently throughout the commonwealth.

Division Director: Johnny Greene

Telephone: 502-573-0140

Web site: <http://www.omsl.ky.gov/>

One Report:

2004 Annual Report

(<http://www.omsl.ky.gov/NR/rdonlyres/E2860A3F-D60E-49DA-ACF9-A1E50ABD6C10/0/2004ARfromweb.pdf>)

2004 ANNUAL REPORT ABSTRACT

The Office of Mine Safety and Licensing Annual Report is published based on a calendar year. Mines licensed in a given year are reported the following year. The report primarily consists of a listing of licensed coal companies/mines sorted by district, county, mine type, company, and mine. The listing includes the coal seam mined, tonnage reported, employee count as well as the number of serious accidents and fatalities. Many other details, charts and tables are included in the final versions of the report. The print copy of the report book includes photographs.

Note: This report was previously known as the Kentucky Department of Mines & Minerals Annual Report first published in 1884.

Office of Mine Safety and Licensing

Annual Report

Year 2004

Company	Mine	Operator	State File No.	Location	Tonnage	Men Emphyd	Days Wrkcd	Seam Name	Seam Hgt
Barbourville District									
CLAY County									
AUGER-SURFACE TRUCK COAL									
CHAS COAL LLC	CHAS 8 HWM	CHARLIE COLLINS	A 18446-3	LICK FORK	21,917	22	65	HAZARD NO 9	32
DAVIS BEND COAL CO LLC	2	SANDRA GRUBB	A 18578	URBAN FORK	319	4	11	HAZARD NO 8	39
DAVIS BEND COAL CO LLC	3	SANDRA GRUBB	A 18508	URBAN FORK CREEK	464	4	13	MANCHESTER	30
J & L MINING & STRIPPING INC	1	JAMES E PARSONS	A 18452-2	MILL BRANCH	23,000 *	6	170	HAZARD NO 5A	30
J R MINING INC	GRAYS FORK	EARL REED JR	14834-14	GRAYS FORK	2,907	4	72	HAZARD NO 4	28
REID & SONS CONSTRUCTION	BEECH CREEK JOB	BRENT E REED	A 18445-4	BEECH CREEK	0	2	5	HORSE CREEK	21
REID & SONS CONSTRUCTION	GABBARD FORK 1	WAYNE M REID	A 18445-2	GABBARD FORK	2,400	3	100	BLUE GEM	18
SAND HILL ENERGY INC	Y-HOLLOW DEV PROP JOB	LARRY W CAMPBELL	17897-12	GOOSE CREEK	7,328	5	70	HORSE CREEK	48
WAR EAGLE COAL CO INC	VERNON SPURLOCK 2	JEFF CLINE	A 18578	URBAN FORK	4,014	4	60	MANCHESTER	10
SURFACE TRUCK COAL									
J R MINING INC	ROCKY BRANCH	EARL REED JR	A 14834-13	ROCKY BRANCH	12,285	3	60	JELLICO	24
SAND HILL ENERGY INC	SAND HILL	LARRY W CAMPBELL	A 17897-10	BOOTS BRANCH	20,296	5	190	HADDIX	66
UNDERGROUND TRUCK COAL									
FREE DOME COAL INC	4	JIMMY ROOT	A 18472	LICK FORK	9,000	24	30	HAZARD NO 8	39
REBCO COAL INC	3	ROY C WAGNER	A 18472	LICK FORK	2,385	11	65	HAZARD NO 8	39
UNDERGROUND TRUCK COAL Totals					11,385	35			
JACKSON County									
SURFACE TRUCK COAL									
J R MINING INC	GRAY HAWK	EARL REED JR	A 14834-12	LITTLE WILD DOG	21,540	5	120	MANCHESTER	18
CLAY County Totals									
Underground					11,385	35			
Surface					94,930	62			
Totals					106,315	97			

INDEPENDENT COMMISSIONS

ENVIRONMENTAL QUALITY COMMISSION

Commission Description: The Environmental Quality Commission works to strengthen the public role in solving environmental problems in our communities and the state.

The Kentucky Environmental Quality Commission is a seven-member citizen board created under state law with a mission to:

- Facilitate public discussion and resolution of environmental issues.
 - Monitor and report on environmental trends and conditions.
- Promote partnerships to improve and protect the environment for future generations.
- Serve as an advisory board to state officials on environmental matters.

Executive Director: Jo Hargis

Telephone: 502-564-2150

Web site: <http://www.eqc.ky.gov/>

No Reports Within the Past Two Years

INDEPENDENT COMMISSIONS
KENTUCKY STATE NATURE PRESERVES COMMISSION

Commission Description: The Kentucky State Nature Preserves Commission protects Kentucky's natural heritage by identifying, acquiring and managing natural areas that represent the best known occurrences of rare native species, natural communities and significant natural features in a statewide nature preserve system; works with others to protect biological diversity; and educates Kentuckians as to the value and purpose of nature preserves and biodiversity conservation.

Director: Don Dott

Telephone: 502-573-2886

Web site: <http://www.naturepreserves.ky.gov/>

Six Reports:

***Kentucky State Nature Preserves Commission Biennial Report
January 2005***

http://www.naturepreserves.ky.gov/NR/rdonlyres/988BDB10-89F5-4B1A-A9C1-1489017A6433/0/05KSNPC_BiennialReport.pdf

***County Report of Endangered, Threatened and Special Concern
Plants, Animals and Natural Communities of Kentucky***

<http://www.naturepreserves.ky.gov/NR/rdonlyres/91E0A271-E42F-45E1-B8D8-741D45366EB2/0/CountyList2006.pdf>

***Kentucky State Nature Preserves Commission Report on Kentucky's
Native Flora - Status and Trends of Rare Plants***

<http://www.naturepreserves.ky.gov/NR/rdonlyres/116D1E53-29F8-4E29-8B2C-59BE6AC50648/0/KYRarePlantReport2006.pdf>

INDEPENDENT COMMISSIONS
KENTUCKY STATE NATURE PRESERVES COMMISSION

Six Reports (continued):

Rare and Extirpated Biota of Kentucky

<http://www.naturepreserves.ky.gov/NR/rdonlyres/C3056FC3-0435-4126-9A2E-6C9AE0D40291/0/ets2005.pdf>

Ecological Communities of Kentucky

<http://www.naturepreserves.ky.gov/NR/rdonlyres/A90F0696-194D-49CE-81F5-93F2D0CD41DA/0/EcologicalCommunitiesofKentucky.pdf>

***County Report of Endangered, Threatened and Special Concern
Plants, Animals and Natural Communities of Kentucky***

[EQC Note: This report includes habitat descriptions]

<http://www.naturepreserves.ky.gov/NR/rdonlyres/3AFAC9F5-55CC-44F2-98E3-B83E617E4C4C/0/CountyListHabitat2006.pdf>

KENTUCKY STATE NATURE PRESERVES COMMISSION

BIENNIAL REPORT

January 2005



**Biennial Report
of the
Kentucky State Nature Preserves Commission
January 2005**

INTRODUCTION

This is the 15th biennial report submitted to the Governor and the General Assembly as required by KRS 146.410 et seq., the Kentucky State Nature Preserves Act, or simply the “Act.” The Kentucky State Nature Preserves Commission was created in 1976.

It is the mission of the Kentucky State Nature Preserves Commission to protect Kentucky’s natural heritage by:

1. Identifying, acquiring, and managing natural areas that represent the best known natural occurrences of rare native species, natural communities, and significant natural features in a statewide nature preserves system.
2. Working with others to protect biological diversity.
3. Educating Kentuckians as to the value and purpose of nature preserves and biodiversity preservation.

The Commission is composed of five citizen members selected by the Governor, two at-large members and one member appointed from each of three groups: the Kentucky Farm Bureau Association, the State Association of Soil Conservation Districts and the National Farmers Organization. The current commissioners are: Mrs. Clara Wheatley, Chairperson (National Farmers Organization), Mr. David Wright (at-large), Mr. O. D. Hawkins (Kentucky Farm Bureau Association), Mrs. Gayle Horn (State Association of Soil Conservation Districts), and Dr. Eunice Johnson, M.D. (at-large). The executive director is Donald S. Dott, Jr. The Commission staff consists of 22 full-time positions and one permanent part-time position. Interim positions are used when funding is available to perform seasonal support work such as biological inventory and nature preserve maintenance or stewardship.

The Commission has adopted a vision statement for our long-term future:

“The people of Kentucky recognize, appreciate, endorse, and actively support biodiversity conservation, including the acquisition and maintenance of a state nature preserve system that represents the best possible examples of native biological diversity and significant natural features within the Commonwealth.”

**COUNTY REPORT
OF
ENDANGERED, THREATENED, AND SPECIAL CONCERN
PLANTS, ANIMALS, AND NATURAL COMMUNITIES
OF
KENTUCKY**

**KENTUCKY STATE NATURE
PRESERVES COMMISSION
801 SCHENKEL LANE
FRANKFORT, KY 40601
(502) 573-2886 (phone)
(502) 573-2355 (fax)**

www.naturepreserves.ky.gov

Kentucky State Nature Preserves Commission

Key for County List Report

Within a county, elements are arranged first by taxonomic complexity (plants first, natural communities last), and second by scientific name. A key to status, ranks, and count data fields follows.

STATUS

KSNPC: Kentucky State Nature Preserves Commission status:

N or blank = none E = endangered T = threatened S = special concern H = historic X = extirpated

USESA: U.S. Fish and Wildlife Service status:

blank = none C = candidate LT = listed as threatened LE = listed as endangered
SOMC = Species of Management Concern

RANKS

GRANK: Estimate of element abundance on a global scale:

G1 = Critically imperiled GU = Unrankable
G2 = Imperiled G#? = Inexact rank (e.g. G2?)
G3 = Vulnerable G#Q = Questionable taxonomy
G4 = Apparently secure G#T# = Infrspecific taxa (Subspecies and variety abundances are coded with a 'T' suffix; the 'G' portion of the rank then refers to the entire species)
G5 = Secure
GH = Historic, possibly extinct GNR = Unranked
GX = Presumed extinct GNA = Not applicable

SRANK: Estimate of element abundance in Kentucky:

S1 = Critically imperiled SU = Unrankable
S2 = Imperiled S#? = Inexact rank (e.g. G2?)
S3 = Vulnerable S#Q = Questionable taxonomy
S4 = Apparently secure S#T# = Infrspecific taxa
S5 = Secure SNR = Unranked
SH = Historic, possibly extirpated SNA = Not applicable
SX = Presumed extirpated

Migratory species may have separate ranks for different population segments (e.g. S1B, S2N, S4M):
S#B = Rank of breeding population
S#N = Rank of non-breeding population
S#M = Rank of transient population

COUNT DATA FIELDS

OF OCCURRENCES: Number of occurrences of a particular element from a county. Column headings are as follows:

E - currently reported from the county
H - reported from the county but not seen for at least 20 years
F - reported from county & cannot be relocated but for which further inventory is needed
X - known to be extirpated from the county
U - reported from a county but cannot be mapped to a quadrangle or exact location.

The data from which the county report is generated is continually updated. The date on which the report was created is in the report footer. Contact KSNPC for a current copy of the report.

Please note that the quantity and quality of data collected by the Kentucky Natural Heritage Program are dependent on the research and observations of many individuals and organizations. In most cases, this information is not the result of comprehensive or site-specific field surveys; many natural areas in Kentucky have never been thoroughly surveyed, and new species of plants and animals are still being discovered. For these reasons, the Kentucky Natural Heritage Program cannot provide a definitive statement on the presence, absence, or condition of biological elements in any part of Kentucky. Heritage reports summarize the existing information known to the Kentucky Natural Heritage Program at the time of the request regarding the biological elements or locations in question. They should never be regarded as final statements on the elements or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments.

KSNPC appreciates the submission of any endangered species data for Kentucky from field observations. For information on data reporting or other data services provided by KSNPC, please contact the Data Manager at:

Kentucky State Nature Preserves Commission
801 Schenkel Lane
Frankfort, KY 40601
phone: (502) 573-2886
fax: (502) 573-2355
email: naturepreserves@ky.gov
internet: www.naturepreserves.ky.gov

County Report of Endangered, Threatened, and Special Concern Plants, Animals, and Natural Communities of Kentucky
 Kentucky State Nature Preserves Commission

County	Taxonomic Group	Scientific name	Common name	Statuses	Ranks	# of Occurrences				
						E	H	F	X	U
Adair	Vascular Plants	<i>Acer spicatum</i>	Mountain Maple	E/	G5/S1S2	0	1	0	0	0
Adair	Vascular Plants	<i>Aureolaria patula</i>	Spreading False Foxglove	S/	G3/S3	2	0	0	0	0
Adair	Vascular Plants	<i>Elymus svensonii</i>	Svenson's Wildrye	S/ SOMC	G3/S3	1	0	0	0	0
Adair	Vascular Plants	<i>Helianthus eggertii</i>	Eggert's Sunflower	T/	G3/S2	1	0	0	0	0
Adair	Vascular Plants	<i>Heteranthera dubia</i>	Grassleaf Mud-plantain	S/	G5/S3	0	0	1	0	0
Adair	Vascular Plants	<i>Lespedeza capitata</i>	Round-head Bush-clover	S/	G5/S3	1	0	0	0	0
Adair	Vascular Plants	<i>Matelea carolinensis</i>	Carolina Anglepod	E/	G4/S1?	0	0	1	0	0
Adair	Vascular Plants	<i>Parnassia grandifolia</i>	Large-leaved Grass-of-parnassus	E/	G3/S1	0	0	0	1	0
Adair	Vascular Plants	<i>Ulmus serotina</i>	September Elm	S/	G4/S3	2	0	0	0	0
Adair	Freshwater Mussels	<i>Epioblasma capsaeformis</i>	Oyster Mussel	E/LE	G1/S1	0	0	0	1	0
Adair	Freshwater Mussels	<i>Epioblasma triquetra</i>	Snuffbox	E/ SOMC	G3/S1	0	0	0	1	0
Adair	Freshwater Mussels	<i>Fusconaia subrotunda subrotunda</i>	Longsolid	S/	G3T3/S3	0	0	0	1	0
Adair	Freshwater Mussels	<i>Lampsilis ovata</i>	Pocketbook	E/	G5/S1	0	0	0	1	0
Adair	Freshwater Mussels	<i>Plethobasus cyphus</i>	Sheepnose	E/C	G3/S1	0	0	0	1	0
Adair	Freshwater Mussels	<i>Quadrula cylindrica cylindrica</i>	Rabbitsfoot	T/ SOMC	G3T3/S2	1	0	0	0	0
Adair	Freshwater Mussels	<i>Toxolasma lividus</i>	Purple Lilliput	E/ SOMC	G2/S1	1	0	0	0	0
Adair	Freshwater Mussels	<i>Villosa ilenosa</i>	Little Spectaclecase	S/	G5/S3S4	2	0	1	0	0
Adair	Freshwater Mussels	<i>Villosa ortmanni</i>	Kentucky Creekshell	T/ SOMC	G2/S2	4	0	0	0	0
Adair	Freshwater Mussels	<i>Villosa trabalis</i>	Cumberland Bean	E/LE	G1/S1	0	0	0	1	0
Adair	Crustaceans	<i>Barbicambarus cornutus</i>	Bottlebrush Crayfish	S/	G3G4/S2	4	0	0	0	0
Adair	Diplopods	<i>Pseudotremia merops</i>	A Cave Obligate Milliped	T/	G1/S1S2	0	1	0	0	0
Adair	Insects	<i>Allocapnia cunninghami</i>	A Capniid Stonefly	T/	G1/S1S2	0	1	0	0	0
Adair	Fishes	<i>Erimystax insignis</i>	Blotched Chub	E/ SOMC	G3G4/S1	0	1	0	0	0
Adair	Fishes	<i>Etheostoma maculatum</i>	Spotted Darter	T/ SOMC	G2/S2	2	1	0	0	0
Adair	Fishes	<i>Ichthyomyzon greeleyi</i>	Mountain Brook Lamprey	T/	G3G4/S2	1	0	0	0	0
Adair	Fishes	<i>Percina macrocephala</i>	Longhead Darter	E/ SOMC	G3/S1	4	1	0	0	0
Adair	Fishes	<i>Phenacobius uranops</i>	Stargazing Minnow	S/	G4/S2S3	2	1	0	0	0
Adair	Amphibians	<i>Cryptobranchius alleghaniensis alleghaniensis</i>	Eastern Hellbender	S/ SOMC	G3G4T3T4/S3	4	0	0	0	0
Adair	Breeding Birds	<i>Accipiter striatus</i>	Sharp-shinned Hawk	S/	G5/S3B,S4N	1	0	0	0	0
Adair	Mammals	<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat	S/ SOMC	G3G4/S3	1	0	0	0	0
Adair	Mammals	<i>Myotis grisescens</i>	Gray Myotis	T/LE	G3/S2	3	1	0	1	0
Adair	Mammals	<i>Myotis sodalis</i>	Indiana Bat	E/LE	G2/S1S2	0	1	0	0	0
Adair	Mammals	<i>Nycticeius humeralis</i>	Evening Bat	S/	G5/S3	1	0	0	0	0
Adair	Communities	<i>Calcareous mesophytic forest</i>		N/	GNR/S5	1	0	0	0	0
Adair County Total:						39	17	3	8	0
Allen	Vascular Plants	<i>Hydrocotyle americana</i>	American Water-pennywort	E/	G5/S1	1	0	0	0	0

Kentucky State Nature Preserves Commission
Report on
Kentucky's Native Flora -
Status and Trends of Rare Plants

Submitted to
Governor Ernie Fletcher and
2006 Kentucky Legislature

Kentucky Ladyslipper (Cypripedium kentuckiense)



The General Assembly finds and declares that it is the policy of the Commonwealth to recognize endangered and threatened species of plants for human enjoyment, for scientific purposes, and to ensure their perpetuation as viable components of their ecosystems for the benefit of the people of Kentucky. ~~~ Kentucky Rare Plant Recognition Act. KRS146.600

The 1994 Kentucky General Assembly passed the Kentucky Rare Plant Recognition Act (KRS 146.600 ~ 146.619) recognizing the importance of rare plants to our natural heritage and ensuring their perpetuation as viable components of their ecosystems (Appendix A). This report is required every four years pursuant to KRS 146.610(4). As the responsible agency for activities outlined in the Act, the Kentucky State Nature Preserves Commission (KSNPC) provides information to Governor Fletcher and the 2006 Kentucky General Assembly on the conditions and needs of Kentucky's rare plants. It includes information on the status of rare plants and the program focused on their protection and provides recommendations that address extinction and decline in rare plants and the conservation of the state's native flora.

KSNPC promulgated regulations in 2002 (400 KAR 3:010 to 3:040) to create lists of endangered and threatened plant species and the mechanisms by which plants may be added and removed from the lists (Appendix B). KSNPC will promulgate amendments to these lists every four years; a proposed amendment will be submitted in 2006. Dissemination of this information will hopefully be used to preserve these plants. The Act itself, and the regulations, do not create any obligation on the part of the landowner to protect the rare plants on these lists.

Status of Kentucky's Rare and Native Plant Flora

Of the 2,030 native plants reported from Kentucky, 275 are listed under 400 KAR 3:010 to 3:040. Of these endangered and threatened plants, 117 have at least one population on natural lands that are managed primarily for natural resource protection¹ (i.e. state nature preserves). Only 60 listed plants have more than one occurrence protected (and the vast majority of these

¹ This also includes lands such as national parks that are specifically established to protect the natural features of the site; these lands are not designated for multiple use.

have only two). One or a few protected occurrences for these plants is far short of what is needed to ensure that they can sustain themselves in the Kentucky landscape. National guidelines suggest about 100 populations of a plant are needed to consider it secure²; a lesser number may be considered if there are stable populations on natural areas dedicated to its protection and management.

Of the 275 plants listed as endangered and threatened, 61 have not been seen in Kentucky for 20 or more years. This generally provides evidence that rare plants are disappearing from our flora and could be indicative of a trend toward extinction. However, the lack of botanical inventories and a sustained monitoring program may account for some of the missing species. Another 56 are listed as special concern under a state list produced by

KSNPC and many more that are considered candidates for listing need to be assessed. KSNPC needs additional staff to complete this work.

Primary threats to rare plants are: 1) habitat destruction and land development that fragments the natural landscape; 2) invasive exotic plants; and 3) disruption of ecosystem functions such as suppression of natural fire and damming of rivers and streams. Considering the changing patterns of development and resource use in Kentucky, it is clear that natural areas

Values of Native Plants to Kentuckians

Our native flora is an important natural resource that should be utilized to support other important aspects of Kentucky life.

- ❖ **Recreation Industry** –Unique rare plants and native flora are important to Kentucky’s appeal as an ecotourism destination
- ❖ **Heritage** – Kentucky is proud of its natural heritage and native plants are integral in maintaining these ties to our state
- ❖ **Research** - Well over 40% of the drugs we use today are derived from native plants
- ❖ **Environmental Stability** - Rare plants are excellent indicators of state of the environment and the flora as a whole is essential for environmental stability
- ❖ **Health** - Not only do people need green space around them, they need space that is diverse and beautiful. And, they need places for relief from everyday stress.
- ❖ **Legacy** - Can we ethically permit a situation that does not leave Kentucky lady’s-slipper for the next generation to see? It is an obligation that state government needs to take more seriously.

²This standard methodology is used to assess the status of rare plants and animals by state heritage programs in all fifty states.

are being degraded and converted for other uses. It follows that the native flora is also declining in diversity and that the rare plants will be the first to disappear, simply because their low population numbers make them acutely vulnerable.

Kentucky State Nature Preserves Commission Rare Plant Program

KSNPC functions as a clearinghouse for information on Kentucky's rare flora as well as the native flora as a whole, and issues relating to the protection of native plants. A botanical database maintained by KSNPC (part of the Kentucky Natural Heritage Database) has been developed and is actively maintained with information from many sources (herbaria, literature, government reports and field botanists). From this information, and with input from other botanists, KSNPC develops the regulatory list of state rare plants. The database is an intensive effort that records specific locations of rare plant populations and their quality and is essential in developing science-based strategies for the protection of the flora.

Commission botanists and information specialists provide technical assistance to state and federal agencies and private landowners in assessing impacts to and developing protection strategies for rare plant populations. KSNPC is the only agency in state government that has employees working specifically on this issue.

KSNPC has two permanent full-time botanists. The KSNPC botany program is partially funded through a limited cooperative agreement with the U. S. Fish and Wildlife Service. This federal program provides funds (an average of about \$25,000 per year) for species field inventories, population monitoring, site protection and restoration, and public education. However, these activities are focused mainly on the eight federally listed plants in Kentucky. Work completed in 2005 through this program regionwide resulted in removal of one federally listed plant, Eggert's sunflower. This funding, while an asset, may not be used to address state-listed species that are not on the federal list. KSNPC supplements the limited federal funding for the rare plant program by conducting general floristic surveys and other studies through contracts with other government agencies. Again, these funds are helpful, but result in staff botanists distracted from focusing on the protection of state-listed plants. Additional funding is needed to address the decline and loss of species in the Kentucky flora.

Ecological Communities of Kentucky

The Kentucky State Nature Preserves Commission monitors exemplary occurrences of the following ecological communities. Exemplary ecological communities are relatively undisturbed or have recovered sufficiently from previous disturbances and have the flora and fauna that represents, to the best of our knowledge, the ecological communities that existed in Kentucky at the time of European colonization. This list was last updated January 2006.

For additional information about these communities, please contact Marc Evans – marc.evans@ky.gov.

Lacustrine Communities:

- Floodplain lake

Palustrine Communities:

- Acid seep
- Alluvial forest
- Appalachian acid seep
- Bottomland hardwood forest
- Bottomland hardwood swamp
- Bottomland marsh
- Calcareous seep
- Coastal plain slough
- Cretaceous hills forested acid seep
- Cypress swamp
- Depression swamp
- Floodplain ridge/terrace forest
- Floodplain slough
- Riparian forest
- Shrub swamp
- Sinkhole/depression marsh
- Sinkhole/depression pond
- Wet prairie

Riverine Communities:

- Cumberland Plateau gravel/cobble bar
- Mud flat
- Sand bar
- Typic gravel/cobble bar

Terrestrial Communities:

- Acidic mesophytic forest
- Acidic sub-xeric forest
- Appalachian mesophytic forest
- Appalachian pine-oak forest
- Appalachian sub-xeric forest
- Bluegrass mesophytic cane forest
- Bluegrass savanna-woodland
- Calcareous mesophytic forest
- Calcareous sub-xeric forest
- Coastal plain mesophytic cane forest
- Cumberland highlands forest
- Cumberland Mountains xeric pine woodland
- Cumberland Plateau sandstone glade
- Deep soil mesophytic forest
- Dolomite glade
- Dry limestone cliff
- Dry sandstone cliff
- Hemlock-mixed forest
- Knobs shale barrens
- Limestone barrens
- Limestone flat rock glade
- Limestone prairie
- Limestone slope glade
- Moist limestone cliff
- Moist sandstone cliff
- Pine savanna-woodland
- Red Cedar-oak forest
- Sandstone barrens
- Sandstone prairie
- Shawnee hills sandstone glade
- Siltstone/shale glade
- Tallgrass prairie
- Virginia pine forest
- Xeric acidic forest
- Xeric calcareous forest
- Xerohydric flatwood

**COUNTY REPORT
OF
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**KENTUCKY STATE NATURE
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801 SCHENKEL LANE
FRANKFORT, KY 40601
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www.naturepreserves.ky.gov

Kentucky State Nature Preserves Commission

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Within a county, elements are arranged first by taxonomic complexity (plants first, natural communities last), and second by scientific name. A key to status, ranks, and count data fields follows.

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blank = none C = candidate LT = listed as threatened LE = listed as endangered
SOMC = Species of Management Concern

RANKS

GRANK: Estimate of element abundance on a global scale:

G1 = Critically imperiled GU = Unrankable
G2 = Imperiled G#? = Inexact rank (e.g. G2?)
G3 = Vulnerable G#Q = Questionable taxonomy
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Migratory species may have separate ranks for different population segments (e.g. S1B, S2N, S4M):
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COUNT DATA FIELDS

OF OCCURRENCES: Number of occurrences of a particular element from a county. Column headings are as follows:

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F - reported from county & cannot be relocated but for which further inventory is needed
X - known to be extirpated from the county
U - reported from a county but cannot be mapped to a quadrangle or exact location.

* Due to size considerations, habitat description has been restricted to display only two lines. For further details, please see the *Report of Monitored Species and Communities of Kentucky with Habitat and Numbers of Occurrences by EORank Included*.

The data from which the county report is generated is continually updated. The date on which the report was created is in the report footer. Contact KSNPC for a current copy of the report.

Please note that the quantity and quality of data collected by the Kentucky Natural Heritage Program are dependent on the research and observations of many individuals and organizations. In most cases, this information is not the result of comprehensive or site-specific field surveys; many natural areas in Kentucky have never been thoroughly surveyed, and new species of plants and animals are still being discovered. For these reasons, the Kentucky Natural Heritage Program cannot provide a definitive statement on the presence, absence, or condition of biological elements in any part of Kentucky. Heritage reports summarize the existing information known to the Kentucky Natural Heritage Program at the time of the request regarding the biological elements or locations in question. They should never be regarded as final statements on the elements or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments.

KSNPC appreciates the submission of any endangered species data for Kentucky from field observations. For information on data reporting or other data services provided by KSNPC, please contact the Data Manager at:

Kentucky State Nature Preserves Commission
801 Schenkel Lane
Frankfort, KY 40601
phone: (502) 573-2886
fax: (502) 573-2355
email: naturepreserves@ky.gov
internet: www.naturepreserves.ky.gov

County Report of Endangered, Threatened, and Special Concern Plants, Animals, and Natural Communities of Kentucky
 Kentucky State Nature Preserves Commission

County	Taxonomic Group	Scientific name	Common name	Statuses	Ranks	# of Occurrences				
						E	H	F	X	U
Adair	Vascular Plants	<i>Acer spicatum</i>	Mountain Maple	E /	G5 / S1S2	0	1	0	0	0
		Cool, moist, mesic woods. often associated with cool air drainages from caves, or at high elevations; periglacial boulderfields (Weakley 1998).								
Adair	Vascular Plants	<i>Aureolaria patula</i>	Spreading False Foxglove	S /	G3 / S3	2	0	0	0	0
		WOODS (GLEASON & CRONQUIST 1991); OPENINGS ALONG LIMESTONE RIVER BLUFFS.								
Adair	Vascular Plants	<i>Elymus svensonii</i>	Svenson's Wildrye	S / SOMC	G3 / S3	1	0	0	0	0
		XERIC ROCKY OPEN OR WOODED BLUFFS ALONG KY AND DIX RIVERS AND TRIBUTARIES.								
Adair	Vascular Plants	<i>Helianthus eggertii</i>	Eggert's Sunflower	T /	G3 / S2	1	0	0	0	0
		Open oak hickory forest on the highland rim in KY; rocky hills and barrens and roadside remnants of this habitat.								
Adair	Vascular Plants	<i>Lespedeza capitata</i>	Round-head Bush-clover	S /	G5 / S3	1	0	0	0	0
		PRAIRIE PATCHES ON LIMESTONE.								
Adair	Vascular Plants	<i>Parnassia grandifolia</i>	Large-leaved Grass-of-parmassus	E /	G3 / S1	0	0	0	1	0
		Wet calcareous soil in the mountains (Gleason & Cronquist 1991); herbaceous seepage areas.								
Adair	Vascular Plants	<i>Ulmus serotina</i>	September Elm	S /	G4 / S3	2	0	0	0	0
		UPLAND TO BOTTOMLAND LIMESTONE WOODS, ALLUVIAL TERRACES.								
Adair	Freshwater Mussels	<i>Epioblasma triquetra</i>	Snuffbox	E / SOMC	G3 / S1	0	0	0	1	0
		Occurs in medium-sized streams to large rivers generally on mud, rocky, gravel, or sand substrates in flowing water (Baker 1928, Buchanan 1980, Johnson 1978, Murray and Leonard 1962, Parmalee 1967). Often deeply buried in substrate and overlooked by collectors.								
Adair	Freshwater Mussels	<i>Lampsilis ovata</i>	Pocketbook	E /	G5 / S1	0	0	0	1	0
		Considered a large river species (Clench and Van Der Schalie 1944, Parmalee 1967, Stansbery 1976), but occurs in medium-sized streams in gravel, sand, or even mud (Parmalee 1967, Johnson 1970, Gordon and Layzer 1989). In the Lower Wabash and Ohio Rivers specimens were taken in deep water (6-10 feet or more) in current from sand or gravel.								
Adair	Freshwater Mussels	<i>Plethobasus cyphus</i>	Sheepnose	E / C	G3 / S1	0	0	0	1	0
		Usually found in large rivers in current on mud, sand, or gravel bottoms at depth of 1-2 meters or more (Baker 1928, Parmalee 1967, Gordon and Layzer 1989).								
Adair	Freshwater Mussels	<i>Quadrula cylindrica cylindrica</i>	Rabbitfoot	T / SOMC	G3T3 / S2	1	0	0	0	0
		SMALL TO LARGE RIVERS WITH SAND, GRAVEL, AND COBBLE AND MODERATE TO SWIFT CURRENT, SOMETIMES IN DEEP WATER (PARMALEE 1967, BOGAN AND PARMALEE 1983).								
Adair	Freshwater Mussels	<i>Toxolasma lividus</i>	Purple Lilliput	E / SOMC	G2 / S1	1	0	0	0	0
		SMALL TO MEDIUM-SIZED STREAMS (GOODRICH AND VAN DER SCHALIE 1944, PARMALEE 1967, STANSBERY 1976, LAURITSEN 1987), PARMALEE (1967) REPORTED ITS OCCURRENCE ON MUD BUT RELATED THAT SAND OR FINE GRAVEL BEDS IN SHALLOW RUNNING WATER WAS THE PREFERRED HABITAT.								
Adair	Freshwater Mussels	<i>Villosa lienosa</i>	Little Spectaclecase	S /	G5 / S3S4	2	1	1	0	0
		INHABITS SMALL TO MEDIUM-SIZED RIVERS, USUALLY IN SHALLOW WATER ON A SAND/MUD/DETRITUS BOTTOM (PARMALEE 1967, GORDON AND LAYZER 1989).								
Adair	Freshwater Mussels	<i>Villosa ortmanni</i>	Kentucky Creekshell	T / SOMC	G2 / S2	4	0	0	0	0
		Free-flowing, upland rivers that range in size from small (1st order) spring fed streams to the Green River (Cicerello 1994). Many flow permanently, but others sometimes have no flow. Substrates range from cobble and boulder with mixed gravel and sand over bedrock to clayey-mud. Depths range from less than 6 inches to more than 2 meters.								
Adair	Freshwater Mussels	<i>Villosa trabalis</i>	Cumberland Bean	E / LE	G1 / S1	0	0	0	1	0
		SAND OR GRAVEL IN SMALL TO MEDIUM-SIZED STREAMS WITH SLOW TO MODERATE CURRENT, BUT ALSO HISTORICALLY KNOWN FROM BARS IN THE MAINSTREAM CUMBERLAND RIVER (CLARKE 1981, BOGAN AND PARMALEE 1983).								
Adair	Crustaceans	<i>Barbicambarus cornutus</i>	Bottlebrush Crayfish	S /	G3G4 / S2	4	0	0	0	0
		LIVES UNDER OR NEAR LARGE, FLAT COBBLES OR BOULDERS IN STREAMS.								

INDEPENDENT COMMISSIONS
KENTUCKY HERITAGE LAND CONSERVATION FUND

Fund Description: The Kentucky Heritage Land Conservation Fund was established in 1994 to provide funding for preserving and conserving natural areas that possess unique features.

Fund Board Chairman: Dr. William H. Martin

Telephone: 502-573-3080

Web site: <http://www.dnr.ky.gov/heritageland/>

One Report:

2006 Annual Report

<http://www.dnr.ky.gov/NR/rdonlyres/248702F0-9559-4628-B1E6-922DA316F01B/0/2006AnnualReportwithCover.pdf>



Kentucky Heritage Land Conservation Fund Board

Annual Report
July 1, 2005 - June 30, 2006



MISSION

The Kentucky Heritage Land Conservation Fund (KHLCF) was established by the 1994 Kentucky Legislature and is administered by a 12-member board. The board's mission is to award funding for the purchase and preservation of selected natural areas in the Commonwealth; to protect rare and endangered species and migratory birds; to save threatened areas of natural importance, and to provide natural areas for public use, outdoor recreation and education.

The fund is supported by the state portion of the unmined minerals tax, environmental fines, the \$10 additional fee to purchase a Kentucky nature license plate and interest on the fund's assets.

The board can award grants to acquire and protect areas of natural significance. Grants can be awarded to local governments, state colleges and universities and specified state agencies.

ELIGIBILITY CRITERIA

Applicants for KHLCF grants are required to provide documentation that explains how a proposed acquisition will meet one or more of these priorities:

1. Natural areas that possess unique features such as a habitat for rare and endangered species;
2. Areas important to migratory birds;
3. Areas that perform important natural functions that are subject to alteration or loss; and
4. Areas to be preserved in their natural state for public use, outdoor recreation and education.

Applications must also include: (1) an enumeration of costs, (2) a budget that indicates how at least 10 percent of acquisition costs will be spent for management and (3) a preliminary resource management plan for the project. During fiscal year 2006, the Kentucky Heritage Land Conservation Fund Board held four regularly scheduled quarterly meetings to consider applications for funding.

SUMMARY OF ACTIVITIES

This has been another eventful year for the Kentucky Heritage Land Conservation Fund Board (KHLCFB). The board reviewed numerous applications and approved 16 projects in 15 counties in fiscal year 2006. Since the first awards were made in October 1995, the board has approved 148 projects in 61 counties.

This year, local government projects were approved in Boone, Fleming, Green, Letcher, Metcalfe Powell and Pulaski counties; state agency projects were approved in Barren, Bullitt, Carter, Christian, Hickman, LaRue, Laurel and Monroe counties.

Nearly 1,700 acres of natural areas and wildlife habitat were purchased or protected with Heritage Land funds during fiscal year 2006. Purchases were made on eight projects, including additional acreage at Blanton Forest and another tract along the Green River. A complete list of properties pur-

chased or protected in FY 2006 is at the end of this summary.

More than 25,700 acres involving 94 projects have been purchased since October 1995. Costs of these projects (acquisition, administration and management) total \$28 million. Sizes of projects are as follows:

> 1,000 acres	5 projects
500 - 999 acres	6 projects
100 - 499 acres	46 projects
10 - 99 acres	31 projects
< 10 acres	6 projects

This year, the board held one of its quarterly board meetings in Elizabethtown, which allowed members to visit the nearby LaRue Environmental Education and Research Center

Sales of the nature license plates fell slightly in 2006, possibly due to the change in regular passenger plates and more specialty plate choices. The board is currently seeking public input regarding the designs of the nature plates.

In October 2005, the board celebrated its 10th anniversary. The Kentucky Heritage Land Conservation Fund program has been of great benefit to the citizens of Kentucky. Preservation of Blanton Forest, Letourneau Woods and the Upper Green River Biological Preserve are just three accomplishments of the many people who work diligently to make this program a success. While much has been achieved, the board has great concerns about proposed quality acquisitions that could not be accomplished because of limited funding. We are hopeful that additional funds will become available so that many, many more projects will come to fruition during the next 10 years!



Murphy's Pond, Hickman County

INDEPENDENT COMMISSIONS
MINE SAFETY REVIEW COMMISSION

Commission Description: The Mine Safety Review Commission conducts hearings concerning licensed premises and both certified and noncertified personnel involved in coal mining, who are charged with willful and repeated violations of Kentucky's mine safety laws and placing miners in imminent danger of serious injury or death.

General Counsel for the Commission: Bryon Alan Thompson

Telephone: 502-573-0316

Web site: <http://www.msrc.ky.gov>

No Reports Within the Past Two Years

